


Turn an old computer into
an Internet gateway using Linux

GATEWAY TO THE INTERNET



Lots of people, even home users, now have more than one computer. And most people who have more than one computer would like to be able to connect to the Internet from any of them. There are many ways to achieve this, but a good method – if you can afford it – is to use a dedicated gateway/firewall. In fact, this solution isn't as expensive as it sounds.

If you have an old, redundant computer you can set this up easily and cheaply using a Linux-based free software package called FREESCO. Julian Moss investigates

Dedicating a PC to providing Internet access for a couple of computers may seem an expensive solution. But the computer you can use for this doesn't have to be very powerful. Any old 386 that's sitting gathering dust in a corner will do.

FREESCO will let you turn a redundant PC into something genuinely useful. About the only thing you'll have to buy – if you don't have a spare one handy – is a cheap network card.

Windows users might be interested to know that you can use this Linux-based gateway to let Windows computers access the Internet. FREESCO is a lot more versatile and robust than Windows' "modem sharing." Nor does it require you to reconfigure your Internet software to use proxy addresses or a SOCKS interface like many Windows-based solutions. FREESCO will keep your computers safe from attacks coming from the Internet since it functions as a firewall too. The router is configured using a text-based

menu interface and managed using either a terminal or a web-based interface so you don't actually need any knowledge of Linux or Unix to use it.

As well as a gateway FREESCO provides a time server for computers on your network to set their clocks with, plus a print server, a DNS server, a DHCP server, a remote access server (allowing remote users to dial in to your network) and a web server. However, the web server is really an extra use of the server that is there to provide FREESCO's web interface. There's no FTP server for uploading files so if you want to use FREESCO as a web server you must manually transfer your web pages to the appropriate directory while the router is down.

FREESCO supports up to three network cards and two modems. Its main limitation is that it only acts as a static router. You can set it up to use a choice of ISPs but it won't automatically try alternatives if it has trouble getting a connection. If you

want to try FREESCO the first thing you should do is check that you have all the necessary hardware. The main item you will need is an old computer that isn't being used for anything else. It should be a 386 or better with at least 6MB of RAM. It doesn't require a hard disk as FREESCO can boot and run from a floppy. Nor will it need a keyboard or monitor: once set up FREESCO can run without either. If you really can't spare a keyboard, though, make sure you can disable the keyboard test in the BIOS boot-up checks or you may find that the boot process halts with a "keyboard not found" error.

You'll need a network card to connect your router PC to your other computers. FREESCO supports several inexpensive, popular cards including the NE1000, NE2000, 3C509 and 3C59x series. If you're buying a network card specially for this project make sure that its IRQs and I/O addresses can be manually configured. FREESCO doesn't support Plug and Play. "Jumperless" cards are OK, although you'll have to set them up first using the DOS or Windows based setup software. Use the default settings if possible, to make it easy for FREESCO to detect the card.

Finally, you'll need a modem. If you plan to use an internal modem, make sure it isn't a Winmodem. This type of modem is often supplied with a new PC, but it needs special Windows drivers in order to work. It won't, therefore, run under Linux.

Buffered ports

If the modem is an ISA bus card and not PCI, it's almost certainly OK. If it's an external modem you shouldn't have a problem, but if the computer is very old make sure the serial port has a buffered UART compatible with the INS 16550A. Most 386s and many 486s have un-buffered ports that drop characters when run at the speeds needed to use a V90 modem or ISDN TA. Note that FREESCO only supports external TAs that are connected via the serial port and can be controlled in the same manner as modems using the AT command set.

If your old computer lacks a buffered serial port you may be forced to buy an internal modem especially for FREESCO. A few years ago replacement serial cards were easy and cheap to obtain; now, even ISA internal modems are getting a bit hard to find. An inexpensive choice would be the Dynanet 56K Internal ISA from Simply Computers. It works very well with FREESCO.

Having got all the bits together, your next step will be to download the FREESCO software. You can get this from the FREESCO home page at <http://www.freesco.org>. If you can't get to this site try www.freesco.net or www.freesco.com instead: these URLs point to a mirror page. You should download two files: the software – currently version 0.26 – and the documentation, which at the time of writing was only up to version 2.0. Both are Zip format archives. Unzip them to a convenient tempo-

rary location. The documentation is a set of HTML files so you'll want to put it somewhere where you can view it in a browser while you're setting up the software. An annoying feature of the documentation is that it contains a banner ad on each page: this may make your computer try to connect to the Internet whenever you open it.

Boot floppy

Now you need to create the FREESCO boot floppy. The software archive that you downloaded contains a disk image which you simply transfer to a spare floppy disk. Open a console window, change to the directory containing the archive contents and execute the command:

```
dd if=freesco.026 of=/dev/fd0
```

If you're using Windows or DOS you can achieve the same result using the command:

```
rawrite.exe freesco.026
```

For convenience, the DOS rawrite program is included in the package.

Now the fun starts. Install the network card and modem in your router computer, connect it to your network and attach a monitor and keyboard. Boot the computer from the floppy disk you just prepared, and when the command prompt comes up log in as root, password root. (You'll probably want to change this later on: the process as described in the documentation.)

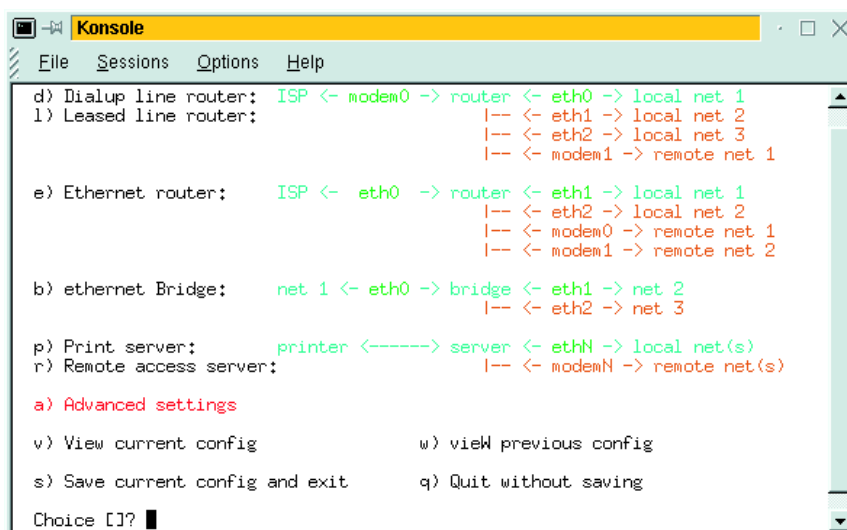
If the computer's hard disk was previously formatted for DOS you now have the choice of installing FREESCO to the hard disk. There are several benefits of doing this. Hard disks are less error-prone than floppies so you'll avoid read errors. FREESCO will load quicker. A hard disk installation will also give you needed extra space if you want to use the built-in web server. To install FREESCO to the hard disk use the command:

```
move2hdd
```

INFO

The FREESCO home page:
<http://www.freesco.org/diald>
information:
<http://diald.unix.ch/>

Fig. 1: Choosing your setup option



Then remove the floppy disk and reboot. To start FREESCO from DOS you must use the `router.bat` file provided. This can easily be made to run at start-up so the computer boots up FREESCO automatically when it is turned on.

Setting up

Now you must perform the initial configuration. You should be logged in as root and looking at a command prompt. Type the command: `setup`

The router setup program is easy to use. You just answer a series of questions. Many options are selected by typing a number, and most can be left to the default settings. However, you can't go back and change an option if you made a typing error so

it will pay to check each entry carefully before pressing Enter. Nothing is written to disk until the end, so if you make a mistake you can simply reboot and start again.

Setup gives you a choice of three types of router configuration. The first, which is the one we will describe here, is the LAN-to-Internet dial-on-demand gateway. You select this by typing "d" at the menu (Fig. 1). A very similar option to set up is the LAN-to-Internet gateway using a leased line. The third option doesn't provide a gateway function at all: it simply acts as a bridge connecting two or three small Ethernets, reducing network traffic by restricting local data packets to their own segment of the network.

To complete the setup you'll need to know the I/O address and IRQ number of your network card and all the details – phone number, login name and password, authentication method and domain name server (DNS) address – for connecting to your ISP. You'll also need to know the IP address range and network mask for the PCs in your network. If you already have a working network and can connect to your ISP from one PC you should already have all this information.

While working through the setup steps look at section 4 of the documentation. It gives a list of most of the steps but not all of them as it hasn't been updated since version 0.20. However, you'll find that helpful notes are displayed by the setup program itself before each choice (fig. 2). The default value for most of the choices will prove to be sensible for most users.

Enabling

If the computers on your network have each been allocated their own IP address already (the typical home or small business network case) you can answer No to the option for enabling the DHCP service. You'll also probably answer No to the WINS address question. You won't want to enable the public HTTP server (web server) unless you need a local web server on your network for some reason. If you do, bear in mind the difficulty involved in updating the web pages, as previously mentioned.

If you pay by the minute for Internet calls you should choose the value for "Keep up ppp link" with care. (Note: it's in seconds.) If it's too high, you'll waste money keeping the link up while it's idle: if it's too low and you use a modem you'll waste time redialling whenever the link drops. You can use FREESCO's web interface to bring the link up and down manually, but you may find this method a bit cumbersome.

If you choose the value 0 for this setting the link will be controlled by the rules in the file `/etc/filter.cfg`. It's worth trying the supplied rules to see if they work well for you. You can customise these rules to suit your requirements, but the way the rules are expressed makes this far from easy. The filter rules

```

Konsole
File Sessions Options Help

Now let's enable and configure services and servers.

Caching DNS server. Generally you should enable and use
it, particularly with a dialup connection, otherwise you
may get unexpected dialouts.
You may want to edit the DNS configuration files:
rc_named, named,hst, named10.rev, named172.rev, named192.rev
Consult manual at http://www.isc.org regarding BIND v4
WARNING: y - enable service worldwide, insecure!
         s - enable service locally, secure (recommended)
         n - disable service
411 Enable caching DNS server y/s/n [s]?
412 Enable DNS requests logging for debug purpose y/n [n]?
     Enable DHCP if you want automatic configuration of client
     IP address, subnet mask, domain, and dns server. You must
     choose an IP address range in network setup for each
     network you require DHCP to work on.
     NOTE: You should not enable two or more DHCP servers
           on the same network.
WARNING: y - enable service worldwide, insecure!
         s - enable service locally, secure (recommended)
         n - disable service
421 Enable DHCP server y/s/n [n]?
  
```

Fig. 2: Explanatory help text is displayed by the program

```

Netscape: FREESCO Control Panel (c) 1999,2000 serg@mailandnews.com
File Edit View Go Communicator Help
Back Forward Reload Home Search Netscape Print Security Shop Stop
Bookmarks Location: http://darwin:82/cgi/usr.cgi What's Related

Info
System
Recent Log
Last Logins
Network

Dialout Link
Status
Up Down
Un Block
Un Force

Modem Users
List Change Del

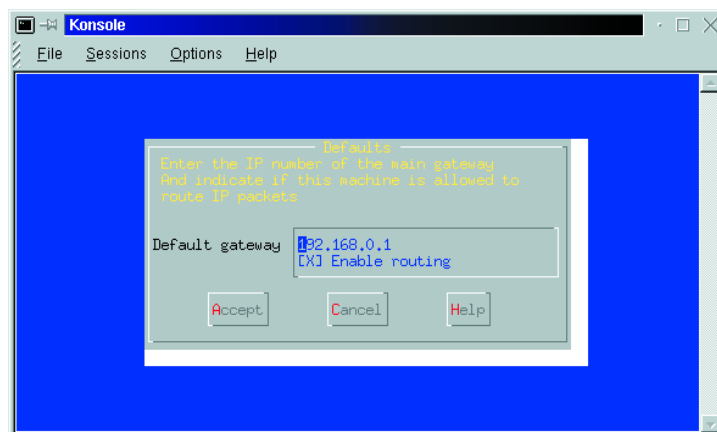
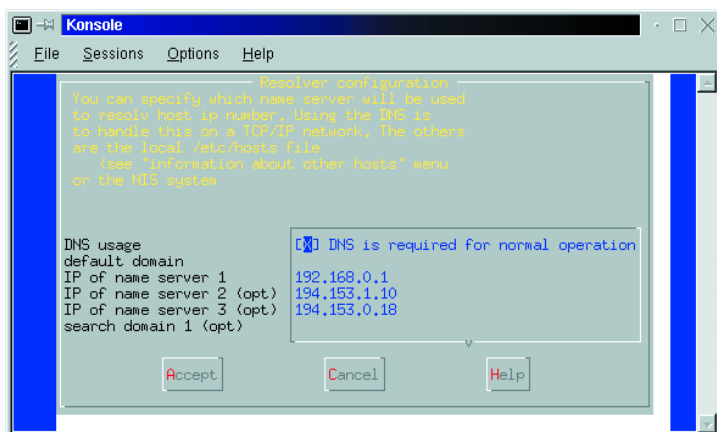
Web Users
List Change Del

Services
DNS      RST OFF
DHCP     RST OFF
HTTP     OFF
LPD      RST OFF
MODEM    RST OFF
RINGS    RST MOR
TELNET   RST
FIREWALL RST
SYNCTIME NOW
BAN      ADDR
UNBAN    ADDR

Port Forwarding

[Linux] _
[Linux] I
  
```

Fig. 3: FREESCO's web interface



use the same format as the file `diald.conf` so for more information on how to customise them see the `diald` documentation which you can find online.

If you plan to use more than one ISP bear in mind that the default ISP – the one that FREESCO will begin using immediately after boot-up – will be the first one in the alphanumericly-sorted list. ISP names are limited to 8 characters in length. Therefore you may find it useful to use names like 1-FSNET, 2-CIX to ensure that they are listed and used in the order you want.

Remember to start the ISP phone number with a T (for tone dialling) and don't put spaces in the number. You can enter more than one number for an ISP, with spaces between each one, so a space within a number will cause it to be treated as two separate numbers.

Once you have completed the initial configuration you can reboot the router and it will be ready for use. With the network interface active and assigned the correct IP address you can now Telnet to the router (assuming that you enabled the Telnet interface during setup.) Once connected you can log in, edit the configuration, add new ISPs and so on.

For day-to-day use you can use the web interface to check the router's status, change its settings, switch ISPs and even reboot the router (Fig. 3). This means that you can, if you want, remove the keyboard and monitor from the router PC and move it out of the way somewhere.

Workstation configuration

Before you can start accessing the Internet through your router you must set up the PCs on your network so that they know that your FREESCO PC is the default gateway to the Internet. Your PCs – and any software running on them that performs domain name look-ups – should also be configured to use the router PC as their primary DNS.

With most Linux distributions you can do this using a system configuration utility such as `linuxconf`. Choose the Networking option, then choose "Name server specification (DNS)" and enter the FREESCO PC's IP address (fig. 4). Save this, return to the menu and select "Routing and gateways." Again, enter the router's IP address here (fig. 5) and ensure that routing is enabled.

Another method would be to update each PC's kernel routing table using the `route` command. If your router has the IP address 192.168.0.1 then the command would be:

```
route add default gw 192.168.0.1
```

You'll probably want this command to be executed every time the PC starts up. One way to do this is to append this command to the file `/etc/rc.d/rc.local`.

To tell a Windows PC to start using your FREESCO router to access the Internet you should open the Control Panel and double-click Network. Go to the Configuration tab and select from the list the item "TCP/IP -> network card". Then click on Properties. Go to the DNS Configuration tab, enable DNS and ensure that the router's IP address is the only one listed (Fig. 6). If you're enabling DNS for the first time you must also enter a domain. Then go to the Gateway tab and add the same IP address as the first and only gateway (Fig. 7). You'll probably also need to open the Internet control panel and change the setting from "Dial using this connection" to "Use Network."

Once the workstations are set up all a user needs to do to connect to the Internet is launch their web browser, mail client or whatever. If the router isn't connected at the time there will be a short delay while it dials your ISP and establishes a connection. The connection will remain up until no data has passed over the link for the period you set in "Keep up PPP link" or according to the rules in the `filter.cfg` file. If you have ISDN then connections are almost instantaneous and it feels almost as if you have a leased line.

Conclusion

By using the FREESCO router you can provide Internet access to all the PCs on your network using a single ISP connection, dialling on demand. There is no need to reconfigure any of your Internet software to use special proxy addresses or a SOCKS interface.

FREESCO also protects your network behind a firewall to prevent unauthorised access from the Internet. It is a very good, very simple and very inexpensive way to access the Internet that can be used by any small home or business network. ■

[left]
Fig. 4: Setting up the DNS using `linuxconf`

[right]
Fig. 5: Setting the default gateway using `linuxconf`

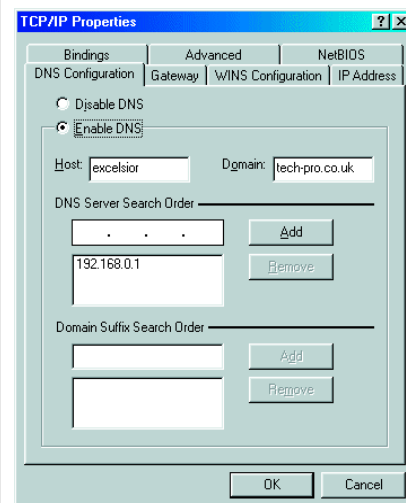


Fig. 6: Configuring DNS on a Windows PC

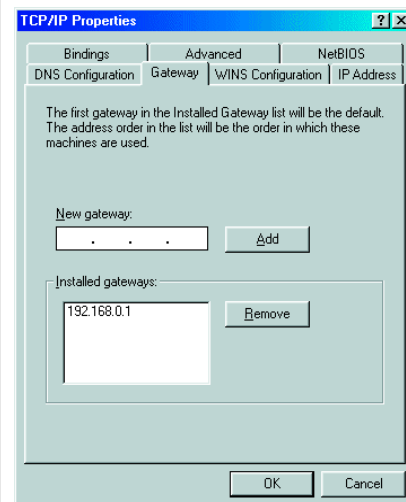


Fig. 7: Setting the default gateway under Windows