Configuring JetDirect Printer with BOOTP/TFTP Server

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About This Document

This document describes how to set up and configure a RISC System/6000 to work with a Hewlett-Packard JetDirect printer. This document applies to AIX 3.2.5.

Prerequisites to Configuring

- AIX version 3.2.5 should be installed on the RISC System/6000. Previous versions of AIX do not support the Hewlett-Packard JetDirect feature. The only exception is with AIX version 3.2.4 if the fix U435111 has been installed.
- A working knowledge of Ethernet, addressing, TCP/IP, and SMIT (System Management Interface Tool) is assumed.
- The printer should be configured for network printing (i.e., the JetDirect card should be physically installed and configured).
- This document assumes that you are NOT setting up a JetDirect card with an "lpd" (RFC 1179) daemon running on the card. Check with Hewlett-Packard for model specifications.
- This document assumes that your network is running the TCP/IP protocol. (You can run multiprocotol; i.e., Novell IPX along with the TCP/IP protocol.)

Overview of Configuration

Each time the printer is powered on, the JetDirect card will require network configuration data such as the card's IP address and subnet mask in order to communicate with the host system over the network.

The card can get this data either from a BOOTP/TFTP server on the network or from parameters entered manually from the front panel on the printer and saved in nonvolatile memory on the card. The method of attaining IP address for the card is dependent on the type of card (external box, like the EX model, or internal card) and the type of printer. When shipped from the factory, the card is set to get network configuration data from the network (BOOTP/TFTP server).

If you cannot manually configure the card to accept the IP address from the front panel of the printer, then configuration data must be obtained from the network by configuring the BOOTP/TFTP server.

When BOOTP/TFTP is configured on the RISC System/6000, the RISC server will recognize the network query (hardware address broadcast) generated by the card and will send the appropriate data to the card.

Important Notes

- The BOOTP/TFTP server can be accessed across a gateway, but this will require configuring routers.
- It is a good idea to have only one machine on the network that acts as the BOOTP/TFTP server.

- The JetDirect card is designed to support ethernet, however, you should be able to use the card on a token ring network with only minor modification. (Please see TOKEN RING SETTING at the end of this document.)
- If you are going across a router from RISC to a JetDirect printer AND if you are using BOOTP/TFTP to download the IP address to the printer, then YOU MUST make sure that the router is configured to allow the bootp daemon to go across that particular router (AIX support cannot offer assistance with this process).

Information Requirements

Have the following data written down and available prior to beginning the steps outlined below:

1. IP address for JetDirect card _____
2. Hostname associated with IP address _____
3. Hardware address of JetDirect card _____
4. Network type (ethernet, token ring) _____
5. Gateway address of network _____
6. Subnet Mask of network _____
7. Printer type (model, make) _____

Some of the data above might or might not be used depending on your particular network set up and whether or not you want to set up your RISC System/6000 as a BOOTP/TFTP server.

For demonstration purposes, we will use the following set up:

1. 150.1.1.4
2. hp4
3. 080109463974
4. ethernet
5. 150.1.1.1
6. 255.255.255.0
7. HP LaserJet IV

Obtaining Printer Hardware Address

Once the JetDirect card is connected to your printer, the hardware address may be attained by printing out a test page. Check the printer and JetDirect card manual for instructions on how this is accomplished. The entry on the test page should look something like: "LAN HW Address". Usually, the JetDirect card will also have the hardware address written on it.

Note that the test page will also indicate that there is NOT an IP address presently on the card unless you have already entered an address through the front panel.

Important Considerations

Some things to consider when deciding whether to make the RISC a BOOTP/TFTP server:

a. Were you able to enter the IP address of the printer at the site of the printer (front panel input)?

b. Is there another BOOTP/TFTP server on the same network?

Refer to the following decision help matrix.

Questions a	Questions b	Answers
Yes	Yes	Setting up the JetDirect through a BOOTP/TFTP server is optional. Note: If you choose to set the JetDirect through a BOOTP/TFTP server, then you must make sure the BOOTP/TFTP server on the same network and is configured appropriately. Suggestion: Do NOT set this up as a BOOTP/TFTP server. In STEP 6, choose option No. 2.
Yes	No	Same as above. Suggestion: Do NOT set this up as a BOOTP/TFTP server. In STEP 6, choose option No. 2.
No	Yes	If the other BOOTP/TFTP server is on the same network and is a RISC, then you must be on that RISC System/6000 in order to continue on with the steps. Suggestion: Set this up as a BOOTP/TFTP server. In STEP 6, choose option No. 1. If the other BOOTP/TFTP server is not a RISC then you must do what is appropriate on that system to configure the network data for the JetDirect down loading. Suggestion: Since the down loading of network data is being done on the other machine, you don't need to set the RISC up as a BOOTP/TFTP server. In STEP 6, choose option No. 2.
No	No	Set up the RISC to be a BOOTP/TFTP server (there is no other way to down load the network data to the JetDirect Card). Suggestion: In STEP 6, you must choose option No. 1.

Steps to Configure Server

Follow these steps on the RISC System/6000.

1. If you are setting up the RISC-BOOTP/TFTP server then you must do the following prior to proceeding to STEP 2. If you are not setting up as RISC-BOOTP/TFTP then proceed to step 2.

   a. In the "/etc/inetd.conf" file make sure "bootps" and "tftp" are not commented out. The lines containing "bootps" and "tftp" should not begin with a "#" symbol (if the lines do begin with the "#" symbol, then you must erase the "#" from the lines).

   b. From the AIX command line type "inetimp". This will redigest the "inetd.conf" into something that the RISC can use.

   c. From the AIX command line type "refresh -s inetd". This will cause the "inetd" daemon to refresh itself.

2. Make sure the printer has a valid hostname and IP address.

   - If you are using a nameserver, ensure that the printer's IP address is in the nameserver database.
   - If you are not using a nameserver, ensure that the printer's hostname and IP address are in the "/etc/hosts" file. Sample "/etc/hosts" entry:

     ```
     hp4          150.1.1.4
     ```

   If the hardware permits, enter the IP address you have chosen for the printer onto the printer now (usually through the front panel of the printer).

   For AIX 3.2.5 follow steps below. For AIX 4.1.4, see section titled, "AIX 4.1.4 Steps Continued".

3. Entering the following at the AIX command line:

   ```
   mkvirprt
   ```

   You will see the following menu screen (or something similiar):

```
------------------------------------------------------------
 No.   Description
 1     Printer or Plotter Attached to Host
 2     Printer or Plotter Attached to Xstation
 3     Printer or Plotter Attached to ASCII Terminal
 4     Network Printer (Hewlett-Packard JetDirect)

 Enter number from list above (press Enter to terminate):  ->
------------------------------------------------------------
```

4. Select "Network Printer (Hewlett-Packard JetDirect)" and press the "enter" key.

   If the above option does not appear on the SMIT menu, then you cannot proceed. Either AIX is not installed to the correct update level (3.2.5) or the system does not have all the necessary software installed.

5. The "Enter the printer hostname:" prompt will appear on the screen.

Enter the printer hostname at the prompt. In demonstration, we enter "hp4" (our printer's hostname) and press the "enter" key. The following menu will be displayed:

```
-----------------------------------------------------------------
 No.    BOOTP/TFTP Server
 1      Make this system a BOOTP/TFTP server
 2      Do NOT make this system a BOOTP/TFTP server

 Enter number from list above (press Enter to terminate):  ->
-----------------------------------------------------------------
```

Enter the number as appropriate to your situation and press "enter".

If you choose option No. 1, then go to step 6 on page 6.

If you choose option No. 2, then skip to step 9 on page 6.

Note: Choosing option No. 1, will cause the creation of an entry in the "/etc/bootptab" file defined for the printer.

6. After choosing option No. 1 and pressing the "enter" key, the "Enter the hardware address for the JetDirect Card:" prompt will appear.

   Enter the hardware address and press the "enter" key (In our demonstration, we entered "080109463974").

   You should then see the "Enter the gateway IP address:" prompt.

7. Enter the gateway IP address and press the "enter" key (In our demonstration, we entered "150.1.1.1"). If you don't have a gateway, then press the "enter" key.

   You will be prompted to enter the subnet mask.

8. Enter the subnet mask and press the "enter" key (we entered "255.255.255.0"). If you don't have a subnet mask press the "enter" key.

9. A menu will prompt you to input the printer type.

   You can use the up/down arrow keys to scroll through the selections to find your particular type of printer. The menu screen will look something like this:

```
-----------------------------------------------------------------
 No.    Description
 1      IBM 2380 Personal Printer II
 2      IBM 2381 Personal Printer II
 3      IBM 2390 Personal Printer II
 .      ...
 .      ...
 .      ...
 19     IBM 4212 Proprinter 24P
 20     IBM 4216 Personal Page Printer, Model 031
 21     IBM 4224 Printer, Models 301,302,3C2,3E3  [42 more ]

 Enter number from list above (press Enter to terminate):  ->
-----------------------------------------------------------------
```

You can scroll down the list by using the down arrow key.

For our demonstration, we enter "40" at the prompt for Hewlett-Packard LaserJet 4 and then press the "enter" key.

10. The following would occur (you would get something different depending on the printer type that you chose in STEP 10):

    a. We will get a prompt asking for header pages. Press the "enter" key for the default, "(n)".

    b. Next we get a prompt asking for trailer pages. Press the "enter" key for the default.

       This brings up the prompt for postscript virtual printer. In both instances below, it is up to you what to name the queues and if you want to make them a default queue or not.

       Note: The hplj-4 printer supports multiple print data streams. Each of the data streams will now be configured individually.

```
Enter print queue name (or, ! to bypass configuration): -> (ps)
Should this queue be the default queue? -> (y)
```

    c. For this demonstration, we would enter "hp4ps" and then press the "enter" key twice.

    d. A prompt for pcl virtual printer will come up since our printer type does support multiple data stream:

```
Enter print queue name (or, ! to bypass configuration): -> (pcl)
Should this queue be the default queue? -> (y)
```

       Enter "hp4pcl" (for this demonstration) and press the "enter" key. Since we have chosen the previous queue to be our default, enter "n" and then press the "enter" key.

You will get an AIX command prompt. You should now be ready to print.

e. Try running a "lpstat" command at the AIX command prompt to make sure that everything is "READY".

AIX 4.1.4 Steps Continued

How to add a JetDirect queue for AIX 4.1.x

The following steps should be taken when adding a JetDirect Network Printer in AIX 4.1.x. This is a step-by-step guide, and has been verified for AIX 4.1.1 thru AIX 4.1.4.

Through smit, bring up the following menu to add a Print Queue.

```
                Add a Print Queue

Move cursor to desired item and press Enter.
Use arrow keys to scroll.

  # ATTACHMENT TYPE      DESCRIPTION
    local                Printer Attached to Local Host
    remote               Printer Attached to Remote Host
    xstation             Printer Attached to Xstation
    ascii                Printer Attached to ASCII Terminal
    hpJetDirect          Network Printer (HP JetDirect)
    file                 File (in /dev directory)
    other                User Defined Backend

    F1=Help                 F2=Refresh              F3=Cancel
    F8=Image                F10=Exit                Enter=Do
    /=Find                  n=Find Next
```

After selecting the hpJetDirect entry, you should not get an error. If you, more likely the error will read:

```
                Printer Attachment Type Support Not Installed

  Software to support the printer attachment type
  you selected is not installed. Press Enter to
  install software support packages for printer
  attachment types (and printers).
```

This will bring up the following menu to install software.

```
                  Install Additional Printer/Plotter Software


                                              [Entry Fields]
 INPUT device / directory for software  [ ]
```

HIT F4 to get the following menu.

```
                    INPUT device / directory for software

   Move cursor to desired item and press Enter.

     /dev/rmt1.1 (2.3 GB 8mm Tape Drive)
     /dev/fd0 (Diskette Drive)
     /dev/cd0 (CD-ROM Drive)
     /usr/sys/inst.images (Install Directory)
```

Select drive and hit enter

```
                  Install Additional Printer/Plotter Software

                                                [Entry Fields]
* INPUT device / directory for software       /dev/rmt1.1
* SOFTWARE to install                         [ ]
```

Hit F4 to go to selection menu. Wait until menu appears

```
                             SOFTWARE to install

 Move cursor to desired item and press F7. Use arrow keys to scroll.
     ONE OR MORE items can be selected.
 Press Enter AFTER making all selections.

 [TOP]
   #-----------------------------------------
   # + = No license password required
   # $ = License found
   # ! = No license found
   # @ = Currently installed
   #
   # The "all_licensed" filter will include filesets
   # with "+" and "$".
   #-----------------------------------------
   4.1.0.0  printers                          ALL
 [MORE...112]
```

hit / $lbrk.enter]

```
                                FIND
  Enter Search Pattern.

   [ ]
```

type jet and hit enter.

```
                              SOFTWARE to install
 Move cursor to desired item and press F7.
 Use arrow keys to scroll.
     ONE OR MORE items can be selected.
 Press Enter AFTER making all selections.

 [MORE...28]
     + 4.1.0.0  Bull Compuprint PageMaster 970
     + 4.1.0.0  Bull PR-88
     + 4.1.0.0  Canon Laser Shot LBP-A404PS/Lite
     + 4.1.0.0  Canon Laser Shot LBP-B406/S/DA404
     + 4.1.0.0  Canon Laser Shot LBP-B406G
     + 4.1.0.0  Common Bull 970/1070 fonts
     + 4.1.0.0  Dataproducts BP2000 Line Printer
     + 4.1.0.0  Dataproducts LZR 2665 Laser Printer
     + 4.1.0.0  Hewlett-Packard JetDirect
                Network Printer Attachment
 [MORE...84]
```

Select the JetDirect line and hit enter.

```
          Install Additional Printer/Plotter Software
                                          [Entry Fields]
* INPUT device / directory for software   /dev/rmt1.1
* SOFTWARE to install            [4.1.0.0  Hewlett-Pac>]
```

Hit enter to install

```
                                  ARE YOU SURE?

             Continuing may delete information you may want
             to keep.  This is your last chance to stop
             before continuing.
                 Press Enter to continue.
                 Press Cancel to return to the application.
```

Hit enter again. This will bring the following screen:

```
                          COMMAND STATUS
Command: running       stdout: no            stderr: no

installp:  APPLYING software for:
        printers.hpJetDirect.attach 4.1.0.0
```

Hit F10 to exit, then type: #smitty mkvirprt

```
                                  Add a Print Queue

  Move cursor to desired item and press Enter.
  Use arrow keys to scroll.

    # ATTACHMENT TYPE      DESCRIPTION
      local                Printer Attached to Local Host
      remote               Printer Attached to Remote Host
      xstation             Printer Attached to Xstation
      ascii                Printer Attached to ASCII Terminal
      hpJetDirect          Network Printer (HP JetDirect)
      file                 File (in /dev directory)
      other                User Defined Backend
```

```
                                      Printer Type

  Move cursor to desired item and press Enter.

    Bull
    Canon
    Dataproducts
    Hewlett-Packard
    IBM
    OKI
    Printronix
    QMS
    Texas Instruments
    Other (Select this if your printer type is not listed above)
```

Select Printer Type

```
                      Printer Type

  Move cursor to desired item and press Enter.

    hplj-2    Hewlett-Packard LaserJet II
    hplj-3    Hewlett-Packard LaserJet III
    hplj-3si  Hewlett-Packard LaserJet IIISi
    hplj-4    Hewlett-Packard LaserJet 4,4M
    Other (Select this if your printer type is not listed above)

  F1=Help                 F2=Refresh              F3=Cancel
```

Select model

```
BOOTP/TFTP Server

Move cursor to desired item and press Enter.

 1 Make this system a BOOTP/TFTP server
 2 Do NOT make this system a BOOTP/TFTP server

  F1=Help                F2=Refresh             F3=Cancel
  F8=Image               F10=Exit               Enter=Do
```

Select appropriate connection type:

1. This is used if you have an external jetdirect card. Or if you wish to use bootp to give your internal jetdirect card its ip address.
2. This is used if you have programmed your internal jetdirect card's ip address from the front panel of the printer. It can also be used if you have already setup a queue using selection number 1, or if another system on your network is providing bootp service to the jetdirect card. The best way to test if you can use this selection is if you can ping the printer by hostname. If so, select option 2.

If option 2 is selected, the last three fields (HW addr, GW addr, SUBNET) will not be present, in the example below:

```
                              [Entry Fields]
  Description                      Hewlett-Packard LaserJ>

  Names of NEW print queues to add
     PCL                      [hppcl]
     PostScript               [hpps]
     HP-GL/2                   []

  Printer connection characteristics
*  HOSTNAME of the JetDirect Card     [hp3]
*  HARDWARE ADDRESS of the JetDirect Card  [1000090EAAC39]
     GATEWAY ADDRESS                      []
     SUBNET MASK                          [255.255.255.0]

                                  COMMAND STATUS

Command: OK            stdout: yes           stderr: no
```

Before command completion, additional instructions may appear below.

```
Added print queue 'hppcl'.
Added print queue 'hpps'.
```

Problem Trouble Shooting Tips / Diagnostics

- Problem: The job sits in the queue with status "RUNNING" ("lpstat" command will show status) and does not print.

  Cause: The JetDirect card is probably not booted up and never received tftp packets. Probably faulty cables or unterminated ethernet lines.

  Solution: If you have any other hosts on the same net, verify that they can still communicate with no errors. Check cables and termination.

  1. Problem: Can you ping the hostname? Can you ping the TCP/IP address of the hostname?

     Solution: Check the IP address of the printer by printing out a test page to see if the IP address is indeed on the printer. Then check to see if the IP address is the same as the one you have in the "/etc/hosts" file.

  If you can ping the hostname, then try the following:

  ```
  telnet hostname 9100
  ```

  This should get sent to the printer. (This is an example telnet session that printed to our printer.)

  ```
  mod590 /etc # telnet 150.1.1.4 9100
  Trying...
  Connected to 150.1.1.4.
  Escape character is '^]'
  Hey guys, this is going to print!!!
  ^]

  telnet> quit
  Connection closed.
  ```

  The print out "Hey guys, this is going to print!!!" should go to the printer.

- Problem: The test sheet and the IP address and subnet mask are blank.

  Cause: The card has not been configured.

  Solution: Find the area under TCP/IP labeled bootp. It