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SUSE Router How-To

Novell Cool Solutions: Feature By Scott M. Morris

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This article has been updated for SUSE 10.0. Please refer to the newer article.

I like to get the most out of things. More to the point, I like to get as much out of one Internet connection as I can. Between my brother, my wife, and myself, we have a grand total of 10 computers in our apartment. How can I get all of these machines on the Internet? I have to find a way to share the connection. The simple solution is to go buy a router. But at around \$100 a pop, that is a little more than I am prepared to spend.

I can easily use one of the older machines to share my connection, rather than purchasing a router. What many people don't know is that an old computer loaded with SUSE and 2 Ethernet cards is roughly the same thing as one of these routers. I'd like to demonstrate how to set up an old computer as a router. Hopefully, this guide will save you some time in scouring the Internet for clues on how this is done.

This tutorial should be easy for everyone to use. Each step has a quick summary, in case you already know how to do the actions in that step. If not, I also provide a detailed explanation of each step for the novice user.

Necessary Hardware

First of all, let's list the hardware that we'll need:

- 1 computer with 1 Ethernet card in it
- 1 computer with 2 Ethernet cards in it
- 3 or 4 Ethernet cables
- 1 small hub
- Internet connection
- Printed Router Setup Sheet

So we have all the hardware. Let's take a look at the computers. You will use one to share your Internet connection to an internal network. We'll refer to this machine as the 'router' box. This is the computer with 2 Ethernet cards in it. The computer with one Ethernet card will be a computer on the network. We'll use it for testing our connection.

Preliminary Router Setup

Quick Explanation

Set up the two Ethernet cards as DHCP clients. Plug the Internet connection into one of the cards. Restart the network to obtain an IP address for that card.

Detailed Steps

The first thing that we'll do is get the networking set up on the router machine. On the router box, plug the Internet connection into one of the Ethernet cards. It does not matter which one. Then, open up YAST. On the left, click NETWORK DEVICES. Then select NETWORK CARD from the options on the right:



Another window comes up. It's called "Network cards configuration." We are going to set up the Ethernet cards from this window. Here's what my window looks

like:

Network card setup	Network cards configuration
Configure your network card nere. Adding a network card: Choose a network card from the ist of detected network cards. If your network card was not outodetected, select Other (not detected) then press Configure	Network cards to configure Agailable are: 3Com 3C905C-TX Fast Etherlink for PC Management NIC IBM 10/100 Etherjet Adapter with Alert on LAN Other (not detected)
Editing or Deleting:	Configure
f you press Change , an additional dialog in which to change the configuration opens.	Already configured devices: • 3Com 3C905B Fast Etherlink XL 10/100 Configured with DHCP

You can see that one of my Ethernet cards has already been configured with DHCP. That's good, both cards should be configured with DHCP. Doing this is very easy. You just select the card you want to configure from the list at the top. Click the CONFIGURE button. A new screen comes up:

YaST2 3		
VGST		6236
Configure your IP address.	🔮 Network add	ress setup
You can select dynamic address assignment, if you	Configuration Name	
have a DHCP server running on your local network.	Cheose the setup meth Automatic address	od setup (via DHCP)
Also select this if you do not	😌 Gtatic address setu	p
have a static IP address	IP Address	<u>S</u> ubnet mask
assigned by the system		255.255.255.0
administrator or your cable or 🧧 DSL provider.	Detailed settings	
Network addresses will then	<u>H</u> ost nar	me and name server
be obtained automatically		Routing
from the server.		dvanced •
Clicking Next completes the		
configuration.	Back	Abort

"Automatic address setup (via DHCP)" should be selected by default. If not, select it and click NEXT. You are taken back to where you were before. This time, the Ethernet adapter we added shows up in the bottom list.

YaST2 3	-	C
VGSU		ð
Network card setup Configure your network card here. Adding a network card:	Network cards configuration Network cards to configure Available are:	
Choose a network card from the list of detected network cards. If	IBM 10/100 EtherJet Adapter with Alert on LAN Other (not detected)	-
your network card was not autodetected, select Other (not detected) then press	Configure]



Note that at this point, both adapters should appear in the bottom list. They should say "Configured with DHCP" below them. If they don't, click CHANGE, delete them, and come back and re-add them as I have instructed above.

Looks like we're all good. Click FINISH when you have set up both of your adapters.

Now, we just need to get the IP address from our ISP. This is quite painless. Open up a terminal window. As root, restart the network by typing //etc/init.d/network restart'. This step is shown below: linux:/> su Password: root:/> /etc/init.d/network restart

After you hit ENTER, it will show you a bunch of output that we don't really care about here.

Next, let's make sure we got the IP address from the ISP. To do this, run '/sbin/ifconfig', like this:

linux:/>	/sbin/ifconfig
eth0	Link encap:Ethernet HWaddr 00:01:02:F3:8B:2B
	<pre>inet addr:67.176.189.15 Bcast:255.255.255.255 Mask:255.255.254.0 inet6 addr: fe80::201:2ff:fef3:8b2b/64 Scope:Link UP BROADCAST NOTRAILERS RUNNING MULTICAST MTU:1500 Metric:1 RX packets:86027 errors:0 dropped:0 overruns:0 frame:0 TX packets:133 errors:0 dropped:0 overruns:0 carrier:0</pre>
	collisions:0 txqueuelen:1000
	RX bytes:5600017 (5.3 Mb) TX bytes:21627 (21.1 Kb) Interrupt:9 Base address:0x5800
eth1	Link encap:Ethernet HWaddr 00:01:03:27:7B:3C
	inet6 addr: fe80::201:3ff:fe27:7b3c/64 Scope:Link
	UP BROADCAST NOTRAILERS MULTICAST MTU:1500 Metric:1
	RX packets:0 errors:0 dropped:0 overruns:0 trame:0
	TX packets:139 errors:0 dropped:0 overruns:0 carrier:131 collisions:0 txqueuelen:1000
	RX bytes:0 (0.0 b) TX bytes:59290 (57.9 Kb)
	Interrupt:11 Base address:0x5880
lo	Link encap:Local Loopback
	inet addr:127.0.0.1 Mask:255.0.0.0
	inet6 addr: ::1/128 Scope:Host
	UP LOOPBACK RUNNING MTU:16436 Metric:1
	RX packets:60 errors:0 dropped:0 overruns:0 frame:0
	TX packets:60 errors:0 dropped:0 overruns:0 carrier:0
	collisions:0 txqueuelen:0
	RX bytes:3899 (3.8 Kb) TX bytes:3899 (3.8 Kb)

linux:/>

You will see that this command produces some information for each of your adapters. The first adapter is eth0 and the second one is eth1. Disregard the lo adapter. We will not use any of its output here.

You can see that eth0 has an IP address. In the second line of the eth0 section, you see 'inetaddr:67.176.189.15'. This means that eth0 is our external adapter. On the line above the IP address, in the middle of the line, it says "HWaddr" and has some numbers and colons after it. This is the card's hardware address.

Now, let's take a look at your output. Find the adapter on your screen that has the IP address. Find the hardware address for this adapter. Write this hardware address on the EXTERNAL CARD line on the ROUTER CONFIG SHEET.

Now we need to find your internal card. That's easy. It's the one that's not the external card. It has no IP address. Find the hardware address of your internal card. Write it on the INTERNAL CARD line on the ROUTER CONFIG SHEET.

In my output, my external card's hardware address is highlighted in green. My internal card's hardware address is highlighted in red.

If you were unable to find the IP address, try restarting your cablemodem or whatever device you use to connect to the Internet. When it comes back up, run these commands again to restart your network and display your IP. If this doesn't work, try plugging the cable into your other Ethernet card.

Write Down Name Servers and Gateway

Quick Explanation

Find and write your Name Servers and Gateway on the ROUTER CONFIG SHEET.

Detailed Steps

We need to find out what your Name Servers and Gateway are. This is very easy to do in SUSE. First, fire up YAST. On the left, click NETWORK SERVICES. Then select DNS AND HOST NAME from the options on the right:





If a small window appears, click on the MODIFY button.

A window comes up that's called "Host name and name server configuration." We're not going to change anything here. We're just looking for Name Servers:

2 YaST2@x1-6-00-01-02-f3-	8b-2b 🧕	
Insert the host name and domain name for your computer. Name server list	Host name configurati	and name server on
and domain search list are optional.	Host name and doma Host Name	ain name Domain Name
A name server is a computer = that translates host names into IP addresses. This value	linux S Change host nam	site e via DHCP
must be entered as an IP address (e.g., 10,10,0,1), not	Name servers and de Name Server <u>1</u>	omain search list Doma <u>i</u> n Search 1
as a host name.	63.240.76.4	attbi.com
Search domain is the domain	Name Server 2	Domain Search 2
name where host name	204.127.198.4	
searching starts. The primary search domain is usually the	Name Server 3	Dom <u>a</u> in Search 3
same as the domain name of your computer (e.g., suse.de).	🗵 Update name serv	vers and search list via DHCP
There may be additional search domains (e.g.,	Back	Abort Einish

Write down the Name Servers on the ROUTER CONFIG SHEET under NAME SERVERS. Then, just click BACK to close the window. Also, close YAST.

Now, we need to find out what your ISP's Gateway is. Again, this is incredibly simple. Open up a terminal and type '/sbin/route -n' and hit ENTER, as follows:

linux:/> /sbin Kernel IP rout	/route -n ing table						
Destination	Gateway	Genmask	Flags	Metric	Ref	Use	Iface
192.168.0.0	0.0.0.0	255.255.255.0	U	0	0	0	eth1
67.176.188.0	0.0.0.0	255.255.254.0	U	0	0	0	eth0
169.254.0.0	0.0.0.0	255.255.0.0	U	0	0	0	eth0
127.0.0.0	0.0.0.0	255.0.0.0	U	0	0	0	lo
0.0.0.0	67.176.188.1	0.0.0.0	UG	0	0	0	eth0
linux:/>							

Again, we don't care about most of this output. Just look at the very last line in the 'Gateway' column. It will have an IP address. That's your Gateway. Mine is 67.176.188.1 (highlighted green) in this example. Write your Gateway on the ROUTER CONFIG SHEET under GATEWAY.

Next, take a note of which card your Internet connection is plugged into. Unplug it. It is vital to remember which card it was plugged into. You will need to know this later. Make sure neither of the Ethernet cards have any cables plugged into them and reboot the machine. When your computer comes back up, log back in. Then, continue with the next step, below.

Internal Ethernet Card Setup

Quick Explanation

Set up your internal adapter to have a static IP of 192.168.0.1.

Detailed Steps

Now, we have to go back into YAST. On the left, select NETWORK DEVICES. On the right, select NETWORK CARD:



The "Network cards configuration" window appears:

Network card setup	🔮 Network cards configurati	on
Configure your network card here.	Network cards to configure	
Adding a network card:	Ayailable are:	749-87
Choose a network card from the list of detected network cards. If	IBM 10/100 Etherjet Adapter with Alert on L	AN
your network card was not autodetected, select Other (not detected) then press Configure.	ouler (not detected)	
Editing or Deleting:		⊆onfigure
If you press Change , an additional dialog in which to change the configuration opens.	Already configured devices: • 3Com 3C905B Fast Etherlink XL 10/10 Configured with DHCP	0

When that window comes up, click CHANGE. Another screen appears:

YaST2			-
YaST			
Network card overview Obtain an overview of installed	🥺 Networl	k cards configu	ration overview
network cards. Additionally, edit their configuration.	Name	Device	IP Address
Adding a patronyle and	3Com 3C9058	Fast eth-id-00:01:02:	f3:8b:2b DHCP
Press Add to configure a new network card manually.	3Com 3C905C	-TX F eth-id-00:01:03:	27:7b:3c DHCP
Editing or deleting:			



In this window, select the card whose DEVICE matches what you wrote for INTERNAL CARD on the ROUTER CONFIG SHEET. Then click EDIT:

Network card overview Obtain an overview of installed	Vetwork	cards configura	tion overviev
network cards. Additionally, edit their configuration.	Name	Device	IP Address
Adding a network card: Press Add to configure a new network card manually. Editing or deleting:	3Com 3C905B Fa 3Com 3C905C-T	ast eth-id-00:01:03:27 X (eth-id-00:01:03:27	86:26 DHCP :76:3c D CP
Choose a network card to change or remove. Then press Edit or			

The "Network address setup" window comes up. In this window, select the "Static address setup" radio button. In the IP Address, type 192.168.0.1. When you're finished, it should look like the following:

Yast		
Configure your IP address.	😔 Network a	ddress setup
You can select dynamic address assignment, if you have a DHCP server running on your local network.	Choose the setup m Automatic addre Static address se	ethod ss setup (via DHCP) etup Subnet mask
have a static IP address	192.168.0.1	255.255.255.0
assigned by the system administrator or your cable or DSL provider.	-Detailed settings-	ame and name server
Network addresses will then be obtained automatically from the server.		Routing Advanced
Clicking Next completes the configuration.	Back	Abogt

So go ahead and click NEXT. On the next screen, click FINISH. It will wrap things up and close.

Routing Setup

Quick Explanation

Unplug all cables, taking a note of which Ethernet card goes to the Internet connection. Reboot the machine. In YAST, set up routing. The gateway will be the one from your ISP. Also, tick "Enable IP Forwarding."

Detailed Steps

Head back into YAST. On the left, click NETWORK SERVICES. Then select ROUTING from the options on the right:





A window comes up called "Routing Configuration". This is where we need the ROUTER CONFIG SHEET. In the DEFAULT GATEWAY box in this window, put in the GATEWAY from the ROUTER CONFIG SHEET. Then, tick the "Enable IP Forwarding" box. It should look something like this:

YaST	
The routing can be set up in this dialog. The Default Gateway	Routing configuration
matches every possible destination, but poorly, If any	Default <u>G</u> ateway
other entry exists that matches	67.176.188.1
the required address, it will be used instead of the default route. The idea of the default	Routing Table
route is simply to enable you to say "and everything else should go here".	Oestination Gateway, Netmask A01 Edit Delete
Enable IP Forwarding if the system is a router.	Enable <u>I</u> P Forwarding
	Back Abort Finish

When you have done this, click FINISH. You are taken back to the YAST window.

Firewall Setup

Quick Explanation

Set up the firewall. Enable desired services, and enable traffic forwarding and masquerading.

Detailed Steps

Go into YAST and select SECURITY AND USERS on the left side. Select FIREWALL from the options that appear at the right:





You are presented with a window called "Firewall Configuration (Step 1 of 4): Basic Settings." It has two drop-down boxes. One is called "External Interface" and the other is the "Internal Interface." For the "External Interface," select the option that you have written as the EXTERNAL INTERFACE on your ROUTER CONFIG SHEET. For the "Internal Interface," select the option. It will be what you have written as the INTERNAL INTERFACE on your ROUTER CONFIG SHEET. It should look similar to this:

Yasta		
This tool aims to be an easy-to-use configuration front-end for the Linux packet	🚊 Firewall Config	uration (Step 1 of 4): Basic Settings
filter engine. The configuration items in the following menus are a collection of the most	-Select interfaces to protect External Interface:	eth0 (eth1, eth2) is typically
important functions of the	id-00:01:02:f3:8b:2b used for ethernet cards, ippp0 for	used for ethernet cards, ippp0 for
SuSEfirewall2 package. Take a few moments to go through all menus and select the options carefully.	Internal interface:	ISDN, and ppp0 for modem and ADSL connections Leave this empty if you do not have an internal network.
External Interface:		
Choose the interface connected to the Internet for which to configure the firewall.	Warning: DSL with PPP over Eth interface. Your ethern	ernet uses ppp0 (ppp1, ppp2, etc.) as the external et interface is not the external interface in this case.
Internal Interface: Choose your internal network interface.	1	
It is possible to specify more	Tresk	Abort

When you're done, click NEXT. You're taken to another screen. Select any services that you wish to have accessible through the firewall. I generally tick the SECURE SHELL(SSH) box:



services.	Mail Server	
Attention	S <u>M</u> TP	
Attention.	POP <u>3</u>	
Even correctly configured	POP3 with SSL (POP3s)	
packet filtering rules cannot	IMAP.	
save you from vulnerabilities	IMAP with SSL (IMAPs)	
that may be present in the	Other Services	
services to which you allow	R Secure Shell (ssh)	
access from the Internet. Use	C telnet	
YOLL (YaST Online Lindate) to	Remote Sunchronization (round)	
roo (rast online opdate) to	Remote Synchronization (rsync)	
keep your system up-to-date	Additional Services:	
with the latest update	Expert	
packages from the SuSE FTP	Experc	
servers.		
	Back Abo <u>r</u> t <u>N</u> ext	

When you're ready, click NEXT. It takes you to yet another screen. On this screen, tick the "Forward Traffic and Do Masquerade" box. Uncheck the "Protect from Internal Network" box. It should look like this:



When it looks like that, click NEXT. On the next page, just click NEXT. It will pop up a small box called "Save settings and activate firewall." In this box, click CONTINUE. When it's all done, you will be back at the YAST window.

Install and Configure DHCP Server

Quick Explanation

Install the 'dhcp-server' package. Go into the DHCP Server in YAST. Select the internal adapter to run the DHCP Server on. Put in the Name Servers from the ISP, and 192.168.0.1 as the Gateway. Put in Lease Times, and the IP range for your network.

Detailed Steps

Run YAST, and select NETWORK SERVICES at the left. On the right, click DHCP SERVER:





You may see a small box that says that the 'dhcp-server' package needs to be installed:

*
These packages need to be installed:
dhcp-server
C <u>o</u> ntinue <u>C</u> ancel

Simply click CONTINUE. It will ask you for a CD, which you gladly put into the drive:

* 9	?		×
Insert			
'SUSE LINUX Enterprise Server 9 C	D3'		
🔲 Show <u>d</u> etails			
OK Abort Skip	Fie	ct	
			J

Click OK to continue. It installs the server, and takes you to another screen, called "DHCP Server Wizard (1/3): Card Selection." Select the option that you wrote on the ROUTER CONFIG SHEET for INTERNAL CARD. Then click NEXT:

YaST2 3	
Network Card Selection Select one of listed network cards to configure the DHCP to run on it.	DHCP Server Wizard (1/3) : Card Selection YaST detected the following network devices. Select the interface the DHCP server should use.
	Network Card Selection
	eth-id-00:01:02:f3:8b:2b
	eth-id-00:01:03:27:7b:3c

It takes you to a place to enter a bunch of information. Grab your ROUTER CONFIG SHEET. I usually just type in "my.box" for the DOMAIN NAME in this screen. Type the NAME SERVERS from the sheet into the PRIMARY NAME SERVER IP and SECONDARY NAME SERVER IP spots on this screen. Type "time.nist.gov" for the TIME SERVER. Also, put in 192.168.0.1 into the DEFAULT GATEWAY (ROUTER) field on this page. I usually just put '2 Days' in the DEFAULT LEASE TIME box. It should look something like this:

Global Settings Here, make several DHCP settings.	DHCP Server Wizard (2/3) : Global Settings		
LDAP Support To store the DHCP	LDAP Support		
configuration in LDAP, enable	Domain Name	Time Server	
his check box.	my.box	time.nist.gov	
Domain Name sets for which	Primary Name Server IP	Print Server	
domain the DHCP server is	63.240.76.4		
easing IPs to clients.	Secondary Name Server IP	WINS Server	
rimary Name Server IP	204.127.198.4		
nd Secondary Name	Default Gateway (Router)	Default Lease Time	
erver IP offers these name		E.L.	

When it looks like that, click NEXT. You are taken to the final screen of the DHCP Server Wizard. In the FIRST IP ADDRESS: box, I usually just put 192.168.0.100 as the IP address. I also put 192.168.0.254 in the LAST IP ADDRESS: box. In the LEASE TIME box, I put '2 DAYS'. In the MAX. LEASE TIME box, I put '4 DAYS'. Here's what mine looks like:

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3/1/2007 2:41 AM



When you have put these values in, click NEXT. From the next screen, select "On - Start DHCP Server during Boot", and click FINISH:



The machine then saves the settings and restarts the DHCP Server, taking you back to the YAST window.

Assemble the Network

Quick Explanation

Put the network together. Restart the network on the router machine.

Detailed Steps

Now, it's time to plug everything in the way it is supposed to be. Remember when I said you'd need to know which card to plug the Internet into on the router

machine? Well, that time is now.

Plug the Internet connection into the external card on the router box. Plug the internal card into your hub. Plug your client machine into your hub. At this stage, you can also plug in all other machines that will be on the network. Your network should look like this, now:



When this is all plugged in, open a terminal window and restart the network on your router machine:

linux:/> su Password: root:/> /etc/init.d/network restart

It will have a ton of output, but just let it all finish before you move on to the next step.

Clients Setup

Quick Explanation

Renew IP addresses on the client machines and then ping google.com from each to make sure everything is working properly.

Detailed Steps

You should now be able to connect your client machines. You need to release and renew IP addresses on each machine. Depending upon the operating system on the computer, this is done differently.

Linux Client Machines:

Open up a terminal, and renew your IP address:

linux:/> su
Password:
root:/> /etc/init.d/network restart

Then, ping google.com to make sure you are able to access the Internet through the router box:

```
linux:/> ping google.com
PING google.com (216.239.39.99) 56(84) bytes of data.
64 bytes from 216.239.39.99: icmp_seq=1 ttl=239 time=33.2 ms
64 bytes from 216.239.39.99: icmp_seq=2 ttl=239 time=32.4 ms
64 bytes from 216.239.39.99: icmp_seq=4 ttl=239 time=32.9 ms
```

If it starts to scroll responses down the page, everything is working. Press CTRL+C to stop the pinging.

You are finished with this machine and can move on to the next one.

Windows Client Machines:

Use the ipconfig command to release:

c:\>ipconfig /release

It will print out a bunch of stuff. Then use the same command to renew the IP address:

c:\>ipconfig /renew

And it will renew your IP address. Then, ping google to test:

c:\>ping google.com

It should ping three or four times and then quit.

You are now finished with this machine and can move on to the next one.

Conclusion

A router will allow you to share your Internet connection to an internal network of many computers. This is great if you have 10 computers and only one

connection. If you are like me, you won't want to spend \$100 on a new router. Hopefully, this guide will save you some time in learning how to set one up on an old machine.

Reader Comments

- Great work -- the pictures are worth a thousand words. I've been trying to set up masquerading for awhile in both YaST and the DHCP and firewall configuration files without success. Following your step-by-step approach, everything worked the first time.
- Just what I needed!
- Wonderful. Thanks!
- I'm having trouble with clients suddenly not receiving internet access, yet the still retain their IP and can ping the server. Any ideas on what can cause this?
- Great How-To. Just an added explanation. If you want static internal IP adresses please follow de set-by-step. And you don't need to do the DHCP Server section. For instance if your internal client is 192.168.0.10 instead of 192.168.0.(random internal network dhcp ip address). Tested with SuSE Linux 9.2 Professional. Then you need only to configure the client machine to the static IP address of 192.168.0.10 and the gateway as 192.168.0.1. Configure the Name Servers from you ISP and the client machine is ready!!! Luis Freitas
- Excellent worked first time thanks
- This is Excelent !! Rohan.
- Great time saver. Thank you !!!!!!!!!!!
- Excellent step-by-step guide for setting up a linux server using the power of SuSE's YaST. Well done Scott !!!
- Just the way I did it under M\$Windoze

- THANKS!!
- Thanks, Works great. I don't use DHCP

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