Implementing an easy and secure broadband router using Coyote Linux.

stijn.huyghe@thti.telindus.be

Description: *set up a broadband router using a floppy based Linux distribution. Linux experience is not required for a successful configuration and deployment on a home network. Network connection sharing is done through dynamic NAT (Network Address Translation).*

Computers and Internet access get cheaper every month. It is not uncommon anymore that an average household possesses more than one PC. Usually these PCs are often integrated in a home network for sharing files and printers, playing computer games and sharing the broadband Internet access so that every PC is able to connect to the Internet.
That's what this article is all about, building a cheap, free, secure and stable access point towards the outside world. We suppose that you have already a working network between your PC and that you know something of basic networking.

Coyote Linux.

Coyote Linux is a single floppy based Linux distribution developed by Vortech Consulting with only one goal in mind: sharing an Internet connection. The Coyote floppy can be created using a true wizard on Microsoft Windows or by a Linux shell script. Coyote Linux is available free of charge and requires very low hardware requirements. The distribution is able to provide the performance and uptime that is Expected from a Linux based system.

During this article we will make use of the Windows wizard, as it is the one that most people will use to start with (the set up for the Linux shell script follows the same configuration steps).

Requirements.

This is what you need:

- One old (spare) PC.
  Coyote requires at least a 486DX with 12MB RAM and a floppy drive (3.5"). You don't need a hard disk. For this small how-to we have used an old Dell OptiPlex with 16 MB EDO RAM and a 133Mhz Pentium processor.
- One working system with Microsoft Windows or Linux to run the wizard or shell script on.
- Two network interface cards (NIC), 10Mbit or 100Mbit, PCI.
- External (non-USB) broadband modem.
  For the set up we used an Alcatel 1000 ADSL modem.

Running the wizard.

First step: download the current release of Coyote Linux from http://www.coyotelinux.com. You can find both the Linux creator and Windows disk creator in the download section of the site. We made use of version 2.0.3 (April, 2003). After selection of the file, you will be redirected to the download site of Sourceforge (sourceforge.net) to choose your closest mirror to download the file from (e.g. for people from Belgium, select "belnet (BE) in the "select preferred mirror" selection menu).
Download the zip file and extract it with the tool of your choice (e.g. Winzip, WinRAR,…) of your choice to a directory on your hard disk

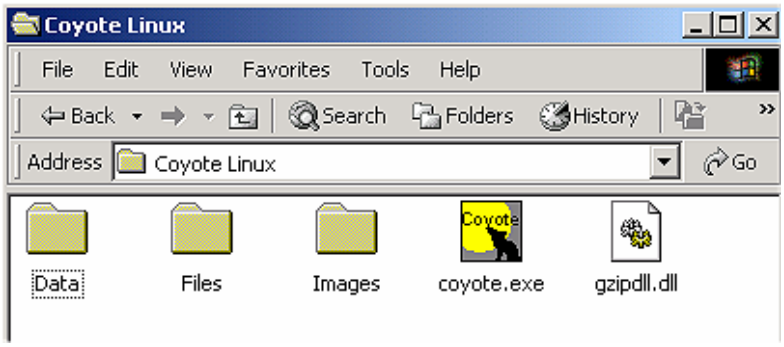

Figure 1. Extracted Coyote Linux files.

Second step: find a decent and working floppy disk (one of the hardest steps during this set up). Format the disk using standard Windows tools (Select your floppy drive in "My Computer" and choose format or perform a "format a:" at the DOS prompt – where "a:" is your floppy drive).

Step three: running the Windows wizard. The Windows wizard will guide you through the process of building your Coyote Linux boot floppy. Simply run the "coyote.exe" executable. The welcome screen will pop-up. Select "next" to go to the next screen after reading the comment.

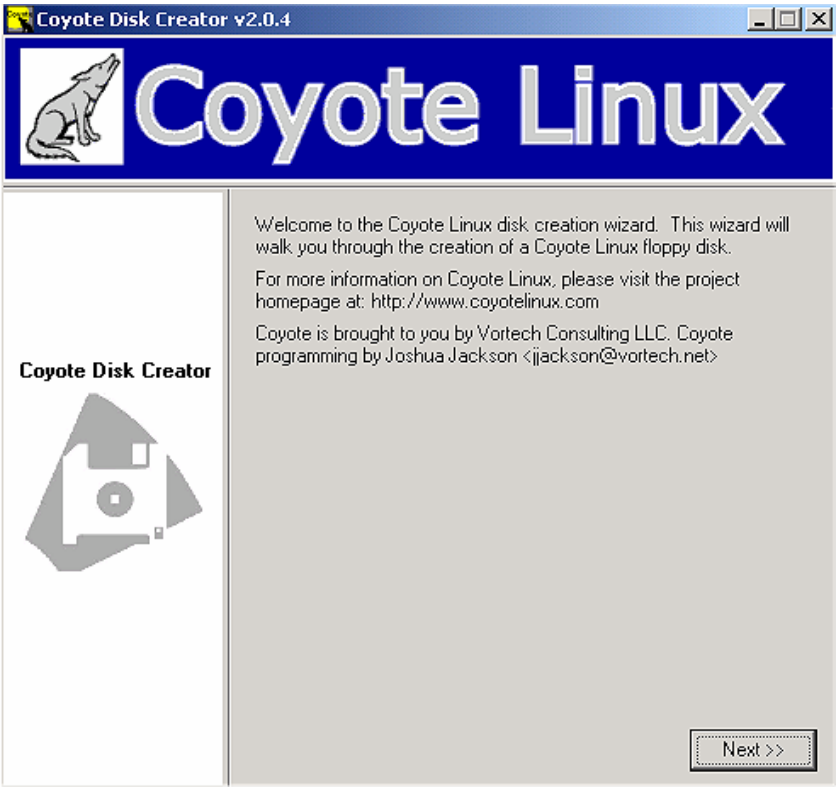

Figure 2 Coyote Linux welcome screen.

In the following screen you will configure the settings of your internal network. This is your internal network range that is using the router to connect to the Internet. Coyote proposes the 192.168.0.0/24 network but you can change it to fit your needs. Note: make sure that you are using a non-routable IP address range for your internal network. Non-routable IP addresses ranges:

- Class A: 10.0.0.0 to 10.255.255.255.
- Class B: 172.16.0.0 to 172.31.255.255.
- Class C: 192.168.0.0 to 192.168.255.255.

We will make use of the 192.168.0.x network during the set up. This means that all the hosts behind the router (if you don't make use of DHCP) need an IP address in this range (192.168.0.x) with a configured subnet mask of /24 (or 255.255.255.0). The default gateway of your internal hosts will be the Coyote Linux router (192.168.0.1) with the DNS settings provided by your ISP. Also, don't forget to configure proxy settings in the browsers when required by your ISP.

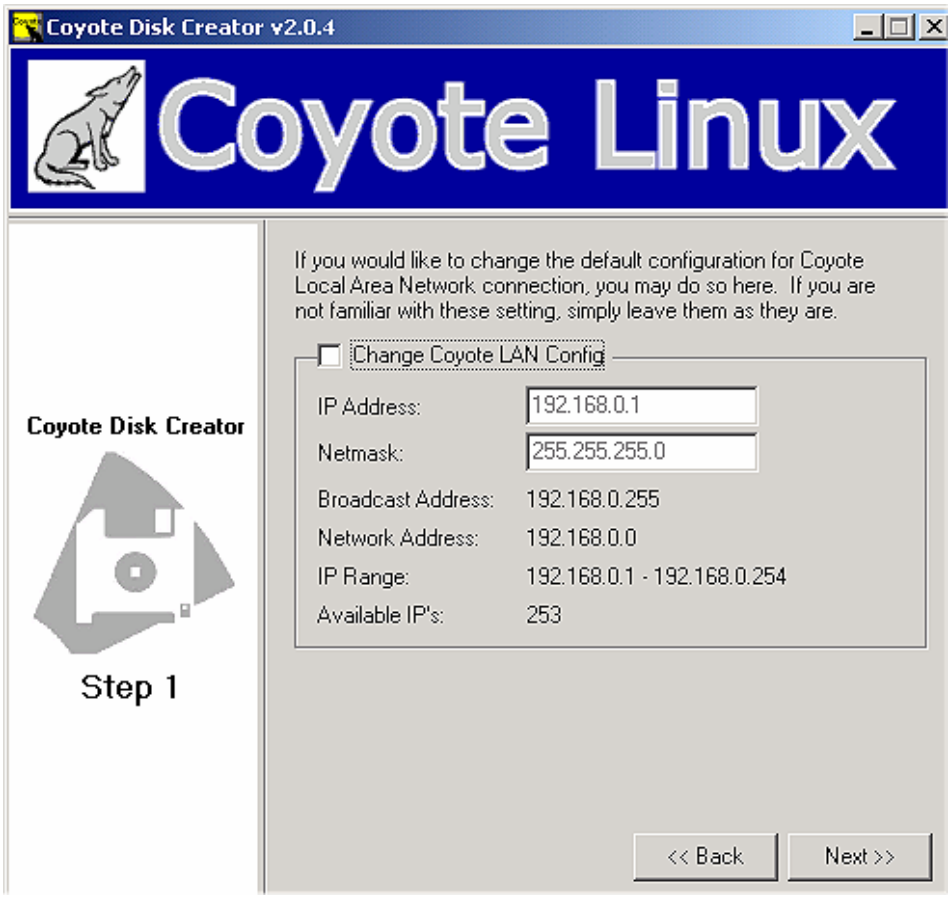

Figure 3 Coyote Linux: configuration of the internal network.

The screen that follows is only intended for the Road Runner cable modem service. Most of you don't need it, so just hit "next" and continue screen. (If you would need these settings, consult the Coyote Linux web site for more information and fill in the data provided by your ISP).

Select your select your connection type: DHCP (e.g. cable), static IP, PPPoE (e.g. ADSL) or a PPP modem dialup. We will use the PPP over Ethernet configuration as we are dealing with an ADSL modem and connection.

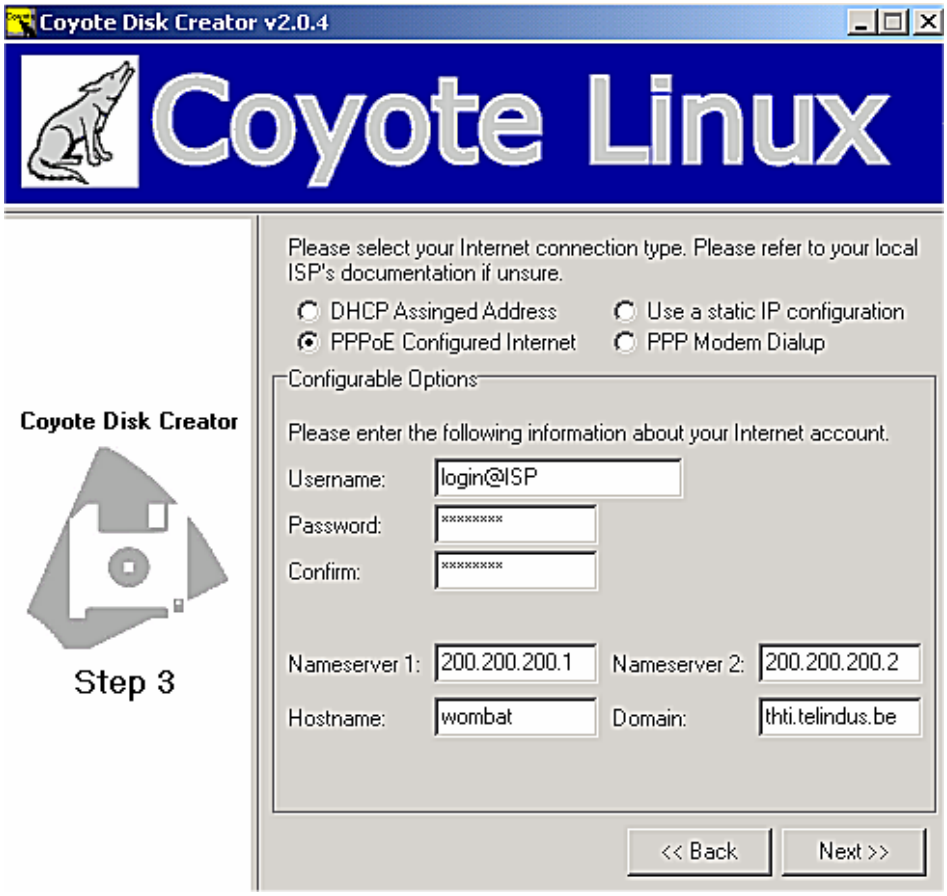

Figure 4 Configuration of the Internet connection.

If you want to run an additional DHCP service offered by Coyote Linux on your network, enable it in the next screen. When the DHCP server is enabled, fill in the number of IP addresses available through it. In our configuration, we have chosen to provide the information for 50 IP addresses (192.168.0.204-254) through this service. Make sure that your clients are configured to use the DHCP settings.

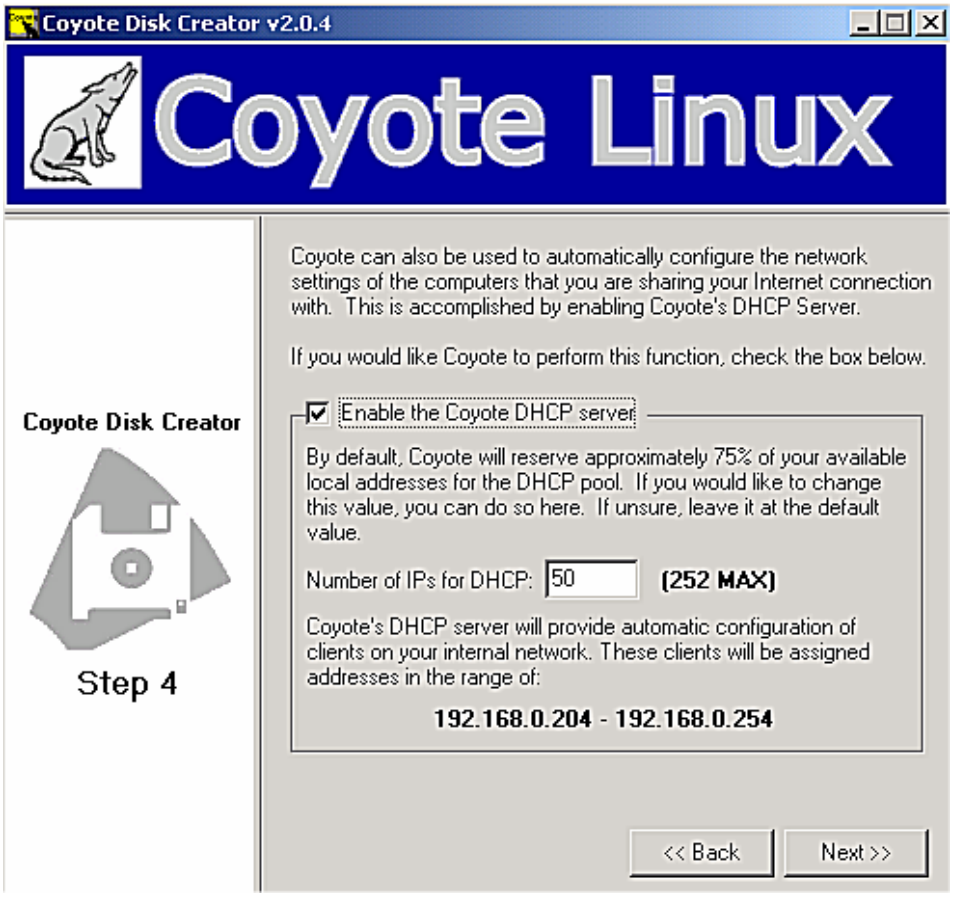

Figure 5 Configuration of the DHCP server.

After this, the wizard will ask you to set and configure your both NICs for use in the Linux router. If you don't have a clue, select the "select" button. Here you can find a listing of most commonly used NICs, vendors and chipsets. As you can see, for our router configuration we used two NICs with a RealTec 8139 chipset.

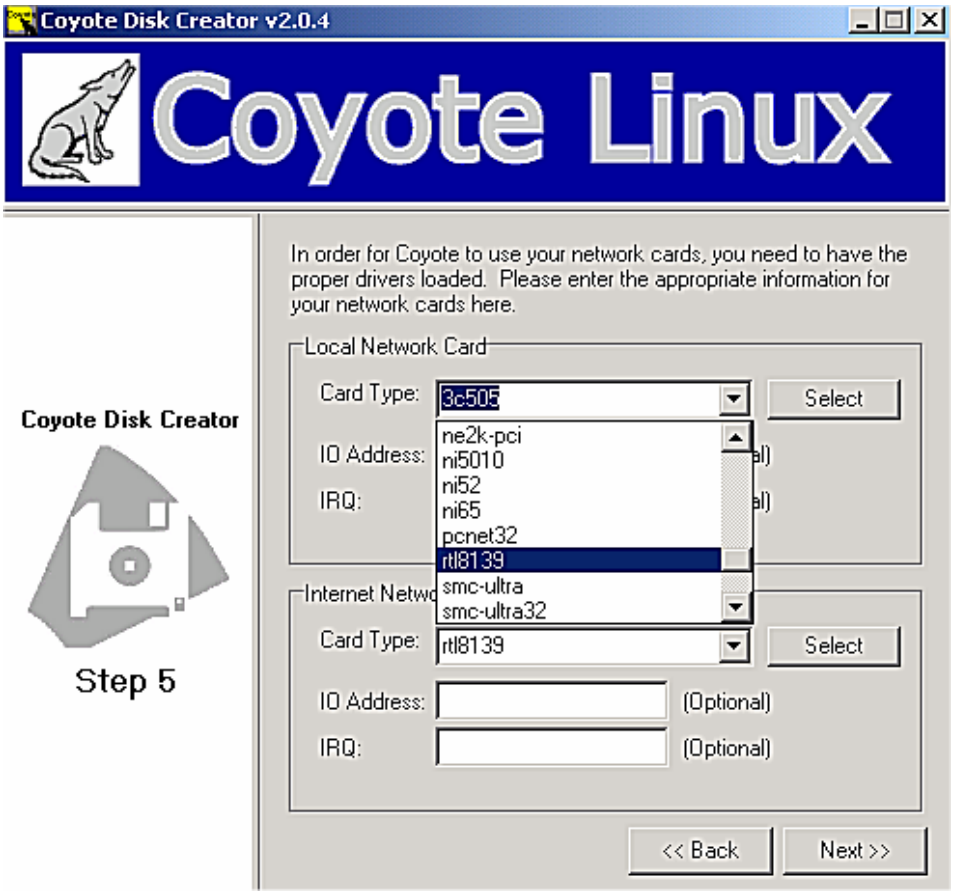

Figure 6 Selecting the NICs for your router.

Almost done! Select "next" to go to the next screen. Here you just find one big button to create your Coyote Linux floppy, writing the distribution and the configuration on the floppy. That's it for the initial configuration. There is nothing else that you need to do at this point.

Running Coyote Linux.

At this point, make sure that your hardware is ok. Connect one of the interfaces to your broadband modem. Connect the other interface to your hub or switch of the internal network. Insert the configured floppy in the drive and boot the device. Make sure that the BIOS is instructed to boot from the floppy drive.

If everything is ok, Coyote Linux will boot, will recognize your two NICs and will start automatically a connection to the Internet using your settings (you might need to switch cables if you connected the wrong interface to the modem). A login prompt will be shown on your screen (you don't need a screen or keyboard later on).

The first thing that you need to do is to change the password on the system. To do that, log in using "root" and hit enter (you don't need a password). Type "4" at the menu and change your password. Make sure that you choose a strong password for

user “root” (note: keyboard is set by default in qwerty). Go back to the main menu and choose to save your configuration to disk (make sure that your floppy is not write protected at this point).

The Coyote Menu allows you to change and monitor your network settings, system settings, package settings, the running configuration and even if you want to enable remote access through the telnet server (as a general security rule: if you don’t need it, disable it. If you use it, disable it on the external interface). You can further enhance security by creating Ipchains (Linux packet filter) rules through the menu. Ipchains will also be used to masquerade (to hide) your network towards the Internet by default, so you don’t need to create additional rules to activate NAT.
Hitting “q” in the main menu will drop you a shell. If you want to go back to the Coyote menu, type “lrcfg” (Linux Router ConFiGuration).

At this point, everything should be up and running.

Other (more advanced solutions) you might consider:

Astaro Security Linux: http://www.astaro.com.
FREESCO: http://www.freesco.org.
Fli4l – the one disk router: http://www.fli4l.de.
Linux Router Project: http://www.linuxrouter.org.
Smoothwall: http://www.smoothwall.org.
Netfilter/iptables – fire walling subsystem for Linux: http://www.netfilter.org

Related links:
Coyote Linux: http://www.coyotelinux.com
Router Design Project: http://www.routerdesign.com.
Linux IPChains HOWTO: http://www.tldp.org/HOWTO/IPCHAINS-HOWTO.html