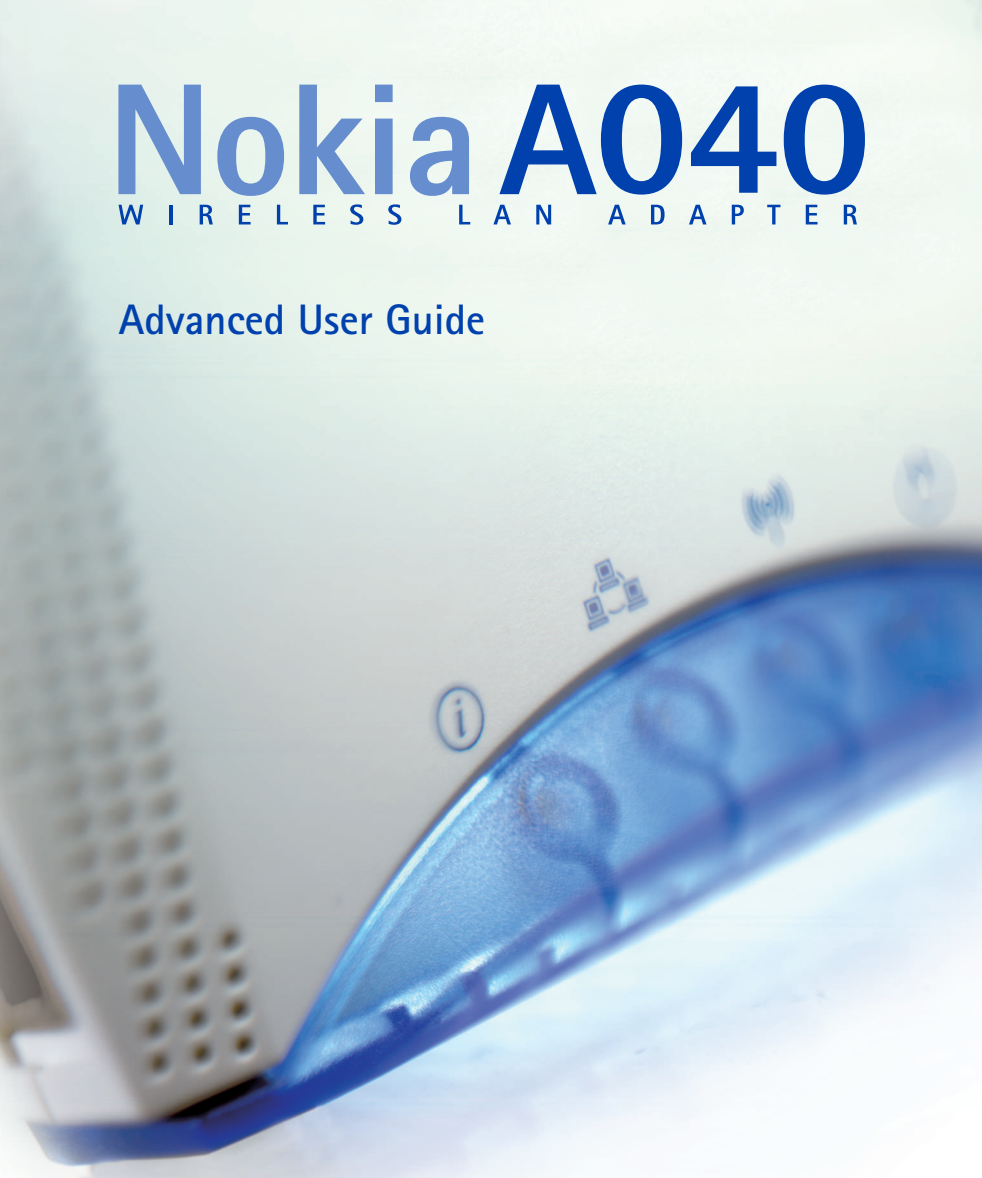
Nokia A040

WIRELESS LAN ADAPTER

Advanced User Guide



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ISSUE 1

Welcome

This guide follows on from the *A040 Getting Started* guide. It explains how to:

- Use a desktop or laptop PC to perform optional configuration via a direct Ethernet connection
- Monitor and make advanced configuration changes remotely, using any suitably privileged wired or wireless network station.

Conventions used in this guide

Your A040 can transfer information between a standalone computer and an existing LAN.

Notes

You'll find tips or other useful facts in side notes throughout the manual. Pay particular attention to notes that start with **Note** or WARNING.

Text conventions

We use the following conventions:

- `courier` is used for file names, or to denote text that appears on your screen
- **`courier bold`** is used to denote text that you should type in
- new terms are shown in *italic* text the first time they appear
- **bold** text denotes the name of a physical button or LED on the adapter (e.g. the **alert** LED) or a button on screen that you need to click (e.g. "click **Restart**").

Table of contents

1. Overview

This chapter introduces the various methods you can use to configure your A040.

The next chapter (*Preparing to configure an adapter* on page 13 describes the mechanics of performing configuration changes.

Configuration parameters on page 33 describes in detail all the configuration parameters available.

IP address options

You can use the A040 with or without assigning it an IP address (by default, it has *no* IP address).

The simplest method to access all the A040 management interfaces is to assign a unique IP address to the unit. However, in some cases you may not want to do this:

- You might have a limited number of addresses available
- You might want to move the unit around and not know in advance which IP subnet it will be attached to
- You might not be using a TCP/IP network.

With no IP address, you can still configure the A040, but you will not have access to all the management interfaces.

Management (configuration) interfaces

If you want to configure security or specific network names, or access the A040's range of special features, you need to use the built-in management functions:

- Web Browser Manager – Allows you to point your standard web browser to the A040 to access a built-in management utility
- Command Line Monitor (CLM) – Provides an ASCII text-based management utility which you can access using Telnet
- TFTP Transfer – Allows you to perform bulk uploads and downloads of configuration settings
- SNMP – Allows you to monitor the unit via an SNMP manager (not supplied).

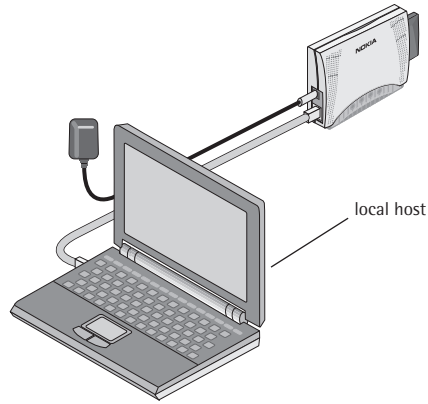
Accessing management interfaces

There are four methods by which you can access the management functions:

Note: *The only way to configure the adapter in its factory state is via a local host computer, using set-up mode or the Nokia IT Proxy Manager.*

- Set-up mode
- Nokia IT Proxy Manager
- IP address intercept
- Direct IP address.

For the first two methods above, the adapter must be connected to a *local host* computer (a PC directly connected to the adapter) which has an IP address:



These methods are described in more detail below.

Set-up mode

This is a special mode which allows the adapter to respond (temporarily) to *any* IP address (that is valid on the local host's subnet).

Generally, it would not make sense to have an A040 physically connected to a LAN, as its sole purpose is to connect a standalone device to a LAN wirelessly!

If the unit were connected to a normal TCP/IP LAN, responding to any IP address would be a disaster. However, in set-up mode, the adapter is only attached to a single host computer.

Assuming that the host computer has a valid IP address, you can start a Web browser, TFTP or Telnet application and set up a connection to any IP address which is valid for your local subnet (the *intermediate* address). The adapter will respond immediately to the application, allowing you to reconfigure it.

Nokia IT Proxy Manager

The Nokia IT Proxy Manager is a software program supplied by Nokia for Windows 95/98, Windows 2000 and Windows NT4. The program uses a special Nokia protocol to communicate with the adapter in place of TCP/IP. However, it presents an IP interface internally to the local host, fooling the Web browser and Telnet programs into thinking that they are talking to a TCP/IP device.

The advantage is that this method can be used without assigning an IP address to the A040 adapter.

IP address intercept

This method can be used once the adapter is successfully connecting to a network via an Access Point. It can only be used from the Access Point side (*not* from a local host computer) and only works if the host device has an IP address assigned.

The idea behind IP address intercept is that the adapter finds out the IP address of the host computer to which it is attached and then intercepts and uses this IP address for some of its own management functions. The host computer never sees the intercepted IP frames.

In its default state, the adapter has the intercept function turned on. However, you can selectively enable IP address interception for any combination of Web, Telnet, TFTP or SNMP applications. Normally the host computer does not have Web server, Telnet server or TFTP server functions so no functionality is lost by this method. The operation of client applications on the host are not affected – the host computer can use its Web browser or Telnet program to access other servers in the normal way.

Direct IP address

This method can be used once the adapter is successfully connecting to a network via an Access Point. It can be used from the Access Point side or from a local host computer, but only works if the adapter has a fixed IP address (it does *not* have one by default).

Summary

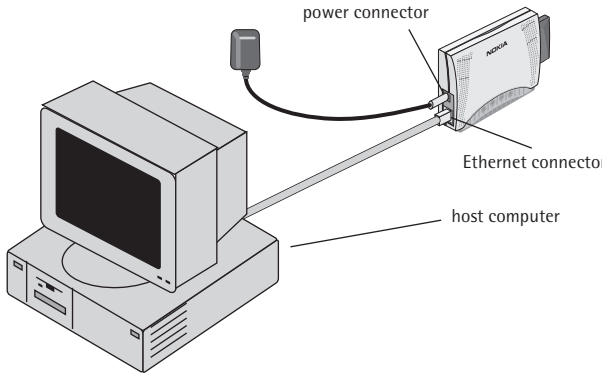
The table below summarizes which configuration methods and management interfaces you can use under different circumstances:

Method	Mgmt interface	From local host?	From remote station?	Notes
Set-up mode	**Web** **Telnet** **TFTP** **SNMP**	✔ ✔ ✔ ✔		One way to configure from the factory default state. See page 18.
Nokia IT Proxy Manager	**Web** **Telnet** **TFTP** **SNMP**	✔ ✔		Second way to configure from the factory default state. See page 22.
IP intercept (via host IP address)	**Web** **Telnet** **TFTP** **SNMP**		✔ ✔ ✔ ✔	Must have previously set appropriate management interfaces to accept intercepts. See page 28, page 38 and page 47.
A040 direct IP address	**Web** **Telnet** **TFTP** **SNMP**	✔ ✔ ✔ ✔	✔ ✔ ✔ ✔	Must have assigned a fixed IP address to A040 using set-up mode or the Nokia IT Proxy Manager. See page 18, page 22, page 37 and page 47.

2. Preparing to configure an adapter

For many applications, the A040 will work straight out of the box, with no configuration necessary. You'll only need to follow the instructions in this chapter if you need to change any of the A040 default configuration settings.

Note that you can only perform the configuration if you are able to connect the A040 to a PC supporting TCP/IP. In a non-TCP/IP environment, you'll need to set up TCP/IP temporarily on a workstation.



Installing the A040 utilities

Note: *The utilities only need to be installed on the machine you want to use for configuring attached adapters. (probably an administrator's machine, used for initial setup).*

Before you start to configure the A040, you'll need to install some system utilities and default configuration files onto a desktop or laptop PC (the local host, which will be directly connected to the adapter):

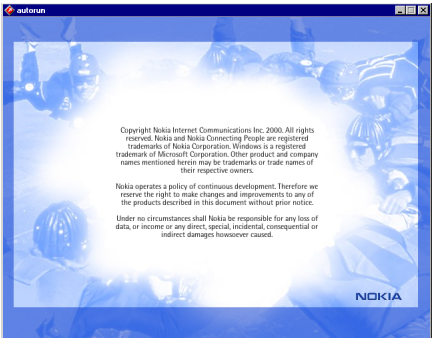
- Nokia IT Proxy Manager – Utility for configuring the adapter from a local host
- Nokia TFTP client – One way to upload new configuration settings; the only way to upgrade the system firmware

These are provided on the Utilities CD-ROM.

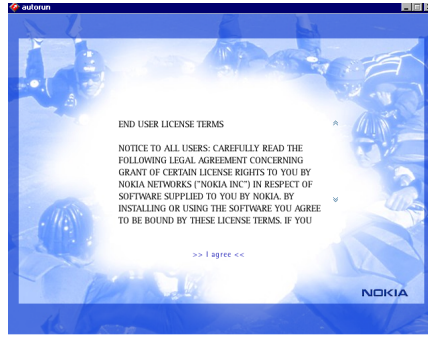
To install the Nokia IT Proxy Manager, along with other A040 utilities:

1 Insert the *Nokia A040 Utilities CD-ROM* into the host computer's CD drive.

The Nokia Utilities application should run automatically – you'll see the following screen after a few seconds:



2 Double-click on the copyright text to display the Nokia License Agreement:



3 Read the License Agreement and click >> **I agree** << at the bottom of the page to display the CD-ROM home page:

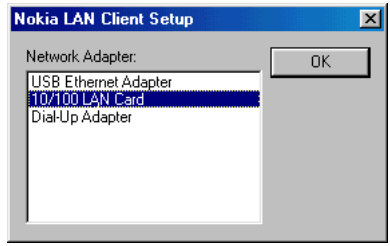
4 Click **Install Nokia A040.**

You'll see the installation options at the bottom of the page:

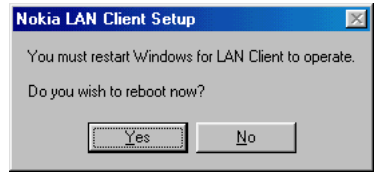
5 Click **Install A040 Utilities.**

6 Follow the on-screen instructions to install the utilities onto the host computer.

7 Select the network interface card used by the local host and click **OK**:



8 When you see the following prompt, **eject the Utilities CD from the drive** then click **Yes** to reboot the local host:

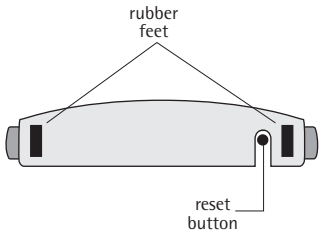


Using set-up mode

Starting the adapter in set-up mode

To put the A040 into set-up mode:

1. Switch the local host on.
2. Plug the Ethernet cable into the Ethernet connector on the A040 and the Ethernet port on the local host.
3. Plug one end of the A040's power adapter into a wall outlet.
4. Using the tip of a ballpoint pen, press and hold in the hidden reset button on the underside of the unit:



5. While holding in the reset button, plug the other end of the power adapter cable into the unit's power connector.

   The LEDs will come on, then go out again.
6. As soon as the LEDs go out, release the reset button.

While the unit is in set-up mode the following special conditions occur:

- The unit beeps intermittently
- The unit does **not** attempt to connect with any Access Point
- The unit will respond to **any** IP address (as long as it is valid on the local host's subnet).

Accessing management interfaces

Web interface

To access the Web interface while the adapter is in set-up mode:

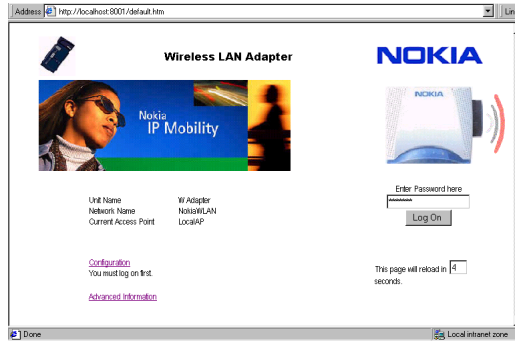
1 Start a Web browser on the local host.

2 Enter the following URL:

`http://xxx.xxx.xxx.xxx/`

where xxx.xxx.xxx.xxx is any IP address on the same subnet as the host computer.

You'll see the configuration home page:



3 Enter the password (**`default`**) and click **Log On**.

You can now use the Web management interface to configure the adapter. See page 34 for a description of all the parameters.

Restarting the adapter

You must click Enter followed by **Save** *to make your changes take effect.*

To make your changes take effect:

1 Click **Enter** to save the settings you've made.

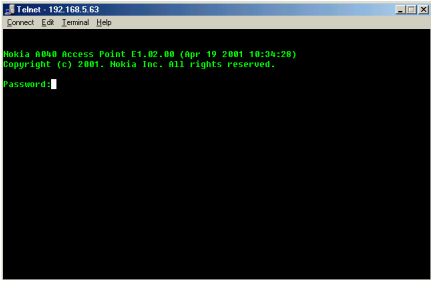
2 Click **Save** to commit the changes. This restarts the A040.

Telnet interface

To access the Telnet interface while the adapter is in set-up mode:

1. Choose **Run** from the **Start** menu on the local host.
2. Type **`Telnet`** and click **OK**.
3. From the Telnet window menu, choose **Connect > Remote system**.
4. In the **Host Name** field, enter any IP address in the same subnet as that of the host computer (you don't need to enter a **Port**).
5. Click **Connect**.

   At this point, the Nokia banner should appear in the Telnet console, followed by a logon prompt:



6. Enter your password at the prompt (the factory default password is `default`).

   You'll see the `CMD:` prompt in the Telnet window.

A full list of options is given in *Telnet management interface* on page 44.

TFTP interface

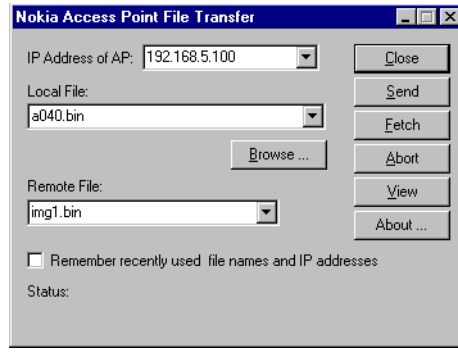
You can use the TFTP interface to configure the A040 with new settings, or to perform a system software upgrade.

To access the TFTP interface while the adapter is in set-up mode:

1 On the local host, click on **Start > Programs > Nokia A040 utilities > Nokia TFTP client**.

2 Enter any valid, unused IP address. The address must be valid for your local subnet.

You'll see the following window:



See page 53 for details on performing configuration changes; see page 69 for upgrade instructions.

Using the Nokia IT Proxy Manager

What you'll need

To configure the adapter using the Nokia IT Proxy Manager, you'll need a desktop or laptop computer (the local host) with the following:

- Windows 95/98, Windows 2000 or Windows NT4
- Web browser (e.g. Internet Explorer) or a Telnet client
- TCP/IP and a configured IP address/subnet mask (or auto-configuration)
- an Ethernet card
- Ethernet adapter cable with an RJ45 plug (supplied) if you're using a laptop with a PCMCIA Ethernet card
- The A040 utilities installed (see page 14).

Connecting the adapter

With the local host on:

1. Plug the Ethernet cable into the Ethernet connector on the A040 and the Ethernet port on the local host.
2. Connect the A040's power adapter to a wall outlet and the A040 and switch on.

   All the LEDs will come on, then go out. When the unit has started up, the **power** LED will light up and the unit will emit a 'chirp' (three rising tones).

Starting the Nokia IT Proxy Manager

Note: *IT Proxy software is only installed on computers used for configuring the adapters.*

To start the Nokia IT Proxy Manager:

1 From the **Start** menu choose **Programs > Nokia A040 Utilities > Run Nokia IT Proxy**.

You'll see the Nokia IT Proxy Manager icon on the icon bar.

- To start with it will show the following icon while it tries to find the adapter:

- When it finds the adapter, you'll see the following icon:

- If there is no adapter connected, you'll see the following icon:

Accessing management interfaces using the Nokia IT Proxy Manager

Web interface

To access the Web management interface:

1 Start a Web browser on the local host.

2 Enter the following URL:

`http://localhost:8001/`

You'll see the configuration home page:

3 Enter the password (**`default`**) and click **Log On**.

4 Click the **Configuration** link.

You can now use the Web management interface to configure the adapter. See page 34 for a description of all the parameters.

Restarting the adapter

To make your changes take effect:

1 Click **Enter** to save the settings you've made.

2 Click **Save** to commit the changes. This restarts the A040.

Note: *You must click* **Enter** *followed by* **Save** *to make your changes take effect.*

Telnet interface

Telnet provides a command line interface. To configure the A040 Telnet from the local host via the Nokia IT Proxy Manager:

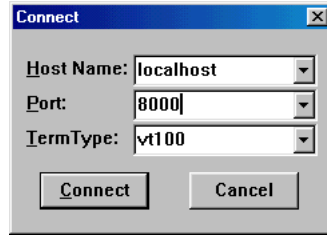
1 Choose **Run** from the **Start** menu.

2 Type **`Telnet`** and click **OK**.

If this fails for any reason, use the Find Files utility to search for `Telnet`. This should find a program called `Telnet.exe`, on which you should double-click.

3 From the Telnet window menu, choose **Connect > Remote system**.

4 Enter **`localhost`** as the **Host Name**, and **`8000`** as the **Port** and click **Connect**



At this point, the Nokia banner should appear, followed by a logon prompt.

5 Enter your `Password` when prompted. The factory-set password is `default`.

You'll see the following prompt in the Telnet window:

```
CMD:
```

You're now ready to enter commands.

Making changes

You use the `set` command to make configuration changes using Telnet. Commands take the form:

```
set parameter value
```

The full list of options is given on page 44.

Restarting the adapter

To make your changes take effect:

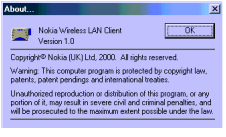
1 Type **`restart`** at the command line prompt.

This restarts the adapter with the new settings.

Nokia IT Proxy Manager Taskbar options

If you right-click on the Nokia IT Proxy Manager's icon on the taskbar, you'll see the following menu options:

- **About** – Displays the current version of the Nokia IT Proxy Manager.



- **Status** – Displays the connection status of the Nokia A040 and which Access Point it is connected to (MAC address and unit name).

- **Rescan** – Forces the Nokia A040 to rescan for an Access Point. Normally this will happen automatically. It also happens when you start the Nokia IT Proxy Manager.

  This appears when the unit conducts a Rescan – if a unit is found it will show the unit's MAC Address and Unit Name (see Status above). If no unit is detected it will show "No units found":

- **Settings** – Allows you to change the ports for Telnet and Web access (in some cases the default ports may clash with other services used by the computer).

Using IP intercept

To use the IP intercept method:

- Your chosen management interface on the adapter (Web, Telnet or TFTP) must be configured to accept IP intercepts
- You can only use this method from a remote computer (that is, you can *not* use it from a local host physically connected to the adapter)
- The host device (computer, printer, or scanner, for example) to which the adapter is connected must already have an IP address
- The adapter itself must *not* have a fixed IP address.

Enabling intercepts

Before you can use IP intercepts from a remote computer, you need to enable your chosen interface on the adapter to accept IP intercepts. You'll have to do this from a local host.

An example – enabling Web intercepts

For example, if you want to be able to configure the adapter remotely using the Web interface:

1 Use set-up mode (see page 18) or the Nokia IT Proxy Manager (see page 22) to remove the adapter's fixed IP address, if it has one.

2 Use set-up mode or the Nokia IT Proxy Manager to enable Web intercepts.

You can use the Web or Telnet interfaces to do this (see page 38 and page 46).

Accessing management interfaces using IP intercept

Web interface

To use the Web manager from a computer on the Access Point side of the network:

1 Start a Web browser.

2 Enter a URL of the following form:

`http://xxx.xxx.xxx.xxx/`

where *xxx.xxx.xxx.xxx* is the IP address of the host device.

You'll see the configuration home page:

3 Enter the password (**`default`**) and click **Log On**.

4 Click the **Configuration** link.

You can now use the Web management interface to configure the adapter. See page 34 for a description.

Restarting the adapter

You must click Enter followed by **Save** *to make your changes take effect.*

To make your changes take effect:

1 Click **Enter** to save the settings you've made.

2 Click **Save** to commit the changes. This restarts the A040.

Telnet interface

To use the Telnet manager from a computer on the Access Point side of the network:

1. Choose **Run** from the **Start** menu.
2. Type **`Telnet`** and click **OK**.
3. From the Telnet window menu, choose **Connect > Remote system**.
4. In the **Host Name** field, enter the IP address of the host device (you don't need to enter a **Port**).
5. Click **Connect**.

   At this point, the Nokia banner should appear, followed by a logon prompt.
6. At the `Password:` prompt, enter your password. The factory default password is `default`.

You'll see the following prompt in the Telnet window:

```
CMD:
```

You're now ready to enter commands.

Making changes

You use the `set` command to make configuration changes using Telnet. Commands take the form:

```
set parameter value
```

The full list of options is given in *Telnet management interface* on page 44.

Restarting the adapter

To make your changes take effect:

1. Type **`restart`** at the command line prompt.

This restarts the adapter with the new settings.

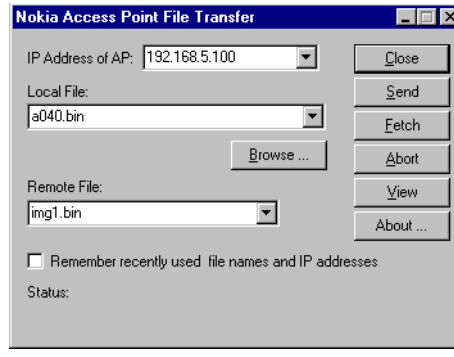
TFTP interface

Before you use the TFTP management interface from a remote computer, it must have a TFTP client installed. If necessary, you can install the Nokia TFTP client on the remote computer (see page 14).

To access the TFTP interface from a remote computer using the Nokia TFTP client program:

1 Click on **Start > Programs > Nokia A040 utilities > Nokia TFTP client.**

You'll see the following window:



2 If you want, place a check in the **Remember recently used file names and IP addresses** box. This will save time next time you use TFTP.

3 Enter the IP address of the *host device* (the adapter should not have an IP address!) into the **IP Address of Target** field.

You can now transfer files between the remote computer and the adapter. Please see *TFTP configuration* on page 53 for details on making configuration changes via TFTP.

Using a direct IP address

If the A040 has its own fixed IP address, you can access all the management interfaces from a local host or remote computer.

You can use exactly the same methods described in *Using IP intercept* on page 28 for accessing the various management interfaces. The only difference is that you enter the IP address *of the adapter itself*, rather than the IP address of any host device attached to it.

3. Configuration parameters

This chapter explains all the A040 configuration options.

There are many ways of accessing the management interfaces described in this chapter – please see *Preparing to configure an adapter* on page 13.

The table below describes the different management interfaces:

Interface	Description	See...
Web	The adapter acts as a Web server and generates screens by which you can monitor or configure the adapter.	page 34
Telnet	You can use a Telnet program to configure and monitor the adapter via a command line interface.	page 44
TFTP	You can use the supplied TFTP utility to download or upload information, or configure the adapter.	page 53
SNMP	You can use any suitable SNMP manager to monitor the adapter (an SNMP management application is **not** supplied).	page 59

Web configuration

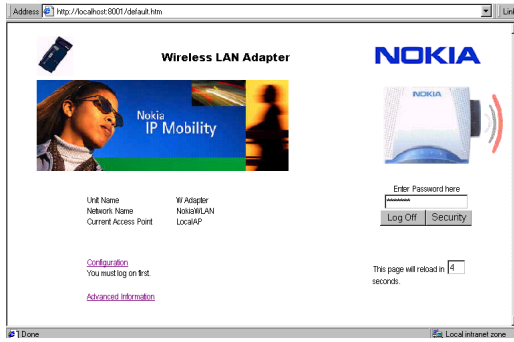
Logging on

Once you've accessed the Web interface, you'll see the configuration home page:

1 If necessary, enter the password (the default password is `default`). This is filled in for you.

2 Click **Log On**.

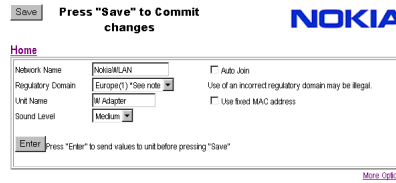
The page will update to show **Log Off** and **Security** buttons:



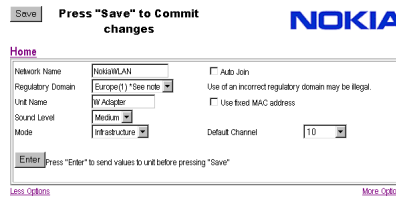
Viewing configuration pages

There are three pages of configuration options:

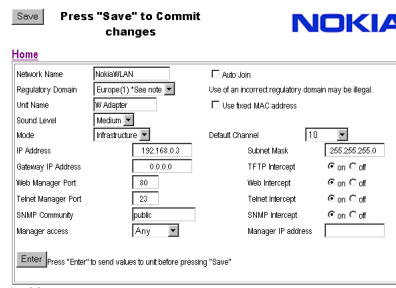
1 Click **Configuration** on the home page to see the basic settings:



2 Click **More Options** to see all the basic options, plus operating mode and default channel:



3 Click **More Options** again to see the basic and intermediate options, plus management settings:



You can click the **Home** link at any time to get back to the home page.

Making configuration changes

In general, to change a configuration option:

1 View the appropriate configuration page, as described above.

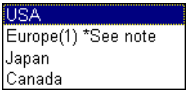
2 Click **Enter** to send new settings to the Nokia A040.

3 Click **Save** to restart the adapter with the new settings.

You must click **Enter** *and* **Save** *to make your changes take effect.*

Configuration settings

The following table explains what all the configuration settings mean, and gives advice on changing them:

Field	Meaning
Network Name	String specifying the network name for the wireless LAN. The entry can be up to 32 alphanumeric characters, and may include spaces. If you're only using one network, check the **Auto Join** box (see below).
Regulatory Domain	This defines the radio channels you are allowed to use, depending on which country is set. Select your country from the **Regulatory Domain** drop-down:  See *Regulatory domains* on page 67 for more information. **Important**: Use only the region setting appropriate for the area where the adapter is used at the present time. Using the adapter in any other region or with an incorrect region setting may be illegal.

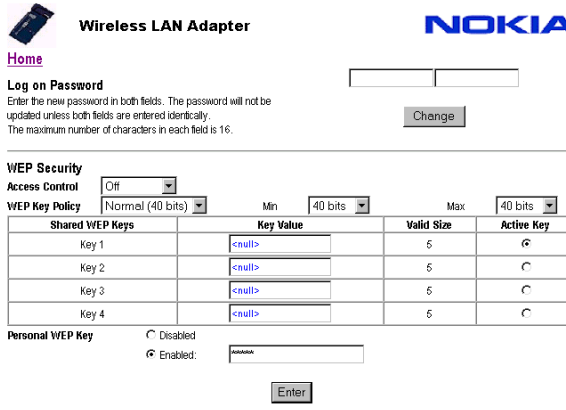
Field	Meaning
Unit Name	String up to 16 characters used to give the adapter an identifier name. Useful if you have multiple adapters on a network. Accessible through proprietary SNMP MIB.
Auto Join	Specifies whether the adapter will try to join *any* available network (suitable for small installations).
Use fixed MAC address	When selected, causes the MAC address of the radio card in the adapter to appear on Access Point web screens of associated stations, rather than the MAC address of the client's PCMCIA card. The default is **off**.
Sound Level	Sets the sound level of the unit's built-in speaker. Choose from Off, Medium or High.
Mode	The operating mode of the adapter: • Infrastructure – if using an Access Point • Peer-to-Peer – if not using an Access Point
Default Channel	Specifies the channel at which to *start* scanning for Access Points. If you have many adapters and Access Points, vary the default channel – that will prevent all adapters from choosing the same Access Point.
IP address	The IP address assigned to the adapter for management purposes. Normally the network system administrator will select this value. If you do not want to assign an IP address, leave this field blank. You'll need to set the adapter to use IP address intercept on one or more of the management interfaces (see the last entries in this table).
Subnet Mask	If you have set an IP address, this must be set to the value used on the adapter's local IP subnetwork.
Gateway IP Address	This is required if the management functions will be accessed from outside the local subnetwork.

Field	Meaning
Web Manager Port **Telnet Manager Port**	For security reasons or for remote access you may want to make the adapter respond to non-standard port numbers for Telnet and Web access. Disable Telnet and/or Web manager functions by specifying port **0** or **Off**. The default values for the Telnet and Web ports are **23** and **80** respectively. Most browsers allow access to a non-standard port numbers using a URL of the form `http://static_IP_address:port_number`
SNMP Community	Defines the SNMP community name used in SNMP accesses (maximum 16 characters).
Manager Access	Use this to restrict access to the Web, Telnet and TFTP management interfaces. The options are as follows: • **Any** - Allows any LAN or WLAN station to use the management functions. • **Specific** – Restricts access to the management functions to the machine with IP address defined in the Manager IP Address field (see below).
Manager IP Address	Enter the IP address of the workstation from which you want to be able to configure the adapter.
TFTP Intercept	Specify intercept of TFTP frames received from Air to IP address of the host computer. Note that Intercepts are only active if the A040 does not have a fixed IP address. If the A040 has its own IP address, setting the intercept on or off has no effect – use the direct IP address method (see page 32).
WEB Intercept	Specify intercept of WEB frames received from Air to IP address of the host computer. Intercepts are only active if the A040 does not have a fixed IP address.
Telnet Intercept	Specify intercept of Telnet frames received from Air to IP address of the host computer. Intercepts are only active if the A040 does not have a fixed IP address.
SNMP Intercept	Specify intercept of SNMP frames received from Air to IP address of the host computer. Intercepts are only active if the A040 does not have a fixed IP address.

Changing your password

To change your password:

1. After logging on, click the **Security** button below the password box on the home page.
2. On the resulting page enter your new password twice into the two fields above the Change button. Then click **Change**:



The password can be any alphanumeric string up to 16 characters long.

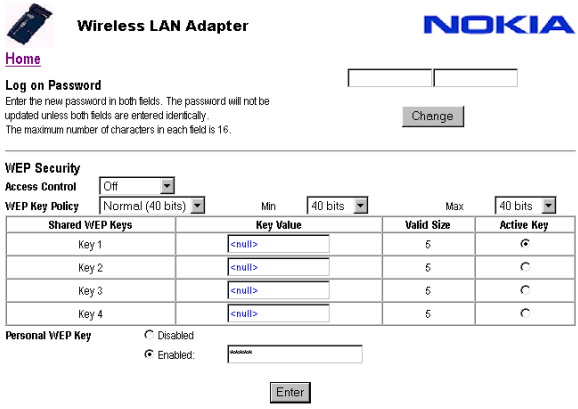
Changing WEP security measures

Your A040 is capable of using WEP security measures to prevent unwanted access to your network.

To change WEP security measures:

1 After logging on, click the **Security** button below the password box on the home page.

2 On the resulting page, amend the **WEP Security** options as necessary and click **Enter**:



The following table explains what all the options mean:

Item	Description
Access Control	Specifies whether WEP is active, and the admission policy. **Off** WEP mode deactivated **On** WEP wireless clients allowed to connect, using shared or personal WEP keys **WiFi WEP** Special mode used with some non-Nokia WiFi compatible systems; not generally recommended

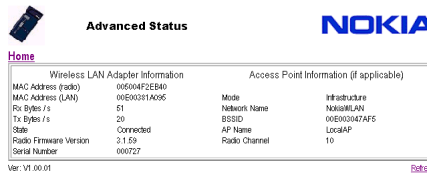
Item	Description
WEP Key Policy	This parameter determines the number of bits allowed for the WEP keys. • **Normal** – IEEE802.11 compatible mode: 40 bits • **Strong** – 128-bit key length • **Custom** – Use Min and Max key length settings: **40** (enter keys as ten octets) **56** (enter keys as 14 octets) **64** (enter keys as 16 octets) **96** (enter keys as 24 octets) **104** (enter keys as 26 octets) **128** (enter keys as 32 octets) For example, setting Min to 40 and Max to 96 will allow keys of 40, 56, 64 or 96 bits.
Key Value	These fields are used to enter the shared WEP key values. Note that the values are not displayed after entry (they appear as ****). If you want to enter keys in hexadecimal, prefix them with **0x**. **Important**: The keys will only work if their length is within the **Valid Size** limits (see below). A valid key is shown in green. If you enter a key that is of incorrect value, it will be shown in red.
Valid Size	(Read only) Tells you the valid size of the password for the current setting of WEP Key Policy. For an ASCII key entry this indicates how many ASCII characters should be in the WEP Key.
Active Key	This determines which of the four shared WEP keys is active (i.e. used for transmission).
Personal WEP key	Allows you to set (or disable) a personal WEP key for the A040. The disable and enable buttons allow you to activate or disable the Personal WEP Key.

Viewing status information

To view the current state of the adapter:

1 Click the **Advanced Information** link on the home page.

You'll see the following status page:



2 Click **Refresh** at any time to update the status display.

Status values

The following table explains the status values:

Item	Description
MAC Address (radio)	The MAC address used by the adapter for IEEE802.11 transmissions; this is learned from the attached host computer.
MAC Address (LAN)	The MAC address of the A040 used for management functions when accessed from the LAN side
Rx Bytes/s	Average bytes/sec in 10 second window
Tx Bytes/s	Average bytes/sec in 10 second window

Item	Description
State	Connection status: • Dormant – Unit is not communicating with a network. (Usually implies the radio card is not working) • Scanning – Unit is looking for an Access point • Joining – Unit has found an Access Point and is attempting to join the network • Authenticate – Unit has found an Access Point and is attempting to Authenticate • Associate – Unit has found an Access Point, authenticated and is now attempting to associate • Connected – Unit has successfully joined a network See also *Special LED/sound sequences* in the *Getting Started* guide
Radio Firmware Version	The current version of the radio firmware.
Serial Number	The serial number of the device.
Mode	Operating mode: • Infrastructure – if using one or more Access Points • Peer-to-Peer – if not using an Access Point
Network Name	Target network name (that which the adapter will try to join when scanning) or connected network name. Note that in the case of Auto Join this will show the network name of the Access Point which has been joined
BSSID	BSSID (usually the MAC address) of the Access Point which has been joined
AP Name	Name of the Access Point to which the A040 has connected
Radio Channel	Current radio channel in operation

Telnet management interface

Telnet provides a command line interface to configure A040 adapters. *Telnet interface* on page 20 tells you how to access the Telnet interface.

When you see the `CMD:` prompt in the Telnet window you're ready to enter commands.

Making changes and restarting

You use the `set` command to make configuration changes using Telnet. Configuration commands take the form:

```
set parameter value
```

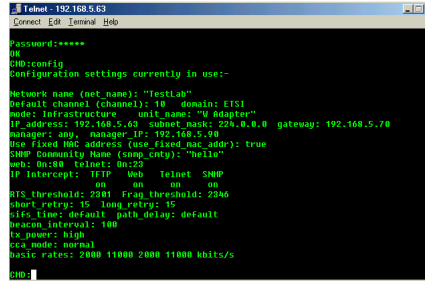
To make the changes take effect:

1 Type **`restart`** at the prompt.

This restarts the adapter with the new settings.

Viewing changes

Use the `config` command to view current settings:



Use the CONFIG+ command to view the new settings for parameters which will take effect after performing a restart.

Configuration settings

The following parameters can be set using the Telnet command line program:

Item	Comment
auto_join	Set **on** if the adapter is to auto-join with any available Access Point. Note that the Telnet `config` command reports this as `--- Automatic ---` **off** – adapter will only join the network specified by `net_name`. Default is `on`.
basic_rate	Controls the radio bit rate when running in peer-peer mode. Valid values are: 1000, 2000, 5500, 11000 (written in kbits/s). The command can take a list of parameters, for example: `set basic_rate 11000 5500`
beacon_interval	Time taken between two beacons.
beep_level	Controls the volume of the built-in beeper. Valid settings are: `off` completely suppressed `quiet` or `medium` the normal (default) sound level `loud` or `high` maximum volume
cca_mode	Channel Clear Assessment – controls detection of activity over the air interface.
channel	Default channel at which to start scanning (dependent on Domain setting).
domain	The regulatory domain (see *Appendix A – Regulatory domains* for definitions.
dtim_interval	Interval setting for Delivery Traffic Indication Message.
frag_threshold	An IEEE802.11 parameter which determines the maximum size of frames sent by the radio. Frames larger than frag_threshold are sent in several pieces. Lowering the value of frag_threshold can improve throughput for poor radio conditions, but reduces throughput for good radio conditions.

Item	Comment
gateway	IP address of gateway. Required if adapter is to be managed from remote location.
help	Displays all non-settable commands., such as `config`. See *Command summary* on page 52.
intercept	Specify intercept of TFTP, Web, SNMP and Telnet frames received from Air to IP address of the host computer. Note that Intercepts are only active if the adapter does not have a fixed IP address. For example: **`set intercept web on`**
ip_address	Fixed IP address of adapter. If you don't want to set an IP address, just type **`set ip_address`** with no parameter (this actually sets the IP address to 0.0.0.0).
long_retry	Specify value of "long retry" to radio.
manager	Used to control access to web, Telnet and TFTP management functions. Possible values are: `any` allows any station to use management functions `specific` allows access by specific stations only (see *manager_ip* below).
manager_ip	Specifies up to four stations allowed to use management functions (if `set manager specific` applies). The format of the command is: **`set manager_ip`** ***`ip_address`*** where: *`ip_address`* IP address of the manager's station For example: **`set manager_ip 192.168.0.1`**
mode	Infrastructure or Peer-Peer.
net_name	Network name (default is **Nokia WLAN**). See also `auto_join` parameter above.
password	Configuration password can be changed if current password is known.
rts_threshold	Specify value of "rts threshold" to radio.

Item	Comment
set help	Displays the list of all settable parameters. The parameters are listed in the Item column and described in the Comment column.
short_retry	Specify value of "short retry" to radio.
sifs_time	IEEE802.11 parameter – Short InterFrame Space Time setting.
snmp_cmty	Community name of adapter.
specific_key	Allows you to specify a personal WEP key. You can turn personal WEP key off, or specify a hexadecimal or ascii string. For example: **`set specific_key off`** **`set specific_key hex ae325e092c`** **`set specific_key ascii mywepkey`**
stats air	Reports on data transferred over the wireless LAN. Stats are reported for both the last 10 second period, and accumulated since the unit was last restarted or the stats were cleared.
stats clear	Wipes out the cumulative stats for both LAN and air.
stats LAN	Reports on data transferred via the Ethernet port. Stats are reported for both the last 10 second period, and accumulated since the unit was last restarted or the stats were cleared.
subnet_mask	This is required if an IP Address is assigned. It denotes whether the client is local or remote.
telnet	TCP Port number of Telnet server.
tx_power	Power setting for transmission. 1=default 2,3,4 are high power values
unit_name	User friendly name for adapter. Accessible through proprietary MIB.
use_fixed_mac_addr	Controls whether the unit uses the radio card's MAC address on the radio interface or reflects the client's MAC address. Valid values are `true` and `false`.

Item	Comment
web	TCP Port number of web server.
wep_key	Assigns a key value to one of the four slots. The command takes the form: `set wep_key key_number key_value` where *key_number* selects which shared WEP key (1, 2, 3 or 4) is being entered, and *key_value* assigns it a value. *key_value* must follow the WEP key policy set by the Access Point. Examples: **set wep_key 2 ae325e092c** assigns the value ae325e092c to shared WEP key number 2. **set wep_key 3 n** assigns a null value, deactivating shared WEP key number 3.
wep_key_active	Specifies which of the four shared WEP keys is active. For example: **set wep_key_active 3** means shared WEP key 3 is active.
wep_key_range	Allows you to specify a custom WEP key policy. The command takes the form: `set wep_key_range min max` where *min* and *max* can be one of the following: 40 40-bit encryption 56 56-bit encryption 64 64-bit encryption 96 96-bit encryption 104 104-bit encryption 128 128-bit encryption For example: **set wep_key_range 56 96** means the adapter will accept keys of a minimum length of 56 bits, up to a maximum length of 96 bits.

Item	Comment
wep_mode	Specifies whether WEP (wire equivalent privacy) is active, and the admission policy. Please see the documentation that came with your Access Point for a full description of WEP. `open` WEP mode deactivated `wep` WEP wireless clients allowed to connect, using shared or personal WEP keys `wifi` Special mode used with some non-Nokia WiFi compatible systems. Station may use open authentication to associate with the Access Point then switch to shared WEP key. Personal WEP keys not supported. Mode provided for compatibility with other vendor equipment; not generally recommended. `personal` A personal WEP key encrypts the link between a station and an AP. This key can be different for each station. The key encrypts unicast frames (frames directed at a particular station or AP). There is one personal WEP key allowed per station and the AP must be configured to get the key from an external Radius server, or it should be included in the NID table. If a personal WEP key is not used, the current shared WEP key is used instead.

CLM commands

This section gives a complete listing of the CLM commands available on the Nokia A040. For an explanation of how to access the CLM, see *Telnet interface* on page 25.

The basic command syntax is:

```
command parameter1 value
```

The format of *value* depends on the parameter you're changing. Some values are simple numbers, some are strings and some are special values such as IP addresses.

The command and parameters are separated by spaces.

- You can correct typing errors using the backspace key.
- You can terminate certain commands and return to the command prompt by pressing **Ctrl-C**.
- You can repeat the previous command by pressing the space bar at the command prompt.

Help on commands

- To see a summary of commands, type:
  help (or **?**)
- To get help on a specific command, type:
  help *command* (or **? *command***)
  For example:
  help ping
- To see a list of parameters for the `set` command, type:
  set help (or **set ?**)

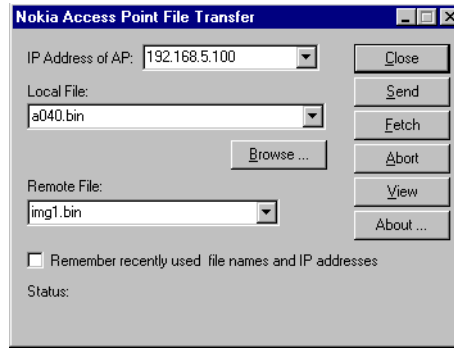
Command summary

Command	Description
config	Displays current system configuration settings.
config+	This works like the config command but shows the settings that will take effect on the next restart.
exit	Performs a logout from the command line (and is functionally identical to the logout command). For a telnet connection, it also disconnects the telnet session.
help or **?**	Issued on its own, displays a summary of all commands. Can also display on a specific command.
log dump	Displays the contents of the initialization log on the screen.
log clear	Clears out the log information.
logout	Exits the CLM. Re-enter the password to use CLM.
restart	Causes the Nokia A040 to re-initialize. This is equivalent to turning the power off and on again. Normally this command is issued after configuration changes. Restarting the unit can be disruptive to currently connected users.
set	See *Telnet management interface* on page 44.
stats lan **stats air**	Displays traffic statistics for the last 10-second interval (cumulative since last cleared or system reset). Clear stats using the command **`stats clear`**.
status	Returns the following details: LAN MAC Address; Associated Access Point; CurrentNetwork; Current IEEE 802.11 BSSID; Current Channel.
ver	Displays product name, along with version and copyright information for the Nokia A040 software.
wep	Displays current WEP settings. Radius Server IP Address fields are not returned if Radius lookup is not enabled (via the wep_mode command).
wep+	This works like the wep command but shows the settings that will take effect on the next restart.

TFTP configuration

All the parameters listed in *Configuration settings* on page 46 can be read and set using the TFTP transfer file `config.txt`.

Preparing to configure an adapter on page 13 tells you how to start the TFTP client. Once it is running, you can transfer files between a local or remote computer and the adapter:

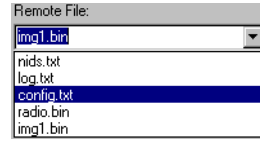


You can click **Browse** *to specify a file.*

The drop-down menu lists recently-used files.

1 In the **Local File** field, enter the name of the source file (when sending) or destination file (when fetching) on your local disk or network drive.

2 In the **Remote File** field, choose the name of the A040 'file' you want to send or fetch from the drop-down menu.



You can click **Abort** *to interrupt a send or fetch.*

3 Click **Send** or **Fetch.**

If the operation is successful the status message should read 'File Sent OK' or 'File Fetched OK' as appropriate.

Please see *config.txt* on page 56 for details on making configuration changes via TFTP.

Possible error messages

You may see one or more of the following error messages during file transfer:

Message	Possible causes
`timed out`	You typed the wrong IP address, you have not connected to the A040, or the A040 is configured not to accept TFTP from your station.
`unknown file`	You probably made an invalid entry in the **Remote File** field.
`upload in progress`	Another station is performing an upload at the same time, or the previous upload was not completed successfully. Try again after 30 seconds.

TFTP file descriptions

This section gives a detailed description of each file available for transfer between a client and the A040 using TFTP.

log.txt

The A040 maintains a log file which is updated when the unit is initialized.

This file keeps a record of each initialization. The uploaded log file is stored in regular text format.

Here's an example of a log file:

```
Initializing version: V1.00.01

Initialize LAN port...
LAN Port ready, Message :  Web Config Update

Initializing version: V1.00.01

Initialize LAN port...
LAN Port ready, Message :  Flash Update

Initializing version: V1.00.01

Initialize LAN port...
LAN Port ready, Message :  CLM Request

Initializing version: V1.00.01

Initialize LAN port...
LAN Port ready,
```

img1.bin

`img1.bin` is the name of the 'file' on the A040 where the firmware for the adapter is stored.

From time to time during the warrantee period, Nokia may make new versions of firmware available. New releases might have additional features or might fix anomalies that have been reported in the operation of the unit. In such cases Nokia will provide a binary file as denoted by the extension `.bin` (e.g. `a040.bin`), along with upgrade instructions.

For example, to upgrade the A040 firmware:

1 Using the TFTP client, select `a040.bin` as the **Local File**, and `img1.bin` as the **Remote File**.

2 Click **Send**.

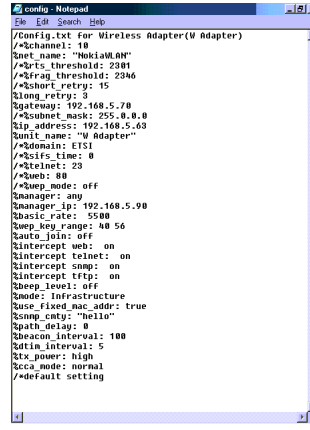
config.txt

This file is a text file containing all the A040's important configuration settings.

A system manager may want to keep a record of the A040's configuration settings for future reference, or as a backup before performing any new configuration.

You can use a backup copy of config.txt if you run into problems while configuring or upgrading the A040.

An example of a config.txt file is shown below:



Modifying the config.txt file

Note that some entries are commented out (lines starting with '`/*`'). This denotes entries that are set to a default value. You can delete these lines without affecting the result when the file is downloaded to the A040.

If you want to modify a parameter, delete the comment characters and amend the parameter accordingly.

For example, to change the radio channel:

1 Use a text editor to open `config.txt`.

2 Modify the file as follows:

Old line: `/*%channel: 10`

Modified line: `%channel: 11`

3 Save `config.txt`.

4 Send the file to the A040.

When you send `config.txt`, the following action is taken by the A040:

1. The new configuration file is read in and checked for format. If there are any format errors the configuration is not updated
2. If the send is good, all the parameters (except password) are reset to their default value.
3. New settings from the config.txt file are loaded into the A040.
4. The A040 performs a restart with the new settings.

Monitoring information

TFTP can download the contents of the log.txt file which may contain diagnostics information in the event of software failures.

SNMP management interface

The A040 has a built-in SNMP Agent capability which allows integration into SNMP managed enterprise environments. The Agent supports SNMP V1.0 requests and provides data from the following MIBs (supplied as files when you install from the Utilities CD-ROM):

Data	Supplied in file
RFC1213 (MIBII)	`RFC1213.mib` `IANAifType.mib`
IEEE802.11 MIB	`IEEE80211.mib`
ETHERLIKE MIB (partial)	`ETHERLIKE.mib`
Proprietary MIB	`Nokia-A040-MIBv1.mib`

The source text for these MIBs is provided on the Utilities CD-ROM supplied with your Access Point. The MIBs are provided in ASCII text format for easy incorporation into SNMP Manager Products.

Items which are listed as Read/Write in the MIB will cause an error response if a Set command is issued.

You cannot configure an adapter using SNMP.

MIB Summary – RFC1213 – MIB II (1.3.6.1.2...)

The Version of RFC1213 supplied has been modified to recognize the IEEE802.11 interface type The following is a summary of the sections of MIBII indicating which parts of the MIB are supported:

System	All fields supported (Read only). The Contact, Name and Location values can be set using the Web manager function.
Interfaces	All fields supported. There are two entries in the Interface table. Interface 1 is the Ethernet Interface and Interface 2 is the IEEE802.11 Interface.
AT	Not Supported.
Internet Protocol	All fields supported (Static information).
ICMP	Supported as appropriate.
TCP	TCP connections are shown in an eight-row table. All fields are supported in each table row. However, the table size is fixed.
UDP	Supported for UDP listeners TFTP and SNMP.
EGP	Not supported.
Transmission	DOT3 Stats Table supported (partial).
SNMP	All fields supported.

IEEE802.11 MIB (1.2.840.10036...)

The IEEE802.11 Standard MIB is defined as an SNMP V2.0 MIB. The MIB supplied on the *Nokia A040 Utilities CD-ROM* has been converted to an SNMP V1.0 format for easy integration into a wide range of managers. Many of the entries in the MIB are not relevant to the A040 because they refer to some capability (such as frequency hopping) which is not supported. The following groups are supported:

Dot11SMT	Station Configuration Table	All entries supported (Read only)
Dot11SMT	Authentication Algorithms Table	All entries are static
Dot11SMT	WEP Default Keys	Not supported
Dot11SMT	WEP Key Mapping Table	Not supported
Dot11SMT	Privacy Table	Supported
Dot11SMT	SMT notification	Not supported
Dot11MAC	Operation Table	Fully supported (Read only)
Dot11MAC	Counters Table	Fully Supported
Dot11MAC	Group Addresses Table	Not Supported
Dot11RES	Static entry	
Dot11PHY		Fully supported for Direct Sequence

Nokia proprietary MIB

The following information is provided as part of the Nokia MIB.

System information

The entries in this section describe characteristics of the adapter:

Serial number	Serial number of unit hardware. Should correspond to exterior label.
Hardware Information	Special information about this unit (normally shows `Unknown`).
Software Version	Shows Version number of firmware and BIOS in flash memory.
Software Build Date	Compile date of firmware (may be useful for support).

System configuration

The entries in this group relate to the current configuration of the adapter:

Name	User-assigned name of adapter.
Auto Join	Indicates whether the unit will scan or look for a specific network.
Management Address	The IP Address of the specific manager.
Operating Mode	Infrastructure or peer-to-peer
Net Name	Network Name in ASCII text format.
Telnet Access	Indicates whether Telnet access is enabled.
Telnet Port	TCP/IP port number on which Telnet service is provided.
Web Access	Indicates whether Web access is enabled.
Web Port	TCP/IP port number on which Web service is provided.
Management Enable	Global setting of Management enable flag (all, none, specific).
Gateway Address	IP address of network gateway configured into adapter.

Radio table

Note that the counters in this group are measured from the adapter's perspective, treating the PCMCIA radio card as an independent device. Since the PCMCIA radio card contains its own MAC processor there may be small differences between the numbers reported in this group and those reported by the IEEE802.11 MIB which are measured inside the PCMCIA radio card. Note that counters are 32-bit and overflow back to 0.

Radio Interface Index	Fixed value of 2.
Radio Status	indicates `up`, `down` or `not present`. The latter is the case if the PCMCIA slot is empty.
Radio Type	Identifies the type of PCMCIA radio card installed.
Radio Description	Taken from the CIS of the PCMCIA Radio card.
Radio Firmware	Indicates the version of firmware used by the PCMCIA radio MAC processor.
Radio Usage	The percentage utilization over a recent 10 second interval (0 – 100%).
Radio Rx All Frames	Counter of frames received from PCMCIA card.
Radio Rx Mgmt Frames	Counter of management frames received from PCMCIA card.
Radio Rx Data Frames	Counter of data frames received from PCMCIA card.
Radio Rx Copied Octets	Counter of total bytes copied from PCMCIA radio card.
Radio Rx Frame Discards	Frames discarded by adapter due to unspecified problem.
Radio Tx All Frames	All frames sent to the PCMCIA radio card.
Radio Tx Sent Octets	Counter of total bytes copied to PCMCIA radio card.
Radio Tx Fails	Count of frames for which re-transmission was required.

LAN table (Ethernet)

Note that counters are 32 bit and overflow back to zero.

LAN Interface Index	Fixed value of 1.
LAN Status	Indicates up or down (if disabled by management process).
LAN Current Interface	Indicates 10baseT.
LAN Rx All Frames	Counter of all frames received by LAN interface.
LAN Rx Accept frames	Counter of frames which are copied into adapter for processing.
LAN Rx Copied Octets	Counter of bytes transferred into adapter from LAN interface.
LAN Rx Frame Discards	Frames discarded by adapter due to unspecified problem.
LAN Tx All Frame	Counter of all frames sent to LAN interface.
LAN Rx Sent Octets	Counter of Bytes transferred to LAN interface.

Distribution

Information on the mandatory A040 Access Point internal distribution bridge table.

Current Network	ESSID – Client Adapter.
Current Access Point	The name of the current Access Point connected.

Appendix A – Regulatory domains

This appendix lists the regulatory domains appropriate to various countries. Use only the region setting appropriate for the area where the adapter is used at the present time. Using the adapter in any other region or with an incorrect region setting may be illegal.

The regulatory domain is set at the factory, and should be correct for the region in which you purchased the unit. If you need to change it, refer to the table below:

Country	Regulatory domain
USA	USA
Austria Denmark Finland Germany Iceland Ireland Italy Norway Spain Sweden Switzerland UK	Europe[a]
Japan	Japan
Canada	Canada

a. If using the CLM to set the regulatory domain, you should enter **`set domain ETSI`**

Appendix B – Upgrading the A040

You can use the TFTP interface to perform a system software upgrade, if one is supplied by Nokia. You should do this from the local host (the PC on which you installed the A040 utilities – see page 14).

Starting in set-up mode

To put the A040 into set-up mode:

1. Switch the local host on.
2. Plug the Ethernet cable into the Ethernet connector on the A040 and the Ethernet port on the local host.
3. Plug one end of the A040's power adapter into a wall outlet.
4. Using the tip of a ballpoint pen, press and hold in the hidden reset button on the underside of the unit.
5. While holding in the reset button, plug the other end of the power adapter cable into the unit's power connector.

   The LEDs will come on, then go out again.
6. As soon as the LEDs come on again, release the reset button.

While the unit is in set-up mode the following special conditions occur:

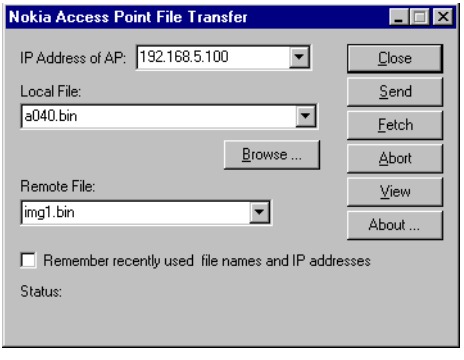
- The unit makes an intermittent beeping sound
- The unit does not attempt to connect with any Access Point
- The unit will respond to any IP address.

Accessing the TFTP interface

To access the TFTP interface:

1 Click on **Start > Programs > Nokia A040 utilities > Nokia TFTP client.**

You'll see the following window:



2 Enter any valid, unused IP address. The address must be valid for your local subnet.

Uploading the software image

If Nokia supply you with a new software image for the A040, it will be called something like `A040.bin`. For example:

1 In the **Local** file box enter **`A040.bin`**

2 In the **Remote** file box select **`img1.bin`**

3 Click the **Send** button.

The new image will be sent to the adapter.

When the upgrade is complete, there will be a single, long beep and the unit will reboot. It is important not to power off the unit during this process. Failure to observe this may leave the unit in an unrecoverable state, requiring factory repair.

Appendix C – Resetting factory defaults

If the configuration settings have been changed you can revert back to the factory default settings as follows:

Starting in set-up mode

To put the A040 into set-up mode:

1. Switch the local host on.
2. Plug the Ethernet or USB cable into the Ethernet connector on the A040 and the Ethernet port on the local host.
3. Plug one end of the A040's power adapter into a wall outlet.
4. Using the tip of a ballpoint pen, press and hold in the hidden reset button on the underside of the unit.
5. While holding in the reset button, plug the other end of the power adapter cable into the unit's power connector.

   The LEDs will come on, then go out again.
6. As soon as the LEDs go out, release the reset button.

   While the unit is in set-up mode it makes an intermittent beeping sound.
7. Press and hold the reset button until the **power** LED flickers red.

   While the button is being held, the beeping will become higher in pitch.

8 Hold the reset button for the count of five higher-pitched beeps.

9 Release the reset button.

10 After the defaults have been loaded, the beeping should return to the lower pitch.

11 Switch the adapter off and then on again (by removing and replacing the power cable).

The adapter will start beeping as it searches for and tries to connect to an Access Point.

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