

Configuring for dhclient (dhcp 2.0)

06 August 1999

WARNING: BACKUP YOUR NETINFO FILES FIRST. YOU WILL MAKE MODIFICATIONS TO NETINFO AND /etc/hostconfig BELOW, PROCEED AT YOUR OWN RISK! SAVE A BACKUP COPY OF NETINFO that you know you can restore.

For my setup, I save a copy of /etc/netinfo to /etc/netinfo.preDHCP....make sure you write down the name YOU use for the backup!

General Notes: I have tried to make the below as simple as possible, which is hopefully not too frustrating for very experienced users. Step 8 details netinfo changes, using NetInfoManager.app. I did this because while netinfo is more cumbersome, it allows you to review your work before saving. *If you know what you're doing and are comfortable using the niutil utility instead of NetInfoManager.app, all of step 8 can be accomplished using step 9 instead.* Of course, once you make a change with niutil, it is entered in the netinfo database with no feedback, so you must be precise!

BEFORE YOU START: The instructions below assume you are on a standalone machine that can successfully boot, and that you have passwords assigned to your login user, and superuser (root).

If your machine is in a network and not a standalone, contact your system administrator before proceeding further.

If you do not have passwords assigned, you can do this through UserManager.app (located in the /NextAdmin directory); or by using the "Lock and Key" icon in Preferences.app (in /NextApps) while logged in as the specific user.

If your machine is not connected to a network and you have not previously set it up as a standalone, open HostManager.app and click on the "Local...." menu item. This will open the "Local Configuration" window. In the upper-left corner of this window is a box titled "NetInfo Binding". There are two radio buttons here (only one of which can be selected). "use local domain only" should be selected (white). If it is so, quit HostManager.app. If "Bind to network Netinfo server" is selected, click on the "use local domain only" radio button, and then click on the set button, and reboot.

A. BACKGROUND. This is an NEXTSTEP 3.3 (Intel hardware) package installer for ISC's 2.0 version of DHCP, which modifies /etc/rc.local, and installs necessary bpf, dhcp binaries, man pages, and configuration files. I've tried to make the installation/configuration procedure as automated as possible; unfortunately there is still some work to do at the system level. I've tried to make that as clear as possible. **YOU ARE SOLEY RESPONSIBLE FOR YOUR IMPLEMENTATION OF THESE CONFIGURATION/INSTALLATION SUGGESTIONS!!**

B. The source is patched with a patch by Eric Norum, which causes netinfo's /machines directory to be searched for an ethernet address for your

host machine.

C. This package installs and backs up files as follows:

---Berkeley Packet Filter (bpf) Loadable Kernel Server in /usr/local/lib/kern_loader/bpf; and four special device files (/dev/bpf0 through /dev/bpf3)

---/etc/hostconfig (your current /etc/hostconfig file is moved to /etc/hostconfig.preDHCP2.0 during the installation process). This file will be modified for your hostname in one of the below steps.

---dhcp binaries (dhclient, dhcpd (dhcp server), and dhcrelay) in /usr/local/etc

---scripts to load and unload the bpf LKS (bpf_load and bpf_unload) in /usr/local/etc

---man pages in /usr/local/man/man4, man5, and man8 (bpf, dhclient.conf, dhclient.leases, dhcpd.conf, dhcpd.leases, dhcpd-options, dhclient-script, dhclient, dhcpd, dhcrelay)

---/etc/dhclient.conf, /etc/dhclient-script, /etc/dhcpd.conf

---backs up your current /etc/rc.local to /etc/rc.local.preDHCP, and then modifies your /etc/rc.local to load the BPF LKS and dhclient binary during bootup.

---backs up /etc/hostconfig and any existing /etc/resolv.conf, /etc/dhclient.conf, /etc/dhclient-script, and /etc/dhcpd.conf files in the /etc/ directory with a "preDHCP2.0" extension.

The installer will make some annotations in the Installer LogView and Workspace's Console regarding moving/creation of some files. For a complete list of things installed, use Installer.app's "List" button.

D. System Restoration to pre-DHCP state / deleting the dhcp package.

1. Double-click on the icon for /NextLibrary/Receipts/dhcp-2.0.1.pkg and delete the dhcp package using Installer.app. This should (if you haven't moved any of the backed up files):

- a. Restore your original /etc/hostconfig (ie, move /etc/hostconfig.preDHCP2.0 back to /etc/hostconfig)
- b. Restore your /etc/rc.local to the pre-dhcp configuration
- c. Remove bpf and dhcp files
- d. kill the bpf and dhclient processes
- e. Remove other files installed by the package
- f. Remove /etc/dhclient.leases and /etc/dhclient.pid

2. Restore netinfo using the backup copy you made. **You must restore netinfo yourself.** For example, if you saved a backup of /etc/netinfo in /etc/netinfo.backup, remove /etc/netinfo and then rename /etc/netinfo.backup to /etc/netinfo

3. Reboot.

E. If you have problem and cannot boot after making the changes in *INSTALLATION/CONFIGURATION*, you'll have to boot up in the single user mode and manually restore the system.

1. Intel Hardware:

a. at the "boot:" prompt type "-s" (less the quote marks!). The system will boot in single user mode, letting you know that fsck has not been run. When you see the pound sign prompt (#), you are booted up single user. **BE CAREFUL HERE**, you have root (superuser) status

2. Manually restore the file /etc/hostconfig and your backup copy of netinfo.

At the # prompt, type the first line below and press return; repeat for each of the remaining lines when the # prompt reappears. **Replace "netinfo.preDHCP" with the ACTUAL name of your netinfo backup in the third line below!!**

```
cd /etc
cp hostconfig.preDHCP2.0 hostconfig
cp -r netinfo.preDHCP netinfo
```

If you're tired of messing with dhcp, and don't want to try another configuration, you should also replace /etc/rc.local. If you don't restore the pre-dhcp /etc/rc.local this should not be a problem; when you reboot, dhclient should simply fail and the reboot complete.

```
cp rc.local.preDHCP rc.local
```

and press return.

3. At the # prompt, type "halt" (less the quote marks!). After a short while, the system will halt and you'll get the "It's safe to turn off the computer" message on Intel hardware.

Intel Hardware: Power down and restart the machine when "It's safe to turn off the computer"

INSTALLATION/CONFIGURATION

The following SAMPLE INFORMATION is used to illustrate the configuration steps. (Note that none of these values are valid as far as I know, this is just an example; you should have the *actual values* for these items before proceeding):

ISP's domain. cable.modem.com

ISP has assigned you the hostname. blue1

You want your machine's hostname to be. myhost

Your ethernet address (obtained from verbose boot as in step 1 below) is: **0:0:5:f:b2:c9**

Step 1: Get the ethernet address for your machine.

NOTE : The ethernet address you get in this step may have leading zeros. If this is the case, DO NOT use the leading zeros in step 8d-5 (or step 9 if you decided to use niutil instead of NetInfoManager.app for the netinfo changes). For example, **0:0:5:f:b2:c9** is a valid Ethernet address to use as a *value* for the en_address property *key*, **00:00:05:0f:b2:c9** is not.

Intel hardware. You must boot verbosely; during boot, you should see the ethernet address for your ethernet card when devices are registered. Copy the ethernet address (**0:0:5:f:b2:c9** in the example); remember the note above.

Step 2: Log in as root after the reboot is complete.

Step 3: Locate the dhcp-2.0.NI.pkg package and double-click the icon.

Step 4: Install the package.

Step 5: Open the file /etc/hostconfig.

The /etc/hostconfig file should look like this, your original has been backed up as noted above:

```
HOSTNAME=YOURHOSTNAME
INETADDR=-NO-
ROUTER=-NO-
IPNETMASK=-NO-
IPBROADCAST=-NO-
NETMASTER=-NO-
YPPDOMAIN=-NO-
TIME=-NO-
```

Step 6: In /etc/hostconfig, change the value for HOSTNAME from YOURHOSTNAME to the actual hostname for your machine (but NOT localhost; use either the current host name for your machine if you have chosen one, or the hostname your cablemodem/ADSL ISP assigned). Be careful to change only the HOSTNAME string, and do not put a space on either side of the "=" sign.

Following the sample information provided above, you would change the first line to look like one of the two lines below, and then save the file (obviously blue1 and myhost are "dummy" values and you should use your own actual hostname info here):

NOTE: For consistency, whatever you used as the the HOSTNAME value in /etc/hostconfig should be the first value used in steps 8d-1 and 8d-2.

```
HOSTNAME=myhost
```

or

```
HOSTNAME=blue1
```

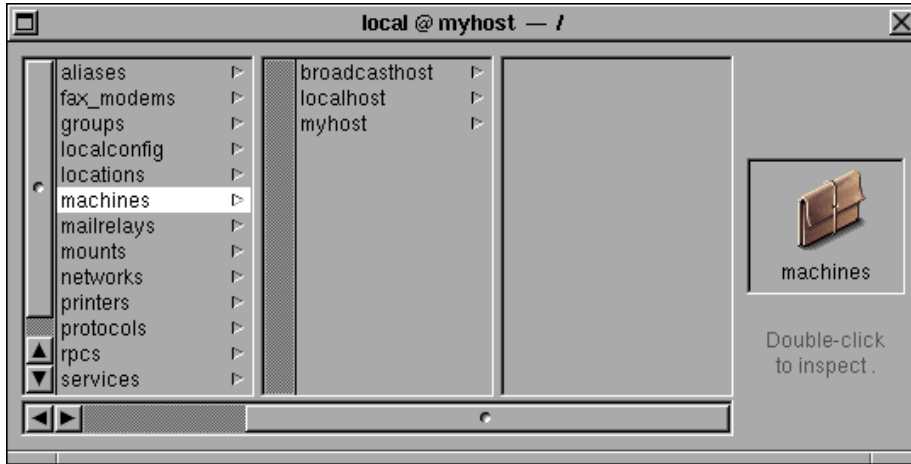
Step 7: Save /etc/hostconfig.

Step 8: Modify Netinfo to reflect your machine's internet address and relevant host info, using NetInfoManager.app

The below instructions specify how to do this in NetInfoManager.app. If you are comfortable using the niutil utility instead, you can proceed to step 9.

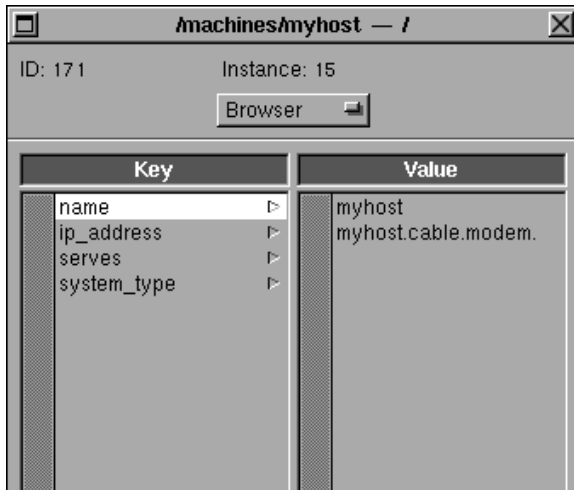
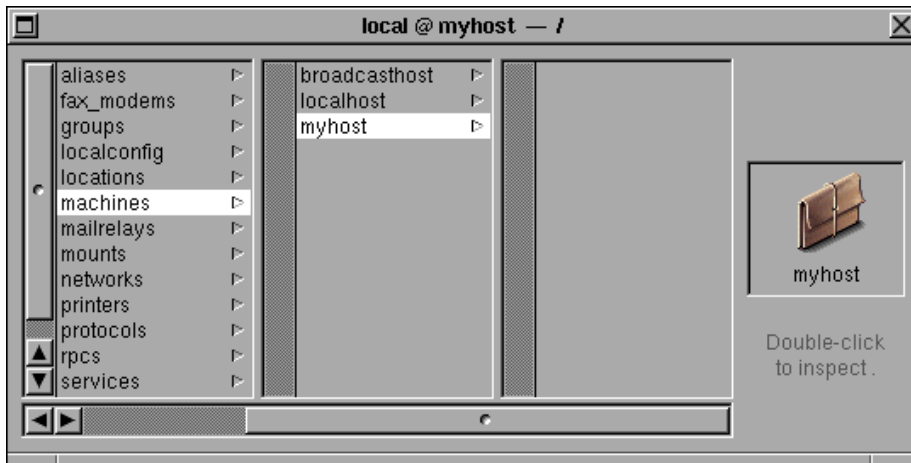
8a. Launch NetInfoManager.app

8b. In the NetInfoManager browser window, single-click on the /machines entry. The "machines" entry should now be highlighted.



8c.

8c-1. If you already have an entry (myhost in our example) under machines for your host machine (*other than* "localhost"), double-click on it...if you double-clicked properly, a mini-browser window for this one host should now be open. Go to step **8d-2**.



name

8c-2. If you don't have an entry for your host machine (except for localhost), single-click on "localhost", and once it is highlighted, click on the NetInfo menu item Edit->Duplicate. This will produce a new entry under the machines netinfo directory called "copy_of_localhost" and it will be highlighted.



NetInfoManager	
Info	▶
Domain	▶
Directory	▶
Restart NetInfo	
Edit	▶
Page Layout...	
Print	p
Windows	▶
Services	▶
Hide	h
Quit	q
	Edit
	Cut x
	Copy c
	Paste v
	Delete r
	Duplicate d
	Edit Long Text...
	Find Panel... f



8d. Make appropriate entries for machine hostname, fully qualified domain name, ip_address, and en_address. Double-click on the appropriate entry in the *machines* subdirectory (copy_of_localhost in the example below) to open a mini-window for that entry if one is not already open.

8d-1. Single-click on the *name* key, then on the first entry in the *value* list. The value will be highlighted in the text entry field in the bottom of the window. Change this from "copy_of_localhost" to "myhost" (less the quotemarks!) and press return.

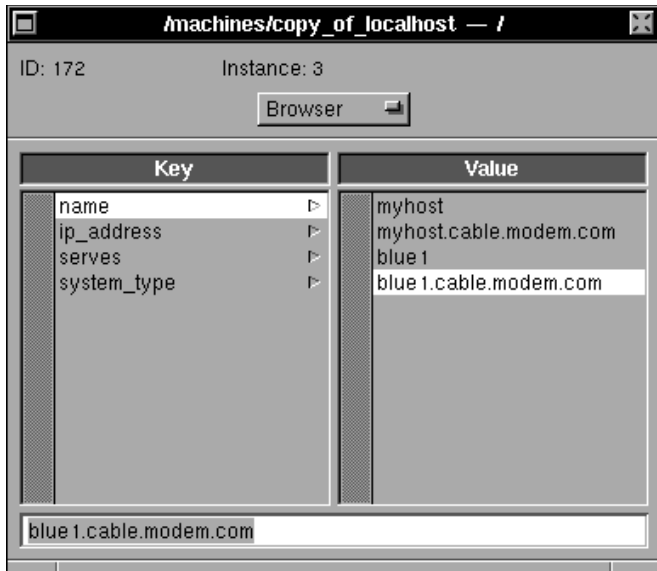
NOTE: The actual order of the values for the name property key is not important, except that the first value in the list will be the name of the subdirectory, in the /machines subdirectory of NetInfoManager's browser window. For consistency, whatever you used as the the HOSTNAME value in /etc/hostconfig should be the first value used in steps 8d-1 and 8d-2.



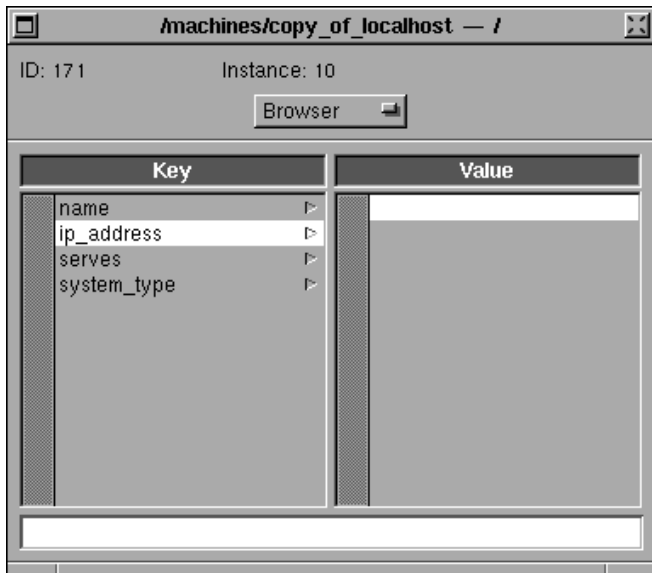
8d-2. With the *name* key still highlighted, use the NetInfoManager Directory-->New Value menu item to add a new value **myhost.cable.modem.com** to the *name* key and press return; in the same way, add new values for **blue1** and **blue1.cable.modem.com**.

NOTE: The actual order of the values for the name property key is not important, except that the first value in the list will be the name of the subdirectory, in the /machines subdirectory of NetInfoManager's browser window. For consistency, whatever you used as the the HOSTNAME value in /etc/hostconfig should be the first value used in steps 8d-1 and 8d-2.

NetInfoManager	
Info	Directory
Domain	Inspect i
Directory	Save s
Restart NetInfo	Revert to Saved u
Edit	New Property
Page Layout...	Insert Property
Print p	Append Property
Windows	Sort Values
Services	New Value
Hide h	Insert Value
Quit q	Append Value

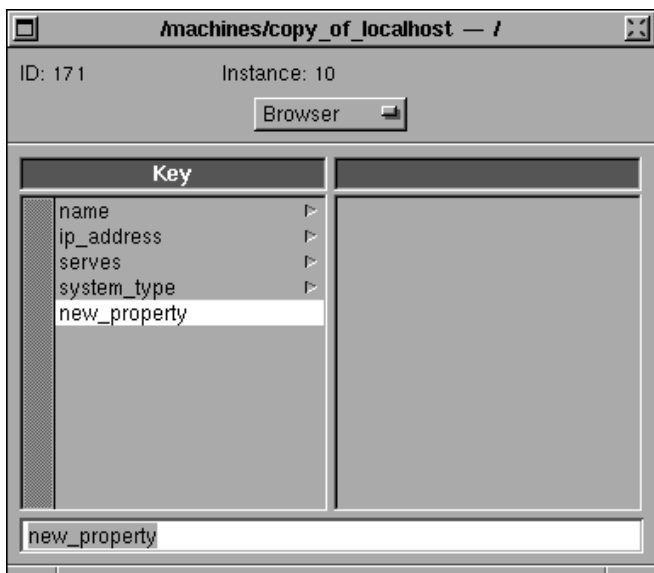


8d-3. Single-click on the *ip_address* key, then single-click on the numerical value. Remove it by pressing the backspace key then the return key. The idea here is to have an *ip_address* key with a null value assigned to it.



8d-4. Use the NetInfoManager Directory-->New Property menu item to add a new key. Click on the new_property key in the mini-browser window, and change it to "en_address" (and press return).

NetInfoManager	
Info	Directory
Domain	Inspect i
Directory	Save s
Restart NetInfo	Revert to Saved u
Edit	New Property
Page Layout...	Insert Property
Print	Append Property
Windows	Sort Values
Services	New Value
Hide	Insert Value
Quit	Append Value



8d-5. Add a *value* to the *en_address* *key* by clicking on the *en_address* *key* (it will now be highlighted) and then selecting the NetInfoManager Directory-->New Value menu item. Make this *value* the ethernet address value you obtained from step 1 above, without any leading

zeros. For example, **0:0:5:f:b2:c9** is a valid Ethernet address to use as a *value* for the *en_address* property *key*; **00:00:05:0f:b2:c9** is not. Using our example info, the *value* should be **0:0:5:f:b2:c9**.



NetInfoManager	
Info	Directory
Domain	Inspect i
Directory	Save s
Restart NetInfo	Revert to Saved u
Edit	New Property
Page Layout...	Insert Property
Print	Append Property
Windows	Sort Values
Services	New Value
Hide	Insert Value
Quit	Append Value



8d-6. Save your changes to netinfo (use NetInfoManager's Directory-->Save menu item).

NetInfoManager	
Info	Directory
Domain	Inspect i
Directory	Save s
Restart NetInfo	Revert to Saved u
Edit	New Property
Page Layout...	Insert Property
Print	Append Property
Windows	Sort Values
Services	New Value
Hide	Insert Value
Quit	Append Value

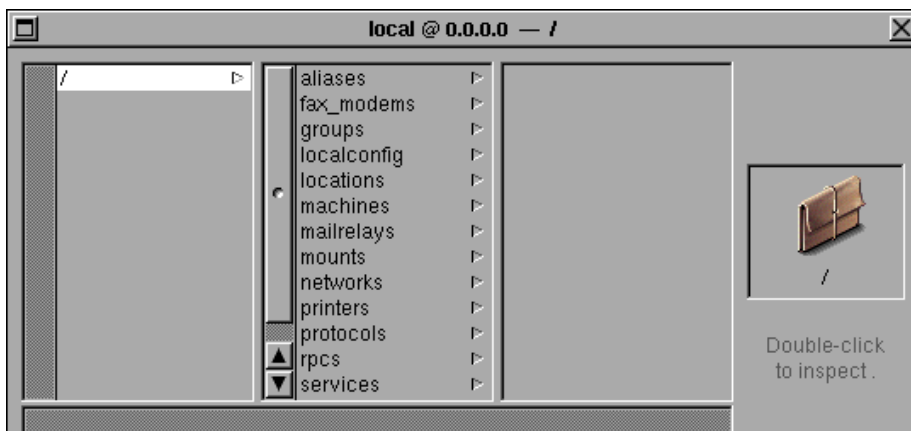
8d-7. Here is what the table view of the above work looks like:

The screenshot shows a window titled "machines/myhost - /". It displays a table with the following data:

Key	Value	Value	Value	Value
name	myhost	myhost.cable.modem.com	blue 1	blue 1.cable.modem.com
ip_address				
serves	./local			
system_type	Unknown			
en_address	0:0:5:f:b2:c9			

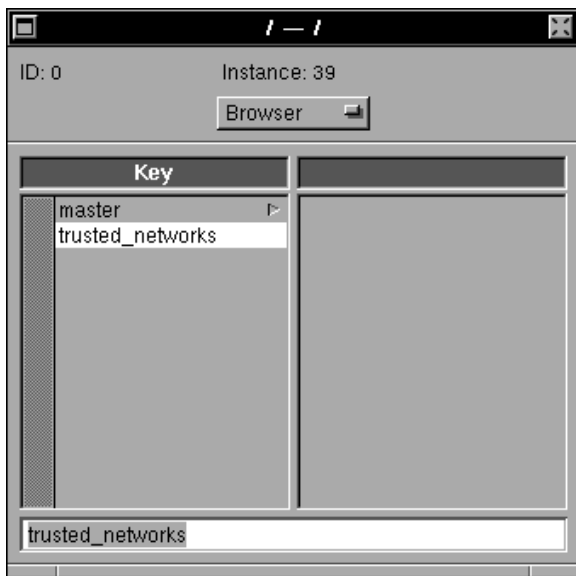
8d-8. This step is probably not necessary, but good from a security point of view.

8d-8a. Double-click on the root-level netinfo domain directory, which will open a mini-window for the netinfo root domain.





8d-8b. If there is already a property *key* called "trusted_networks", proceed to step 8d-8c and change its value to 127. If not, Click on the NetInfoManager menu item Directory-->New Property, change the new_property name to "trusted_networks" (without the quotes!), and press return, as you did to add properties above.

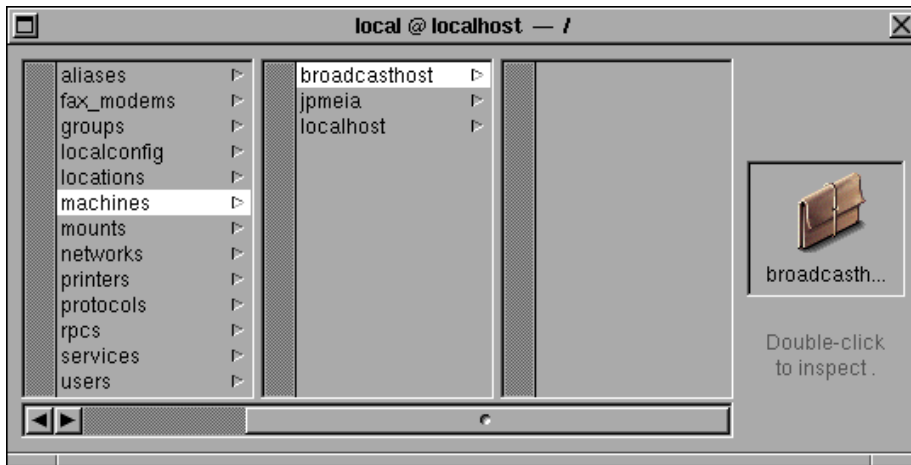


8d-8c. If there was already a trusted_networks *key* and you did not have to create it in the previous step, click on the trusted_networks *key*, then click on the *value*, change it to "127" (less the quotes!) and press return. If you just created the trusted_networks key in the above step (or it existed with no *value*), click on the trusted_networks *key* so it is highlighted, then click on the NetInfoManager menu item Directory-->New Value, change "new_value" to "127" (less the quotes!) and press return. **Save this change to netinfo as you did in previous steps (8d-6).**

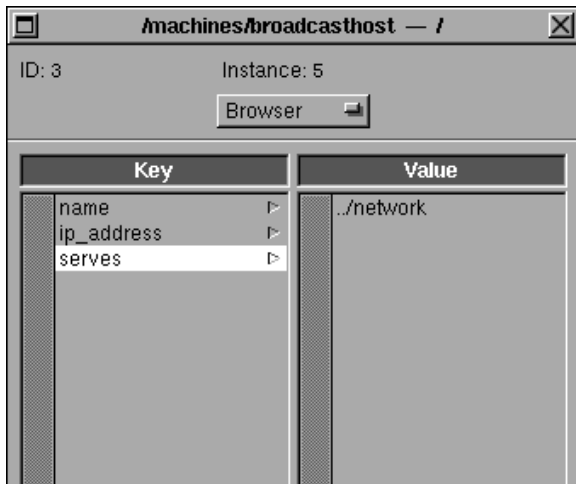


8d-9. If your /machines/broadcasthost has a *value* for the "serves" property *key*, remove it.

8d-9a. Double-click on the /machines/broadcast host entry.

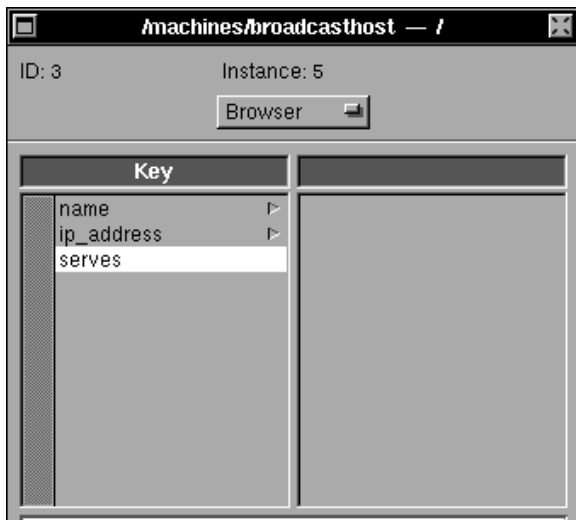
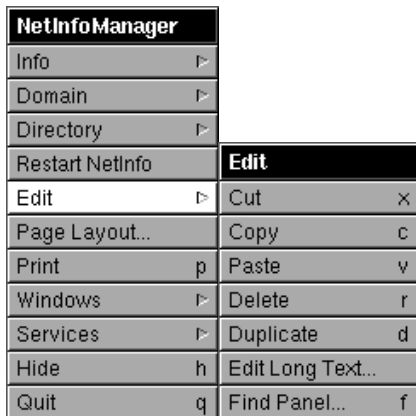


8d-9b. Click on the "serves" property *key* so it is highlighted, then on the *value* for the serves property key so the value is highlighted.





8d-9c. With the value still highlighted, delete the *value* for the serves property *key* using the NetInfoManger menu item Edit-->Delete





8d-9d. Save your change as before (step 8d-6)

This concludes the netinfo changes! Actually, there are *probably* no more changes needed, but read the below information just in case. Important information follows, proceed to step 10!

Step 9: Doing what step 8 does using the niutil utility instead of NetInfoManager.app. Remember that once you press return, the change is made with no feedback!

(Still logged in as root!) Launch Terminal.app. In the shell window, type the first line (**after replacing the BOLDED items with the actual values for your machine**) and press return. Repeat for each of the remaining six lines. The spaces in these commands may be hard to pick out; you can make the changes required to the BOLDED items, and copy/paste each line into the Terminal.app shell. For this reason, there are two sets of the commands below so that you have a "working copy", only enter each line once. There are seven lines to be entered (one at a time). *If you already have a netinfo subdirectory for /machines/myhost you can skip the first line.* Also, note that on the second line there are FOUR name values (myhost, myhost.cable.modem.com, blue1, blue1.cable.modem.com).

```
niutil -create /machines/myhost
niutil -createprop //machines/myhost name myhost myhost.cable.modem.com blue1 blue1.cable.modem.com
niutil -createprop //machines/myhost ip_address ""
niutil -createprop //machines/myhost serves .local
niutil -createprop //machines/myhost en_address 0:0:5:f:b2:c9
niutil -createprop // trusted_networks 127
niutil -createprop //machines/broadcasthost serves
```

You can make changes to this set if you're going to copy/paste. Remember to copy only the text and NOT to the end of the line, or you'll include a return on the command line!!

```
niutil -create /machines/myhost
niutil -createprop //machines/myhost name myhost myhost.cable.modem.com blue1 blue1.cable.modem.com
niutil -createprop //machines/myhost ip_address ""
niutil -createprop //machines/myhost serves .local
niutil -createprop //machines/myhost en_address 0:0:5:f:b2:c9
niutil -createprop // trusted_networks 127
niutil -createprop //machines/broadcasthost serves
```

Once you've completed this step, your /machines/myhost table view in NetInfoManager.app should look the same as in step 8d-7 (note that the system_type property doesn't matter).

This concludes the netinfo changes! Actually, there are *probably* no more changes needed, but read the below information just in case. Important information follows!

Step 10: (Probably not required; make the changes suggested below only if the installed blank /etc/dhclient.conf file does not work for you)

NOTE THAT THERE IS ALSO A FILE /etc/dhcpd.conf....THIS IS NOT THE FILE WE ARE DISCUSSING HERE. /etc/dhcpd.conf configures the dhcp server binary, which is beyond the scope of these instructions (which only get a dhcp client working).

The file /etc/dhclient.conf should normally be blank. If repeated attempts at lease negotiation fail using a blank /etc/dhclient.conf file, you'll have to get specific configuration information from your cablemodem ISP as to exactly what information the dhcp server they run looks for during lease negotiation, and play around a bit with the contents of /etc/dhclient.conf. A simple two-line entry like this may work:

```
send host-name "blue1";
send dhcp-client-identifier 0:0:5:f:b2:c9;
```

NOTE that the "" quotation marks in the send host-name line ARE required by the script to quote a string; there ARE NO QUOTE MARKS surrounding the ethernet address in the send dhcp-client-identifier line. Generally, use quote marks for strings, and no quote marks for hex data.

In configuring my own dhclient.conf file, I found that for my cablemodem service, I had to use my hostname for the dhcp-client-identifier, so my /etc/dhclient.conf is a single line like this (note that this is in fact a very backward way of configuring a lease):

```
send dhcp-client-identifier "blue1";
```

Generally, your `/etc/dhclient.conf` should not be very complicated at all, and ideally empty as noted above. See the `dhclient.conf` man page for more details.

Step 11: Notes on `/etc/dhclient-script`:

The required file `/etc/dhclient-script` is installed and should be fine as is. There is a man page for this script if you need to modify it (but again, this script is probably just fine as is). If you are having problems with negotiating a lease, it is most likely with `/etc/dhclient.conf` or your netinfo setup, NOT this script. If you are having problems with netinfo sleeping, or applications not launching, it is probably with the `dhclient-script`, since this is where routing tables are configured.

This script is required. As-is, it will re-write your `/etc/resolv.conf` during each lease negotiation. The `/etc/resolv.conf` file existing at package installation is backed up as `/etc/resolv.conf.preDHCP2.0`

See the man page for `dhclient-script` for more details about this script.

Step 12: Make sure all your work is correct, and saved. Then reboot in verbose mode. The cablemodem or ADSL modem must be properly connected, powered on, and ready to make a connection. If necessary, power down the computer before connecting and powering up the modem.

12a. If you did not correctly modify netinfo, you'll probably see something like this during reboot:

```
Listening on BPF/en0/<null>
```

Double-check your netinfo and `/etc/hostconfig` entries and correct as needed.

12b. If netinfo is set up correctly, during bootup `bpf` and `dhclient` will load, and if booting verbosely, you'll see something about like this:

```
Listening on BPF/en0/00:00:05:0f:b2:c9
Sending on BPF/en0/00:00:05:0f:b2:c9
Sending on Socket/fallback/fallback-net
```

after which you'll see some lines detailing the DHCP REQUEST and DHCPDISCOVER progress (something about like this):

```
DHCPREQUEST on en0 to 255.255.255.255 port 67
DHCPREQUEST on en0 to 255.255.255.255 port 67
DHCPDISCOVER on en0 to 255.255.255.255 port 67 interval 4
DHCPDISCOVER on en0 to 255.255.255.255 port 67 interval 10
DHCPDISCOVER on en0 to 255.255.255.255 port 67 interval 15
DHCPDISCOVER on en0 to 255.255.255.255 port 67 interval 18
DHCPDISCOVER on en0 to 255.255.255.255 port 67 interval 3
```

If a lease is negotiated successfully, you'll see information on this, most likely with some data as to the assigned IP address (BOUND TO `XX.XX.XX.XX`) and when the lease expires; and the reboot will finish. Detailed info on the lease will be found in `/etc/dhclient.leases`.

12c. If for some reason `dhclient` can't negotiate a lease, you'll see something like this after the DHCPDISCOVER lines:

```
NO DHCP OFFERS received
Trying recorded lease xx.xx.xx.xx
No working leases in persistent database - sleeping
```

and your machine will finish its normal boot (although you'll have no dhcp connection). Possibly, in this case, `/etc/dhclient.conf` needs work (although the problem might be on the server end, and another reboot could result in a valid lease...you should try another reboot). In either case, some details on the lease process will be written to the file `/tmp/dhlog`.

12d. If the lease seems to negotiate successfully, but lookup problems arise after login in, check your `/etc/resolv.conf`. This file is rewritten with each lease negotiation. Some problems just have to be resolved with the ISP. For example, during testing, I got out-to-lunch leases and an empty `/etc/resolv.conf`. Investigation revealed that the problem was someone else on my cablemodem node running an unauthorized dhcp server open to the node, and the ISP had to fix that, it was not a problem with `dhclient`.

Please send any questions, comments, or suggestions for improvement to: jpmeia@ix.netcom.com

Special thanks to ISC for the freeware implementation of dhcp; to Eric Norum, for his patch to read an ethernet address from netinfo; and to Eric Tremblay (ericet@cam.org) for his invaluable assistance in validating the setup.