IPX NET BOOT NetBSD via console from Redhat Linux 7.1 Server

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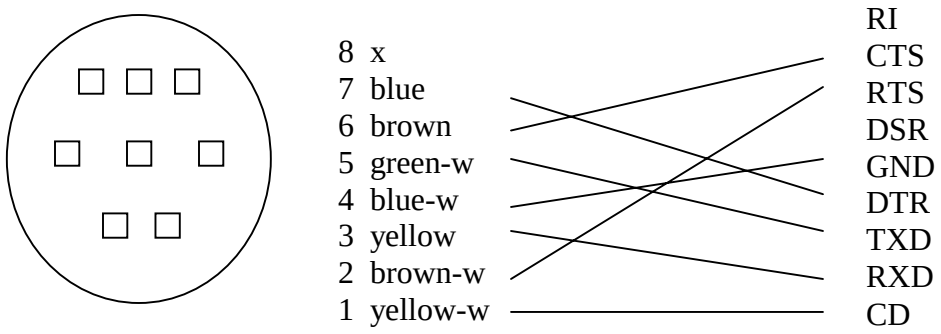
(For my reference only)

1. Client:

IPX 4/50 SUN4C
48M RAM
500M Hard Disk
Serial Port A
10BaseT Network (SynOptical Communications Inc,)

2. Null-Modem Cable:



3. Server:

These servers should running:

 # /usr/sbin/rpcinfo -p

```
   program vers proto   port
    100000    2   tcp    111  portmapper
    100000    2   udp    111  portmapper
    100026    1   udp    971  bootparam
    100011    1   udp    994  rquotad
    100011    2   udp    994  rquotad
    100005    1   udp   1024  mountd
    100005    1   tcp   1024  mountd
    100005    2   udp   1024  mountd
    100005    2   tcp   1024  mountd
    100005    3   udp   1024  mountd
    100005    3   tcp   1024  mountd
    100003    2   udp   2049  nfs
    100003    3   udp   2049  nfs
    100021    1   udp   1026  nlockmgr
    100021    3   udp   1026  nlockmgr
    100021    4   udp   1026  nlockmgr
```

4. Server Configuration Files:

- **/etc/ethers**
  08:00:20:0c:85:ed 192.168.1.100

- **/etc/bootparams**
  space root=192.168.1.1:/tftpboot/root gateway=192.168.1.1:0xffffff00

- **/etc/hosts**
  # Do not remove the following line, or various programs
  # that require network functionality will fail.
  127.0.0.1 localhost.localdomain localhost
  192.168.1.1 myGateway myGateway
  192.168.1.100 space

- **/etc/hosts.allow**
  ALL : ALL

- **/etc/exports**
  /tftpboot/root 192.168.1.100(rw,no_root_squash)
  /tftpboot/swap 192.168.1.100(rw,no_root_squash)
  /tftpboot/usr 192.168.1.100(rw,no_root_squash)
  /tftpboot/home 192.168.1.100(rw,no_root_squash)

- **/etc/xinetd.conf**
  #
  # Simple configuration file for xinetd
  #
  # Some defaults, and include /etc/xinetd.d/

  defaults
  {
  instances = 60
  log_type = SYSLOG authpriv
  log_on_success = HOST PID
  log_on_failure = HOST
  }
  includedir /etc/xinetd.d

- **/etc/xinetd.d/tftp**
  # default: off
  # description: The tftp server serves files using the trivial file transfer
  # protocol. The tftp protocol is often used to boot diskless
  # workstations, download configuration files to network-aware printers,
  # and to start the installation process for some operating systems.

```
service tftp
{
        disable         = no
        socket_type     = dgram
        protocol        = udp
        wait            = yes
        user            = root
        server          = /usr/sbin/in.tftpd
        server_args     = -s /tftpboot
}
```

5. Service Running:

[*] anacron
[*] apmd
[*] atd
[*] autofs
[*] bootparamd
[*] crond
[*] dhcpd
[*] gpm
[*] ipchains
[*] keytable
[*] kudzu
[*] netfs
[*] network
[*] nfs
[*] portmap
[*] random
[*] rarpd
[*] rawdevices
[*] sshd
[*] syslog
[*] tftp
[*] xinetd

6. Setting up the rarpd server

```
# /usr/sbin/rarpd –A eth1

<my IPX connected to eth1>
```

See `rarp(8)` for more details.

7. Setting up the rpc.bootparamd server

```
# /usr/sbin/rpc.bootparamd -d
```

8. Setting up the tftpd server

```
# adduser tftp
```

```
# vi /etc/shadow
```
to change tftp's password to be *.

```
# ps aux | grep xinetd
```
`kill -HUP` that process to force it to reread `/etc/inetd.conf`.

You can test your `tftpd` from any unix machine, by running:

```
# tftp 192.168.1.1
tftp> get C0A80164.SUN4C
Received ???? bytes in 0.?? seconds
tftp> quit
```
In this case, we use `C0A80164.SUN4C`, the sparc kernel name as the test file to get.

9. Setting up the NFS server

Server (exported directory)	*Client*
`/tftpboot/root`	`/`
`/tftpboot/swap` *(file)*	`/swap` *(file)*
`/tftpboot/usr`	`/usr`
`/tftpboot/home`	`/home`

```
# mkdir -p /tftpboot/root/dev
```

```
# mkdir /tftpboot/usr
```

```
# mkdir /tftpboot/home
```

```
# touch /tftpboot/swap
```

```
# cd /tftpboot/root
```

```
# tar -xvpzf /tftpboot/NetBSD-1.5.2/binary/sets/kern.tgz
```

```
# mknod /tftpboot/root/dev/console c 0 0
```

```
# ps aux | grep mountd
```
If `mountd` is running, then `kill -HUP` that process. This will force it to reread the `/etc/exports` file. If it's not already running, then you need to:
```
# /sbin/rpc.mountd [--no-nfs-version 3]
```
You may need to add the `--no-nfs-version 3` if you're having problems. See below.

```
# ps aux | grep nfsd
```
If the `nfs` daemons are running, then you need to restart them so that they reread the `/etc/exports` file. If they're not already running, then you need to:
```
# /sbin/rpc.nfsd
```

10. Setting up the filesystem

Extract essential distribution sets:
```
# tar -xvpzf /tftpboot/NetBSD-1.5.2/binary/sets/base.tgz
# tar -xvpzf /tftpboot/NetBSD-1.5.2/binary/sets/etc.tgz
```

Extract any additional distribution sets using the same procedure

```
# mkdir /tftpboot/root/kern
```

Set up swap and creates a 16 MB swap file.
```
# mkdir /tftpboot/root/swap
# dd if=/dev/zero of=/tftpboot/swap bs=4k count=4k
```

Set up `/etc/ifconfig.le0`. Create a file called `/tftpboot/root/etc/ifconfig.le0`, which has the following line:

```
inet space netmask 255.255.255.0 broadcast 192.168.1.255
```

Set up `/etc/fstab`. Create a file called `/tftpboot/root/etc/fstab`, which has the following lines:

```
#/etc/fstab
myGateway:/tftpboot/swap   none  swap  sw,nfsmntpt=/swap
myGateway:/tftpboot/root   /     nfs   rw 0 0
myGateway:/tftpboot/usr    /usr  nfs   rw 0 0
myGateway:/tftpboot/home   /home nfs   rw 0 0
```

Edit `/etc/rc.conf`. Open in your editor `/tftpboot/root/etc/rc.conf`. Some important things to set up are (replace `192.168.1.1` with the router your network administrator specifies):

```
hostname="space"
defaultroute="192.168.1.1"
nfs_client=YES
```

Add your machines to `/etc/hosts`. Add the following lines to `/tftpboot/root/etc/hosts`:

```
#/etc/hosts
192.168.1.100  space
192.168.1.1    myGateway
```

```
# mv /tftpboot/root/usr/* /tftpboot/usr/
```

11. Other setting

#/sbin/arp –f; cd /tftpboot; ln –s boot.net C0A80164.SUN4C

12. It's time to boot up your diskless machine!

1. Issue command: ok boot net
2. Here is an example of what the diskless boot messages on a NetBSD/hp300 machine look like.
   If your screen goes black or appears to hang, make sure that NetBSD supports a local console on your particular machine, you may need to hook up a serial terminal.

   If your serial terminal doesn't show anything (or your machine doesn't even have serial ports), then you need to read additional directions on setting up remote access without any console

3. Your client will boot into single-user mode, giving you this prompt:
   `Enter pathname of shell or RETURN for sh:`
   Hit return.
4. It'll ask you your terminal type.
   On a NetBSD/hp300 machine, the local console, is `hp300h`, and for serial console, you should probably use `vt100`

   ```
   # mount /usr
   ```

5. Create the `/dev` files.
   `# cd /dev;./MAKEDEV all`
   This takes a while (at least two minutes), be patient.

   Note, this won't work using the HP-UX 9 or earlier NFS server, since it doesn't allow client creation of device files. You'll have to download this tarball of device files (5 KB) for NetBSD/hp300 and run, on the nfs server:
   `# cd /tftpboot/root`
   `# tar -xpvzf dev.tar.gz`

6. Check to make sure swap will work:

   ```
   # swapctl -A
   swapctl: adding nfsserver:/export/client/swap as swap device at
priority 0
   # swapctl -l
   Device      512-blocks     Used    Avail Capacity  Priority
   /dev/??          32768        0    32768     0%    0
   ```

7. Continue to multi-user mode. Edit `/etc/rc.conf` either on the nfs server (in `/tftpboot/root/etc/rc.conf`) or on the client, and change the line to read:
   `rc_configured=YES`

8. Exit out of the single-user shell, by typing **`exit`**.
9. Log in as `root` and have fun using your new NetBSD diskless workstation!

12. Finishing up, Red Hat Linux

The VAX Network Booting HOWTO discusses how to set up SysV style scripts for Red Hat linux.

If you don't want to bother with that, you can just add the daemons to your `/etc/rc.d/rc.local`.

1. Setting up rarp and bootparamd:
   Add the following lines to `/etc/rc.d/rc.local` after your client-specific daemon

```
echo -n ' arp'
/sbin/arp -s client CC:CC:CC:CC:CC:CC
/sbin/rarp -s client CC:CC:CC:CC:CC:CC
if [ -f /usr/[local]/sbin/rpc.bootparamd ]; then
    echo -n ' rpc.bootparamd'; /usr/sbin/rpc.bootparamd
>/dev/null
fi
echo '.'
```

2. Setting up dhcpd:
   This depends on whether dhcpd ships with your distribution. If it does, then there's probably some startup script you can use. Otherwise, add the following lines to `/etc/rc.d/rc.local`

```
echo -n ' dhcpd'
if [ -f /usr/[local]/sbin/dhcpd ]; then
    /usr/[local]/sbin/dhcpd -q
fi
echo '.'
```

3. Setting up nfs:
   Actually, NFS is supposed to be enabled by default on Red Hat systems. If you encountered NFS3 errors, then change the line in `/etc/rc.d/init.d/nfs` to read:

```
daemon rpc.mountd --no-nfs-version 3

For Redhat 7.1 You don’t need to do that.
```

Congratulations, you're done!

13. Useful setup

DHCP server

```
#touch /var/lib/dhcp/dhcpd.leases

#cat /etc/dhcpd.conf
option domain-name-servers 192.168.1.1;
option domain-name "myGateway.net";
option broadcast-address 192.168.1.255;
option routers 192.168.1.1;

allow bootp;

shared-network GAVIN-HOME {
  subnet 192.168.1.0 netmask 255.255.255.0 {
    range 192.168.1.2 192.168.1.20;
  }

  host space {
    hardware ethernet 08:00:20:0c:85:ed;
    fixed-address 192.168.1.100;
    filename "/tftpboot/C0A80164.SUN4C";
  }
}
```

14. Reference:

http://www.netbsd.org/Documentation/network/netboot/

15. Boot Sample:

```
[gavin@myGateway gavin]$ minicom

Welcome to minicom 1.83.1

OPTIONS: History Buffer, F-key Macros, Search History Buffer, I18n
Compiled on Feb 23 2001, 07:31:40.

Press CTRL-A Z for help on special keys


WARNING: Unable to determine keyboard type SPARCstation IPX, No Keyboard
ROM Rev. 2.4, 48 MB memory installed, Serial #2153042.
Ethernet address 8:0:20:c:85:ed, Host ID: 5720da52.



Testing   1 megs of memory. Still to go    0
```

```
SBus slot 0 le esp dma
SBus slot 1
SBus slot 2
SBus slot 3 cgsix


Type b (boot), c (continue), or n (new command mode)
>n
Type  help  for more information
ok boot net
Boot device: /sbus/le@0,c00000   File and args:
13200
>> NetBSD/sparc Secondary Boot, Revision 1.9
>> (toor@proxima, Tue Aug 21 23:18:13 CST 2001)
Booting netbsd
Using BOOTPARAMS protocol: ip address: 192.168.1.100, hostname: space
root addr=192.168.1.1 path=/tftpboot/root
2407018+115748+235192 [68+154160+112699]=0x2f29c0
OBP version 2, revision 2.4 (plugin rev 2)
Copyright (c) 1996, 1997, 1998, 1999, 2000, 2001
   The NetBSD Foundation, Inc.  All rights reserved.
Copyright (c) 1982, 1986, 1989, 1991, 1993
   The Regents of the University of California.  All rights reserved.

NetBSD 1.5.2 (GENERIC) #0: Wed Aug 22 04:33:09 CST 2001
   toor@proxima:/usr/src/sys/arch/sparc/compile/GENERIC
total memory = 49032 KB
avail memory = 44548 KB
using 128 buffers containing 512 KB of memory
bootpath: /sbus0/le@0,c00000
mainbus0 (root): SUNW,Sun 4/50
cpu0 at mainbus0: cache chip bug; trap page uncached: W8601/8701 or MB86903 @ 4U
cpu0: 64K byte write-through, 32 bytes/line, hw flush: cache enabled
memreg0 at mainbus0 ioaddr 0xf4000000
clock0 at mainbus0 ioaddr 0xf2000000: mk48t02 (eeprom)
timer0 at mainbus0 ioaddr 0xf3000000 ipl 10 delay constant 17
auxreg0 at mainbus0 ioaddr 0xf7400003
zs0 at mainbus0 ioaddr 0xf1000000 ipl 12 softpri 6
zstty0 at zs0 channel 0 (console i/o)
zstty1 at zs0 channel 1
zs1 at mainbus0 ioaddr 0xf0000000 ipl 12 softpri 6
kbd0 at zs1 channel 0
ms0 at zs1 channel 1
audioamd0 at mainbus0 ioaddr 0xf7201000 ipl 13 softpri 4
audio0 at audioamd0: full duplex
sbus0 at mainbus0 ioaddr 0xf8000000: clock = 20 MHz
```

```
dma0 at sbus0 slot 0 offset 0x400000: rev 1+
esp0 at sbus0 slot 0 offset 0x800000 level 3: ESP100A, 20MHz, SCSI ID 7
scsibus0 at esp0: 8 targets, 8 luns per target
le0 at sbus0 slot 0 offset 0xc00000 level 5: address 08:00:20:0c:85:ed
le0: 8 receive buffers, 2 transmit buffers
cgsix0 at sbus0 slot 3 offset 0x0 level 7: SUNW,501-1672, 1152 x 900, rev 6
cgsix0: attached to /dev/fb
fdc0 at mainbus0 ioaddr 0xf7200000 ipl 11 softpri 4: chip 82072
fd0 at fdc0 drive 0: 1.44MB 80 cyl, 2 head, 18 sec
scsibus0: waiting 2 seconds for devices to settle...
probe(esp0:3:0): max sync rate 4.03MB/s
sd0 at scsibus0 target 3 lun 0: <SEAGATE, ST1480   SUN0424, 6266> SCSI2 0/direcd
sd0: 411 MB, 1476 cyl, 9 head, 63 sec, 512 bytes/sect x 843284 sectors
root on le0
nfs_boot: trying RARP (and RPC/bootparam)
nfs_boot: client_addr=192.168.1.100 (RARP from 192.168.1.1)
nfs_boot: server_addr=192.168.1.1
nfs_boot: hostname=space
nfs_boot: gateway=192.168.1.1
nfs_boot: my_mask=255.255.255.0
root on 192.168.1.1:/tftpboot/root
root file system type: nfs
/etc/rc.conf is not configured.  Multiuser boot aborted.
Enter pathname of shell or RETURN for sh:
We recommend creating a non-root account and using su(1) for root access.
# mount /usr
# swapctl -A
swapctl: /swap is readable by the world
swapctl: adding myGateway:/tftpboot/swap as swap device at priority 0
# swapctl -l
Device      1K-blocks     Used    Avail Capacity  Priority
/swap           16384        0    16384     0%    0
# exit
Setting tty flags.
Setting sysctl variables:
Starting network.
Hostname: space
default             192.168.1.1          done
add net 127.0.0.0: gateway 127.0.0.1
add net fe80::: gateway ::1
add net fec0::: gateway ::1
add net ::ffff:0.0.0.0: gateway ::1
add net ::224.0.0.0: gateway ::1
add net ::127.0.0.0: gateway ::1
add net ::0.0.0.0: gateway ::1
add net ::255.0.0.0: gateway ::1
```

```
add net 2002:e000::: gateway ::1
add net 2002:7f00::: gateway ::1
add net 2002:0000::: gateway ::1
add net 2002:ff00::: gateway ::1
add net ::0.0.0.0: gateway ::1
IPv6 mode: host
Configuring network interfaces: le0ifconfig: net: bad value
.
add net default: gateway 192.168.1.1
Adding interface aliases:
Building databases...
Starting syslogd.
Checking for core dump...
savecore: no core dump (no dumpdev)
Mounting all filesystems...
Clearing /tmp.
Checking quotas: done.
Setting securelevel: kern.securelevel: 0 -> 1
mount_nfs: myGateway:/tftpboot/swap on /swap: Not a directory
swapctl: myGateway:/tftpboot/swap: mount failed
Creating runtime link editor directory cache.
Updating motd.
starting local daemons:.
Starting inetd.
Starting cron.
Sun Jan 27 22:26:49 PST 2002

NetBSD/sparc (space) (console)

login: root
Jan 27 22:27:01 space login: ROOT LOGIN (root) ON console
Copyright (c) 1996, 1997, 1998, 1999, 2000
        The NetBSD Foundation, Inc.  All rights reserved.
Copyright (c) 1980, 1983, 1986, 1988, 1990, 1991, 1993, 1994
        The Regents of the University of California.  All rights reserved.

Jan 27 22:27:01 space login: ROOT LOGIN (root) ON console
NetBSD 1.5.2 (GENERIC) #0: Wed Aug 22 04:33:09 CST 2001

Welcome to NetBSD!

Terminal type is sun.
We recommend creating a non-root account and using su(1) for root access.
space# ls
.cshrc    .klogin   .login    .profile  .shrc
space# useradd -m gavin
```

```
space# cd home/gavin
space# ls
.cshrc   .login   .mailrc   .profile   .rhosts
space# passwd gavin
Changing local password for gavin.
New password:
Retype new password:
space#
```