

Nokia M10

ADSL Router

T66160

USER'S MANUAL



NOKIA

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ADSL ROUTER

User's Manual

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Nokia M10 User's Manual

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Glossary

Chapter 1

Introduction to Nokia M10

Nokia M10 is an ADSL modem which enables high-speed Internet access and LAN interconnection. It increases the capacity of the already installed telephone lines used traditionally for telephone services. M10 enables high-speed connections for residential users, small offices and telecommuters.



Figure 1-1 Nokia M10

Nokia M10 is a modem with an ADSL router and bridge. This allows a PC equipped with a 10Base-T Ethernet interface to be connected to a remote IP network via a Digital Subscriber Line Access Multiplexer

(DSLAM) and an ATM access network. M10 can also act as a bridge between the Ethernet LAN and ADSL/ATM network interfaces.

The ADSL transmission is based on a DMT line code and it provides speeds up to 8 Mbit/s downstream (from the network) and 1 Mbit/s upstream (to the network). M10 can adjust its speed to the line conditions in steps of 32 kbit/s maximising the data throughput over the given distance. M10 is compatible with Nokia Eksos B DSLAM.

M10 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.

As a default, M10 supports plug-and-play operation for an Internet access application. The ADSL connection, data connection as well as Internet network addresses are set up automatically.

M10 has an integrated Web server which enables the configuration of the most frequently used parameters with an ordinary Web browser. It can also be managed through a command line interface via telnet protocol or via local console interface.

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

Chapter 2

Applications and features

This chapter introduces the most common applications, features and management method options of M10.

2.1 Applications

M10 has three main applications:

- Internet access
- Remote work
- LAN interconnection

In these application examples M10 can act as a router, bridge or NAPT router. The selected mode for every single application depends on the access and service provider network architectures. Table 2-1 presents the different application examples and the respective modes of M10. The application examples described in this manual are marked with bold 'X's. See Chapter 6 for more information on routing, bridging and Network Address Port Translation.

Application	NAPT	Router	Bridge
Business Internet access	X	X	X
Residential Internet access	X		X
Remote work	X	X	X
LAN interconnection		X	X

Table 2-1 Applications and M10 modes

2.1.1 Internet access using NAPT router

M10 can connect your PC via your operator's Digital Subscriber Line Access Multiplexer (DSLAM) and ATM network to an Internet service provider (ISP). If you are connected to a single ISP the network addresses (IP addresses) in your home can be part of the ISP's IP address range. However, in many cases it is more practical that the home network is an independent network utilising private IP addresses which are not visible to outside and that M10 has only one external IP address received from the ISP. The external Internet services are accessed through this single IP address. This mode of operation is called the Network Port Address Translation (NAPT).

The benefits of NAPT are the minimum coupling of the ISP and the home network, the saving of public IP addresses, and in-built simple firewall functionality.

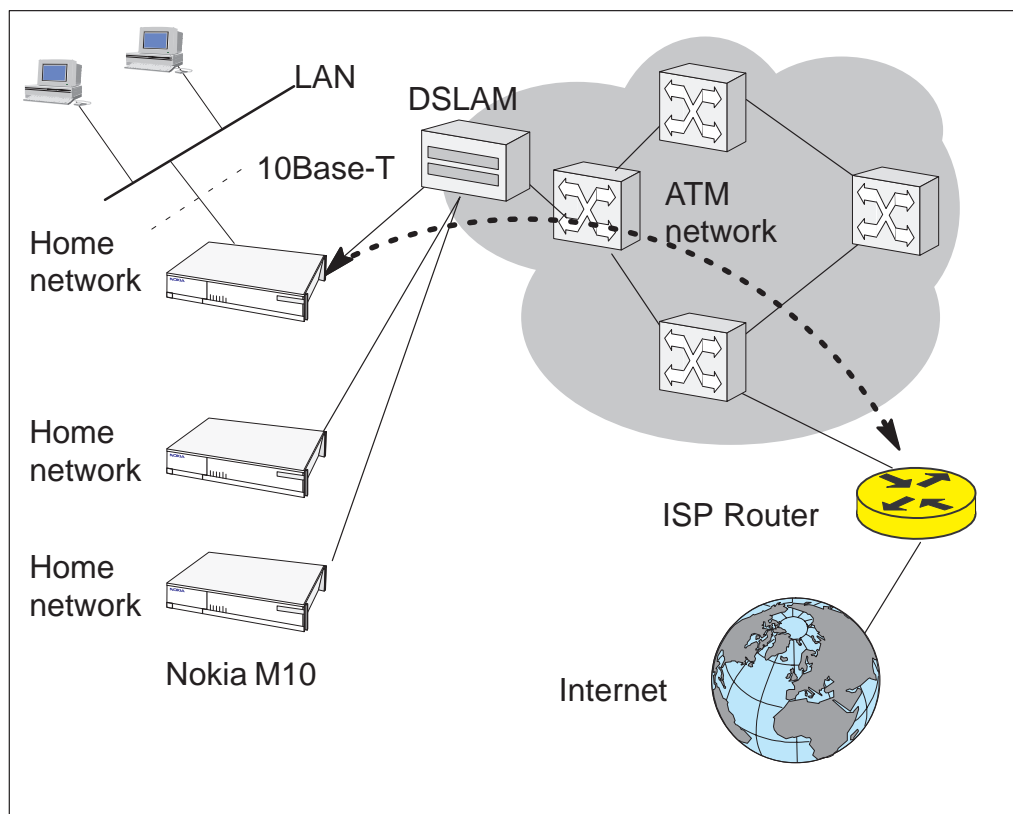


Figure 2-1 Internet access using NAPT router

2.1.2 Remote work

In a typical remote work application M10 is used as an IP router to provide access to corporate Intranet services. Using routing functionality between the home and the corporate networks prevents unnecessary broadcast traffic as well as non-IP protocol traffic from loading the access connection still providing sufficient transparency for Intranet applications. M10 routing table can be static or can be updated dynamically using RIP version 1 and RIP version 2 routing protocols.

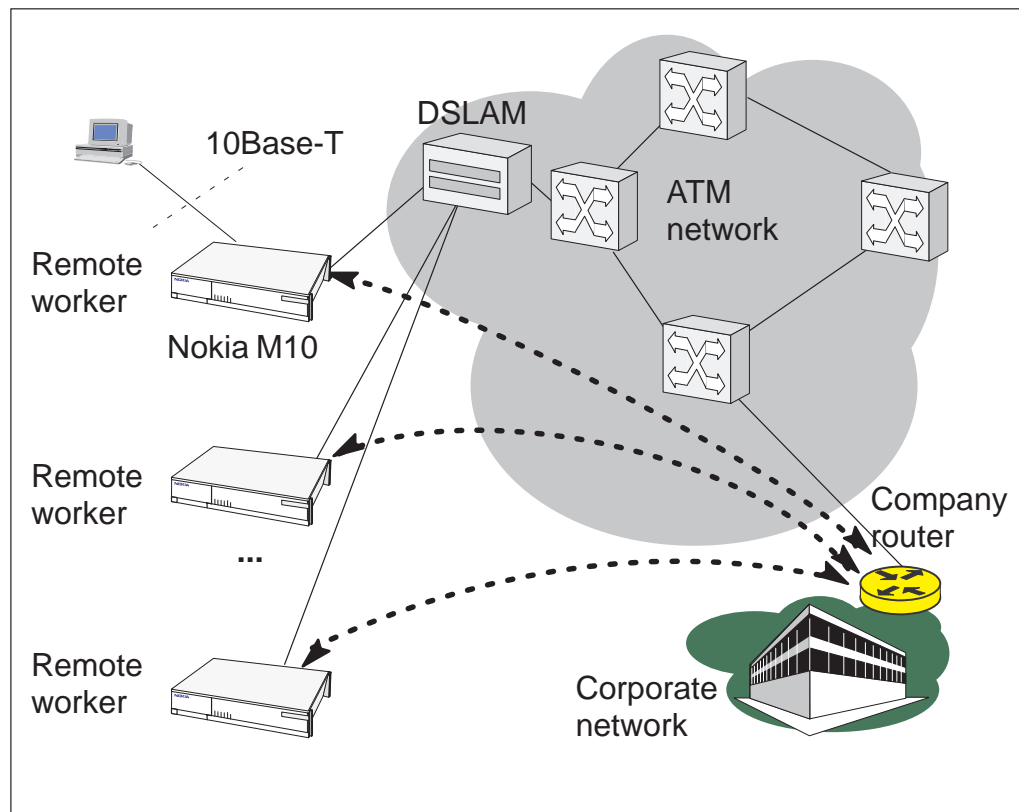


Figure 2-2 Remote work using M10 as a standard router

2.1.3 LAN interconnection using M10 as a bridge

LAN interconnection between a corporate headquarters and its remote office is another typical application for M10. In the LAN interconnection application M10 is typically used as an Ethernet bridge which 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.

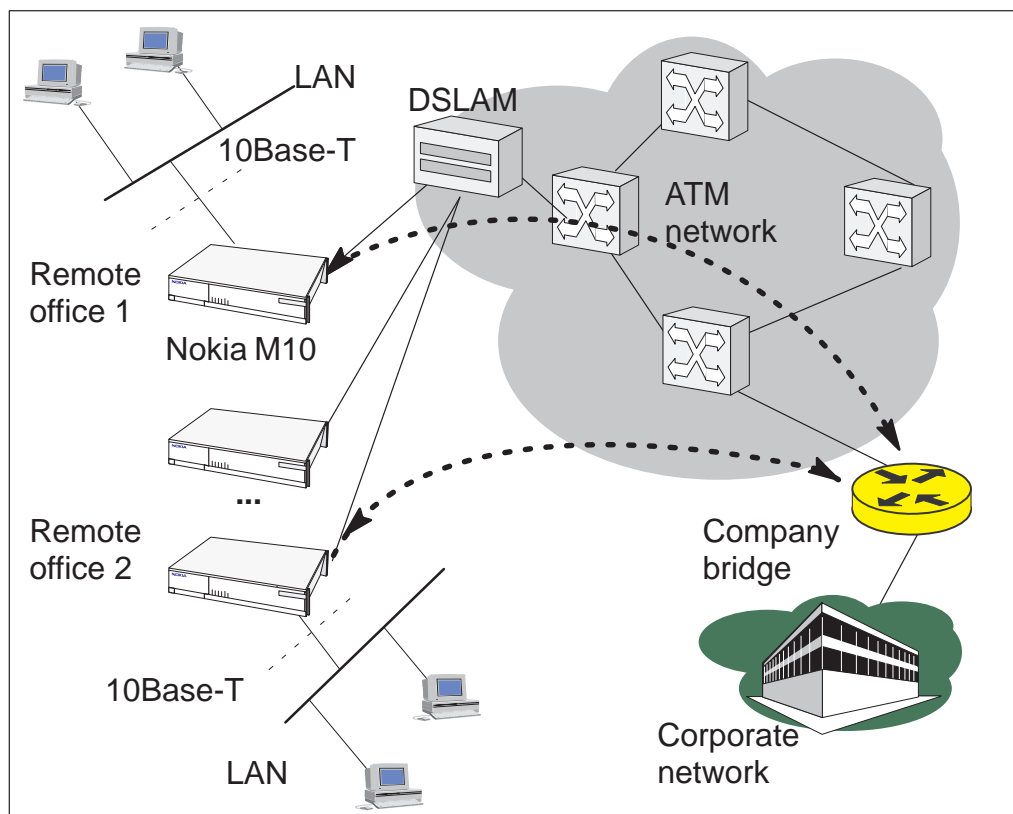


Figure 2-3 Internet access and LAN interconnection

2.2 Functionality

M10 can operate as an OSI layer 3 Internet Protocol (IP) router between the Ethernet interface and the virtual channels of ADSL/ATM interface. M10 supports both dynamic and static routing.

It can also operate as a self-learning bridge supporting up to 256 MAC addresses.

Routing

Routing is based on routing entries in a routing table. Static routes are added via the management interface and dynamic routing is done using RIP and RIPv2. Routing is done between the Ethernet 10Base-T interface and the virtual channel connection (VCC) of the ATM/ADSL interface. Optionally, the routing between the VCCs can be disabled. M10 supports up to 8 simultaneous VCCs.

Bridging

Bridging is supported if full protocol transparency is required. Bridging can be used simultaneously with IP routing. M10 works as a self-learning bridge supporting up to 256 MAC addresses. Bridging is done between the Ethernet 10Base-T interface and each ATM VCC interface. Optionally, the bridging between the VCCs can be disabled. M10 supports up to 8 simultaneous VCCs.

Network Address Port Translation

M10 supports Network Address Port Translation (NAPT) for TCP/IP and UDP/IP protocols. When NAPT is used a single IP address is allocated to a VCC to the public IP network. The Ethernet subnet has private IP addressing and is not visible to the VCC. NAPT translates the IP source address and source port number dynamically to the VCC IP address and port number. Similarly packets coming from the VCC are mapped back to the original destination addresses. NAPT allows up to 253 hosts to share the single VCC IP address to the public network. The Network Address Port Translation principle is presented in Figure 2-4.

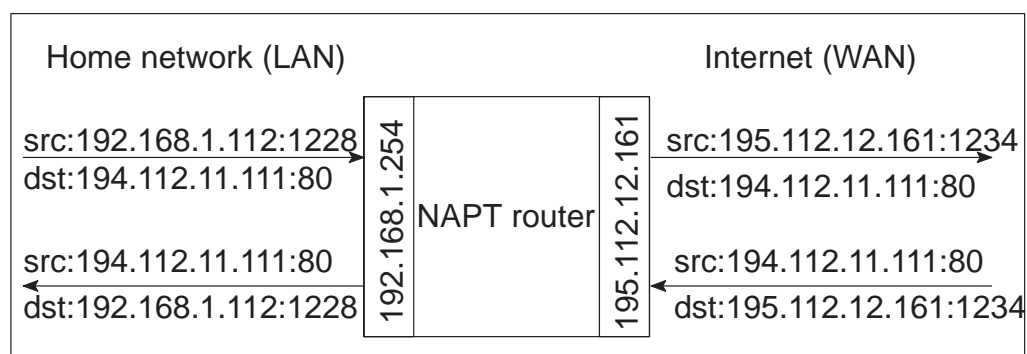


Figure 2-4 Network Address Port Translation

NAPT may restrict the operation of some IP applications. NAPT also operates as a simple IP firewall because translation is only allowed when the first packet is transmitted from the LAN because the NAPT table entry is created on when a packet is sent from the home network to the Internet. With a pinhole capability the user can add static entries to the NAPT table allowing the translation always in both directions. This capability is used to add servers (HTTP, NNTP, and FTP), which are visible from the public IP network via the VCC, in the LAN subnet

Dynamic Host Configuration

M10 can act as a Dynamic Host Configuration Protocol (DHCP) server for the PCs in the end-user LAN. In this mode M10 can assign up to 253 IP addresses to the PCs in the home network.

ATM and ADSL

M10 supports up to 8 simultaneous VCCs and supports UBR (Unspecified bit rate) traffic shaping on all VCCs. The maximum transmit rate on each VCC is the ADSL upstream capability. If more than one VCCs are transmitting simultaneously the ADSL upstream capability is temporarily shared between these VCCs. When one VCC is idle the bandwidth is used by another VCC.

The ADSL transmission is based on the DMT line code. M10 provides a DMT line rate up to 8 Mbit/s downstream and up to 1 Mbit/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. The ADSL interface of M10 functions completely automatically and all configuration related to the ADSL connection is done at the access multiplexer in the operator's premises.

The ATM over ADSL transmission is based on ANSI T1.413 Issue 2 recommendation.

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 Eksos B DSLAM.

Payload encapsulations

Both routed and bridged protocols are encapsulated in the ATM link by using either RFC 1483 LLC/SNAP encapsulation or VC multiplexing. M10 also supports PPP over AAL5 encapsulation, in which both bridged and routed protocols are first encapsulated in PPP (RFC 1661).

PPP is then encapsulated in ATM according to the IETF PPP over AAL5 using RFC 2364 VC multiplexing.

Routed IP packets can also be encapsulated using LLC/SNAP or VC-multiplexed Ethernet (bridged) encapsulations. See Chapter 6 for more information on the payload encapsulations.

2.3 Management

There are four management methods in M10:

- Command line interface (CLI) over console serial port
- CLI via telnet
- SNMP
- Web browser management

The CLI allows complete configuration of the unit and the Web browser management addresses the most frequently used configuration parameters. SNMP can be used to read some equipment identity information and to provide traps for authentication failures.

Chapter 3

Interfaces and indicator lights

M10 provides one Ethernet 10Base-T interface and one ADSL line interface. The ADSL line interface is ANSI T1.413 Issue 2 compatible.

3.1 10Base-T Ethernet interface

The Ethernet interface is a standard 10 Mbit/s half-duplex 10Base-T interface. The mechanical connector is an 8-pin RJ-45 connector.

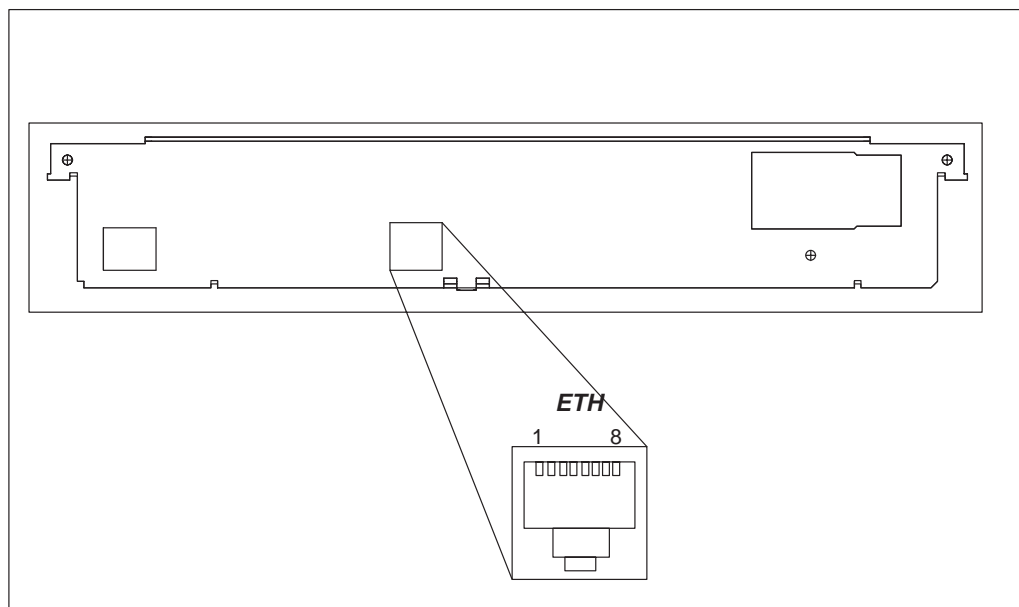


Figure 3-1 Ethernet connector location

PIN	Signal	Direction M10-Ethernet	MDI signal
1	Tx+	->	Transmit data +
2	Tx-	->	Transmit data -
3	Rx+	<-	Receive data +
6	Rx-	<-	Receive data -

3.2 ADSL line interface

The ADSL line interface is ANSI T1.413 Issue 2 compatible. The mechanical connector is a 6-pin RJ-11 connector.

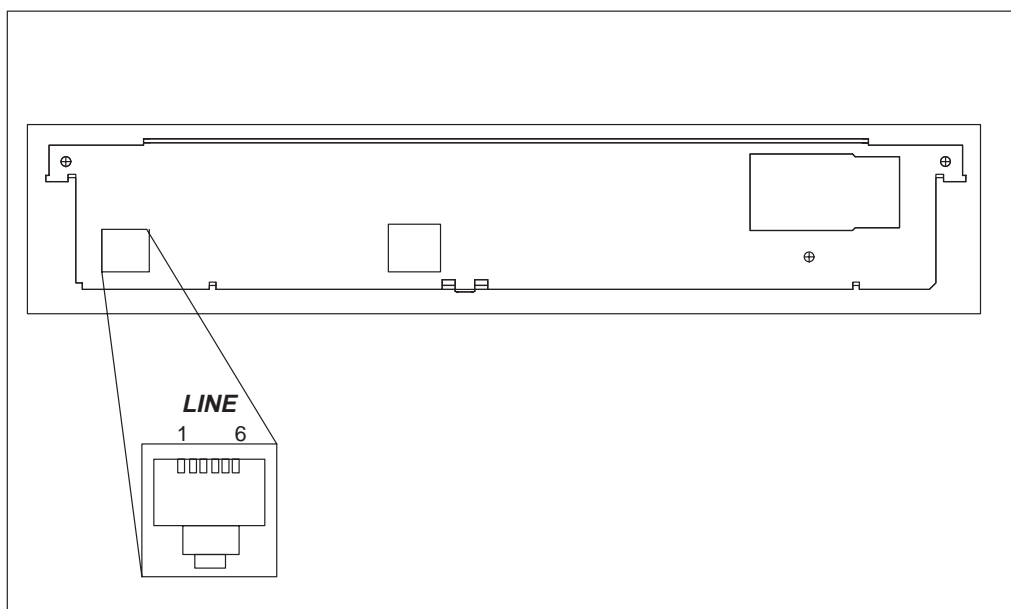


Figure 3-2 ADSL line connector location

PIN	Signal
3	DSL1
4	DSL2

3.3 Front panel indicator lights

Six indicator lights have been grouped into three groups in the front panel:

- STA
- DSL
- LAN

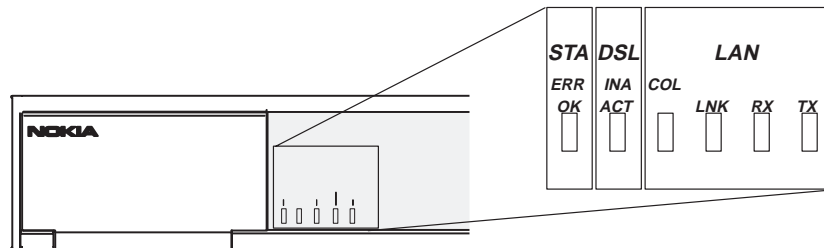


Figure 3-3 Front panel indicator lights

STA indicator

- Err (red): There is a malfunction in the unit. Switch power off and on again. If this does not help send the unit for repair.
- OK (green): Unit is functional

DSL indicator (ADSL line status)

- INA (red): ADSL line is inactive (no connection). Blinking light indicates that the ADSL link is training.
- ACT (green): ADSL line is active (connection).

LAN indicators

- COL (red): Blinking light indicates collisions on the Ethernet.
- LNK (green): Lit if the Ethernet connection is OK.
- Rx (green): Blinking light indicates that M10 is receiving Ethernet packets.
- Tx (green): Blinking light indicates that M10 is transmitting Ethernet packets.

Chapter 4

Installation

This chapter presents a step-by-step installation example procedure for three different application examples of Nokia M10:

- Internet access (NAPT router)
- Remote work (basic router)
- LAN interconnection (basic bridge)

These installation procedures are examples to guide you through some of the typical use cases.

The installation examples assume that you have a new M10 with a factory default configuration. The complete default configuration is presented in the end of this chapter. The default settings are, briefly:

- Single ADSL/ATM channel (VPI = 0, VCI = 100)
- PPP over ATM/AAL5 encapsulation
- M10 retrieves IP address configuration from the IP network using PPP-IPCP negotiation
- Network Address Port Translation activated
- Private IP addresses in use in LAN
- DHCP server for the LAN interface activated

Before starting the installation, unpack the unit and check that it is physically undamaged.

4.1 Internet access (NAPT router)

This application is based on the default configuration of the Nokia M10. By default, Nokia M10 is an Internet access device that uses

Network Address Port Translation between the private home network and the public Internet.

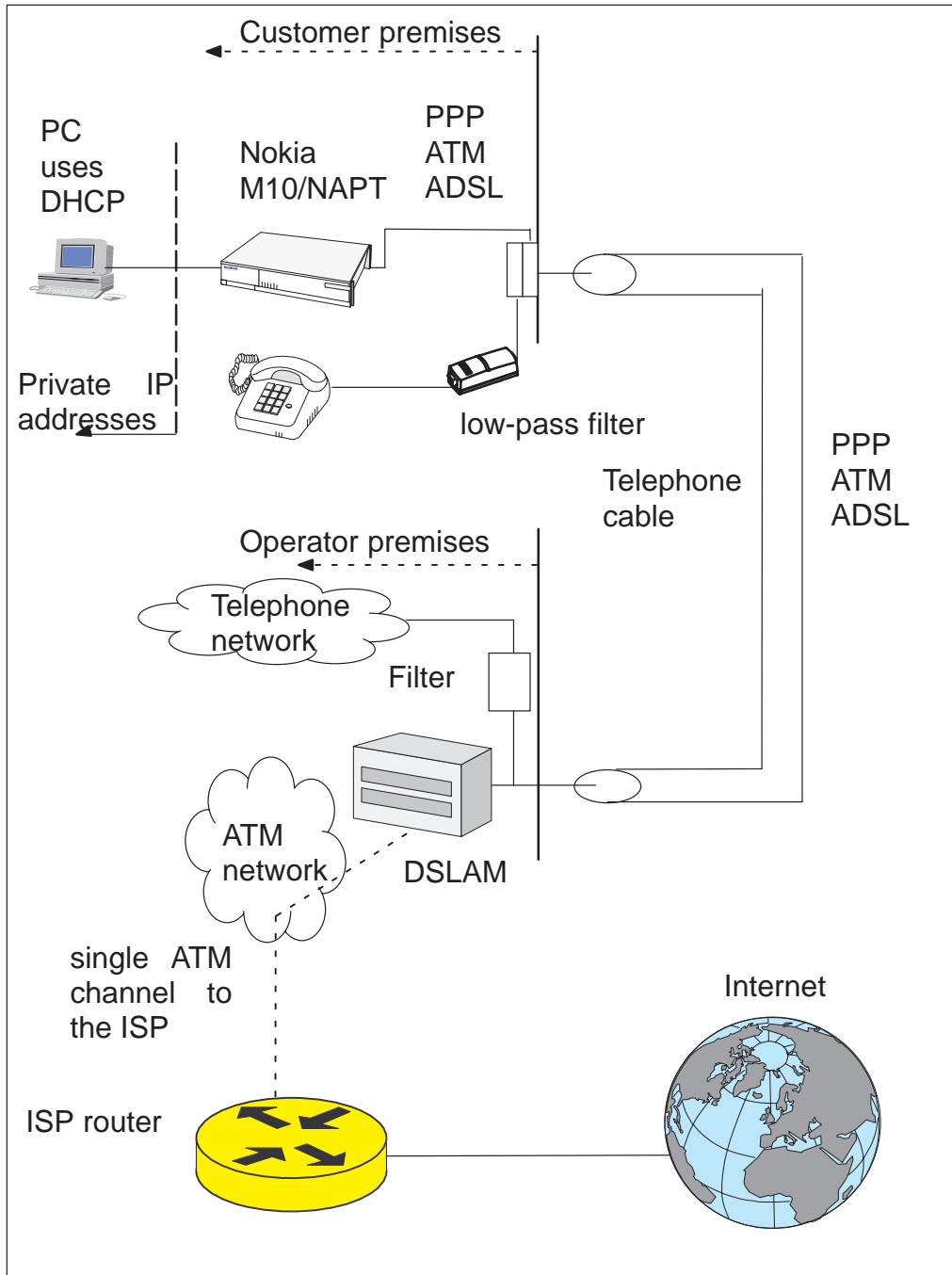


Figure 4-1 Internet access application

The Internet access application requires that your PC uses Dynamic Host Configuration Protocol (DHCP) to get its network address (IP address) from your Nokia M10.

The installation procedure depends on whether you want to use data services only or data and simultaneous telephone services. If you want data services only start from the Step 1a. Start from Step 1b if you want both data and telephone services.

M10 has an optional three-level password (user, user-admin, and admin) which also affects the installation procedure. By default, the password is disabled but it can be enabled through the command line interface (see Chapter 5 Management). Steps 4b and 5b describe the actions when password is enabled.

Step 1a: Connect cables (data services only)

Connect the following cables:

- Connect the mains power cord first to the Nokia M10 and to a power outlet.
- Connect the Ethernet cross cable to the Nokia M10 ETH connector and the other end to your PC's Ethernet port.
- Connect the ADSL cable to the telephone socket.
- Go to Step 2.

Step 1b: Connect cables (data and telephone services)

If you want to use your telephone line for both the high-speed ADSL service and normal telephone service you must install a POTS filter. You can use Nokia POTS filter T66130 or T66150. See separate installation instructions for POTS filters.

Connect the following cables:

- Connect the mains power cord first to the Nokia M10 and to a power outlet.
- Connect the Ethernet cross cable to the Nokia M10 ETH connector and the other end to your PC's Ethernet port.
- Connect the ADSL cable and the telephone according to the separate POTS filter installation instructions.

Step 2: Switch power on

Turn the Nokia M10 on. The green STA indicator and red DSL indicator light up. After a while the DSL light starts blinking indicating

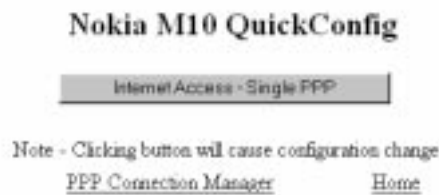
that the connection is being established. Green DSL light indicates that the unit has a connection to the central office.

Step 3: Turn on your PC

Turn on your PC. The LAN/LNK indicator lights up in the Nokia M10 front panel. Note that you must activate the DHCP functionality in your PC to make it retrieve an IP address from M10.

Step 4a: Connect to M10 with a Web browser (password disabled)

Start the Web browser in your PC, write the IP address (192.168.1.254) or the name ("M10") of the M10 to the HTTP address field and press Enter. The M10 QuickConfig page is displayed. Note that the QuickConfig page is displayed first only when M10 has its factory default settings active. If M10 has been previously configured the first page to appear is the M10 home page. Go to Step 5a.



Step 4b: Connect to M10 with a Web browser (password enabled)

Start the Web browser in your PC, write the IP address (192.168.1.254) or the name ("M10") of the M10 to the HTTP address field and press Enter. Enter Network Password dialog is shown. Enter your M10 User name and Password and click OK. Goto Step 5b.



Step 5a: Configure M10 (password disabled)

Click Internet Access-Single PPP button to set your username and password for the Internet service.

M10 QuickStart

PPP Over ATM

System Name:	<input type="text" value="M10"/>
VPI [0 - 255]:	<input type="text" value="0"/>
VCI [0 - 65535]:	<input type="text" value="100"/>
PAP Authentication:	<input checked="" type="radio"/> on <input type="radio"/> off
PAP Username:	<input type="text"/>
PAP Password:	<input type="text"/>
CHAP Authentication:	<input type="radio"/> on <input checked="" type="radio"/> off
CHAP Username:	<input type="text"/>
CHAP Password:	<input type="text"/>
Domain Name:	<input type="text"/>
Primary Nameserver Address:	<input type="text" value="0.0.0.0"/>
(Optional) Secondary Nameserver Address:	<input type="text" value="0.0.0.0"/>

NOTE
You must click Save then Restart M10 for your changes to take effect.

Here it is assumed that the default settings of M10 are suitable for accessing the Internet through your Internet Service Provider, i.e. the connection from M10 to the ISP uses PPP over AAL5 protocol, the ISP provides the required network address information to your M10 automatically, and the default connection channel (VPI and VCI values) of M10 is correct. This means that you only have to enable the needed authentication method (CHAP or PAP) by clicking the relevant radio button and to type in your username and password related to the authentication method. You will get the information which authentication method to use and your corresponding username and password from your Internet Service Provider. After entering the information click Save and restart M10.

Step 5b: Configure M10 (password enabled)

Enable PAP or CHAP authentication and type in your corresponding user name and password. You will get the information which authentication method to use and your corresponding username and password from your Internet Service Provider. After entering the information click Save and restart M10.

PPP Connection Manager	Enable	Monitor	Restart M10
------------------------	--------	---------	-------------

M10
"M10"



PAP and CHAP Setup

PAP Authentication: on off

PAP Username:

PAP Password:

CHAP Authentication: on off

CHAP Username:

CHAP Password:

Step 6: Surf

After the ADSL connection has been established the installation is complete and you can use your Web browser normally.

4.2 Remote work (Basic router)

In the remote work application example the Nokia M10 routes you to your company's LAN through an ATM network. It is assumed that your PC belongs to your company's IP network and has a fixed IP address. It is also assumed that static IP routing is used. An example is shown in Figure 4-2.

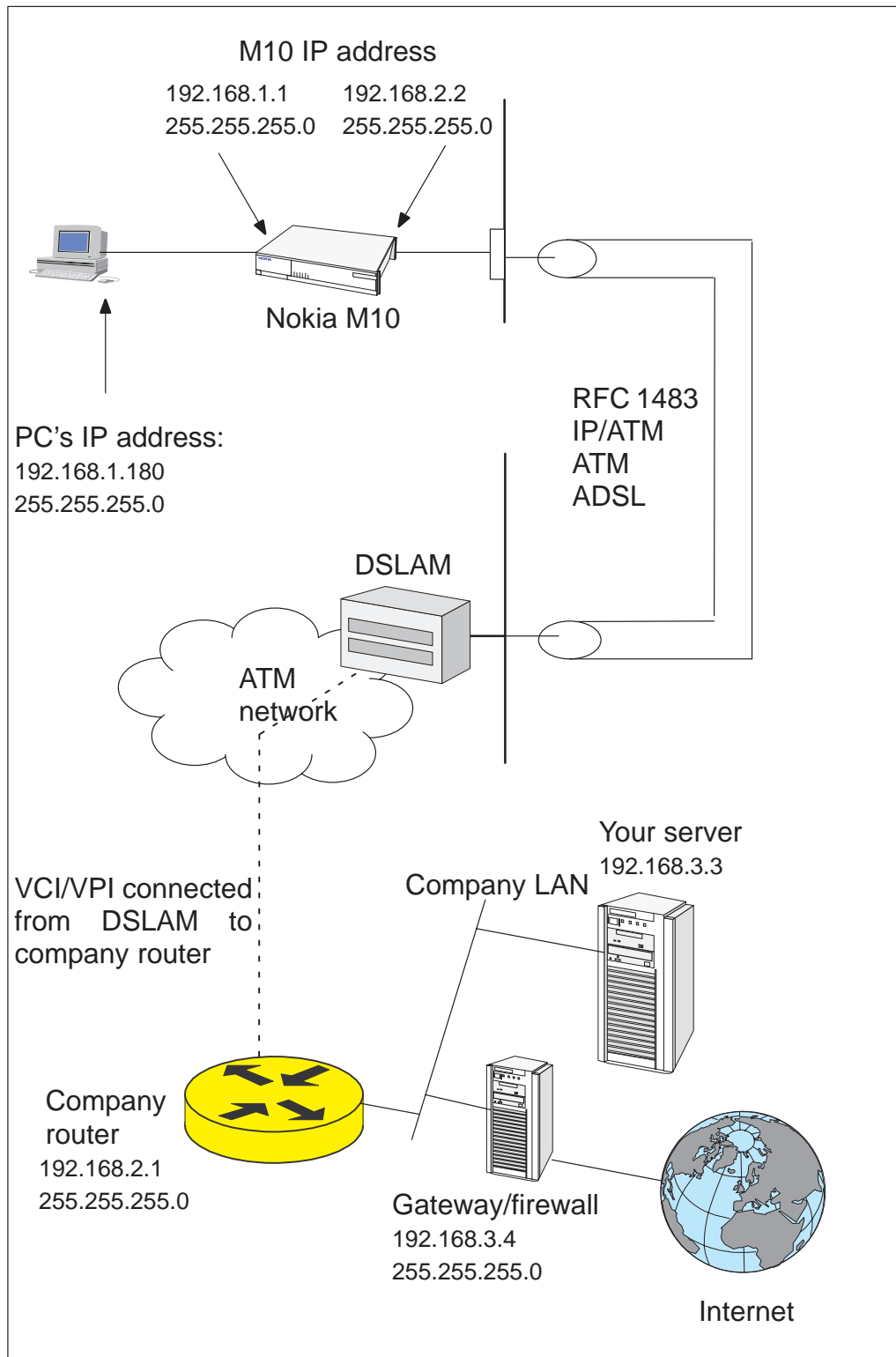


Figure 4-2 Remote work application

Here the configuration is done using the command line interface (CLI) through the console port of Nokia M10. A special cable is needed, type designation E64320.01.

Step 1: Connect cables

- Connect the mains power cord to your M10 and the other end to the power outlet.
- Connect the M10 console cable to the console port behind the hatch in the front panel of your M10. Connect the other end of the cable to the serial port of your PC/terminal.

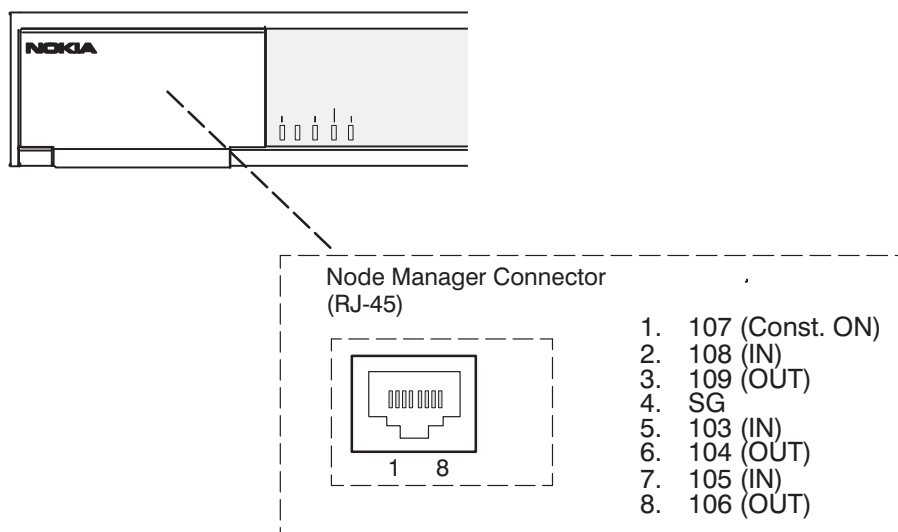


Figure 4-3 Location of the console port

- Turn on your Nokia M10. The green status indicator and the red DSL indicator light up.

Step 2: Turn on your PC and start the terminal software

Set the following terminal software parameters: 9600, 8 bits, no parity, 1 stop bit, no flow control.

Press enter in the terminal window. The Nokia command line interface prompt will be displayed.

Step 3: Configure the M10

The configurations given here assume that the unit uses its default configurations and the changes are done on top of the default configuration.

The Nokia M10 command line interface includes a step mode to automate the process of entering configuration settings. When you use the Config step mode, the CLI prompts you for all required and optional information. You can enter the configuration values appropriate for your site without having to enter complete CLI commands.

When you are in step mode, the CLI prompts you to enter required and optional settings. If a setting has a default value or a current setting, the command line interface displays the default value for the command in parentheses. If a command has a limited number of acceptable values, those values are presented in brackets, with each value separated by a vertical line. For example, the following CLI step command indicates that the default value is off and that valid entries are limited to on and off.

```
option (off) [on|off]: on
```

You can accept the default value for a field by pressing the Enter key. To use a different value, type it in and press Enter.

Enter the Config step mode by typing `set` from the top node of the Config hierarchy. See Chapter 5 section *Stepping through M10 configuration* for more information on the step mode.

In the following example the values changed by the user are in bold type. The default values have been accepted by pressing Enter.

```
M10> config
Config Mode v1.0
(admin level privileges -- read/write
M10 (top)>>set
Stepping set mode (press Control-X <Return/Enter> to
exit)...
```

```
    system
      name ("M10"): <Enter>
      Diagnostic Level List
        low
        medium
        high
        warnings
        failures
      diagnostic-level (high): <Enter>
    dmt
      option (on) [on|off]: <Enter>
```

```
encap (CELL) [HDLC|PPP|CELL]: <Enter>
downRate (1536.0) [1536.0|3072.0|4608.0|
6144.0] CO Only: <Enter>
upRate (64.0) [64.0|160.0|384.0|576.0|640.0]
CO Only: <Enter>
margin (3) [-3 - 9] CO Only: <Enter>
atm
option (on) [on|off]: <Enter>
vcc 1
option (on): <Enter>
vpi (0) [0 - 255]: <Enter>
vci (100) [0 - 65535]: <Enter>
encap (ppp-vcmux)
    ppp-vcmux      :   PPP over ATM,
                    VC-muxed
    ether-vcmux   :   RFC-1483, bridged
                    Ethernet, VC-muxed
    ether-llc     :   RFC-1483, bridged
                    Ethernet, LLC-SNAP
    ip-vcmux      :   RFC-1483, routed IP,
                    VC-muxed
    ip-llc        :   RFC-1483, routed IP,
                    LLC-SNAP
    [ppp-vcmux|ether-vcmux|ether-llc|
ip-vcmux|ip-llc]: ip-llc
vcc 2
option (off): <Enter>
vcc 3
option (off): <Enter>
vcc 4
option (off): <Enter>
vcc 5
option (off): <Enter>
vcc 6
option (off): <Enter>
vcc 7
option (off): <Enter>
vcc 8
option (off): <Enter>
cell
ehdr (0x00000001) [0x0 - 0xffffffff]:
<Enter>
epayload (0x6a6a6a6a) [0x0 - 0xffffffff]:
```

```

        <Enter>
        hec_coset (on): <Enter>
        payload_scrambling (on): <Enter>
bncp
option (off) [on|off]: <Enter>
ip
option (on) [on|off]: <Enter>
ethernet
    option (on) [on|off]: <Enter>
    address (192.168.1.254): 192.168.1.1
    broadcast (192.168.1.255): <Enter>
    netmask (255.255.255.0): <Enter>
    proxy-arp (off) [on|off]: <Enter>
    rip-send (v1) [off | v1 | v2 |
v1-compat]: <Enter>
    rip-receive (v1) [off | v1 | v2 |
v1-compat]: <Enter>
dsl vccl
    option (off) [on|off]: on
    address (0.0.0.0): 192.168.2.2
    broadcast (0.0.0.255): 192.168.2.255
    netmask (255.255.255.0): <Enter>
    addr-mapping (on) [on|off]: off
    proxy-arp (off) [on|off]: <Enter>
    rip-send (v1) [off | v1 | v2 |
v1-compat]: <Enter>
    rip-receive (v1) [off | v1 | v2 |
v1-compat]: <Enter>
    admin-disable (off) [on|off]: <Enter>
gateway
    option (on) [on|off]: <Enter>
    interface () [ip-address]: ip-address
    default (0.0.0.0): 192.168.2.1
interwan-routing (on) [on|off]: <Enter>
static routes

```

IP Static Route List

```

    destination-network (0.0.0.0) [enter a
    listed or new static route address]: <Enter>
location
Location names: <Enter>

```

```
name ("") [enter a listed or new location name]:
<Enter>
dhcp
    option (on) [on|off]: off
dns
    domain-name (""): <Enter>
    primary-address (0.0.0.0): <Enter>
    secondary-address (0.0.0.0): <Enter>
bridge
    option (off) [on|off]: <Enter>
    interwan-bridging (on) [on|off]: <Enter>
snmp
```

Community Name List

```
"public"

community (""): <Enter>
traps
    authentication-traps (off) [on|off]:
    <Enter>
```

IP Trap List

```
ip-traps (0.0.0.0) [enter a listed or
new IP address]: <Enter>
sysgroup
    contact (""): <Enter>
    location (""): <Enter>
ppp
peer-database
```

Authentication User List

```
peer-name ("") [enter a listed or new
user name]: <Enter>
pinhole
```

Pinhole Table

```
item (0) [enter a listed or new
pinhole entry]:
servers
```

```
web-http (80) [0 - 32767]: <Enter>
telnet-tcp (23) [0 - 32767]: <Enter>
```

Stepping mode ended.

```
M10 (top)>> save
WARNING: 'dns domain-name' is null, indicating no
domain name is available.
WARNING: 'dns primary-address [0.0.0.0]' and 'dns
secondary-address [0.0.0.0]' indicates no nameserver
is available.
Configuration data saved.
```

```
M10 (top)>> exit
```

```
M10> restart
REBOOT scheduled in 2 seconds
```

Goodbye.

The following changes were made in the above basic router example:

- Ip-llc encapsulation was selected for the ATM channel 1. This encapsulation is used by your company's main office router. Alternatively vc-mux encapsulation could be used. See Chapter 6 for more information on the payload encapsulations.
- IP address was assigned to the Ethernet port of your M10.
- IP and broadcast addresses were assigned to the ATM/ADSL interface of your M10.
- Address mapping was disabled because your PC and M10 belong to your company network.
- Default gateway was enabled and its IP address defines the IP gateway interface.
- IP address of the default gateway was given.
- DHCP was disabled.

The warnings in the end of the above example indicate that the addresses have not been specified. 0.0.0.0 setting indicates that M10 retrieves the name server addresses from the network. Warning is not fatal. If an error message occurs the configuration has not been validated successfully and M10 does not save the configuration.

Step 4: Connect your M10 to the network

Connect the ADSL cable to the telephone socket and the Ethernet interface to your PC. The green LAN LNK indicator lights up when you connect the Ethernet cable. After a while the DSL light starts blinking indicating that the connection is being established. The green DSL light indicates that the unit has a connection to the central office.

Step 5: Check that the connection works

Ping the company server or the gateway to check that the connection works.

4.3 LAN interconnection (Basic Ethernet bridge)

In this application example Nokia M10 connects transparently to a remote office or company headquarters.

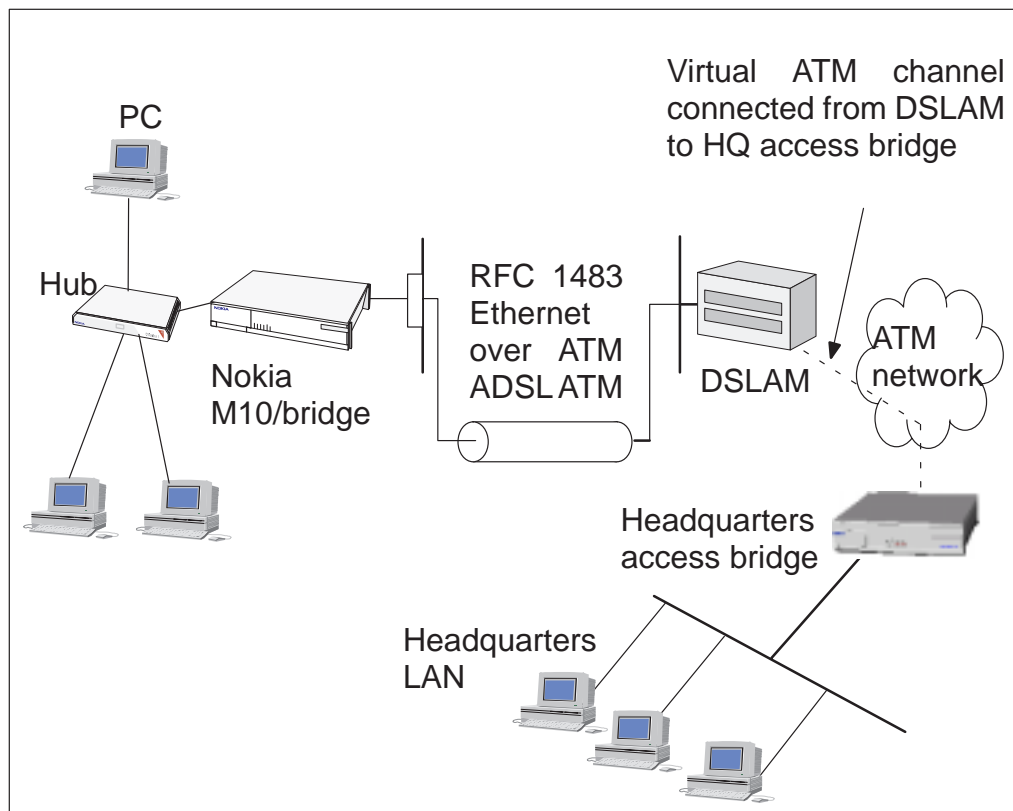


Figure 4-4 LAN interconnection

Step 1: Connect cables

- Connect the mains power cord to your M10 and the other end to the power outlet.
- Connect the M10 console cable to the console port behind the hatch in the front panel of your M10. Connect the other end of the cable to the serial port of your PC/terminal. A special cable is needed, type designation E64320.01.
- Turn on your Nokia M10. The green status indicator and the red DSL indicator light up.

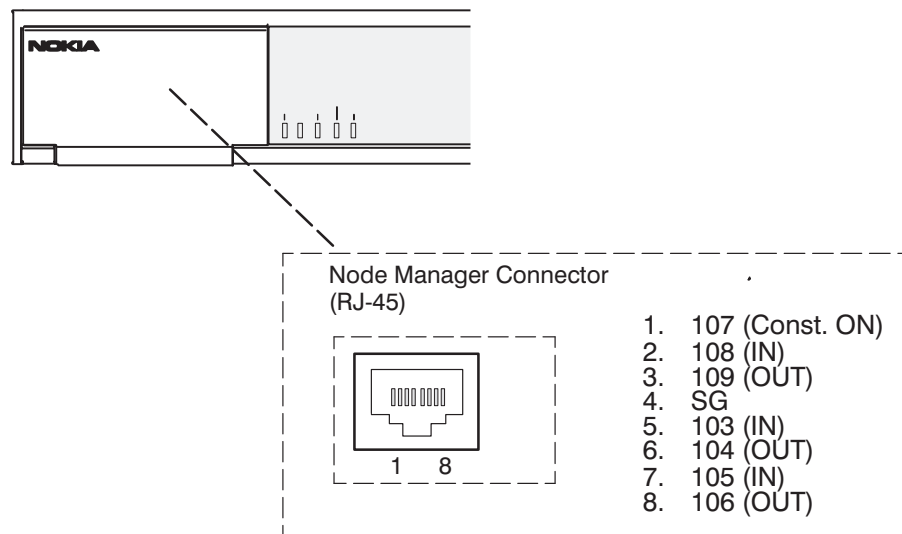


Figure 4-5 Location of the console port

Step 2: Turn on your PC and start the terminal software

Set the following terminal software parameters: 9600, 8, no parity, no flow control.

Step 3: Configure the M10 using CLI commands

The configurations given here assume that the unit uses its default configurations and the changes are done on top of the default configuration.

The Nokia M10 command line interface includes a step mode to automate the process of entering configuration settings. When you use the Config step mode, the CLI prompts you for all required and optional information. You can enter the configuration values

appropriate for your site without having to enter complete CLI commands.

When you are in step mode, the CLI prompts you to enter required and optional settings. If a setting has a default value or a current setting, the command line interface displays the default value for the command in parentheses. If a command has a limited number of acceptable values, those values are presented in brackets, with each value separated by a vertical line. For example, the following CLI step command indicates that the default value is off and that valid entries are limited to on and off.

```
option (off) [on|off]: on
```

You can accept the default value for a field by pressing the Enter key. To use a different value, type it in and press Enter.

You can enter the Config step mode by typing `set` from the top node of the Config hierarchy.

In the following example the values changed by the user are in bold type. The default values have been accepted by pressing Enter.

```
M10> config
Config Mode v1.0
(admin level privileges -- read/write
M10 (top)>>set
Stepping set mode (press Control-X <Return/Enter> to
exit)...
```

```
system
  name ("M10"): <Enter>
  Diagnostic Level List
    low
    medium
    high
  warnings
  failures
  diagnostic-level (high): <Enter>
dmt
  option (on) [on|off]: <Enter>
  encap (CELL) [HDLC|PPP|CELL]: <Enter>
  downRate (1536.0) [1536.0|3072.0|4608.0|
6144.0] CO Only: <Enter>
  upRate (64.0) [64.0|160.0|384.0|576.0|640.0]
CO Only: <Enter>
```



```
margin (3) [-3 - 9] CO Only: <Enter>
atm
option (on) [on|off]: <Enter>
vcc 1
option (on): <Enter>
vpi (0) [0 - 255]: <Enter>
vci (100) [0 - 65535]: <Enter>
encap (ppp-vcmux)
    ppp-vcmux      :   PPP over ATM,
                    VC-muxed
    ether-vcmux    :   RFC-1483, bridged
                    Ethernet, VC-muxed
    ether-llc      :   RFC-1483, bridged
                    Ethernet, LLC-SNAP
    ip-vcmux       :   RFC-1483, routed IP,
                    VC-muxed
    ip-llc         :   RFC-1483, routed IP,
                    LLC-SNAP
    [ppp-vcmux|ether-vcmux|ether-llc|
    ip-vcmux|ip-llc]: ether-llc
vcc 2
option (off): <Enter>
vcc 3
option (off): <Enter>
vcc 4
option (off): <Enter>
vcc 5
option (off): <Enter>
vcc 6
option (off): <Enter>
vcc 7
option (off): <Enter>
vcc 8
option (off): <Enter>
cell
ehdr (0x00000001) [0x0 - 0xffffffff]:
<Enter>
epayload (0x6a6a6a6a) [0x0 - 0xffffffff]:
<Enter>
hec_coset (on): <Enter>
payload_scrambling (on): <Enter>
bncp
option (off) [on|off]: <Enter>
```

```
ip
  option (on) [on|off]: <Enter>
  ethernet
    option (on) [on|off]: off
  dsl vccl
    option (off) [on|off]: <Enter>
  gateway
    option (on) [on|off]: off
  interwan-routing (on) [on|off]: off<Enter>
  static routes
```

IP Static Route List

```
  destination-network (0.0.0.0) [enter a
  listed or new static route address]: <Enter>
  location
  Location names: <Enter>
```

```
  name ("") [enter a listed or new location name]:
  <Enter>
  dhcp
    option (on) [on|off]: off
  dns
    domain-name (""): <Enter>
    primary-address (0.0.0.0): <Enter>
    secondary-address (0.0.0.0): <Enter>
  bridge
    option (off) [on|off]: on
    ethernet
      option (on) [on|off]: <Enter>
    dsl vccl
      option (on) [on|off]: <Enter>
    interwan-bridging (on) [on|off]: <Enter>
  snmp
```

Community Name List

```
"public"

  community (""): <Enter>
  traps
    authentication-traps (off) [on|off]:
    <Enter>
```

IP Trap List

```
        ip-traps (0.0.0.0) [enter a listed or
        new IP address]: <Enter>
    sysgroup
        contact (""): <Enter>
        location (""): <Enter>
    ppp
        peer-database
```

Authentication User List

```
        peer-name ("") [enter a listed or new
        user name]: <Enter>
    pinhole
```

Pinhole Table

```
        item (0) [enter a listed or new
        pinhole entry]:
    servers
        web-http (80) [0 - 32767]: <Enter>
        telnet-tcp (23) [0 - 32767]: <Enter>
```

Stepping mode ended.

```
M10 (top)>> ip
M10 (ip)>> set
Stepping set mode (press Control-X <Return/Enter> to
exit)...
    ip
        option (on) [on|off]: off
        interwan-routing (off) [on|off]: <Enter>
        static routes
```

IP Static Route List

```
        destination-network (0.0.0.0) [enter a
        listed or new static route address]:
        <Enter>
```

Stepping mode ended.

```
M10 (top)>> save
WARNING: 'dns domain-name' is null, indicating no
domain name is available.
WARNING: 'dns primary-address [0.0.0.0]' and 'dns
secondary-address [0.0.0.0]' indicates no nameserver
is available.
Configuration data saved.
```

```
M10 (ip)>> exit
```

```
M10> restart
REBOOT scheduled in 2 seconds
```

Goodbye.

The following changes were made in the above basic router example:

- Ether-llc encapsulation was selected for the ATM channel 1. This encapsulation is used by your company's main office bridge. Alternatively ether-vcmux encapsulation could be used. See Chapter 6 for more information on the payload encapsulations.
- IP functionality, default gateway and interwan routing were disabled in the Ethernet. Note, that you have to go through the IP option twice. First to disable Ethernet and gateway options and then to disable the IP option.
- DHCP option was disabled.
- Bridge was enabled.

Warnings related to 0.0.0.0 settings of DNS servers are irrelevant in this configuration because the M10 is now a transparent bridge. Warnings are not fatal. If an error message occurs the configuration has not been validated successfully and M10 does not save the configuration.

Step 4: Connect your M10 to the network

Connect the ADSL cable to the telephone socket and the Ethernet interface to your office hub. The green LAN LNK indicator lights up when you connect the Ethernet cable. After a while the DSL indicator starts blinking indicating that the connection is being established. The green DSL light indicates that the unit has a connection to the central office.

Step 5: Check that the connection works

Establish a connection to the office server to check that the connection works.

4.4 Default settings

The table below indicates the default settings for Nokia M10. By default, Nokia M10 works as a plug and play unit for Internet access application. Node and Subnode refer to Config command hierarchy nodes (see Chapter 5).

Node	Subnode	Parameter	M10 default
System		System name	M10
		System Diagnostic Level	3 (high)
		System Name Password/ User	<empty>
		System Name Password/ Admin	<empty>
		CLI Verbose	OFF
		CLI Lines	16
ATM Option			ON
		Empty Cell Header Value	0x00000001
		Empty Cell Payload Value	0x6A6A6A6A
		ATM HEC Coset	ON
		Payload Scrambling	ON
	ATM VCC Options (8)		ON (VCC1), others OFF
		VCI (VCC1)	100
		VPI (VCC1)	0
		Encapsulation (VCC1)	ppp-vcmux
BNCP Option			OFF
PPP Option			ON

Node	Subnode	Parameter	M10 default
		PPP Maximum Receive Unit	1500
		LCP Magic Number Negotiation	ON
		Protocol Compression	OFF
		Address Compression	OFF
		LCP Echo Requests	ON
		Failures-max	10
		Configure-max	10
		Terminate-max	2
		Restart Timer	3
		Activity Timeout	0
	Chap Option		OFF
		Chap Name	"empty"
		Chap Secret	"empty"
	PAP Option		OFF
		PAP Name	"empty"
		PAP Password	"empty"
	Chap Peer Option		OFF
	PAP Peer Option		OFF
		Peer Host Name(s)	"empty"
		Peer Host CHAP Secrets	"empty"
		Peer Host PAP Passwords	"empty"
IP Option			ON

Node	Subnode	Parameter	M10 default
	IP Gateway Option		ON
		IP Gateway Interface	ppp (VCC1)
		IP Gateway IP Address	“empty”
	IP Ethernet Option		ON
		IP Ethernet Address	192.168.1.254
		IP Ethernet Broadcast Address	192.168.1.255
		IP Ethernet Netmask	255.255.255.0
		IP Ethernet RIP send	RIP V1
		IP Ethernet RIP receive	RIP V1
	IP WAN Option		OFF
	IP DSL Option		OFF
	IP-ppp Option		ON (VCC1)
		IP-PPP IP Address	0.0.0.0 (VCC1)
		IP-PPP Peer IP Address	0.0.0.0 (VCC1)
		IP-PPP Address mapping	ON (VCC1)
		IP-PPP RIP Send	OFF
		IP-PPP RIP Receive	OFF
		IP-PPP Flush Routes	OFF
	Static Routes Tbl		Empty
DHCP Option			ON
	DHCP Start IP address		192.168.1.1

Node	Subnode	Parameter	M10 default
DNS		Default Do- main Name	<empty>
		Primary DNS Server Ad- dress	0.0.0.0 (The address will be retrieved from through the PPP link)
		Secondary DNS Server Address	0.0.0.0 (The address will be retrieved through the PPP link)
Bridge Option			OFF
SNMP		List of communities (table)	Public
		SNMP Auth- entication Traps	None
		Trap IP Ad- dress	Empty
		Trap Com- munity Name	Public
		SysGroup Contact Info	Empty

Table 4-1 Nokia M10 default settings

4.5 Troubleshooting

In case the data transmission does not work you can check the following things:

Is the ADSL connection to the remote network working?

The front panel DSL indicator should be green if the ADSL link is functioning. You can also view the ADSL link status by giving the `show dsl` command line interface command. In case the ADSL link is not functioning, check that the cables connecting the unit to the telephone line/splitter are properly attached and then turn on the M10 again. If the ADSL link still does not work contact your service provider.

Is the Ethernet connection working?

The front panel LAN LNK indicator is green if the Ethernet cable is properly attached. If not, check that the cables are properly connected. Check also that you are using a right kind of Ethernet cable. If you connect your M10 directly to a PC, you should use a cross-connect cable. If you connect your M10 to a HUB, you should use a direct cable.

Is the ATM connection working?

You can check if the ATM connection is working by giving the `show atm` CLI command. For the ATM connection to be functioning, the ADSL connection must be working first. In case the ADSL connection is OK but the ATM connection is not contact your service provider.

Is the PPP connection working?

If you are using PPP to connect to your service provider, you can also check that your PPP connection is working. You can do this by giving the `show ppp` CLI command. If the ADSL link and ATM link are working but the PPP link is not you should first check that the username and password you are using on the PPP link are correct. You can also try to restart the M10 (power-off and power-on) and check if the connection is established. If these do not work contact your service provider for help.

Chapter 5

Management

M10 can be managed with a Web browser or command line interface (CLI). The Web configuration pages of M10 can be accessed through the Ethernet port or through the ADSL/ATM channels of M10. In order to access the Web management feature, the IP functionality must be activated and the IP address must be given to the interface.

The command line interface (CLI) can be accessed through the console port on the M10 front panel. The console interface is an asynchronous V.24/V.28 character-based interface with 9600 bps, 8 bits, no parity, 1 stop bit and no flow control. A special cable for connecting PC's serial port to this interface is available from Nokia, type designation E64320.01. The CLI contains an in-built step procedure which helps you to configure you M10 through the CLI. This procedure is presented in section *Stepping through M10 configuration* in this chapter.

The command line interface can also be accessed through the Ethernet port of M10 or through the ADSL/ATM channels of M10 on top of the telnet protocol. In order to use the CLI through telnet, IP functionality must be activated and IP address must be given to the interface.

5.1 Browser management

You can use your PC's Web browser software to access the Web configuration pages in M10. To access the Web pages you must know the IP address of your M10 or, alternatively, the "name" that your M10 recognises.

5.1.1 Opening a connection

To open a connection to the Nokia M10 follow the next steps:

1. Start your Web browser.
2. Enter the name or IP address of your Nokia M10 in the browser's Open Location field and press enter.
For example, you would enter `http://192.168.1.254` if your Nokia M10 is using its default IP address. The default name is M10.

Note If a password has been assigned to your Nokia M10, enter your username and password and click OK. Now PAP and CHAP Setup page appears, see Figure 5-4.

3. The Nokia M10 home page appears. If you connect to your M10 for the first time the QuickConfig page appears.



Figure 5-1 M10 home page

4. Use the links on the Nokia M10 home page to issue a command or open a window.
 - QuickConfig link opens the QuickConfig window which lets you enter basic Internet access application settings for your Nokia M10.
 - Monitor link opens the Monitor window which displays operating statistics for your Nokia M10.

- Router link is used to configure some generic routing/IP address management parameters and Ethernet interface IP parameters if M10 is used as a router.
- Bridge link is used to enable bridging and attach interfaces to the bridge function.
- ATM link is used to activate ATM channels, select payload encapsulations to ATM and configure important ATM channel parameters.
- DSL link opens the DSL Port Configuration window which lets you configure the DSL port settings of M10 when the unit is working in frame (not ATM) mode on the ADSL line.
- Restart M10 link restarts your M10 causing it to activate any updated configuration information.
- SNMP link is used to configure the SNMP parameters of M10.

5.1.2 QuickConfig page

The QuickConfig page lets you enter basic configuration information for your Nokia M10. To display the QuickConfig page, click QuickConfig on the M10 homepage.

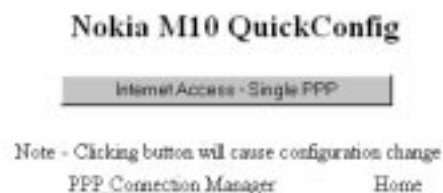


Figure 5-2 QuickConfig page

By clicking the Internet Access-Single PPP button you can enter basic Nokia M10 settings for an Internet access application. Normally you only need to enter your username and password for the Internet service.

If you have configured multiple PPP channels into use, you can manage them through the PPP Connection Manager.

If a password has been assigned to you M10 the PAP and CHAP Setup page will be displayed instead of the QuickConfig page.

QuickStart settings



M10 QuickStart

PPP Over ATM

System Name:

VPI [0 - 255]:

VCI [0 - 65535]:

PAP Authentication: on off

PAP Username:

PAP Password:

CHAP Authentication: on off

CHAP Username:

CHAP Password:

Domain Name:

Primary Nameserver Address:

(Optional) Secondary Nameserver Address:

[Home](#)

NOTE
You must click Save then Restart M10 for your changes to take effect.

Figure 5-3 QuickStart page

1. Change virtual path and channel identifiers if needed.

VPI and VCI are used to select the connection channel that is used between M10 and the Internet service provider (ISP). Normally you do not have to change these values.

2. Enable PAP or CHAP if needed. Enter the respective username and password.
3. Enter local LAN Domain Name if required.
4. Enter Domain Name Server addresses if required. Normally these are assigned automatically and the user should not fill these fields.
5. Save the configuration and restart M10.

You must save the new configuration and restart your M10 for your changes to take effect.

PAP and CHAP Setup settings

If a password has been assigned to your M10 PAP and CHAP Setup page will appear when you enter your M10 username and password and click OK.

On this page you can enable/disable PAP/CHAP and enter the corresponding usernames and passwords. By clicking the Pinhole link you can go to the NAT Pinhole page and configure pinhole settings. Monitor link takes you to the Monitor page where you can monitor the performance of your M10.

PPP Connection Manager	Pinhole	Monitor	Restart M10
------------------------	---------	---------	-------------

M10
"M10"



PAP and CHAP Setup

PAP Authentication: on off

PAP Username:

PAP Password:

CHAP Authentication: on off

CHAP Username:

CHAP Password:

Figure 5-4 PAP and CHAP Setup page

PPP Connection Manager settings

You can set the username and password for each PPP connection you have configured. Select the PPP connection you want to modify from the option menu. Press Get values to modify username and password of the connection. Press Reload to restart the PPP connection of the selected channel. The PPP connection will be restarted and new CHAP or PAP values will be used.

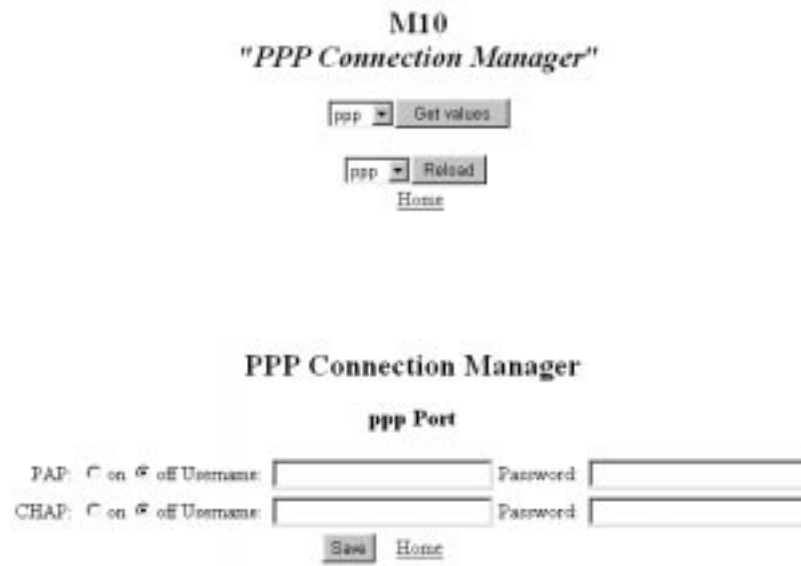


Figure 5-5 PPP Connection manager pages

5.1.3 Router page

Router page is used to configure 'global' parameters of the IP routing functionality of M10, as well as IP parameters of the Ethernet interface.

Router Configuration

System Name:

Ethernet Port

Local Address:

Net Mask:

Broadcast Address:

Rip-send: off v1 v2 v1-compatible

Rip-receive: off v1 v2 v1-compatible

Routing Policy (ATM only)

VC-to-VC Routing: on off

Default Gateway

Gateway: on off

Interface:

Default Address:

DNS Setup

Domain Name:

Primary Nameserver Address:

(Optional) Secondary Nameserver Address:

DHCP Settings

Mode :	<input type="radio"/> off	<input checked="" type="radio"/> server	<input type="radio"/> relay-agent
Start Address	<input type="text" value="192.168.1.1"/>		
End Address	<input type="text" value="192.168.1.254"/>		
Lease Time	<input type="text" value="00:01:00:00"/>		
Server Address	<input type="text"/>		

Server Port Setup

Web-HTTP Port:

Telnet Port:

[Home](#)

Network Address Translation (NAT) Setup

[Go to NAT Setup](#)

Static Routes

	Destination	Netmask	Gateway
<input type="button" value="Add"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

Figure 5-6 Router page

Entering router settings

1. Enter the name of your M10 in the System Name field.

Each M10 is assigned a name as a part of its factory initialisation. The default name is M10. A device name can be 1-16 characters long and cannot include spaces or special characters. The name can be later used to access the M10 through a telnet connection or a Web page from the Ethernet interface.

2. Enter the IP address of your M10.

Local address is the IP address of your M10's Ethernet interface.

3. Enter the subnet mask.

Subnet mask is used to identify the network portion of an IP address. The subnet mask specifies which bits of the 32-bit binary IP address represent network information. Most sites should use 255.255.255.0 for their subnet mask.

4. Enter the broadcast address.

Broadcast address is used to send messages to all computers on your network. Most sites should use `xxx.yyy.zzz.255` as their broadcast address, where `xxx.yyy.zzz` is the network portion of the IP address.

5. Enter RIP settings for the Ethernet interface.

Rip-send and Rip-receive radio buttons are used to enable dynamic routing using Routing Information Protocol (RIP). RIP and RIP version 2 can be used. RIP-send with V1-compat option enables the sending of RIPv2 packets using multicast. RIP-receive with V1-compat option accepts both RIPv1 and RIPv2 packets.

6. Enable/disable routing between ATM VCCs (Routing Policy).

IP forwarding and dynamic route distribution between ATM VCC routing can be disabled when multiple VCCs are used.

7. Enable/disable default gateway.

The default gateway is the host to which your M10 will send a packet when it does not know how to reach the packet's destination host.

8. Select the default gateway port from the Interface option menu.

The default gateway port can be one of the active PPP channels or a specified IP address defined in Default Address field (see step 9.).

9. Enter IP address for your default gateway if you selected 'ip-address' in step 8.
10. Enter domain name server settings.

A domain name server is a network computer responsible for matching host names to numeric IP addresses so that network traffic can be routed correctly. These fields are set if DNS addresses are not allocated dynamically. Consult your service provider for further assistance.

Domain names identify organisations on the Internet. The domain name is usually the domain name of your company or your ISP.

If secondary name server address is configured the M10 relays the name service request to that server if the primary name server is unavailable.

11. Enable/disable DHCP server.

As a Dynamic Host Control Protocol (DHCP) server your M10 can assign IP addresses to other devices on your LAN. If you want your M10 to assign IP addresses, enter the first number of the IP address range in the Start Address field and the last number of the IP address range to the End Address field. Lease Time indicates how often the PC will renew the DHCP lease.

If you want your M10 to relay the DHCP request to an external server you can do this by enabling relay-agent and entering the server's IP address to the Server Address field.

Note If you use M10 as a DHCP server, you should assign IP addresses outside the M10's DHCP address range to devices requiring static IP addresses. Before M10 assigns an IP address to a DHCP client, it verifies that no other device is using that address. However, network conflicts can result when the M10 assigns an address in its DHCP range to one device and the another device configured to use that address is turned on.

12. Change M10 Web-HTTP port number if needed.

You can change M10 internal Web server port number default value 80 if the same number is used for pinhole functionality.

13. Change M10 telnet port number if needed.

You can change M10 internal telnet server port number default value 23 if the same number is used for pinhole functionality.

14. Click Go to NAT Setup to configure the pinhole functionality, if needed.

15. Enter static routes

Static route identifies a manually configured route to a remote network. Unlike dynamic routes, which are acquired and confirmed periodically from other routers, static routes do not time out.

You can enter static routes by entering the remote router's destination address, net mask and gateway address. After you have entered the required information click Add.

16. Save the configuration.

You must save the new configuration. Save command takes you to the M10 home page.

17. Restart your M10.

You must restart your M10 by clicking Restart M10 for your changes to take effect.

5.1.4 Bridge page

Bridge page is used to enable/disable bridging. When bridging is enabled the page is used to select the interfaces which are included in the bridging function.



Figure 5-7 Bridge page

Only those ATM interfaces which support 'ether-llc' or 'ether-vcmux' encapsulation or 'ppp-vcmux' encapsulation with BNCP support can be used in bridging operation.

Entering bridge settings

1. Turn on bridge
2. Click ATM to configure ATM channels, if needed (see Section 5.1.5).
3. Select the interfaces you want to use for bridging.

Ethernet indicates the Ethernet interface of M10. DSL VCC [N] radio buttons indicate ATM channels using 'ether-llc' or 'ether-vcmux' encapsulation. WAN VCC [N] radio buttons indicate ATM channels using 'ppp-vcmux' encapsulation with BNCP support.

4. Enable/disable bridging between ATM VCCs.

This option can be used when multiple M10s are connected together using bridged connection. Disabling the bridging between the VCCs eliminates the loops from the bridged network.

5. Save the configuration.

You must save the new configuration. Save command takes you to the M10 home page.

6. Restart your M10.

You must restart your M10 by clicking Restart M10 for your changes to take effect.

5.1.5 ATM page

ATM page is used to enable/disable ATM channels and select the payload encapsulation method for the particular channel. After enabling an ATM channel you can configure the channel in more detail through the ATM-channel-specific Config buttons.



Figure 5-8 ATM page

Entering ATM settings

1. Enable a channel by selecting the encapsulation from the option menu. Up to eight ATM channels can be used.

2. Configure the ATM channels.

Click Config button for the channel you want to configure.

Configuring ATM channels

PPP over ATM (VC-muxed)

VCC 1 Configuration

PPP over ATM (VC-muxed)

VPI [0 - 255]:

VCI [0 - 65535]:

IP Settings

Option: On Off

Local Address:

Peer Address:

Addr-Mapping: On Off

** RIP ignored if Mapping on **

Rip-send: off v1 v2 v1-compat

Rip-receive: off v1 v2 v1-compat

Flush Routes: On Off

PAP Authentication: on off

PAP Username:

PAP Password:

CHAP Authentication: on off

CHAP Username:

CHAP Password:

Static Routes

	Destination	Netmask	Gateway
<input type="button" value="Add"/>	<input type="text"/>	<input type="text"/>	ppp-vcc1

Figure 5-9 ATM channel configuration page (VC-muxed)

1. Set the virtual path and virtual channel identifications.

2. Enable/disable IP.

IP Settings allows you to activate the IP layer function of the ATM channel. Local address and peer address specify the basic IP address parameters of the ATM channel interface (PPP over ATM). If you enter 0.0.0.0 to these fields the M10 will try to get them from the network either using IPCP protocol (ATM channel using PPP) or DHCP (ATM channel not using PPP).

Address mapping radio button activates/deactivates the Network Address Port Translation (NAPT).

3. Configure Routing Information Protocol (RIP) settings.

Enable/disable dynamic routing for the active IP interface on the ATM channel by selecting the corresponding radio buttons. If RIP-send is selected the M10 sends RIP messages (version 1, 2 or both) to the network. If RIP-receive is selected the M10 listens to RIP messages from the network. RIP-send with V1-compatible option enables the sending of RIPv2 packets using multicast. RIP-receive with V1-compatible option accepts both RIPv1 and RIPv2 packets. If you enable Flush Routes the learned routes are deleted when the PPP connection is disconnected.

4. Add static routes to the routing table of the interface.

Enter destination address, net mask and gateway and click Add.

5. Save the configuration.

You must save the new configuration. Save command takes you to the M10 home page.

6. Restart your M10.

You must restart your M10 by clicking Restart M10 for your changes to take effect.

Other encapsulations

VCC 2 Configuration

Ethernet over RFC1483 (LLC/SNAP encapsulation)

VPI [0 - 255]

VCI [0 - 65535]

IP Settings

Option: On Off

Local Address:

Net Mask:

Broadcast Address:

Addr-Mapping: On Off

** RIP ignored if Mapping on **

Rip-send: off v1 v2 v1-compat

Rip-receive: off v1 v2 v1-compat

Static Routes

	Destination	Netmask	Gateway
<input type="button" value="Add"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

Figure 5-10 ATM channel configuration page (other encaps.)

1. Set the virtual path and virtual channel identifications.
2. Enable/disable IP.

IP settings allows you to activate the IP layer function of the ATM channel. Local address, netmask and broadcast address specify the basic IP address parameters of the ATM channel interface (IP over RFC1483). If you enter 0.0.0.0 to these fields the M10 will try to get them from the network either using IPCP protocol (ATM channel using PPP) or DHCP (ATM channel not using PPP).

Address mapping radio button activates/deactivates the Network Address Port Translation (NAPT).

3. Configure Routing Information Protocol (RIP) settings.

Enable/disable dynamic routing for the active IP interface on the ATM channel by selecting the corresponding radio buttons. If RIP-send is selected the M10 sends RIP messages (version 1, 2 or both) to the network. If RIP-receive is selected the M10 listens to RIP messages from the network. RIP-send with V1-compatible option enables the sending of RIPv2 packets using multicast. RIP-receive with V1-compatible option accepts both RIPv1 and RIPv2 packets.

4. Add static routes to the routing table of the interface.

Enter destination address, net mask and gateway and press Add.

5. Save the configuration.

You must save the new configuration. Save command takes you to the M10 home page.

6. Restart your M10.

You must restart your M10 by clicking Restart M10 for your changes to take effect.

5.1.6 NAT pinhole page

NAT pinhole page is used to make servers located in LAN visible to WAN through a VCC. It allows fixed NAT mapping between WAN/VCC IP address/port number and internal LAN IP address/port number. Separate entries are created for TCP and UDP ports.

The standard port numbers for the most common protocols are:

- HTTP (Hypertext Transfer Protocol) is TCP port 80
- FTP (File Transfer Protocol) is TCP port 21
- SMTP (Simple Mail Transfer Protocol) is TCP port 25
- NNTP (Network News Transfer Protocol) is TCP port 119

NAT Pinhole Configuration

Pinhole Entries					
	External Port Start	External Port End	Protocol	Internal IP Address	Internal Port
Add	<input type="text"/>	<input type="text"/>	TCP	<input type="text"/>	<input type="text"/>

When finished adding or deleting Pinhole Entries, click the Home button and restart the router.

[Home](#)

Figure 5-11 NAT pinhole page

1. Enter the External Port Start and External Port End number. These define the available range of allowed external ports (port number in WAN interface). Select the protocol. Enter Internal IP address (server IP address in LAN) and Internal Port number (server port number in LAN).
2. Click Add.
3. Repeat until each server's information is filled.
4. To remove entry just press delete.

Pinhole configuration example

The pinhole configuration example in Figure 5-12 can be used to allow access from WAN to a Web server in LAN. The example configuration relays the traffic coming to the M10 WAN TCP port 80 to the LAN IP address 192.168.1.1 port 80. Port 80 is a standard TCP port for HTTP.

Note M10's integral Web server used for monitoring and configuration uses also port 80 by default. You must change the Server Port Setup through the Router page or else the TCP traffic to this port is directed to the M10 Web server instead of the Web server in LAN.

NAT Pinhole Configuration

Pinhole Entries

	External Port Start	External Port End	Protocol	Internal IP Address	Internal Port
Delete	80	80	TCP	192.168.1.1	80
Add	<input type="text"/>	<input type="text"/>	TCP <input type="button" value="v"/>	<input type="text"/>	<input type="text"/>

When finished adding or deleting Pinhole Entries, click the Home button and restart the router.

[Router](#)

[Home](#)

Figure 5-12 Pinhole configuration example

5.1.7 SNMP page

SNMP page is used to configure the SNMP-related parameters of M10. In M10, the SNMP can be used only for writing/reading system contact information and trap addresses. Trap address is an address to which a trap is sent in case of an authentication violation.

SNMP Setup

System Contact:

System Location:

Authentication Traps: on off

Communities

public

Trap Destinations

	IP address	Community
<input type="button" value="Add"/>	<input type="text"/>	<input type="text"/>
<input type="button" value="Add"/>	<input type="text"/>	<input type="text"/>

[Home](#)

Figure 5-13 SNMP page

Entering SNMP settings

1. Enter contact information and system location information in the corresponding fields.
2. Enable/disable authentication traps.
3. Add/delete user communities, if needed.

Enter the name of the new user community into the field.

4. Enter trap destination addresses.

Enter the IP addresses of the hosts to which the traps are sent. Enter also the community string related to this address.

5. Save the configuration.

You must save the new configuration. Save command takes you to the M10 home page.

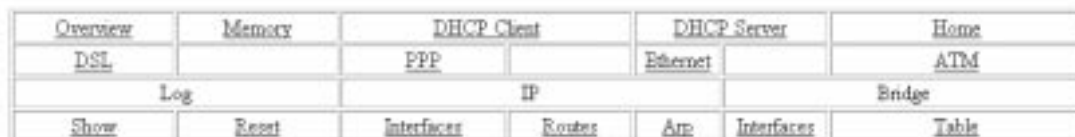
6. Restart your M10.

You must restart your M10 by clicking Restart M10 for your changes to take effect.

5.1.8 Monitor page

You can get information about the status and statistics of the M10 through the Monitor page. The following links are available on the Monitor page.

- **Overview** displays the basic identification information of M10.
- **Memory** displays the memory usage of M10.
- **Show** displays the Diagnostic log of M10.
- **Reset** scrolls the Diagnostic log window back to the first message.
- **PPP** displays status information about the IP/PPP interfaces.
- **Ethernet** displays status information of the Ethernet interface.
- **ATM** displays status information of the ATM channels.
- **Interfaces** displays status information of the active interfaces.
- **Routes** displays the routing table.
- **ARP** displays the ARP cache table.
- **DHCP Server** displays the DHCP server lease table.
- **DHCP Client** displays the IP address settings M10 has received from the network.
- **DSL** displays the the status of the ADSL connection and statistics about the connection.
- **Table** displays the bridge table
- **Home** returns to home page.



Overview	Memory	DHCP Client		DHCP Server		Home
DSL		PPP		Ethernet		ATM
Log		IP			Bridge	
Show	Reset	Interfaces	Routes	Arp	Interfaces	Table

Figure 5-14 Monitor page

5.2 Command line interface

The Nokia M10 operating software includes a command line interface (CLI) that lets you monitor and configure your M10 over a telnet or a local serial console connection. You can use the CLI to enter and update a Nokia M10's configuration settings, monitor its performance, and restart it. Some CLI commands are not available until certain conditions are met. For example, you must turn a function on before you can enter settings for that function.

The commands of the CLI are divided into two hierarchies: Root and Config. The Root command hierarchy lets you monitor the performance of your M10, display and reset M10 statistics, and issue administrative commands to restart M10 functions. The Config command hierarchy lets you configure the settings of your M10.

5.2.1 Starting and ending a CLI session

You can open a command line interface session by opening a telnet connection from a workstation on your network to an M10 Ethernet or ADSL port or by connecting a terminal to the console port on the Nokia M10.

Connecting from telnet

You initiate a telnet connection by issuing the following command from an IP host that supports telnet (or a personal computer running a telnet application such as Microsoft or NCSA Telnet).

```
telnet ADSL_ip_address
```

You must know the IP address of the Nokia M10 before you can connect to it via a telnet connection to it. You can use a Web browser or the serial console to configure the M10's IP address.

Connecting from the console port

You can connect a terminal or a terminal emulator to the console port on the Nokia M10 front panel to configure, administer, and monitor your Nokia M10. To use the Nokia M10 console, you need a serial cable and either a terminal or a terminal emulator (such as a personal computer with a terminal emulation application that supports 9600-baud communication).

To connect your Nokia M10 to a terminal or terminal emulators:

1. Plug the serial cable E64320.01 into the console port behind the hatch on the Nokia M10 front panel.
2. Connect the other end of the serial cable to the serial port on your terminal (or terminal emulator) or the serial port of your computer.
3. Turn on the terminal or run the terminal emulator program on your computer.

Use the following settings to configure your terminal emulation session:

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

The console interface uses the same command line interface as the telnet interface.

Logging in

The command line interface login process emulates the login process for a Unix host. If your Nokia M10 has been assigned an administrator password, you must enter a username (up to 32 characters) and your administrator or user password.

Entering your username lets the Nokia M10 record your access; your username is not used to validate your authorisation. Entering the administrator password lets you display and update Nokia M10 settings. Entering a user password lets you display (but not update) Nokia M10 settings.

When you have logged in successfully, the command line interface lists the username and the security level (admin or user) associated with the password you entered in the diagnostic log.

Entering commands in Nokia M10 CLI

CLI commands consist of *keywords* and *arguments*. Keywords in a Config command specify the action you want to take or the entity on

which you want to act. Arguments in a Config command specify the values appropriate to your site. For example, the Config command `set ip ip-ppp address ip_address` consists of three keywords (`ip`, `ip-ppp`, and `address`) and one argument (`ip_address`). When you configure your M10, you replace command arguments with values appropriate to your site. For example, `set ip ip-ppp address 192.31.222.57`

The optional arguments are marked with braces {argument} and the mandatory arguments with square brackets [argument].

The Table 5-1 provides guidelines for formatting CLI commands.

Command component	Rules for entering CLI commands
Command word	CLI commands must start with a command word (<code>set</code> , <code>show</code> , <code>delete</code>). You can truncate CLI commands to three characters (<code>set</code> , <code>sho</code> , <code>del</code>). CLI commands are not case-sensitive. You can enter "SET", "Set" or <code>set</code> .
Keywords	Keywords are not case-sensitive. You can enter "system", "System" or "SYSTEM" as a keyword without changing its meaning. Keywords can be abbreviated to the length that they are differentiated from other keywords. For example, you can reduce the command "set ip ip-ppp option on" to "set i i o on".
Argument text	Text strings can be as many as 32 characters long, unless otherwise specified. Special characters are represented using backslash notation. Text strings may be enclosed in double (") or single (') quote marks. If the text string includes an embedded space, it must be enclosed in quotes.
Numbers	Enter numbers as integers.
IP addresses	Enter IP addresses in dotted decimal notation (nnn.nnn.nnn.nnn, where nnn = 0 to 255).

Table 5-1 CLI syntax

If a command is ambiguous or miskeyed, the Nokia CLI prompts you to enter additional information.

Ending a CLI session

You end a command line interface session by typing `quit` in the Root mode. Entering `quit` in the Config mode switches the session into the Root mode.

Using the CLI help facility

The help command lets you display on-line help for Root and Config commands. To display a list of the commands available to you from your current location in the command line interface hierarchy, type `help`. To display help related to a particular command type the command followed by a question mark, e.g. `show ?`.

Saving settings

The `save` command saves the working copy of the settings to restart values. You can save the changes you have entered for a specific function or for all functions in the Nokia M10. The Nokia M10 automatically validates its settings when you save and displays a warning message if the configuration is not correct.

5.2.2 The Root command hierarchy

You begin in Root mode when you start a CLI session. The Root mode lets you monitor the performance of your M10, display and reset M10 statistics, and issue administrative commands to restart M10 functions.

Root prompt

When you are in Root mode, the CLI prompt is the name of the M10 followed by a right angle bracket (`>`). For example, if you open a command line interface to the M10 named “Kilo” you would see `Kilo>` as your CLI prompt.

Root command shortcuts

You can truncate most commands in the command line interface to their shortest unique string. For example, you can use the truncated command `q` in place of the full `quit` command to exit the command line interface. However, you would need to enter `rese` for the reset command, since the first characters of `reset` are common to the `restart` command.

The only command you cannot truncate is `restart`. To prevent accidental interruption of communications, you must enter the `restart` command in its entirety.

You can use the `!!` command to repeat the last command you entered. You can press the `Ctrl-P` or `Esc-k` key sequences to obtain the same result.

Root commands

You can get a list of the Root commands by typing `?` in the Root prompt.

- `help` command to get help
- `configure` command to configure unit's options
- `ping` command to send ICMP Echo request
- `atmping` command to send ATM OAM loopback
- `arp` command to send ARP request
- `quit` command to quit shell
- `reset` command to reset subsystems
- `restart` command to restart unit
- `show` command to show system information
- `telnet` command to telnet to a remote host
- `who` command to show who is using the shell
- `log` command to add a message to the diagnostic log
- `loglevel` command to report or change diagnostic log level
- `install` command to download and program an image into flash
- `download` command to download a config file
- `upload` command to upload a config file
- `clear` command to erase all stored configuration information

The following tables present the Root commands, their detailed descriptions, syntax and usage examples.

Command	Send ARP request
Description	Sends an Address resolution protocol request to match the nnn.nnn.nnn.nnn IP address to an Ethernet hardware address.
Syntax	arp [nnn.nnn.nnn.nnn]
Arguments	The argument is an IP string which consists of four decimal numbers with values between 0 and 255 separated by dots.
Example	M10> arp 192.221.11.11

Command	Clear configuration settings
Description	Clears the configuration settings of your M10. Issuing the <code>restart</code> command after the <code>clear</code> command restores the default configuration. <code>clear</code> command alone clears the configuration and brings M10 into an undefined state.
Syntax	clear {yes}
Arguments	If you do not use the optional <code>yes</code> argument CLI prompts you to confirm the <code>clear</code> command.
Example	M10> clear yes

Command	Download software update
Description	Downloads a new version of the Nokia M10 operating software from a TFTP (Trivial File Transfer Protocol) server, validates the software image, and programs the image into the Nokia M10 memory. After you install new operating software, you must restart the Nokia M10.
Syntax	install [server_address] [filename] {confirm}
Arguments	The TFTP server must be accessible on your Ethernet network or through one of the active ATM virtual channels and a route to the server must exist. The <i>server_address</i> argument identifies the IP address of the TFTP server on which your Nokia M10 operating software is stored. The <i>filename</i> argument identifies the path and name of the operating software file on the TFTP server. If you include the optional <i>confirm</i> keyword, you will not be prompted to identify a TFTP server or file name. Your Nokia M10 begins the software installation using its default boot settings.
Example	<pre>M10> install 192.168.1.1 m10c_500.d39 *** WARNING *** YOU ARE ABOUT TO ERASE AND REPROGRAM THE NOKIA M10'S PERMANENT SOFTWARE STORAGE WITH A NEW SOFTWARE VER- SION OBTAINED VIA THE TFTP PROTOCOL. About to install new Flash EPROM software image: server: 192.168.1.1 file: "m10c_500.d39" Do you wish to proceed? (type 'yes' to confirm): yes Installing M10></pre>

Command	Add message to log
Description	Adds the message in the <i>message_string</i> argument to the Nokia M10 diagnostic log.
Syntax	log [message_string]
Arguments	<i>message_string</i> argument is the message you want to add to the log.
Example	M10> log 05/05/99

Command	Define log level
Description	Displays or modifies the types of log messages you want the Nokia M10 to record. You can enter the <code>loglevel</code> command with the <code>level</code> argument to specify the types of diagnostic messages you want to record. All messages with a level number equal to or greater than the level you specify are recorded.
Syntax	<code>loglevel {level}</code>
Arguments	If you enter the <code>loglevel</code> command without the optional <code>level</code> argument, the Nokia CLI displays the current log level setting. The values for the argument are: 1 or low Trivial status messages. 2 or medium Messages that can help monitor the network traffic. 3 or high Status messages that may be significant but do not constitute errors. 4 or warning Recoverable error conditions and useful operator information 5 or failure Messages describing error conditions that may not be recoverable
Example	<code>M10> loglevel 3</code>

Command	Ping
Description	Causes the Nokia M10 to issue a series of ICMP Echo requests for the device with the specified IP address. You can use the <code>ping</code> command to determine whether an IP address is already in use on your network. You cannot use the <code>ping</code> command to ping the Nokia M10's own IP address. If a host using the specified IP address is active, it returns one or more ICMP Echo replies, confirming that it is accessible from your network.
Syntax	<code>ping [ip_address]</code>
Arguments	<code>ip_address</code> argument is the IP address, in dotted decimal notation, of the device you want to locate.
Example	<code>M10> ping 192.122.12.11</code>

Command	ATM ping
Description	Sends 5 OAM F5 loopback cells to the specified VPI/VCI destination with a 5 second total timeout interval.
Syntax	atmping [vpi] [vci] [segment end-to-end]
Arguments	vpi and vci specify the channel and the third argument specifies segment or end-to-end loopback.
Example	m10> atmping 0 100 segment

Command	Exit
Description	Exits the Nokia M10 command line interface.
Syntax	quit
Arguments	None.
Example	M10> quit

Command	Reset ATM statistics
Description	Resets ATM statistics to zero.
Syntax	reset atm
Arguments	None
Example	M10> reset atm

Command	Clear crash information
Description	Clears crash-dump information which identifies the contents of M10 registers at the point of system malfunction.
Syntax	reset crash
Arguments	None.
Example	M10> reset crash

Command	Reset DHCP server leases
Description	Resets DHCP server leases.
Syntax	reset dhcp server
Arguments	None
Example	M10> reset dhcp server

Command	Release DHCP client lease
Description	Resets DHCP client lease of the WAN port.
Syntax	reset dhcp client lease
Arguments	None
Example	M10> reset dhcp client lease

Command	Retrieve DHCP client configuration
Description	Retrieves the DHCP client configuration for the WAN port.
Syntax	reset dhcp client retrieve
Arguments	None
Example	M10> reset dhcp client retrieve

Command	Reset ADSL connection
Description	Resets the ADSL connection.
Syntax	reset dsl
Arguments	None.
Example	M10> reset dsl

Command	Reset Ethernet statistics
Description	Resets the Ethernet statistics to zero.
Syntax	reset enet
Arguments	None.
Example	M10> reset enet

Command	Rewind log
Description	Rewinds the diagnostic log display to the top of the existing M10 diagnostic log. The <code>reset log</code> command does not clear the diagnostic log. The next <code>show log</code> command will display information from the beginning of the log file.
Syntax	<code>reset log</code>
Arguments	None.
Example	<code>M10> reset log</code>

Command	Reset PPP connection
Description	Resets and restarts the PPP connection of the specified ATM logical channel. When you issue the <code>reset ppp</code> command the Nokia M10 closes the PPP session on the specified ATM channel and restarts the connection.
Syntax	<code>reset ppp [vccx]</code>
Arguments	<code>vccx</code> indicates the ATM channel, <code>x = 1 – 8</code> .
Example	<code>M10> reset ppp vcc1</code>

Command	Reset packet statistics
Description	Resets packet statistics to zero.
Syntax	<code>reset xdsl</code>
Arguments	None
Example	<code>M10> reset xdsl</code>

Command	Restart M10
Description	Restarts M10. You must enter the the complete restart command to initiate a restart.
Syntax	<code>restart {seconds}</code>
Arguments	If you include the optional <code>seconds</code> arguments your Nokia M10 will restart when the specified number of seconds has elapsed.
Example	<code>M10> restart 5</code>

Command	Show crash information
Description	Displays the most recent crash information.
Syntax	show crash
Arguments	None.
Example	M10> show crash

Command	Show DHCP server leases in RAM
Description	Displays the DHCP leases stored in RAM.
Syntax	show dhcp server leases
Arguments	None.
Example	M10> show dhcp server leases

Command	Show DHCP server leases in NVRAM
Description	Displays the DHCP leases stored in NVRAM
Syntax	show dhcp server store
Arguments	None.
Example	M10> show dhcp server store

Command	Show DHCP client parameters
Description	Displays the DHCP client parameters of the WAN port.
Syntax	show dhcp client
Arguments	None.
Example	M10> show dhcp client

Command	Show Ethernet statistics
Description	Displays the Ethernet statistics of your M10.
Syntax	show enet {all}
Arguments	Optional argument all displays more detailed information.
Example	<pre>M10> show enet Ethernet driver statistics, device 0: Packets out: 16578 Packets in: 11 Xmit errors: 0 Recv errors: 0 CRC errors: 0 Frame errors: 0 No buffers: 0 No handler: 0 No message: 0 M10></pre>

Command	Show ADSL information
Description	Displays the current status and some statistics about the ADSL connection, e.g. upstream and downstream data rates.
Syntax	show dsl
Arguments	None.
Example	<pre>M10> show dsl DSL Statistics: Type: ADI DMT Datapump HW Rev: 0 Datapump FW Rev: 2220ca05 Current Status: Operational Init Status: Initialization successful Last Init Status: Initialization successful Downstream Upstream Current rate 7968000 bps 640000 bps Maximum rate 10336000 bps 832000 bps Fast parity bytes 0 0 Fast Codeword Size 1 1 Int Parity Bytes 10 8 Int Codeword Size 136 184 Interleve Depth 8 0 Near end Error seconds 0 Noise Margin 7 db Attenuation 17 db Transmitted blocks 34814571 Received Blocks 34814433 Corrected Blocks 0 Uncorrected Blocks 0 M10></pre>

Command	Show ATM information
Description	Displays the current status and some statistics of the active ATM channels.
Syntax	show atm {all}
Arguments	Optional argument all displays more detailed information.
Example	<pre>M10> show atm ATM port status: Cell delineation achieved Serial Rx relay: 4 Rx data rate (bps): 7968000 Tx data rate (bps): 640000 VCC# Type VPI VCI Bound Encapsulation ----- 1 PVC 0 100 Yes PPP over ATM (VC- mured) M10></pre>

Command	Show ARP table
Description	Displays the Ethernet address resolution table stored in M10.
Syntax	show ip arp
Arguments	None.
Example	M10> show ip arp

Command	Show IP interfaces
Description	Displays the IP interfaces of your M10.
Syntax	show ip interfaces
Arguments	None.
Example	<pre>M10> show ip interfaces IP Interfaces: ENET (lan): (up broadcast default rip- send v1 rip-receive v1) inet 192.168.1.254 netmask fffffff0 broadcast 192.168.1.255 physical address 00.40.43.08.ff.ff mtu 1500 PPP (vccl): (up point-to-point rip-send v2 rip-receive v2) inet 10.98.20.21 netmask 0 peer address 10.98.20.1 physical address 00.00.00.00.00.00 mtu 1500 M10></pre>

Command	Show IP routes
Description	Displays the IP routes stored in your M10.
Syntax	show ip routes
Arguments	None.
Example	<pre>M10> show ip routes IP gateway (route) table: 0. Default Gateway -> PPP (vccl), D 2, T 0, (configured) UP DEFAULT IP route cache Net 192.168.1.1, gateway 192.168.1.1, metric 0, timeout 0, via ENET (lan) Net 192.168.1.255, broadcast, via ENET (lan) M10></pre>

Command	Show diagnostic log
Description	Displays blocks of information from the Nokia M10 diagnostic log.
Syntax	show log {all}
Arguments	to see the entire log you can repeat the show log command or you can use the argument <code>all</code> and scroll through the complete log.
Example	M10> show log all

Command	Show memory usage
Description	Displays the memory usage of your M10.
Syntax	show memory {all}
Arguments	Optional argument <code>all</code> displays more detailed information.
Example	M10> show memory all

Command	Show PPP information
Description	Displays information about open PPP links.
Syntax	show ppp {stats lcp ipcp bncp lastconnect}
Arguments	You can display a subset of the PPP statistics by including optional <code>stats</code> , <code>lcp</code> , <code>ipcp</code> , <code>bncp</code> , or <code>lastconnect</code> argument.
Example	M10> show ppp

Command	Show M10 information
Description	Displays current status of a Nokia M10, the device's hardware and software revision levels, a summary of errors encountered, and the length of time the Nokia M10 has been running since it was last restarted.
Syntax	show status
Arguments	None.
Example	<pre>M10> show status Terminal shell v1.0 M10 multiport ADSL router/bridge Running Nokia M10 software version 5.0.0 (build D35) Software built by alan on Fri Nov 13 14:02:16 EST 1998 (completed login: admin level) Serial number J984001344, CPU MPC860, firmware 2.2 Product ID T66160.09 0 Error logger message counts: Low 0, Medium 0, High 61, Warning 26, Lost 0, Total 87 Boot state: running in dram Uptime 00:00:12:25 M10></pre>

Command	Open telnet session
Description	Opens a telnet session to a remote host
Syntax	telnet [host] {port}
Arguments	host is the IP address of the remote host. Optional argument indicates the port of the remote host.
Example	<pre>M10> telnet 1.12.123.123</pre>

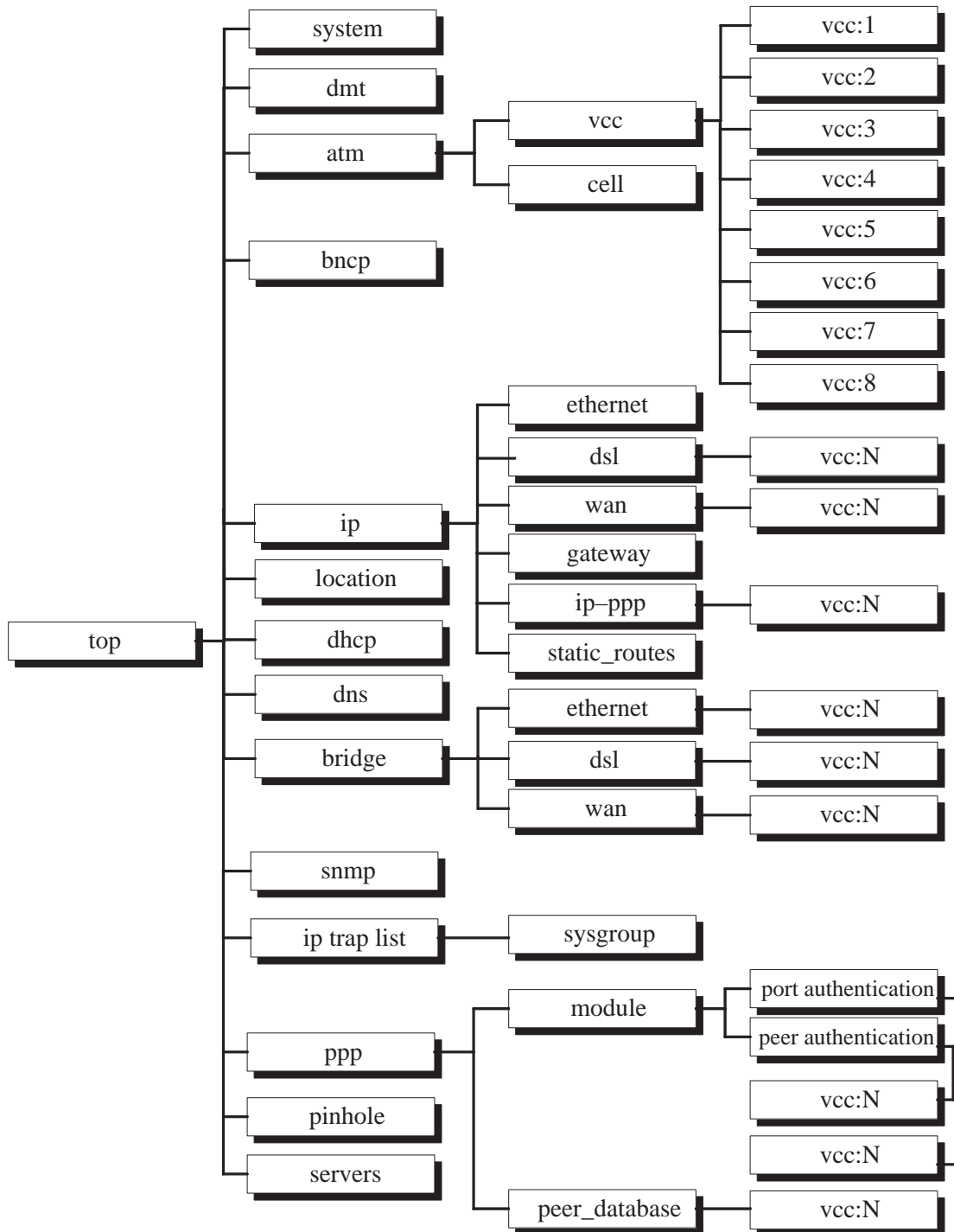
Command	Show users
Description	Displays the names and hostnames of the current shell users.
Syntax	who
Arguments	None
Example	<pre>M10> who</pre>

Command	Download configuration file
Description	Downloads a configuration file from a TFTP server.
Syntax	download [server-ipaddress] [filename] {confirm}
Arguments	server-ipaddress is the IP address of the TFTP server. filename is the name of the configuration file. If invoked as download with no arguments, you will be prompted for information. If the optional confirm keyword is added, the transfer will proceed without further questions.
Example	<pre>M10> download 1.12.123.123 config1.cfg ***WARNING*** YOU ARE ABOUT TO DOWNLOAD A CONFIGURATION FILE. About to download configuration file: server: 1.12.123.123 file: config1.cfg Do you wish to proceed? (type 'yes' to confirm):yes Downloading Downloading file into RAM File Download was successful Replace existing configuration with down- loaded configuration? (type 'yes' to con- firm):yes 172.16.0.0 has been added to the list Configuration data saved. M10></pre>

Command	Upload configuration file
Description	Uploads a configuration file to a TFTP server.
Syntax	upload [server-ipaddress] [filename] {confirm}
Arguments	server-ipaddress is the IP address of the TFTP server. filename is the name of the configuration file. If invoked as upload with no arguments, you will be prompted for information. If the optional confirm keyword is added, the transfer will proceed without further questions.
Example	<pre>M10> upload 1.12.123.123 config2.cfg con- firm</pre>

5.2.3 Config command hierarchy

The Config mode lets you configure the parameters of your M10. The command hierarchy consists of nodes and subnodes. Each node contains the configurable parameters of that particular function.



Config prompt

You reach the configuration mode of the M10 CLI by typing `config` at the Root prompt. When you are in Config mode, the CLI prompt consists of the name of your M10 followed by your current node in the hierarchy and two angle brackets (`>>`). For example, when you enter Config mode (by typing `config` at the Root prompt), the `M10 (top)>>` prompt reminds you that you are at the top of the Config hierarchy. If you move to the `ip` node in the Config hierarchy (by typing `ip` at the Config prompt), the prompt changes to `M10 (ip)>>` to identify your current location.

Navigating the Config hierarchy

You start at the top when you enter Config mode. The command line interface reminds you of your location by showing your current node after the M10 name:

```
M10 (top)>>
```

- **Moving from Config to Root**

You can navigate from anywhere in the Config hierarchy back to the Root level by entering the `quit` command at the Config command prompt and pressing Enter.

```
M10 (top)>> quit  
M10>
```

- **Moving from top to a subnode**

You can navigate from the top node to a subnode by entering the node name (or the significant letters of the node name) at the Config prompt and pressing Enter. For example, you move to the `ip` subnode by entering `ip` and pressing Enter.

```
M10 (top)>> ip  
M10 (ip)>>
```

As a shortcut, you can enter the significant letters of the node in place of the full node name at the Config prompt. The significant characters of a node name are the letters that uniquely identify the node. For example, only the `atm` Config node starts with `a`, you could enter one letter ("`a`") to move to the `atm` node.

```
M10 (top)>> a  
M10 (atm)>>
```

You would have to enter two or more letters ("ppp") to move to the PPP node, since its node name shares the first letter with the preferences node.

- **Jumping down several nodes at once**

You can jump down several levels in the Config hierarchy by entering the complete path to a node.

```
M10 (top)>> ip ip-ppp
M10 (ip ip-ppp)>>
```

- **Moving up one node**

You can move through the Config hierarchy one node at a time by entering the `up` command.

```
M10 (ip ip-ppp)>> up
M10 (ip)>>
```

- **Jumping to the top node**

You can jump to the top level from anywhere in the Config hierarchy by entering the `top` command.

```
M10 (ip ip-ppp)>> top
M10 (top)>>
```

- **Moving from one subnode to another**

You can move from one subnode to another by entering a partial path that identifies how far back to climb.

```
M10 (ip ip-ppp)>> ppp module
M10 (ppp module)>>
```

- **Moving from any subnode to any other subnode**

You can move from any subnode to any other subnode by entering a partial path that starts with a top-level Config command.

```
M10 (ip ip-ppp)>> ip gateway
M10 (ip gateway)>>
```

- **Entering commands without changing nodes**

You can enter a complete Config command from anywhere in the hierarchy without changing your current node.

```
M10 (ip ip-ppp)>> set system diag high
M10 (ip ip-ppp)>>
```

Here diagnostic level is set high in the system without jumping to the node first.

Displaying current settings

You can use the `show` command to display the current Root settings of your M10. When you are in Config mode, you use the `show` command to display the current Config settings. If you enter the `show` command at the top level of the Config hierarchy, the command line interface displays the settings for all enabled functions in the M10. If you enter the `show` command at an intermediate node, you see all settings for that node and its subnodes.

Stepping through M10 configuration

The Nokia M10 command line interface includes a step mode to automate the process of entering configuration settings. When you use the Config step mode, the CLI prompts you for all required and optional information. You can enter the configuration values appropriate for your site without having to enter complete CLI commands.

When you are in step mode, the CLI prompts you to enter required and optional settings. If a setting has a default value or a current setting, the command line interface displays the default value for the command in parentheses. If a command has a limited number of acceptable values, those values are presented in brackets, with each value separated by a vertical line. For example, the following CLI step command indicates that the default value is off and that valid entries are limited to on and off.

```
option (off) [on|off]: on
```

You can accept the default value for a field by pressing the Enter key. To use a different value, type it in and press Enter.

You can enter the Config step mode by typing `set` from the top node of the Config hierarchy. You can enter step mode for a particular node by typing `set node_name`. For example:

```
M10 (top)>> set system
Stepping set mode (press Control-X <Enter> to exit)

system
name ("M10"): Kutoja
Diagnostic Level (High): medium
Stepping mode ended
```

See Chapter 4 for step mode installation examples.

Validating your configuration

You can use the `validate` command to make sure that your configuration settings have been entered correctly. If you use the `validate` command M10 verifies that all required settings are present and that the settings are consistent.

```
M10 (top)>> validate
Error: Subnet mask is incorrect
Global Validation did not pass inspection!
```

You can use the `validate` command to verify your configuration settings at any time. Your M10 automatically validates your configuration any time you save a modified configuration.

Config command reference

The top level configuration command nodes are listed below:

- `system` Unit system options
- `preference` CLI preferences
- `atm` ATM options
- `bncp` BNCP options
- `ip` TCP/IP options
- `location` Location Manager options
- `dhcp` DHCP options
- `dns` DNS options
- `bridge` Bridge options
- `dmt` DMT ADSL options
- `snmp` SNMP options
- `ppp` PPP options
- `pinhole` NAT/NAPT server configuration
- `servers` Local integrated server configuration

The sections below explain the commands under each top level configuration node.

System settings

You can configure system settings to assign a name to your Nokia M10 and to specify what types of messages you want the diagnostic log to record.

Command	Set system name
Description	Specifies the name of your Nokia M10. Each Nokia M10 is assigned a name as a part of its factory initialisation. The default name for Nokia M10 is "M10". Once you have assigned a name to your Nokia M10, you can enter that name in the Open Location text field of your browser to open a connection to your Nokia M10.
Syntax	set system name [name]
Arguments	name is an alphanumeric string of 16 characters.
Example	m10> set system name M10

Command	Set diagnostic level
Description	Specifies the types of log messages you want the M10 to record. All messages with a level number equal to or greater than the level you specify are recorded.
Syntax	set system diagnostic-level {level}
Arguments	If you enter the command without the optional <code>level</code> argument, the Nokia CLI displays the current diagnostic level setting. The values for the <code>level</code> argument are: 1 or low Trivial status messages. 2 or medium Messages that can help monitor the network traffic. 3 or high Status messages that may be significant but do not constitute errors. 4 or warning Recoverable error conditions and useful operator information. 5 or failure Messages describing error conditions that may not be recoverable.
Example	m10> set system diagnostic-level 3

Command	Set password
Description	Specifies the administrator, user-administrator, or user password for a Nokia M10. When you enter the <code>set system password</code> command, you are prompted to repeat the new password to verify that you entered it correctly the first time. To prevent anyone from observing the password you enter, characters in the old and new passwords are not displayed as you type them. A password can be as many as eight alphanumeric characters. Passwords are case-sensitive and cannot include special characters or leading, trailing, or embedded spaces. For example, if you assign a password of "Nokia" to an M10, you could not enter "NOKIA", "nokia", "Nokia", or "Nokia " (with a trailing space) as an acceptable password.
Syntax	<code>set system password [admin user-admin user]</code>
Arguments	Arguments <code>admin</code> , <code>user-admin</code> and <code>user</code> specify whether administrator, user-administrator or user password will be set. User password gives only viewing rights. User-admin password gives rights to change PAP and CHAP usernames and passwords and configure pinhole settings. You must set an admin password before you can set user or user-admin passwords.
Example	<code>m10> set system password admin *****</code>

Note An administrator or user password goes into effect immediately. You do not have to restart the M10 for the password to take effect. Assigning an administrator or user password to M10 does not affect communications through the device.

CLI preferences

You can set the CLI preferences to customize your environment.

Command	Set CLI help mode
Description	Specifies whether you want command help and prompting information displayed. By default, the CLI verbose preference is turned off. If you turn it on, the CLI displays help for a node when you navigate to that node.
Syntax	set preference verbose [on off]
Arguments	The argument enables/disables verbose mode.
Example	m10> set preference verbose off

Command	Set display length
Description	Specifies how many lines of information you want the CLI to display at one time.
Syntax	set preference more [lines]
Arguments	The <code>lines</code> argument specifies the number of lines you want to see at one time. By default, the command line interface shows you 16 lines of text before displaying the prompt <code>More . . . [y n]?</code> . If you enter 0 as the <code>lines</code> argument the CLI displays information as an uninterrupted stream (which is useful for capturing information to a text file).
Example	m10> set preference more 20

ATM settings

You can enable ATM over ADSL operation and configure up to eight ATM channels into use. You can select between five different ways to encapsulate your payload in an ATM channel. You can also fine tune the physical layer parameters of the ATM channel. See also DMT (ADSL) settings on page 5-78.

Command	Enable/disable ATM
Description	Enables/disables the use of ATM on the ADSL link. Disabling ATM forces M10 to work in a frame mode on the ADSL link.
Syntax	set atm option [on off]
Arguments	The argument enables/disables ATM.
Example	m10> set atm option on

Command	Set ATM cell header of an empty cell
Description	Defines the ATM cell header of an empty (idle) ATM cell as an 8-bit variable. This command affects the low-level functionality of the ATM physical layer link and usually you do not have to change this setting.
Syntax	set atm cell ehead [0xbbbbbbbb]
Arguments	ADSL standard value is 0x00000001 or 0x00000000 depending on the DSLAM. Nokia B20 requires the value 0x00000001.
Example	m10> set atm cell ehead 0x00000001

Command	Set payload content of an empty cell
Description	Defines the payload content of an empty (idle) ATM cell as an 8-bit variable. This command affects the low-level functionality of the ATM physical layer link and usually you do not have to change this setting.
Syntax	set atm cell epayload [0xbbbbbbbb]
Arguments	ADSL standard value is 0x6A6A6A6A.
Example	m10> set atm cell epayload 0x6A6A6A6A

Command	Enable/disable header error correction coset function
Description	Enables/disables ATM header error correction coset function in the ATM link. This command affects the low-level functionality of the ATM physical layer link and usually you do not have to change this setting.
Syntax	set atm cell hec_coset [on off]
Arguments	ADSL standard value is ON.
Example	m10> set atm cell hec_coset off

Command	Enable/disable ATM payload scrambling
Description	Enables/disables the scrambling of the ATM payload on the ADSL/ATM link. This command affects the low-level functionality of the ATM physical layer link and usually you do not have to change this setting.
Syntax	set atm cell payload_scrambling [on off]
Arguments	ADSL standard value is ON.
Example	m10> set atm cell payload_scrambling off

Command	Enable/disable specific ATM channel
Description	Enables/disables the specific logical ATM virtual channels. M10 supports up to eight ATM virtual channels.
Syntax	set atm vcc [1 2 3 4 5 6 7 8] option [on off]
Arguments	The first argument 1 2 3 4 5 6 7 8 specifies the channel and the second argument enables/disables it.
Example	m10> set atm vcc 1 option off

Command	Set virtual path identifier for ATM channel
Description	Sets the virtual path identifier for the specific logical ATM channel. M10 is delivered to you with a default virtual circuit identifier so usually you do not have to change this setting.
Syntax	set atm vcc [1 2 3 4 5 6 7 8] vpi [0–255]
Arguments	The first argument 1 2 3 4 5 6 7 8 specifies the channel and the second argument sets the virtual path identifier.
Example	m10> set atm vcc 2 vpi 30

Command	Set virtual channel identifier for ATM channel
Description	Sets the virtual channel identifier for the specified logical ATM channel. M10 is delivered to you with a default circuit identifier and usually you do not have to change this setting.
Syntax	set atm vcc [1 2 3 4 5 6 7 8] vci [0–65535]
Arguments	The first argument 1 2 3 4 5 6 7 8 specifies the channel and the second argument sets the virtual channel identifier.
Example	m10> set atm vcc 2 vci 1221

Command	Set payload encapsulation for specific ATM channel
Description	Defines how the payload is capsulated to the specified logical ATM channel.
Syntax	set atm vcc [1 2 3 4 5 6 7 8] encap [ip-llc ip-vcmux ether-llc ether-vcmux ppp-vcmux]
Arguments	The first argument 1 2 3 4 5 6 7 8 specifies the channel and the second argument sets the encapsulation. The ip-llc and ether-llc encapsulations are according to RFC 1483 with LLC/SNAP encapsulation for ip and Ethernet frames, respectively. The ip-vcmux and ether-vcmux encapsulation are vc-multiplexed according to RFC 1483 for IP and Ethernet frames, respectively. In ppp-vcmux encapsulation both bridged and routed protocols are first encapsulated to point-to-point protocol (PPP) which is, in turn, encapsulated to ATM according to RFC 1483 vc-multiplexing.
Example	m10> set atm vcc 2 encap ip-llc

TCP/IP settings

You can use the Nokia command line interface to specify whether TCP/IP is enabled, identify a default gateway, and to enter TCP/IP settings for the Nokia M10 Ethernet port and all active ATM/ADSL channels.

Depending on the ATM channel encapsulation the IP settings are configured in different nodes (dsl, wan or ip-ppp) of the Config hierarchy as shown in Figure 5-15.

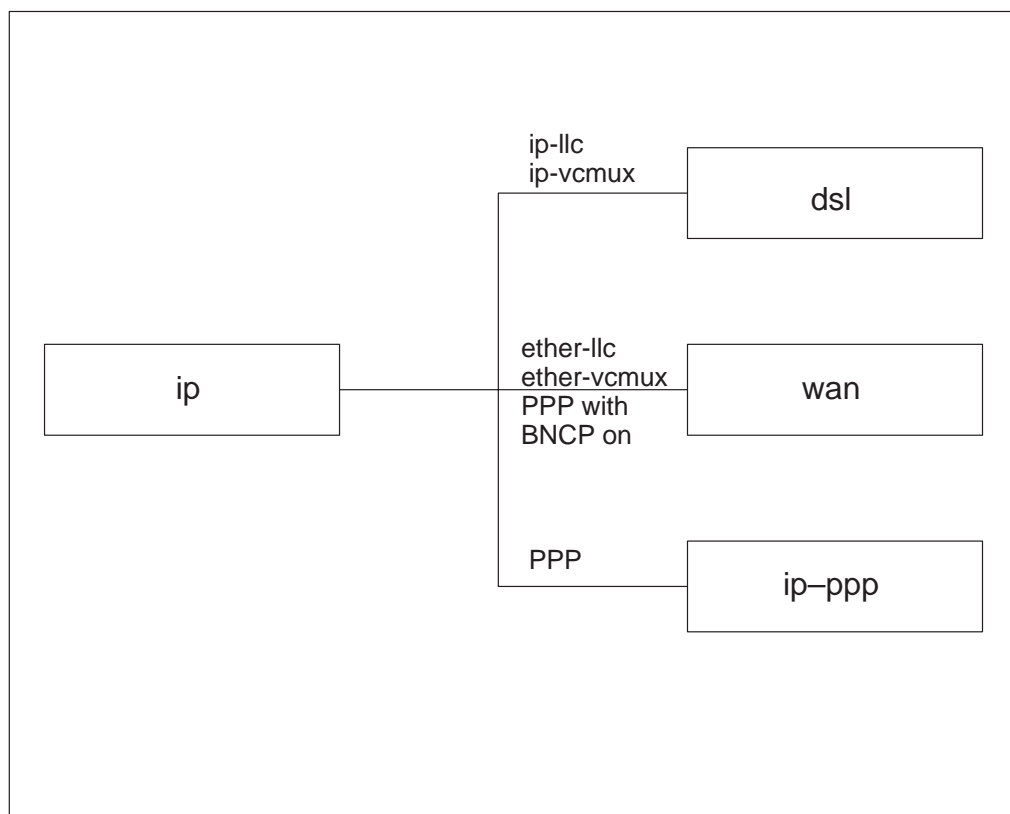


Figure 5-16 IP setting nodes

Command	Enable/disable TCP/IP services
Description	Enables/disables TCP/IP services in the Nokia M10. You must enable TCP/IP services before you can enter other TCP/IP settings for the M10. If you turn off TCP/IP services and save the new configuration, the M10 clears its TCP/IP settings.
Syntax	set ip option [on off]
Arguments	The argument enables/disables TCP/IP
Example	m10> set ip option on

Command	Enable/disable Ethernet port
Description	Enables/disables communications through the Ethernet port in the Nokia M10. You must enable TCP/IP functions for an Ethernet port before you can configure its network settings.
Syntax	set ip ethernet option [on off]
Arguments	The argument enables/disables Ethernet port.
Example	m10> set ip ethernet option on

Command	Set Ethernet port IP address
Description	Assigns an IP address to the Ethernet port. The IP address you assign to an Ethernet port must be unique on your network.
Syntax	set ip ethernet address [ip_address]
Arguments	The ip_address argument is the IP address, in dotted decimal notation
Example	m10> set ip ethernet address 191.212.11.11

Command	Set broadcast address
Description	Specifies the broadcast address for the TCP/IP network connected to the Ethernet port. IP hosts use the broadcast address to send messages to every host on your network simultaneously.
Syntax	set ip ethernet broadcast [broadcast_address]
Arguments	The broadcast address for most networks is the network number followed by 255. For example, the broadcast address for the 192.31.222.0 network would be 192.31.222.255.
Example	m10> set ip ethernet broadcast 192.31.222.255

Command	Set netmask
Description	Specifies the subnet mask for the TCP/IP network connected to the Ethernet port. The subnet mask specifies which bits of the 32-bit binary IP address represent network information.
Syntax	set ip ethernet netmask [netmask]
Arguments	The default subnet mask for most networks is 255.255.255.0 (Class C subnet mask).
Example	set ip ethernet netmask 255.255.255.0

Command	Enable/disable RIP send function
Description	Specifies whether the M10 should use Routing information protocol (RIP) broadcasts to advertise its routing tables to other routers on your network. RIP cannot be activated if address mapping is ON.
Syntax	set ip ethernet rip_send [off v1 v2 v1-compatible]
Arguments	Both RIP version 1 and RIP version 2 functionalities can be simultaneously activated. <i>v1-compatible</i> argument enables the sending of RIPv2 packets using IP multi-cast.
Example	m10> set ip ethernet rip_send off

Command	Enable/disable RIP receive function
Description	Specifies whether the M10 should use Routing information protocol (RIP) broadcasts to update its routing tables with information received from other routers on your network. RIP cannot be activated if address mapping is ON.
Syntax	set ip ethernet rip_receive [off v1 v2 v1-compatible]
Arguments	Both RIP version 1 and RIP version 2 functionalities can be simultaneously activated. v1-compatible argument enables the receiving of both RIPv1 and RIPv2 packets.
Example	m10> set ip ethernet rip_receive off

Command	Enable/disable default gateway
Description	Specifies whether the M10 should send packets to a default gateway if it does not know how to reach the destination host.
Syntax	set ip gateway option [on off]
Arguments	The argument enables/disables the default gateway option.
Example	m10> set ip gateway option on

Command	Select gateway interface
Description	Specifies how M10 should route information to the default gateway.
Syntax	set ip gateway interface [ip_address ppp_vccx]
Arguments	If you select ip_address, you must enter the IP address of a host acting as a default gateway on a local or remote network. If you specify a PPP on ATM channel, the M10 uses the default gateway being used by the remote PPP peer behind that ATM channel. Acceptable values for 'x' are the ATM channels using ppp-vcmux encapsulation.
Example	m10> set ip gateway interface ip-address

Command	Set default gateway IP address
Description	Specifies the IP address of the default IP gateway. Only applies when the default gateway interface is <code>ip-address</code> .
Syntax	<code>set ip gateway default [ip_address]</code>
Arguments	<code>ip_address</code> argument is the IP address of the default gateway.
Example	<code>m10> set ip gateway default 191.233.22.1</code>

Command	Enable IP packet forwarding and route distribution between ATM VCC interfaces
Description	Enable/disable IP packet forwarding and route distribution between ATM VCC interfaces. If only one VCC is used this option can be ignored.
Syntax	<code>set ip interwan-routing [on off]</code>
Arguments	The argument enables/disables interwan routing.
Example	<code>m10> set ip interwan-routing on</code>

Use the following commands to configure settings for routing IP over PPP link.

Command	Enable/disable routing IP over PPP link
Description	Enables/disables IP routing through the specified logical ATM channel using <code>ppp-vcmux</code> encapsulation.
Syntax	<code>set ip ip-ppp {vccx} option [on off]</code>
Arguments	The first argument identifies the ATM channel (<code>vccx</code> , $x = 1 \dots 8$). If there is only one ATM channel using <code>ppp-vcmux</code> encapsulation you can leave the argument <code>vccx</code> out. The <code>on/off</code> argument enables/disables routing.
Example	<code>m10> set ip ip-ppp vcc1 option off</code>

Note You must enable IP routing before you can enter other IP routing settings for the serial port. If you turn off IP routing and save the new configuration, the Nokia M10 clears IP routing settings.

Command	Set IP address to ATM channel using PPP-vcmux encapsulation
Description	Assigns an IP address to the specified logical ATM channel using ppp-vcmux encapsulation.
Syntax	set ip ip-ppp {vccx} address [ip_address]
Arguments	The first argument identifies the ATM channel (vccx, x = 1 ... 8). If there is only one ATM channel using ppp-vcmux encapsulation you can leave the argument vccx out. If you specify an IP address other than 0.0.0.0, your Nokia M10 will not negotiate its IP address with the remote peer. If the remote peer does not accept the IP address specified in the ip_address argument as valid, the link will not come up. The default value for the ip_address argument is 0.0.0.0, which indicates that the WAN port will use the IP address assigned to it by the remote peer. Note that the remote peer must be configured to supply an IP address to your Nokia M10 if you enter 0.0.0.0 for the ip_address argument.
Example	m10> set ip ip-ppp vcc2 address 0.0.0.0

Command	Set peer IP address
Description	Specifies the IP address of the peer on the other end of the logical ATM link using ppp-vcmux encapsulation.
Syntax	set ip ip-ppp {vccx} peer-address [ip_address]
Arguments	The first argument identifies the ATM channel (vccx, x = 1 ... 8). If there is only one ATM channel using ppp-vcmux encapsulation you can leave the argument vccx out. If you specify an IP address other than 0.0.0.0, your Nokia M10 will not negotiate the remote peer's IP address. If the remote peer does not accept the address in the ip_address argument as its IP address (typically because it has been configured with another IP address), the link will not come up. The default value for the ip_address argument is 0.0.0.0, which indicates that the WAN port will accept the IP address returned by the remote peer. If you enter 0.0.0.0, the peer system must be configured to supply this address.
Example	m10> set ip ip-ppp vcc2 peer-address 0.0.0.0

Command	Enable/disable address mapping on ATM link using PPP-vcmux encapsulation
Description	Specifies whether you want Nokia M10 to use NAT on the specified ATM link using ppp-vcmux encapsulation when communicating with remote routers. Address mapping lets you conceal details of your network from remote routers, which is useful when connecting to an Internet Service Provider. By default, the address mapping is turned on.
Syntax	set ip ip-ppp {vccx} addr-mapping [on off]
Arguments	The first argument identifies the ATM channel (vccx, x = 1 ... 8). The second argument enables/disables address mapping on that channel.
Example	m10> set ip ip-ppp vcc2 addr-mapping on

Command	Enable/disable RIP send function on PPP link
Description	Specifies whether the Nokia M10 should use Routing information protocol (RIP) broadcasts to advertise its routing tables to router on the other side of the specified ATM link using ppp-vcmux encapsulation. RIP cannot be activated if address mapping is ON.
Syntax	set ip ip-ppp {vccx} rip-send [off v1 v2 v1-compatible]
Arguments	The first argument identifies the ATM channel (vccx, x = 1 ... 8). If there is only one ATM channel using ppp-vcmux encapsulation you can leave the argument vccx out. Both RIP version 1 and RIP version 2 functionalities can be simultaneously activated. v1-compatible argument enables the sending of RIPv2 packets using IP multicast.
Example	m10> set ip ip-ppp vcc2 rip-send off

Command	Enable/disable RIP receive function on PPP link
Description	Specifies whether the Nokia M10 should use Routing information protocol (RIP) broadcasts to update its routing tables with information received from other routers on the other side of the specified ATM link using ppp-vcmux encapsulation. RIP cannot be activated if address mapping is ON.
Syntax	set ip ip-ppp {vccx} rip-receive [off v1 v2 v1-compat]
Arguments	The first argument identifies the ATM channel (vccx, x = 1 ... 8). If there is only one ATM channel using ppp-vcmux encapsulation you can leave the argument vccx out. Both RIP version 1 and RIP version 2 functionalities can be simultaneously activated. v1-compat argument enables the receiving of both RIPv1 and RIPv2 packets.
Example	m10> set ip ip-ppp vccx rip-receive off

Command	Enable/disable the management through PPP link
Description	Enables/disables the management of Nokia M10 through the specified ATM link using ppp-vcmux encapsulation.
Syntax	set ip ip-ppp {vccx} admin-disable [on off]
Arguments	The first argument identifies the ATM channel (vccx, x = 1 ... 8). If there is only one ATM channel using ppp-vcmux encapsulation you can leave the argument vccx out. The second argument disables/enables management through the PPP link.
Example	m10> set ip ip-ppp vcc2 admin-disable on

Command	Enable/disable IP routing on channels using IP over ATM or bridged encapsulations
Description	Enables/disables IP routing on the specified ATM channel using the IP over ATM encapsulations (ip-llc, ip-vcmux) or bridged encapsulations (ether-llc, ether-vcmux).
Syntax	set ip dsl {vccx} option [on off]
Arguments	The first argument identifies the ATM channel and the second argument enables/disables IP routing. If there is only one ATM channel using one of these encapsulations you can leave the argument <code>vccx</code> out.
Example	<code>set ip dsl vcc2 option off</code>

Command	Set IP address to channels using IP over ATM or bridged encapsulations
Description	Assigns an IP address to the specified logical ATM channel using ip-llc, ip-vcmux, ether-llc, or ether-vcmux encapsulation.
Syntax	set ip dsl {vccx} address [ip_address]
Arguments	The first argument identifies the ATM channel (vccx, x = 1 ... 8). The second argument is the IP address of that channel. If there is only one ATM channel using one of these encapsulations you can leave the argument <code>vccx</code> out. If you enter 0.0.0.0 as the IP address Nokia M10 will retrieve the IP address through the remote peer using Dynamic Host Configuration Protocol.
Example	<code>m10> set ip dsl vcc2 address 0.0.0.0</code>

Command	Set broadcast address to channels using IP over ATM or bridged encapsulations
Description	Assigns a broadcast IP address to the specified logical ATM channel using ip-llc, ip-vcmux, ether-llc, or ether-vcmux encapsulation.
Syntax	set ip dsl {vccx} broadcast [broadcast_address]
Arguments	The first argument identifies the ATM channel. The second argument is the broadcast address to be assigned to that channel. If there is only one ATM channel using one of these encapsulations you can leave the argument <code>vccx</code> out. If you enter 0.0.0.0 as the IP broadcast address Nokia M10 will retrieve the IP address through the remote peer using Dynamic Host Configuration Protocol.
Example	m10> set ip dsl vcc2 broadcast 0.0.0.0

Command	Set network mask to channels using IP over ATM or bridged encapsulations
Description	Assigns an IP network mask to the specified logical ATM channel using ip-llc, ip-vcmux, ether-llc, or ether-vcmux encapsulation.
Syntax	set ip dsl {vccx} netmask [netmask]
Arguments	The first argument identifies the ATM channel (<code>vccx</code> , $x = 1 \dots 8$). The second argument is the network mask to be assigned to that channel. If there is only one ATM channel using one of these encapsulations you can leave the argument <code>vccx</code> out. If you enter 0.0.0.0 as the network mask Nokia M10 will retrieve the IP address through the remote peer using Dynamic Host Configuration Protocol.
Example	m10> set ip dsl vcc2 netmask 0.0.0.0

Command	Enable/disable address mapping on channels using IP over ATM or bridged encapsulations
Description	Specifies whether you want the Nokia M10 to use NAPT on the specified ATM link (vccx, x = 1 ... 8) using ip-llc, ip-vcmux, ether-llc, or ether-vcmux encapsulation when communicating with remote routers. Address mapping lets you conceal details of your network from remote routers. This is useful when connecting to an Internet Service Provider.
Syntax	set ip dsl {vccx} addr-mapping [on off]
Arguments	The first argument identifies the ATM channel (vccx, x = 1 ... 8). The second argument enables/disables address mapping on that channel. If there is only one ATM channel using one of these encapsulations you can leave the argument vccx out.
Example	m10> set ip dsl vcc2 addr-mapping off

Command	Enable proxy address resolution server function on channels using IP over ATM or bridged encapsulations
Description	Specifies whether you want the Nokia M10 to act as a proxy address resolution server for your LAN for the IP addresses behind the specified ATM link using ip-llc, ip-vcmux, ether-llc, or ether-vcmux encapsulation.
Syntax	set ip dsl {vccx} proxy-arp [on off]
Arguments	The first argument identifies the ATM channel (vccx, x = 1 ... 8). The second argument enables/disables the proxy arp function. If there is only one ATM channel using one of these encapsulations you can leave the argument vccx out.
Example	m10> set ip dsl vcc2 proxy-arp off

Command	Enable/disable RIP send function on channels using IP over ATM or bridged encapsulations
Description	Specifies whether the Nokia M10 should use Routing information protocol (RIP) broadcasts to advertise its routing tables to router on the other side of the specified ATM link using ip-llc, ip-vcmux, ether-llc, or ether-vcmux encapsulation.
Syntax	set ip dsl {vccx} rip-send [off v1 v2 v1-compatible]
Arguments	The first argument identifies the ATM channel (vccx, x = 1 ... 8). If there is only one ATM channel using one of these encapsulations you can leave the argument vccx out. Both RIP version 1 and RIP version 2 functionalities can be simultaneously activated. v1-compatible argument enables the sending of RIPv2 packets using IP multicast. RIP cannot be activated if address mapping is ON.
Example	m10> set ip dsl {vccx} rip-send off

Command	Enable/disable RIP receive function on channels using IP over ATM or bridged encapsulations
Description	Specifies whether the Nokia M10 should use Routing information protocol (RIP) broadcasts to update its routing tables with information received from other routers on the other side of the specified ATM link using ip-llc, ip-vcmux, ether-llc, or ether-vcmux encapsulation.
Syntax	set ip dsl {vccx} rip-receive [off v1 v2 v1-compatible]
Arguments	The first argument identifies the ATM channel (vccx, x = 1 ... 8). If there is only one ATM channel using one of these encapsulations you can leave the argument vccx out. Both RIP version 1 and RIP version 2 functionalities can be simultaneously activated. v1-compatible argument enables the receiving of both RIPv1 and RIPv2 packets. RIP cannot be activated if address mapping is ON.
Example	m10> set ip dsl vcc2 rip-receive off

Command	Flush routes
Description	Enabled flush routes function deletes the learned routes from the routing table when the PPP connection is disconnected. Address mapping must be off.
Syntax	flush-routes [on off]
Arguments	The argument enables/disables flush routes function.
Example	m10> flush-routes on

Command	Enable/disable the management through channels using IP over ATM or bridged encapsulations
Description	Enables/disables the management of Nokia M10 through the specified ATM link using ip-llc, ip-vcmux, ether-llc, or ether-vcmux encapsulation.
Syntax	set ip dsl {vccx} admin-disable [on off]
Arguments	The first argument identifies the ATM channel (vccx, x = 1 ... 8). If there is only one ATM channel using one of these encapsulations you can leave the argument vccx out. The second argument disables/enables management through the PPP link.
Example	m10> set ip dsl vcc2 admin-disable off

Command	Enable/disable IP routing on ATM channel
Description	Enables/disables IP routing on the specified ATM channel using PPP over ATM encapsulation in bridged mode (BNCP option on).
Syntax	set ip wan {vccx} option [on off]
Arguments	The first argument identifies the ATM channel (vccx, x = 1 ... 8). If there is only one ATM channel using ppp-vcmux encapsulation you can leave the argument vccx out. The second argument enables/disables the function.
Example	m10> set ip wan vcc2 option off

Command	Set IP address to channels using PPP over ATM encapsulation in bridged mode
Description	Assigns an IP address to the specified logical ATM channel using PPP over ATM encapsulation in bridged mode (BNCP option on).
Syntax	set ip wan {vccx} address [ip_address]
Arguments	The first argument identifies the ATM channel (vccx, x = 1 ... 8). If there is only one ATM channel using ppp-vcmux encapsulation you can leave the argument vccx out. The second argument is the IP address to be assigned to that channel. If you enter 0.0.0.0 as the network mask Nokia M10 will retrieve the IP address through the remote peer using Dynamic Host Configuration Protocol.
Example	m10> set ip wan vcc2 address 0.0.0.0

Command	Set broadcast address to channels using PPP over ATM encapsulation in bridged mode
Description	Assigns a broadcast IP address to the specified logical ATM channel using PPP over ATM encapsulation in bridged mode (BNCP option on).
Syntax	set ip wan {vccx} broadcast [broadcast_address]
Arguments	The first argument identifies the ATM channel (vccx, x = 1 ... 8). If there is only one ATM channel using ppp-vcmux encapsulation you can leave the argument vccx out. The second argument is the broadcast address to be assigned to that channel. If you enter 0.0.0.0 as the broadcast address Nokia M10 will retrieve the IP address through the remote peer using Dynamic Host Configuration Protocol.
Example	m10> set ip wan vcc2 broadcast 0.0.0.0

Command	Set netmask to channels using PPP over ATM encapsulation in bridged mode
Description	Assigns an IP network mask to the specified logical ATM channel using ppp over ATM encapsulation in bridged mode.
Syntax	set ip wan {vccx} netmask [netmask]
Arguments	The first argument identifies the ATM channel (vccx, x = 1 ... 8). If there is only one ATM channel using ppp-vcmux encapsulation you can leave the argument vccx out. The second argument is the netmask address to be assigned to that channel. If you enter 0.0.0.0 as the netmask Nokia M10 will retrieve the netmask through the remote peer using Dynamic Host Configuration Protocol.
Example	m10> set ip wan vcc2 netmask 0.0.0.0

Command	Enable/disable address mapping on channels using PPP over ATM encapsulation in bridged mode
Description	Specifies whether you want the Nokia M10 to use NAPT on the specified ATM link using PPP over ATM encapsulation in bridged mode (BNCP option on) when communicating with remote routers. Address mapping lets you hide details of your network from remote routers. This is useful when connecting to an Internet Service Provider.
Syntax	set ip wan {vccx} addr-mapping [on off]
Arguments	The first argument identifies the ATM channel (vccx, x = 1 ... 8). If there is only one ATM channel using ppp-vcmux encapsulation you can leave the argument vccx out. The second argument is enables/disables address mapping.
Example	m10> set ip wan vcc2 addr-mapping off

Command	Enable proxy ARP function on channels using PPP over ATM encapsulation in bridged mode
Description	Specifies whether you want the Nokia M10 to act as a proxy address resolution server for your PC for the IP addresses behind the specified ATM link using PPP over ATM encapsulation in bridged mode.
Syntax	set ip wan {vccx} proxy-arp [on off]
Arguments	The first argument identifies the ATM channel (vccx, x = 1 ... 8). If there is only one ATM channel using ppp-vcmux encapsulation you can leave the argument vccx out. The second argument is enables/disables proxy ARP function.
Example	set ip wan vcc2 proxy-arp on

Command	Enable/disable RIP send function on channels using PPP over ATM encapsulation in bridged mode
Description	Specifies whether the Nokia M10 should use Routing information protocol (RIP) broadcasts to advertise its routing tables to router on the other side of the specified ATM link using PPP over ATM encapsulation in bridged mode (BNCP option on).
Syntax	set ip wan {vccx} rip-send [off v1 v2 v1-compat]
Arguments	The first argument identifies the ATM channel (vccx, x = 1 ... 8). If there is only one ATM channel using PPP over ATM encapsulation in bridged mode you can leave the argument vccx out. Both RIP version 1 and RIP version 2 functionalities can be simultaneously activated. v1-compat argument enables the sending of RIPv2 packets using IP multicast. RIP cannot be activated if address mapping is ON.
Example	m10> set ip wan vcc2 rip-send off

Command	Enable/disable RIP receive function on channels using PPP over ATM encapsulation in bridged mode
Description	Specifies whether the Nokia M10 should use Routing information protocol (RIP) broadcasts to update its routing tables with information received from other routers on the other side of the specified ATM link using PPP over ATM encapsulation in bridged mode.
Syntax	set ip wan {vccx} rip-receive [off v1 v2 v1-compatible]
Arguments	The first argument identifies the ATM channel (vccx, x = 1 ... 8). If there is only one ATM channel using PPP over ATM encapsulation in bridged mode you can leave the argument vccx out. Both RIP version 1 and RIP version 2 functionalities can be simultaneously activated. v1-compatible argument enables the receiving of both RIPv1 and RIPv2 packets. RIP cannot be activated if address mapping is ON.
Example	m10> set ip wan vcc2 rip-receive off

Command	Enable/disable the management through channels using PPP over ATM encapsulation
Description	Enables/disables the management of Nokia M10 through the specified ATM link using PPP over ATM encapsulation.
Syntax	set ip wan {vccx} admin-disable [on off]
Arguments	The first argument identifies the ATM channel (vccx, x = 1 ... 8). If there is only one ATM channel using PPP over ATM encapsulation in bridged mode you can leave the argument vccx out. The second argument disables/enables management through ATM channel using PPP-vcmux encapsulation.
Example	m10> set ip wan vcc2 admin-disable on

Static route settings

A static route identifies a manually configured pathway to a remote network. Unlike dynamic routes, which are acquired and confirmed periodically from other routers, static routes do not time out. Consequently, static routes are useful when working with PPP, since an intermittent PPP link may make maintenance of dynamic routes problematic.

You can configure as many as 16 static IP routes for a Nokia M10. Use the following commands to maintain static routes to the Nokia M10 routing table:

Command	Add a static route
Description	Adds a static route to the routing table.
Syntax	set ip static-routes destination-network [net_address] netmask [netmask] interface [ip-address ppp-vccx] gateway-address [gate_address] metric [integer]
Arguments	Enter a destination network address in the <code>net_address</code> argument in dotted decimal notation. The <code>net_address</code> argument cannot be 0.0.0.0. <code>netmask</code> is the subnet mask of the destination network. The subnet mask associated with the destination network must represent the same network class (A, B, or C) or a lower class (such as a class C subnet mask for a class B network number) to be valid. <code>ip-address ppp-vccx</code> argument indicates whether the static route can be reached directly through the gateway IP address or through any active PPP channel (<code>ppp-vccx</code> , where <code>x = 1 ... 8</code>). <code>gate_address</code> identifies the default gateway IP address. The gateway address is not needed if <code>ppp-vccx</code> is selected as the gateway interface. The default metric is 1. Enter a number from 1 to 16 for the <code>integer</code> argument to indicate the number of routers (actual or best guess) a packet must traverse to reach the remote network. You can enter a metric of 1 to indicate either: The remote network is one router away and the static route is the best way to reach it; The remote network is more than one router away but the static route should not be replaced by a dynamic route, even if the dynamic route is more efficient. Metric 16 indicates that the route is disabled.
Example	m10> set ip static-routes destination-network 192.111.122.0 netmask 255.255.255.0 ip-address gateway-address 192.111.1.1 metric 3

Command	Set destination network address of a static route
Description	Specifies the network address for the static route.
Syntax	set ip static-routes destination-network [net_address]
Arguments	Enter a network address in the net_address argument in dotted decimal notation. The net_address argument cannot be 0.0.0.0.
Example	m10> set ip static-routes destination-network 192.111.122.0

Command	Modify netmask of a static route
Description	Specifies the subnet mask for the IP network at the other end of the static route.
Syntax	set ip static-routes destination-network [net_address] netmask [netmask]
Arguments	net_address is the destination network address of the static route. Enter the net_address and netmask arguments in dotted decimal notation. The subnet mask associated with the destination network must represent the same network class (A, B, or C) or a lower class (such as a class C subnet mask for a class B network number) to be valid.
Example	m10> set ip static-routes destination-network 192.111.122.0 netmask 255.255.255.0

Command	Modify the interface to static route
Description	Specifies if the static route entry is accessible via a certain PPP link or via a non-PPP link (IP-address).
Syntax	set ip static-routes destination-network [net_address] interface [ip-address ppp-vccx]
Arguments	The first argument identifies the static route and the second argument whether the route is accessible via a PPP link or a non-PPP link. ppp-vccx, where x= 1 ... 8, identifies the ATM channel using PPP.
Example	m10> set ip static-routes destination-network 192.111.122.0 interface ppp-vcc1

Command	Modify default gateway for static route
Description	Specifies the IP address of the gateway for the static route.
Syntax	set ip static-routes destination-network [net_address] gateway-address [gate_address]
Arguments	The net_address argument identifies the static route and gate_address sets the IP address of the default gateway.
Example	m10> set ip static-routes destination-network 192.111.122.0 gateway-address 192.111.1.1

Command	Modify metric for the static route
Description	Specifies the metric for the static route.
Syntax	set ip static-routes destination-network [net_address] metric [integer]
Arguments	The net_address argument identifies the static route. The default metric is 1. Enter a number from 1 to 16 for the integer argument to indicate the number of routers (actual or best guess) a packet must traverse to reach the remote network. You can enter a metric of 1 to indicate either: The remote network is one router away and the static route is the best way to reach it; The remote network is more than one router away but the static route should not be replaced by a dynamic route, even if the dynamic route is more efficient. Metric 16 indicates that the route is disabled.
Example	m10> set ip static-routes destination-network 192.111.122.0 metric 3

Command	Delete static route
Description	Deletes a static route. Note: deleting a static route removes all information associated with that route.
Syntax	delete ip static-routes destination-network [net_address]
Arguments	net_address is the destination network address of the static route.
Example	m10> delete ip static-routes destination-network 192.111.122.0

BNCP setting

Command	Enable/disable BNCP
Description	Specifies whether the Bridge Network Control Protocol (BNCP) option can be used on ATM channels using ppp-vcmux encapsulation. See <code>set ip wan</code> commands above.
Syntax	<code>set bncp option [on off]</code>
Arguments	The argument enables/disables BNCP option.
Example	<code>m10> set bncp option on</code>

DHCP settings

As a Dynamic Host Control Protocol (DHCP) server, your Nokia M10 can assign IP addresses and provide configuration information to other devices on your network dynamically. A device that acquires its IP address and other TCP/IP configuration settings from the Nokia M10 can use the information for 30 minutes (called the DHCP lease).

Note If you use the Nokia M10 as a DHCP server, make sure that the devices on your network are not configured to use IP addresses in the Nokia M10’s DHCP address range. Network conflicts can result when a device on your network uses an IP address that the Nokia M10 has already assigned to another device.

Command	Set DHCP service
Description	Sets DHCP services in the Nokia M10. You must enable DHCP services before you can enter other DHCP settings for the Nokia M10. If you turn off DHCP services and save the new configuration, the Nokia M10 clears its DHCP settings. M10 can also relay DHCP requests to another server
Syntax	set dhcp option [off server relay-agent] start-address [ip_address] end-address [ip_address] lease-time [time]
Arguments	The first argument disables DHCP (<code>off</code>), enables M10 DHCP server (<code>server</code>) or makes M10 act as a relay agent (<code>relay-agent</code>). <code>start-address</code> and <code>end-address</code> arguments define the DHCP address range. <code>lease-time</code> argument defines how often the PC has to renew its DHCP lease.
Example	m10> set dhcp option server start-address 192.168.1.1 end-address 192.168.1.254 lease-time 00:01:00:00

Command	Enable/disable DHCP services
Description	Enables/disables DHCP services in the Nokia M10. You must enable DHCP services before you can enter other DHCP settings for the Nokia M10. If you turn off DHCP services and save the new configuration, the Nokia M10 clears its DHCP settings. M10 can also relay DHCP requests to another server
Syntax	set dhcp option [off server relay-agent]
Arguments	The argument disables DHCP (<i>off</i>), enables M10 DHCP server (<i>server</i>) or makes M10 act as a relay agent (<i>relay-agent</i>)
Example	m10> set dhcp option server

Command	Specify start of DHCP address range
Description	Specifies the first address in the DHCP address range.
Syntax	set dhcp start-address [ip_address]
Arguments	<i>ip_address</i> argument is the first IP address in the DHCP address range.
Example	m10> set dhcp start-address 192.168.1.1

Command	Specify end of DHCP address range
Description	Specifies the last address in the DHCP address range.
Syntax	set dhcp end-address [ip_address]
Arguments	<i>ip_address</i> argument is the last IP address in the DHCP address range.
Example	m10> set dhcp end-address 192.168.1.254

Command	Set DHCP lease time
Description	Sets the time how often the PC has to renew the DHCP lease.
Syntax	set dhcp lease-time [time]
Arguments	<i>time</i> argument sets the lease time.
Example	m10> set dhcp lease-time 00:01:00:00

Command	Set M10 as DHCP relay agent
Description	Configures M10 as DHCP relay agent which relays the DHCP requests to an external DHCP server
Syntax	set dhcp option relay-agent server-address [ip_address]
Arguments	server-address argument specifies the IP address of the external DHCP server.
Example	m10> set dhcp option relay-agent server-address 192.3.2.1

Domain Name System settings

Domain Name System (DNS) is an information service for TCP/IP networks that uses a hierarchical naming system to identify network domains and the hosts associated with them. You can identify one primary DNS server and one secondary server.

Command	Set domain name
Description	Specifies the default domain name for your network. When an application needs to resolve a host name, it appends the default domain name to the host name and asks the DNS server if it has an address for the "fully qualified host name".
Syntax	set dns domain-name [domain_name]
Arguments	domain_name is the default domain name for your system.
Example	m10> set dns domain-name nokia.com

Command	Set IP address of primary name server
Description	Specifies the IP address of the primary DNS name server.
Syntax	set dns primary-address [ip_address]
Arguments	ip_address is the IP address of your primary name server.
Example	m10> set dns primary-address 10.98.16.250

Command	Set IP address of secondary name server
Description	Specifies the IP address of the secondary DNS name server.
Syntax	set dns secondary-address [ip_address]
Arguments	ip_address is the IP address of your secondary name server. Enter 0.0.0.0 if your network does not have a secondary DNS name server.
Example	m10> set dns secondary-address 0.0.0.0

Bridging settings

Bridging lets Nokia M10 learn host addresses as a means of minimizing traffic. When bridging is enabled Nokia M10 maintains a table of up to 256 MAC addresses. Entries that are not used within 10 minutes are dropped. If the bridging table fills up the oldest table entries are dropped to make room for new entries.

Command	Enable/disable bridging
Description	Enables/disables bridging services in the Nokia M10. You must enable bridging services within the Nokia M10 before you can enable it for a specific interface.
Syntax	set bridge option [on off]
Arguments	The argument enables/disables bridging.
Example	m10> set bridge option on

Command	Enable bridging for Ethernet interface
Description	Enables/disables bridging services for the Nokia M10 Ethernet interfaces.
Syntax	set bridge ethernet option [on off]
Arguments	The argument enables/disables bridging for Ethernet interfaces.
Example	m10> set bridge ethernet option on

Command	Enable bridging on channels using PPP over ATM encapsulation
Description	Enables/disables bridging services for the Nokia M10 ATM channel using ppp-vcmux encapsulation.
Syntax	set bridge wan {vccx} option [on off]
Arguments	The first argument identifies the ATM channel (vccx, x = 1 ... 8) and the second argument enables/disables bridging on that channel. If there is only one ATM channel using ppp-vcmux encapsulation you can leave the argument vccx out.
Example	m10> set bridge wan vcc2 option off

Command	Enable bridging on channels using bridged encapsulations
Description	Enables/disables bridging services for a Nokia M10 ATM channel using ether-llc or ether-vcmux encapsulation.
Syntax	set bridge dsl {vccx} option [on off]
Arguments	The first argument identifies the ATM channel (vccx, x = 1 ... 8) and the second argument enables/disables bridging on that channel. If there is only one ATM channel using either one of these encapsulations you can leave the argument vccx out.
Example	m10> set bridge dsl vcc2 option off

Command	Enable/disable bridging between ATM VCC channels
Description	Enables/disables bridging between ATM VCC channels. If only one VCC is used this option can be ignored.
Syntax	set bridge interwan-bridging [on off]
Arguments	The argument enables/disables bridging between VCCs
Example	m10> set bridge interwan-bridging [on off]

DMT (ADSL) setting

This setting is used to define the lowest level format in which the data is transmitted through the ADSL line. As default the data is transmitted in ATM cells to interoperate with the Nokia Eksos B DSLAM. Normally you do not have to change this value.

Command	Set data transmission mode over ADSL line
Description	Specifies the mode used for data transmission over the M10 ADSL line.
Syntax	set dmt encap [hdlc ppp cell]
Arguments	cell must be selected for ATM over ADSL applications. For frame based applications either hdlc (uses simple HDLC framing on ADSL line) or ppp (uses point-to-point protocol on the ADSL line) must be selected.
Example	m10> set dmt encap cell

PPP settings

PPP settings allow you to fine tune the operation of the point-to-point protocol. PPP settings also provide the means to set the authentication parameters, passwords and usernames. These settings must be set separately for each ATM channel using ppp-vcmux encapsulation.

You can use the authentication commands to specify how your Nokia M10 will authenticate itself to a remote peer. The settings for port authentication in the local Nokia M10 must match the authentication that is expected by the remote peer. For example, if the remote peer requires CHAP authentication and has a name and CHAP secret for Nokia M10 you must enable CHAP and specify the same name and secret in the local M10 before a link can be established.

You can also specify that your Nokia M10 will use CHAP, PAP or both to authenticate a remote peer as a PPP link is being established.

Command	Enable/disable PPP processing
Description	Enables/disables PPP processing on the specified ATM channel using ppp-vcmux encapsulation.
Syntax	set ppp module {vccx} option [on off]
Arguments	The first argument identifies the ATM channel (vccx, x = 1 ... 8) and the second argument enables/disables PPP processing.
Example	m10> set ppp module vcc2 off

Command	Set maximum receive unit
Description	Sets the Maximum Receive Unit for the specified ATM channel.
Syntax	set ppp module {vccx} mru [integer]
Arguments	The first argument identifies the ATM channel (vccx, x = 1 ... 8). The integer argument can be any number between 128 and 2048. Normally MRU size 1500 is required for IP traffic. Bridged encapsulation (BNCP) requires the MRU size 1520 in order to allow the maximum size Ethernet packet transmission.
Example	m10> set ppp module vcc2 mru 1500

Command	Enable/disable LCP echoing
Description	Specifies whether you want your Nokia M10 to send LCP echo requests on the specified ATM channel.
Syntax	set ppp module {vccx} lcp-echo-requests [on off]
Arguments	The first argument identifies the ATM channel (vccx, x = 1 ... 8). The second argument enables/disables LCP echoing. You must turn off LCP echoing if you do not want the M10 to drop a PPP link to a nonresponsive peer.
Example	m10> set ppp module vcc2 lcp-echo-requests off

Command	Set Configure-NAK failure maximum
Description	Specifies the maximum number of Configure-NAK messages the PPP module can send without having sent a Configure-ACK message requests on the specified ATM channel.
Syntax	set ppp module {vccx} failures-max [integer]
Arguments	The first argument identifies the ATM channel (vccx, x = 1 ... 8). The integer argument can be any number between 1 and 20.
Example	set ppp module vcc2 failures-max 10

Command	Set unacknowledged configuration request maximum
Description	Specifies the maximum number of unacknowledged configuration requests that your Nokia M10 will send to the specified ATM channel.
Syntax	set ppp module {vccx} configure-max [integer]
Arguments	The first argument identifies the ATM channel (vccx, x = 1 ... 8). The integer argument can be any number between 1 and 10.
Example	set ppp module vcc2 configure-max 10

Command	Set unacknowledged termination request maximum
Description	Specifies the maximum number of unacknowledged termination requests that your Nokia M10 will send before terminating the PPP link on the specified ATM channel.
Syntax	set ppp module {vccx} terminate-max [integer]
Arguments	The first argument identifies the ATM channel (vccx, x = 1 ... 8). The <code>integer</code> argument can be any number between 1 and 10.
Example	m10> set ppp module vcc2 terminate-max 2

Command	Set PPP timeout
Description	Specifies the number of seconds the Nokia M10 must wait for communication activity before terminating the PPP link on the specified ATM channel.
Syntax	set ppp module {vccx} timeout [integer]
Arguments	The first argument identifies the ATM channel (vccx, x = 1 ... 8). The <code>integer</code> argument is the timeout in seconds. If you enter value 0 the connection will never time out.
Example	m10> set ppp module vcc2 timeout 0

Command	Enable/disable CHAP port authentication
Description	Enables/disables CHAP authentication for a port on the specified ATM channel. CHAP authentication must be enabled before you can enter other CHAP information. If CHAP is on it will be the first authentication method offered to a remote peer during link negotiation.
Syntax	set ppp module {vccx} port-authentication chap-option [on off]
Arguments	The first argument identifies the ATM channel (vccx, x = 1 ... 8). The second argument enables/disables CHAP port authentication.
Example	m10> set ppp module vcc2 port-authentication chap-option on

Command	Set CHAP name
Description	Defines the name Nokia M10 sends in the CHAP response packet on the specified ATM channel.
Syntax	set ppp module {vccx} port-authentication chap-name [chap_name]
Arguments	The first argument identifies the ATM channel (vccx, x = 1 ... 8). The chap_name argument consists of 1 - 32 alphanumeric characters. The information you enter must match the CHAP username configured in the remote PPP peer's authentication database.
Example	m10> set ppp module vcc2 port-authentication chap-name myname

Command	Set CHAP password
Description	Defines the CHAP secret for CHAP authentication on the specified ATM channel.
Syntax	set ppp module {vccx} port-authentication chap-secret [chap_secret]
Arguments	The first argument identifies the ATM channel (vccx, x = 1 ... 8). The chap_secret argument consists of 1 - 32 alphanumeric characters. The information you enter must match the CHAP secret used by the PPP peer.
Example	m10> set ppp module vcc2 port-authentication chap-secret mypassword

Command	Enable/disable PAP port authentication
Description	Enables/disables PAP authentication on the specified ATM channel. PAP authentication must be enabled before you can enter other PAP information. If you disable PAP authentication and save the modified settings your M10 retains its PAP settings.
Syntax	set ppp module {vccx} port-authentication pap-option [on off]
Arguments	The first argument identifies the ATM channel (vccx, x = 1 ... 8). The second argument enables/disables PAP port authentication.
Example	m10> set ppp module vcc2 port-authentication pap-option on

Command	Set PAP name
Description	Defines the name Nokia M10 sends in a PAP response packet on the specified ATM channel.
Syntax	set ppp module {vccx} port-authentication pap-name [pap_name]
Arguments	The first argument identifies the ATM channel (vccx, x = 1 ... 8). The pap_name argument consists of 1 - 32 alphanumeric characters. The information you enter must match the PAP username configured in the remote PPP peer's authentication database.
Example	m10> set ppp module vcc2 port-authentication pap-name myname

Command	Set PAP password
Description	Defines the PAP password for PAP authentication on the specified ATM channel.
Syntax	set ppp module {vccx} port-authentication pap-password [pap_password]
Arguments	The first argument identifies the ATM channel (vccx, x = 1 ... 8). The pap_password argument consists of 1 - 32 alphanumeric characters. The information you enter must match the PAP password used by the remote PPP peer.
Example	m10> set ppp module vcc2 port-authentication pap-password mypassword

Command	Enable/disable CHAP peer authentication
Description	Enables/disables CHAP authentication for a connection to a PPP peer on the specified ATM link.
Syntax	set ppp module {vccx} peer-authentication chap-option [on off]
Arguments	The first argument identifies the ATM channel (vccx, x = 1 ... 8). The second argument enables/disables CHAP peer authentication.
Example	m10> set ppp module vcc2 peer-authentication chap-option on

Command	Enable/disable PAP peer authentication
Description	Enables/disables PAP authentication for a connection to a PPP peer on the specified ATM link.
Syntax	set ppp module {vccx} peer-authentication pap-option [on off]
Arguments	The first argument identifies the ATM channel (vccx, x = 1 ... 8). The second argument enables/disables PAP peer authentication.
Example	m10> set ppp module vcc2 peer-authentication pap-option on

Command	Set host name for an authorised PPP peer
Description	Specifies the host name for an authorised PPP peer.
Syntax	set ppp peer-database peer-name [host_name]
Arguments	The <code>host_name</code> argument consists of 1 - 32 alphanumeric characters. The information you enter must match the username that will be received from the remote PPP peer when being authenticated.
Example	m10> set ppp peer-database peer-name host

Command	Set CHAP secret associated with PPP peer
Description	Specifies the secret associated with a PPP peer.
Syntax	set ppp peer-database peer-name [host_name] chap-secret [secret]
Arguments	The <code>secret</code> argument consists of 1 - 32 alphanumeric characters. The information you enter must match the secret that will be received from the remote PPP peer when being authenticated.
Example	set ppp peer-database peer-name host chap-secret mypassword

Command	Set PAP password associated with PPP peer
Description	Specifies the password associated with a PPP peer.
Syntax	set ppp peer-database peer-name [host_name] pap-password [password]
Arguments	The <code>password</code> argument consists of 1 - 32 alphanumeric characters. The information you enter must match the password that will be received from the remote PPP peer when being authenticated.
Example	m10> set ppp peer-database peer-name host pap-password mypassword

SNMP settings

The Simple Network Management Protocol (SNMP) lets a network administrator monitor problems on a network by retrieving settings on remote network devices. The network administrator typically runs an SNMP management station program on a local host to obtain information from an SNMP agent such as the Nokia M10.

Command	Add community
Description	Adds the specified name to the list of communities associated with the Nokia M10. You can associate 2 communities with the Nokia M10.
Syntax	set snmp community [name]
Arguments	By default, the Nokia M10 is associated with the public community.
Example	set snmp community public

Command	Enable/disable SNMP trapping
Description	Enables or disables SNMP trapping. If SNMP trapping is enabled, your Nokia M10 sends authentication traps to all SNMP trap destinations. You must enable trap authentication before you set up your trap destinations.
Syntax	set snmp traps authentication-traps [on off]
Arguments	The argument enables/disables trapping.
Example	set snmp traps authentication-traps on

Command	Set SNMP trap destination
Description	Identifies the destination of SNMP trap messages.
Syntax	<code>set snmp traps ip-traps [ip_address] {community [community_name]}</code>
Arguments	The <code>ip-address</code> argument is the IP address of the host acting as an SNMP console. The optional <code>community community_name</code> identifies the name of the Nokia M10's community, which is included in the trap message the device sends to the management console. This name, which is not used for authentication, does not have to match a predefined community name.
Example	<pre>set snmp traps ip-traps 192.111.122.1 community public</pre>

Command	Set system contact
Description	Identifies the system contact, such as the name, phone number, beeper number, or email address of the person responsible for the Nokia M10.
Syntax	<code>set snmp sysgroup contact [contact_info]</code>
Arguments	You can enter up to 256 characters for the <code>contact-info</code> argument. You must put the <code>contact-info</code> argument in double-quotes if it contains embedded spaces.
Example	<pre>m10> set snmp sysgroup contact 51166777</pre>

Pinhole settings

Pinhole settings are used to configure static entries to NAPT table. It allows the configuring of servers, such as Web-HTTP servers, to LAN which are visible via the WAN interface in cases where NAPT/address mapping is enabled. The settings affect the whole system.

Note If you have a Web server in LAN make sure that it has a different port number than M10's integral Web server. You can change the M10's Web server port through the integral server settings.

Command	Configure pinhole
Description	Configures pinhole.
Syntax	set pinhole item [entry_number] external-port-start [port_number] external-port-end [port_number] protocol [tcp udp icmp pptp] internal-ip [ip_address] internal-port [port_number]
Arguments	The <code>entry_number</code> argument defines the unique pinhole entry number. The sequential values starting from 0 are accepted. The <code>external-port-start</code> specifies the start of the external port range. The <code>external-port-end</code> specifies the end of the external port range. Together the external port arguments define the available range of allowed external ports. The <code>protocol</code> argument specifies the protocol. The <code>internal-ip</code> argument specifies the IP address of the server located in LAN and the <code>internal-port</code> argument its port. Valid values for <code>port_number</code> are 0 – 65535.
Example	m10> set pinhole item 1 external-port-start 80 external-port-end 80 protocol tcp internal-ip 192.168.1.180 internal-port 80

Command	Set external protocol port number range for WAN
Description	Sets the the external protocol port number range.
Syntax	set pinhole item [entry_number] external-port-start [port_number] external-port-end [port_number]
Arguments	The <code>entry_number</code> argument defines the unique pinhole entry number. The sequential values starting from 0 are accepted. The <code>port_number</code> argument defines the start and end of the external port range. Valid values are 0 – 65535.
Example	m10> set pinhole item 1 external-port-start 80 external-port-end 80

Command	Set protocol
Description	Configures the protocol.
Syntax	set pinhole item [entry_number] protocol [protocol]
Arguments	The <code>entry_number</code> argument defines the unique pinhole entry number. The sequential values starting from 0 are accepted. The <code>protocol</code> argument defines the protocol. Protocols are TCP, UDP, ICMP, PPTP.
Example	m10> set pinhole item 1 protocol tcp

Command	Set server IP address in LAN
Description	Configures the server IP address where the protocol defined by the external port number is mapped in LAN port.
Syntax	set pinhole item [entry_number] internal-ip [ip_address]
Arguments	The <code>entry_number</code> argument defines the unique pinhole entry number. The sequential values starting from 0 are accepted. The <code>ip_address</code> argument is the IP address of the server.
Example	m10> set pinhole item 1 internal-ip 192.168.1.80

Command	Set server port in LAN
Description	Configures the server port where the protocol defined by the external port number is mapped in LAN.
Syntax	set pinhole item [entry_number] internal-port [port_number]
Arguments	The <code>entry_number</code> argument defines the unique pinhole entry number. The sequential values starting from 0 are accepted. The <code>internal-port</code> argument specifies the internal port. Valid values for <code>port_number</code> are 0 – 65535.
Example	m10> set pinhole item 1 internal-port 80

Integrated server settings

These command are used to configure the port number settings of the integrated HTTP and telnet servers in M10. This is needed when Pinhole functionality is used. The default port numbers of the integrated HTTP and telnet servers must be changed if there is, e.g. a Web server in the LAN and it must be accessed from the WAN. In this case the port number of the integrated Web server in M10 must be changed into something other than the default port number 80.

Command	Set integrated Web server port number
Description	Changes the port number of the integrated Web server in M10.
Syntax	set servers web-http [0 – 32767]
Arguments	The argument defines the new port number for the integrated Web server.
Example	m10> set servers web-http 81

Command	Set integrated telnet server port number
Description	Changes the port number of the integrated telnet server in M10.
Syntax	set servers telnet-tcp [0 – 32767]
Arguments	The argument defines the new port number for the integrated telnet server.
Example	m10> set servers telnet-tcp 90

5.3 SNMP

The SNMP functionality in Nokia M10 is used only for setting and accessing the system contact information for the unit. Community strings for changing and accessing this information can be set. M10 can be activated to send SNMP traps in case somebody tries to access the unit with a wrong community string.

5.4 Software download

New software can be downloaded to the Nokia M10 via the 10Base-T Ethernet interface. Nokia M10 uses Trivial File Transfer Protocol (TFTP) to download the software from a TFTP server located in the Ethernet LAN. The downloading is activated from the console port using the CLI. Use the following CLI command to download new software to M10:

```
install [server_address] [filename] {confirm}
```

Command	Download software update
Description	Downloads a new version of the Nokia M10 operating software from a TFTP (Trivial File Transfer Protocol) server, validates the software image, and programs the image into the Nokia M10 memory. After you install new operating software, you must restart the Nokia M10.
Syntax	install [server_address] [filename] {confirm}
Arguments	The TFTP server must be accessible on your Ethernet network or through one of the active ATM virtual channels and a route to the server must exist. The <code>server_address</code> argument identifies the IP address of the TFTP server on which your Nokia M10 operating software is stored. The <code>filename</code> argument identifies the path and name of the operating software file on the TFTP server. If you include the optional <code>confirm</code> keyword, you will not be prompted to identify a TFTP server or file name. Your Nokia M10 begins the software installation using its default boot settings.
Example	<pre>M10> install 192.168.1.1 m10c_500.d39 *** WARNING *** YOU ARE ABOUT TO ERASE AND REPROGRAM THE NOKIA M10'S PERMANENT SOFTWARE STORAGE WITH A NEW SOFTWARE VER- SION OBTAINED VIA THE TFTP PROTOCOL. About to install new Flash EPROM software image: server: 192.168.1.1 file: "m10c_500.d39" Do you wish to proceed? (type 'yes' to confirm): yes Installing M10></pre>

Chapter 6

How your Nokia M10 works

This chapter introduces the principles according to which Nokia M10 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 1 Mbit/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 4 kHz channels. By tuning the use of these channels and the information content of these channels Nokia M10 can adapt to different telephone lines.

6.2 ATM and frames over ADSL

Nokia M10 can carry ATM cells or HDLC frames on the ADSL line. The use of cells or frames depends on the application. When M10 uses ATM, it is possible to have up to eight (8) simultaneous connections to different networks from a single M10.

6.3 Routing and bridging

Nokia M10 functions as a brouter, which means that it acts as a network router for TCP/IP traffic and as a network bridge for non-routable traffic.

6.3.1 TCP/IP routing

As a router, Nokia M10 keeps track of the networks that are accessible through each network interface. If you have configured your M10 to use the Routing Information Protocol (RIPv1 or RIPv2) Nokia M10 exchanges information with other routers to learn about the best routes to remote networks and to advertise the networks for which the Nokia M10 has the appropriate route.

When M10 receives a TCP/IP packet it looks up the network portion of the packet's destination IP address in its routing table, and then forwards the packet through the network interface that will let the packet reach its destination most efficiently.

6.3.2 Static and dynamic routes

Static routes identify pathways to destination networks that are stable over time or to networks that must always be available, even if a link is not currently open. These static routes let each router recognize how to reach the other, even if one router has not heard from the other recently.

Dynamic routes identify pathways to destination networks that may change over time. Dynamic routes are created and configured when routers broadcast RIP (Routing information protocol) packets advertising the networks they can reach and the distance (number of routers) to each network.

6.3.3 Bridging

Nokia M10 can function as an Ethernet bridge. It can bridge all protocols or all non-routable (non-IP) protocols between all of its interfaces. The user just has to specify which interfaces take part in the bridging function. The bridging function automatically learns the MAC addresses located behind each of its active interfaces and uses that information to filter local traffic at an interface to prevent it from being unnecessarily relayed to other interfaces. For that purpose M10 has a 256-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.

In bridge-only mode a single IP address can be allocated to M10 if a remote management of the M10 is required. The LAN IP address acts as a host IP address in this case.

6.4 Network Address Port Translation (NAPT)

Network Address Port Translation (NAPT) or Network Address Translation (NAT) is used to save IP addresses. When NAPT is enabled the router has only one global IP address (per ATM channel). The LAN port uses private IP addresses which are not seen outside the router (typically 10.0.0.0 or 192.168.x.x). In normal operation NAPT translates the IP addresses and TCP/UDP socket/port numbers between the LAN and WAN interface.

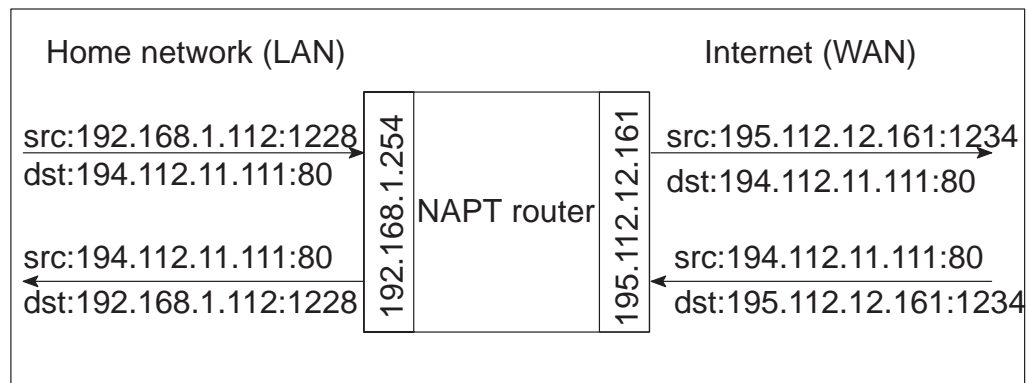


Figure 6-1 Network Address Port Translation

Normally, when host in the home network sends a packet to the Internet the NAPT adds timestamp, protocol (e.g. TCP, UDP), IP source address and source socket number as well as the IP destination address and the destination socket number into the database. The NAPT creates a new free socket number and replaces the original IP source address and source socket number. When a reply is received from WAN the same table is used to map the IP destination address and destination socket number back to the original one. The entries from the NAPT cache/table are removed when the entry timeouts.

6.4.1 Pinhole

The basic NAT functionality does not allow access from WAN port to host in LAN because the private addresses cannot be seen outside the router. In order to support access from the global Internet to a server in a private subnet the static NAT mapping is used. In M10 this functionality is called pinhole.

In the static mapping the WAN IP address and service related protocol/destination socket number are mapped to a private IP address and protocol/destination socket number. This functionality allows access from WAN interface to only allowed server/services. If two services, such as HTTP servers in different machines, are located in the same LAN segment they must have different socket numbers so that the NAT can map the address correctly. Only one server on certain socket number can be used.

6.5 IP address management

IP addresses can be used in two different ways in M10:

- WAN interface belongs to one logical IP subnet and the Ethernet interface belongs to another logical IP subnet. This is how a normal router operates.
- WAN port has only one public IP address. The Ethernet interface uses private IP addressing. Network Address Port Translation (NAPT) is used to map the private IP addresses to and from a single public IP address. The operation is analogous to existing dial-up implementation which consumes only a single IP address and is the most efficient way to use IP addresses.

The IP address of the WAN interface can be set statically or dynamically. Dynamic allocation of the IP address using IPCP (IP control protocol) is possible when PPP over ATM AAL5 is used on an ADSL WAN link. This operation preferred when NAT is used. For bridged WAN encapsulation the DHCP client can be used to retrieve the IP configuration to the WAN port.

The IP address of the Ethernet interface and the subnet must be set statically. However, the built-in DHCP server functionality can be used to allocate an IP address, subnet mask, default gateway and DNS address to host.

When M10 operates in normal routing mode the DHCP request can be relayed to the desired BOOTP/DHCP server. This functionality can be used if DHCP server is located outside M10.

6.6 Payload encapsulation

Both routed and bridged protocols are encapsulated to the ATM uplink using either LLC/SNAP encapsulation (ether-llc or ip-llc) or VC multiplexing (ether-vcmux or ip-vcmux) according to RFC 1483. M10 will alternatively support PPP over AAL5 encapsulation (ppp-vcmux) where both bridged and routed protocols are first encapsulated to PPP (RFC 1661) which is, in turn, encapsulated to ATM according to IETF PPP over AAL5 VC multiplexing.

Typically IP packets are encapsulated directly in the WAN interface using the selected encapsulation method (ip-llc, ip-vcmux, or ppp-vcmux). In some cases bridged encapsulation can also be used for routed IP traffic. In these cases the IP packets are encapsulated in Ethernet MAC frames and the MAC frames are then encapsulated in the WAN interface using the selected encapsulation method (ether-llc, ether-vcmux, or ppp-vcmux). The payload encapsulations are presented in Figure 6-2.

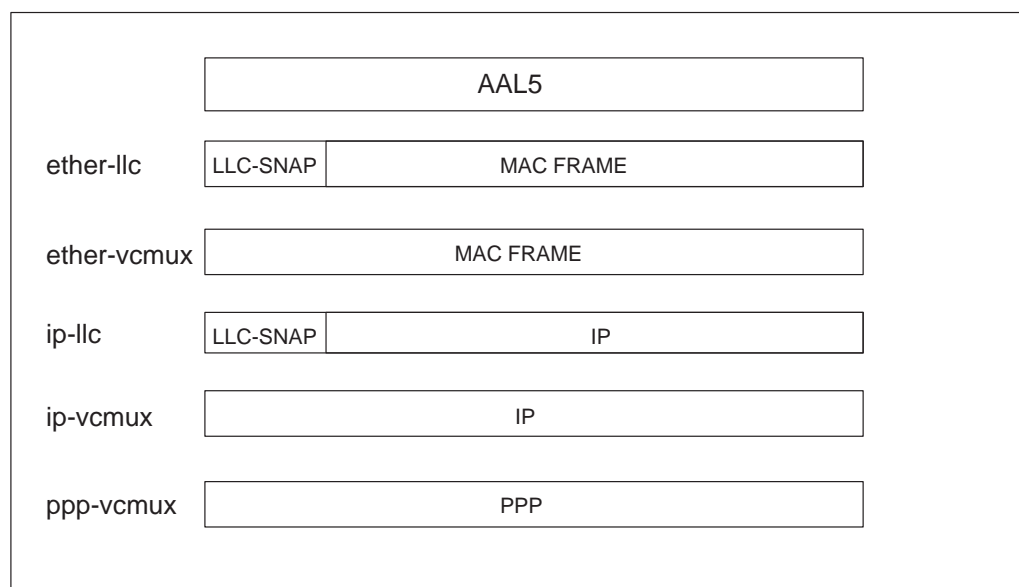


Figure 6-2 Payload encapsulations

M10 also supports two frame-based WAN encapsulations: Ethernet over HDLC and PPP over HDLC as defined in RFC 1662.

6.7 Point-to-point protocol (PPP)

Point-to-point protocol is a set of network protocols which enable you to connect TCP/IP hosts and networks over serial connections.

The nodes at each end of a PPP link are referred to as peers. Unlike client-server networks where one device is responsible of providing services to another, peer-to-peer network peers function as equals providing services to one another as needed.

PPP provides a standard method of encapsulating network protocol information over point-to-point links. PPP defines a Link Control Protocol (LCP) which provides link configuration, peer authentication and link quality monitoring. Finally, PPP includes several Network Control Protocols (NCP) which specify how datagrams for a specific higher level protocol using PPP as a datalink should be encapsulated. Network control protocols establish and configure different network layer protocols, such as TCP/IP.

PPP encapsulation provides transmission of different network layer protocols simultaneously over the same link. Once a PPP link has been established, a PPP peer can negotiate the exchange of TCP/IP, IPX or Appletalk packets over the serial connection. Your M10 supports transmission of both IP (RFC 1332) and Ethernet (RFC 1638) packets over the PPP link.

The setup of a PPP link consists of the following phases:

- Link establishment
- Link configuration
- Authentication
- Network configuration
- Link up

During the link establishment the Nokia M10 synchronises its ADSL and ATM transmission to open a physical layer connection between Nokia M10 and the remote peer router through the ATM access network. When the physical connection has been established the PPP protocol can actually begin its work.

The next step is the PPP link configuration which is done using a Link configuration Protocol (LCP). It allows optional modifications to the standard characteristics of the PPP link to be negotiated. The negotiable items are the maximum receive unit (MRU), link authentication, etc.

After link configuration an authentication is performed using either Password Authentication Protocol (PAP) or Challenge Handshake Authentication Protocol (CHAP) if required or configured. If the authentication succeeds the next step in PPP link establishment is the negotiation of network protocols which will be transferred over the PPP link. After this the link is up and running.

6.7.1 Authentication

The PPP protocol suite includes two optional authentication methods. Password Authentication Protocol (PAP) and Challenge Handshake Authentication Protocol (CHAP) ensure that unauthorized users do not have access to the network services. By default, authentication is not required as part of the PPP link process. However, if a peer requires authentication, it must negotiate the use of an authentication protocol during the link establishment phase.

The manner in which each peer will authenticate the other is negotiated during the link configuration phase, when each peer specifies whether it requires authentication and, if it does, the authentication method it uses. If a link peer requires authentication, the other peer must submit its name and authentication information before the link can proceed. If the peer fails to send valid authentication information, the authenticator terminates the PPP link.

The authentication method used by one peer can be different from the authentication method used by the other peer. For example, a peer at one end of a link may require authentication while the other end of the link may not. Similarly, one end of a link may use PAP to authenticate peers while the other end uses CHAP.

6.7.2 Network configuration

M10 supports IPCP and BNCP network control protocols. IPCP network control protocol is used to exchange the IP configuration parameters. Typically IP addresses are exchanged. M10 is also able to retrieve the IP addresses from the far end or allocate an IP address to the far end. M10 also supports IPCP extension for DNS allocation (RFC 1877) that is used to configure DNS servers dynamically.

BNCP is used to establish the bridged PPP connection.

6.8 Dynamic Host Configuration Protocol (DHCP)

The Dynamic Host Configuration Protocol allows one host on a TCP/IP network to provide configuration information to other hosts on that network. DHCP is built on a client-server model, where designated DHCP server hosts allocate network addresses and deliver configuration parameters to dynamically configured hosts. When DHCP is enabled, the DHCP client requests configuration information, such as an IP address and network information, from a DHCP server each time it is restarted. The DHCP server responds to the request by sending the client an IP address and information about a network, such as the network's subnet mask, broadcast address, name service information, authentication information, and routing information.

6.8.1 DHCP for LAN clients

The Nokia M10 can provide addresses for as many as 253 devices on the network connected to its Ethernet port. When M10 receives a DHCP request from a client computer, it determines what address to assign by checking its DHCP lease table to identify an unused address in its DHCP range. When it finds an address that should be free, the Nokia M10 sends a broadcast message on the network to verify that no other host is using the same IP address. If another host indicates that it is using the selected address, the Nokia M10 selects another address and repeats the sequence until it finds an address that is not in use.

Dynamic allocation of IP addresses means that an IP address can be reused when it is no longer needed by the client to which it is assigned. Dynamic IP address allocation is particularly useful in situations where clients connect to a network temporarily or where a site needs to share a limited pool of IP addresses among a group of clients that do not need permanent IP addresses.

6.8.2 DHCP for WAN port configuration

It is possible to configure Nokia M10 so that it operates as a DHCP client. It can retrieve IP addresses for the ADSL/ATM channels from the network. However, the following requirements must be met:

- ADSL/ATM channels use VC multiplexed or LLC/SNAP RFC 1483 encapsulations for IP or Ethernet packets.
- IP address information of the WAN interface has been set to 0.0.0.0

Nokia M10 sends a DHCP broadcast message asking configuration information from any available DHCP server. If there is an active DHCP server behind the WAN interface M10 accepts and uses the network configuration settings the DHCP server provides to configure the WAN port parameters.

6.9 Domain Name Service (DNS) relay

Nokia M10 can act as a Domain Name Service relay for the LAN clients. M10 LAN IP address acts as a DNS server address for all hosts connected to the LAN. M10 recognises its own name and responses to name queries with its own name. All other name queries Nokia M10 forwards to a primary or secondary Domain Name Server whose address has been configured to Nokia M10 either dynamically or statically.

Appendix A

Technical specifications

A.1 Features

Software features	
Bridging	Self-learning bridge with 256 MAC addresses
Routing	Static routes, RIP and RIPv2
Data encapsulation formats	RFC 1483 IP and Ethernet over ATM PVCs Point-to-point Protocol over ATM AAL5 PVCs
Protocol conformance	RFC 1483, PPP over AAL5, ADSL/ATM
IP address management	NAPT, DHCP server for LAN clients, DHCP client for WAN ports, DNS relay

Hardware features	
ATM features	
ATM connections	PVC, up to 8 channels
Service categories	UBR
ADSL interface	
Physical layer	ANSI T1.413 Issue 2 compliant.
ADSL line connector	RJ-11
Cabling	Standard telephone wiring
Data interface	
Ethernet 10Base-T	IEEE 802.3, DIX V.2

Hardware features	
Data connector	RJ-45
Local management interface	
LMI connector	RJ-45
Indicator lights	
LAN	LAN activity, status and collision
DSL	ADSL line status
STA	M10 status

A.2 Mechanical construction and power supply

The M10 ADSL router is a stand-alone device which can also be wall-mounted using a wall-mount kit.

Mechanical construction	
Width	294 mm
Height	56 mm
Depth	237 mm
Weight	2.5 kg

M10 has an in-built power supply. The characteristics of the mains connection are presented in Table A-1.

Mains connection	
Voltage	100 ... 240 VAC
Frequency	45 ... 65 Hz
Power consumption	9 W

Table A-1 Mains connection

A.3 Ambient conditions, EMC and safety

Installation environment

Unit's operating temperature range 0 to 40°C

Humidity 10% to 90% non-condensing

EMC

The Nokia M10 complies with the following specifications provided that the device is connected to an earthed socket outlet:

EN55022 class B Emission

EN50082-1: 1992 Immunity

ITU-T K21 Overvoltage protection

The Nokia M10 does not require the use of shielded cables.

Safety

The Nokia M10 complies with the following specification:

EN 60950

DRAFT

Nokia M10 User's Manual

Glossary

Abbreviations

ACT	Active
ADSL	Asymmetric digital subscriber line
ATM	Asynchronous transfer mode
BNCP	Bridge Network Control Protocol
BOOTP	Bootstrap protocol
CHAP	Challenge handshake authentication protocol
CLI	Command line interface
COL	Collision
DHCP	Dynamic host configuration protocol
DMT	Discrete multitone
DNS	Domain name service
DSL	Digital subscriber line
DSLAM	Digital Subscriber Line Access Multiplexer
HTTP	Hypertext transfer protocol
INA	Inactive
IP	Internet protocol
IPX	Internetwork packet exchange
ISP	Internet service provider
LAN	Local area network

LCP	Link control protocol
LLC	Logical link control
LNK	Link
MAC	Media access control
MRU	Maximum Receive Unit
NAPT	Network address port translation
NAT	Network address translation
NCP	Network control protocol
NVRAM	Non-volatile RAM
OSI	Open System Interconnection
PAP	Password authentication Protocol
PC	Personal computer
POTS	Plain old telephone system
PPP	Point-to-point protocol
RAM	Random access memory
RFC	Request for comments
RIP(v2)	Routing information protocol (version 2)
SNAP	Subnetwork access protocol
SNMP	Simple network management protocol
STA	Status
TCP	Transmission control protocol
UBR	Unspecified bit rate
UDP	User datagram protocol
VCC	Virtual channel connection
WAN	Wide area network
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.

Appletalk

Series of communications protocols by Apple Computer.

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.

broadcast

A packet delivery system where a copy of a given packet is given to all hosts attached to the network.

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.

Config command hierarchy

A hierarchy of nodes which contain the configurable parameters of M10. It is used to configure M10 through the command line interface. See Root command hierarchy.

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.

domain name service

Domain name service (DNS) is used for translating names of network nodes into addresses.

dynamic routing

Dynamic routing maintains information of routes that may change over time. Dynamic routes are created and configured when routers broadcast Routing information protocol packets advertising the networks they can reach and the distance (number of routers) to each network.

encapsulation

Wrapping of data in a protocol header.

Ethernet

LAN specification IEEE 802.3.

firewall

A system or a group of systems that enforce access control between two networks.

default gateway

A default gateway is the router to which M10 will send a packet if it does not know how to reach the packet's destination host.

half-duplex

Communication between terminals one direction at a time.

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.

ping

Packet Internet groper. A program used to test the reachability of destinations by sending them an ICMP echo request and waiting for a reply.

POTS filter

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

proxy

A mechanism whereby on system 'fronts' for another system in responding to protocol requests.

Root command hierarchy

A hierarchy of commands used to monitor the performance of your M10, display and reset M10 statistics, and issue administrative commands to restart M10 functions through the command line interface.

router

A system responsible for making decisions about which of several routes the network traffic will follow.

routing table

A table in a router according to which the routing decisions are made. It contains addresses of other routers and the distance (number of hops) to those routers.

serial console connection

Serial connection behind the hatch in the front panel of M10. It is used for configuring M10 locally.

socket

In TCP applications socket specifies the TCP service access point defined by the source and destination ports.

static routing

Static routing maintains information of the routes to destination networks that are stable over time or to networks that must always be available, even if a link is not currently open. Static routes must be configured manually into the routing table.

subnet mask

A bit mask used to select bits from an Internet address for subnet addressing. The mask is 32 bits long and selects the network portion of the Internet address and one or more bits of the local portion.

telecommuter

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

telnet

A virtual terminal protocol in the Internet suite of protocols. Allows users of one host to log into a remote host and act as a normal terminal users of that host.

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 channel link

A means of unidirectional transport of ATM cells between the point where the Virtual channel identifier value is assigned and the point where that value is translated or removed.

Web browser

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

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