Configuration Of The DHCP Server

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About This Document

This document describes basic setup and configuration tips for the DHCP server in conjunction with tcpip. This information applies to:

- AIX version 4.1.4
- AIX version 4.2.0

This document was written and tested with the above operating systems. The provided explanations, techniques, and procedures have been reviewed for technical accuracy and applicability. Though the techniques and information contained in this item may work on other levels of the operating system, it has not necessarily been tested. Normal precautions should be taken in adopting these same techniques and procedures in your own environment.

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Configuration Of The DHCP Server

There are numerous configurations and network topologies to consider when configuring a DHCP server. The server configuration file /etc/dhcpsd.cnf contains entries for logging information, options to return, machines to configure, and other items.

Recommended Reading and Documentation: Any AIX 4.1.4 or 4.2.0 system with InfoExplorer contains a detailed description of the DHCP server, client and relay agent processes and their respective configuration file formats. Other related information is found in InfoExplorer using the TCP/IP and DNS search paths.

SECTION 1: Different Configurations:

CASE 1: Basic DHCP server configuration. Simple ipaddress range.

File: /etc/dhcpsd.cnf

Note: This information does not contain the usual documentation found inside the /etc/dhcpsd.cnf file. Please change option 15 to your domain name.

EXAMPLE #1

```
network 144.21.13.0 144.21.13.191-144.21.13.222
{
        option 1 255.255.255.0
        option 3 144.21.13.11
        option 6 144.21.13.31
        option 15 austin.ibm.com
}
numLogFiles 4
logFileSize 100
logFileName /usr/tmp/dhcpsd.log
logItem SYSERR
logItem OBJERR
logItem PROTERR
logItem WARNING
logItem EVENT
logItem ACTION
logItem INFO
logItem ACNTING
logItem TRACE
leaseTimeDefault 30 minute
leaseExpireInterval 3 minute
supportBOOTP Yes
supportUnlistedClients Yes
```

The following two lines of code should appear on one line.

```
updateDNS "/usr/sbin/dhcpaction '%s' '%s' '%s' '%s'
BOTH NONIM >> /tmp/updns.out 2>&1 "
```

EXAMPLE #2

```
network 144.21.0.0 24
{
        subnet 144.21.16.0 144.21.16.191-144.21.16.222
        {
               option 1 255.255.255.0
               option 3 144.21.16.11
               option 6 144.21.13.31
               option 15 austin.ibm.com
        }
}
numLogFiles 4
logFileSize 100
logFileName /usr/tmp/dhcpsd.log
logItem SYSERR
logItem OBJERR
logItem PROTERR
logItem WARNING
logItem EVENT
logItem ACTION
logItem INFO
logItem ACNTING
logItem TRACE
leaseTimeDefault 30 minute
leaseExpireInterval 3 minute
supportBOOTP Yes
supportUnlistedClients Yes
```

The following two lines of code should appear on one line.

```
updateDNS "/usr/sbin/dhcpaction '%s' '%s' '%s' '%s'
BOTH NONIM >> /tmp/updns.out 2>&1 "
```

CASE 2: Simple ipaddress range with subnets and sub-ranges.

File: /etc/dhcpsd.cnf

Note: This information does not contain the usual documentation found inside the /etc/dhcpsd.cnf file.

Note: Please change option 15 to your domain name.

```
network 171.28.0.0 24
{
        option 1 255.255.255.0
        option 6 144.21.13.31
        option 15 subdomain.austin.ibm.com
        subnet 171.28.4.0 171.28.4.220-171.28.4.250
        {
               option 3 171.28.4.10
        }
        subnet 171.28.7.0 171.28.7.220-171.28.7.250
        {
               option 3 171.28.7.10
        }
        subnet 171.28.16.0 171.28.16.220-171.28.16.250
        {
               option 3 171.28.16.10
        }
        subnet 171.28.17.0 171.28.17.220-171.28.17.250
        {
               option 3 171.28.17.10
        }
}

numLogFiles 4
logFileSize 100
logFileName /usr/tmp/dhcpsd.log
logItem SYSERR
logItem OBJERR
logItem PROTERR
logItem WARNING
logItem EVENT
logItem ACTION
logItem INFO
logItem ACNTING
logItem TRACE
leaseTimeDefault 30 minute
leaseExpireInterval 3 minute
supportBOOTP Yes
supportUnlistedClients Yes
```

The following two lines of code should appear on one line.

```
updateDNS "/usr/sbin/dhcpaction '%s' '%s' '%s' '%s'
BOTH NONIM >> /tmp/updns.out 2>&1 "
```

CASE 3: Client ipaddress assignment and exclusion.

File: /etc/dhcpsd.cnf

Note: This information does not contain the usual documentation found inside the /etc/dhcpsd.cnf file.

Note: Please change option 15 to your domain name.

The 'Client assignment' line shows how to give this client the same ipaddress every time. Only this client can receive this ipaddress.

The 'Client exclusion' line shows how to deny or exclude this ipaddress. No client can receive this ipaddress. The server status will show 'Not Available' for this ipaddress.

```
network 144.21.0.0 24
{
   subnet 144.21.16.0 144.21.16.195-144.21.16.220
   {
   client 1 0x00aa00c12c2d 144.21.16.199  # Client assignment
   client 0 0 144.21.16.200               # Client exclusion
   option 1 255.255.255.0
   option 3 144.21.16.11
   option 6 144.21.13.31
   option 15 austin.ibm.com
   }
}

numLogFiles 4
logFileSize 100
logFileName /usr/tmp/dhcpsd.log
logItem SYSERR
logItem OBJERR
logItem PROTERR
logItem WARNING
logItem EVENT
logItem ACTION
logItem INFO
logItem ACNTING
logItem TRACE
leaseTimeDefault 30 minute
leaseExpireInterval 3 minute
supportBOOTP Yes
supportUnlistedClients Yes
```

The following two lines of code should appear on one line.

```
updateDNS "/usr/sbin/dhcpaction '%s' '%s' '%s' '%s'
BOTH NONIM >> /tmp/updns.out 2>&1 "
```

CASE 4: Multiple network assignments.

File: /etc/dhcpsd.cnf

Note: Please change option 15 to your domain name.

```
network 144.21.13.0 144.21.13.191-144.21.13.222
{
        option 1 255.255.255.0
        option 3 144.21.13.11
        option 6 144.21.13.31
        option 15 austin.ibm.com
}
network 144.21.0.0 24
{
        subnet 144.21.16.0 144.21.16.195-144.21.16.220
        {
               option 1 255.255.255.0
               option 3 144.21.16.11
               option 6 144.21.13.31
               option 15 austin.ibm.com
               }
}
network 171.28.0.0 24
{
        option 1 255.255.255.0
        option 6 144.21.13.31
        option 15 austin.ibm.com
        subnet 171.28.4.0 171.28.4.220-171.28.4.250
        {
               option 3 171.28.4.10
        }
        subnet 171.28.7.0 171.28.7.220-171.28.7.250
        {
               option 3 171.28.7.10
        }
        subnet 171.28.16.0 171.28.16.220-171.28.16.250
        {
               option 3 171.28.16.10
        }
        subnet 171.28.17.0 171.28.17.220-171.28.17.250
        {
               option 3 171.28.17.10
        }
}
```

#Log file and trace information. See other examples in other cases.

The following two lines of code should appear on one line.

```
updateDNS "/usr/sbin/dhcpaction '%s' '%s' '%s' '%s'
BOTH NONIM >> /tmp/updns.out 2>&1 "
```

CASE 5: Bootp client support.

File: /etc/dhcpsd.cnf

Note: This information does not contain the usual documentation found inside the /etc/dhcpsd.cnf file.

```
supportBOOTP Yes
supportUnlistedClients Yes
```

These lines are not mutually exclusive. They should both be 'yes' to support bootp clients. /usr/sbin/bootptodhcp is a co nverter routine for bootp client support.

The following steps should be taken to support bootp clients:

1. Configure bootp clients in /etc/bootptab . Make sure this works.
2. Comment out the bootp line in the /etc/inetd.conf file.
3. Run /usr/sbin/bootptodhcp
4. Edit the /etc/dhcpsd.cnf file and add SA records for the bootp clients in the form: sa=ipaddress where ipaddress is the bootp server.
5. Start dhcpsd daemon.

IX58812 for a problem with a backslash "\" in /etc/bootptab.

CASE 6: DDNS and the Nameserver configuration.

File: /etc/dhcpsd.cnf

Note: This information does not contain the usual documentation found inside the /etc/dhcpsd.cnf file.

The following two lines of code should appear on one line.

```
updateDNS "/usr/sbin/dhcpaction '%s' '%s' '%s' '%s'
BOTH NONIM >>
```

This line must be uncommented in the /etc/dhcpsd.cnf file. The nameserver must support DDNS. At the time of this writing, AIX v4.1.4 and AIX v4.2.0 are the only operating systems that support DDNS. No other vendor's OS supports DDNS with the exception of WindowsNT beta v4. This beta or test version of WindowsNT may support DDNS.

Please perform the following steps for DHCP and DDNS:

`/etc/dhcpsd.cnf file:`

1. Uncomment the line that reads:

   The following two lines of code should appear on one line.

   ```
   updateDNS "/usr/sbin/dhcpaction '%s' '%s' '%s' '%s'
   PTR NONIM >>
   ```

The 'PTR' means the pointer record will be updated. This is the default value. If you want to update the 'A' record and the pointer record, you should change the 'PTR' to 'BOTH'.

That line will read:

The following two lines of code should appear on one line.

```
updateDNS "/usr/sbin/dhcpaction '%s' '%s' '%s' '%s'
BOTH NONIM >>
```

2. Change the /etc/named.boot file as follows:

```
primary   domainname.com  /etc/named.data  dynamic controlled
primary   in-addr.arpa    /etc/named.rev   dynamic controlled
```

The 'dynamic' keyword is required for the named.rev line if the updateDNS line shows the 'PTR' update. Since the updateDNS line shows 'BOTH NONIM' then the 'dynamic' keyword is required for the named.data and named.rev lines in the /etc/named.boot file.

Add the keyword 'controlled' to the dynamic lines as it acts like secured and allows updates.

Refresh the named subsystem: 'refresh -s named'

DDNS is documented in Info-Explorer using the following search path:

'List of Books'
'AIX V4.1 System Management Guide: Communications and Networks'
'TCPIP Name Resolution'

EXAMPLE /etc/named.boot file:

```
primary  ztrans.com   /etc/named.data    dynamic controlled
primary  0.0.127.in-addr.arpa    /etc/named.local
primary  32.3.9.in-addr.arpa     /etc/named.rev
cache    .                       /etc/named.ca
```

SECTION 2: Code related information:

To check the code level installed on your DHCP server, run the command:

```
lslpp -h bos.net.tcp.server
```

The output for base level of AIX v4.1.4 shows:

```
Fileset    Level   Action     Status     Date       Time
-------------------------------------------------------------
Path: /usr/lib/objrepos
bos.net.tcp.server
          4.1.4.0  COMMIT     COMPLETE   10/18/95   06:54:42
Path: /etc/objrepos
bos.net.tcp.server
          4.1.4.0  COMMIT    COMPLETE   10/18/95    06:58:18
```

The latest version of bos.net.tcp.server as of 7-17-96 is:
4.1.4.12
The latest version of bos.net.tcp.client as of 7-17-96 is:
4.1.4.13

A system with the latest fixes will show the following levels for the tcpip subsystems:

```
lslpp -h bos.net.tcp.server
```

```
Fileset     Level   Action    Status    Date      Time
-------------------------------------------------------------
Path: /usr/lib/objrepos
bos.net.tcp.server
          4.1.4.0  COMMIT    COMPLETE    02/20/96   19:08:59
          4.1.4.6  COMMIT    COMPLETE    02/26/96   15:16:24
          4.1.4.8  APPLY     COMPLETE    04/08/96   23:29:58
          4.1.4.9  COMMIT    COMPLETE    01/01/70   02:20:47
         4.1.4.11  COMMIT    COMPLETE    07/13/96   17:44:28
         4.1.4.12  COMMIT    COMPLETE    07/13/96   19:27:09
```

```
lslpp -h bos.net.tcp.client
```

```
Fileset    Level   Action    Status      Date        Time
-------------------------------------------------------------
Path: /usr/lib/objrepos
bos.net.tcp.client
          4.1.4.0  COMMIT    COMPLETE  02/20/96     15:30:29
          4.1.4.6  COMMIT    COMPLETE  02/26/96     15:15:59
          4.1.4.9  COMMIT    COMPLETE  03/21/96     18:25:26
         4.1.4.10  APPLY     COMPLETE  04/08/96     23:31:32
         4.1.4.12  COMMIT    COMPLETE  01/01/70     02:20:46
         4.1.4.13  COMMIT    COMPLETE  07/13/96     17:44:24
```

The following fixes have been identified and released. These fixes bring the tcpip subsystems (tcp.server, tcp.client) to versions higher than 4.1.4.0:

```
  APAR       DESCRIPTION                                PTF
-------------------------------------------------------------
named:
IX52536 AIX 4.1.4.0 MAINTENANCE LEVEL                  U439825
IX55067 ZONE IS NOT ALSO AUTH OF UPDATES               U440912
IX54609 NAMED CAN DUMP CORE WHEN DOING A DUMP          U440912
IX55069 NEED TO PUT BACK -T FUNCTIONALITY IN NEW NAMED
PORT                                                   U440912
IX55215 NAMED DIES ON READING INCORRECT DATA FILE      U440912
IX55267 NAMED DOES NOT DO ZONE TRANSFERS               U441125
IX57233 NAMED-XFEER DOESN'T HANDLE SIG AND KEY RECORDS U442872
IX56497 DNS CERT ADVISORY UPDATE FOR DNS 4.9.3         not ready

dhcpsd:
IX52536 AIX 4.1.4.0 MAINTENANCE LEVEL                  U439825
IX55066 DHCP:DHCPSD HAS PROTOCOL LEVEL PROBLEMS  U440912
        WITH DHCPREQUESTS/GWS
IX57083 X-STATIONS NOT BOOTING WITH DHCPSD             U442872
IX58989 DHCP server fails in bridged ethernet to fddi  U444117
IX58990 DHCP server fails in bridged tokenring to fddi U444117

dhcprd:
IX52536 AIX 4.1.4.0 MAINTENANCE LEVEL                  U439825
IX55072 DHCP:DHCPRD DOESN'T EXIST IF CONFIG
        IS EMPTY                                       U440912
IX55068 DHCPRD DOESN'T HAVE GOOD DEFAULT LOGGING VALUESU441683
IX55077 DHCP:MSG SET 1 MSG 37 IN DHCPRD
        MISSPELLED                                     U440912

dhcpcd:
IX52536 AIX 4.1.4.0 MAINTENANCE LEVEL                  U439825
IX55073 DHCP:THE CLEINT DOESN'T START IF NO
        INTERFACES UP                                  U440957
IX55075 DHCP:IP_DHCPMODE IS STILL ON WHEN
        DHCPCD EXITS                                   U441683
IX55071 DHCP:DHCPCD DOESN'T SET DOMAIN IN
        /ETC/RESOLV.CONF                               U440957
IX55271 REMOVE PROPER NAME FROM DHCPCD.INI             U440957

dhcpaction:
IX55070 DHCP:DHCPACTION NEEDS TO REMOVE
        TRAILING DOTS                                  U440957
dhcpsconf:
IX56898 DHCPSCONF CORE DUMPS                           U441947
=============================================================
U440912 = 4.1.4.4  tcp.server
U441947 = 4.1.4.7  tcp.server
U442872 = 4.1.4.8  tcp.server
U444117 = 4.1.4.12 tcp.server
U440957 = 4.1.4.4  tcp.client
U441723 = 4.1.4.8  tcp.client
U443181 = 4.1.4.13 tcp.client
=============================================================
```

SECTION 3:

Troubleshooting and errors commonly found in the DHCP server log file.

Error message #1:

```
------------------------------------------------------------
INFO:  getPortNum: dhcps/udp unknown service, assuming port 67
SYSERR:  createMailbox: bind socket failed - The socket name is
         already in use.
SYSERR:  main: cannot create transport facility. Exit dhcpsd.
log: END
------------------------------------------------------------
```

When the above error is received, it is common for the dhcpsd process to die. This error is common when bootp is running under inetd. bootpd and dhcpsd cannot run at the same time. The dhcpsd process uses the same service port as bootps; however, dhcpsd is not an inetd subserver and is started in the /etc/rc.tcpip file not /etc/inetd.conf. The boot ps line in /etc/inetd.conf must be commented out with the '#'. inetd must be refreshed using the command:

```
refresh -s inetd .
```

The bootps line in /etc/services remains as is:

```
bootps        67/udp      # bootp server port
```

Error message #2:

```
------------------------------------------------------------
TRACE:  am_queryClient: client 1-0x00aa00c12c2d is not known
to address mapper, ask clientele
TRACE:  cl_queryClientele: client 1-0x00aa00c12c2d rejected
in clientele list
OBJERR: am_queryClient: clientele failed when queried about
client 1-0x00aa00c12c2d
INFO:   processDISCOVER: client 1-0x00aa00c12c2d
authentication failed
ACTION: reply_generator: no reply is generated
TRACE:  main: No reply is to be generated
------------------------------------------------------------
```

This error was generated when the DHCP server configuration file shows the following 2 lines:

```
supportBOOTP Yes
supportUnlistedClients No
```

This error was corrected by changing the line: supportUnlistedClients Yes

Error message #3:

```
------------------------------------------------------------
09/05/96 09:39:38 SYSERR: ....initUserComm: bind usercomm
socket failed -  The socket name is not available on this
system.  09/05/96 09:39:38 SYSERR: ..main: cannot create
user communications socket.
Exit
------------------------------------------------------------
```

The above error occurs when the value for 'hostid' is incorrect. There may be an incorrect entry in /etc/hosts etc... The hostid must be a valid address for at least one of the networks defined in /etc/dhcpsd.cnf. The 'hostid' command returns, in hex, the value if the system's ipaddress. The hex value 0x8123cae3 can be converted to decimal and be equal to 129.35.202.227. This is a valid ipaddress for a DHCP server.

SECTION 4:

a) DHCP Client on AIX and the SMIT interface.

The SMIT interface on AIX ONLY applies to the DHCP client configuration. The DHCP server configuration uses a motif interface run by the command: /usr/sbin/dhcpsconf. However, the above server configuration examples can be modified into your own environment using 'vi' or any editing tool which may be quicker and more effective than running the DHCP server motif interface.

The SMIT fastpath: 'smit tcpip' will bring you to a screen where you can select DHCP as follows: Use DHCP for TCPIP Configuration & Startup. After selecting the interface, the Client configuration is set in this screen. Execution of this screen will pass the hostname of this client to the DHCP server for DDNS updates and start the dhcpcd (client daemon) process. The /etc/rc.net file and /etc/rc.tcpip file both are modified to run DHCP as a client. The variable modified in the /etc/rc.net file is: USE_DHCP="1". The line which starts /usr/sbin/dhcpcd is uncommented in the /etc/rc.tcpip file.

SIDE AFFECTS

If the DHCP Client service is started using the SMIT interface, but the system administrator/user never intended for this system to be a DHCP Client or run DHCP services, you will find unusual behavior and a corrupt configuration after a system reboot.

Two symptoms of this is the hostname is changed to loopback or localhost and the default route no longer exists.

You can run 'ps -ef | grep dhcpcd' and see if the client process is running. 'netstat -rn' will verify the routing table.

b) Turning DHCP off.

There are 2 ways to stop the Client service:

1. Edit the /etc/rc.net file and set the variable USE_DHCP="0" and edit the /etc/rc.tcpip file and comment out the line which starts /usr/sbin/dhcpcd. Run 'ps -ef | grep dhcpcd' to obtain the process id for dhcpcd then run 'kill -9 pid' where pid is the process id for dhcpcd. At this point, the DHCP Client service is not running and will not start up on the next reboot, but you need to reconfigure tcpip on the interface to get the correct hostname and default route set. Run 'smit tcpip' and select: Minimum Configuration & Startup to reconfigure tcpip.
2. You can use the SMIT fastpath 'smit dhcpcd' and select: Stop Using the dhcpcd Subsystem. Select 'BOTH' and this will perform the same steps in #1 above; however, you will need to reconfigure tcpip on the interface to get the correct hostname and default route set. Run 'smit tcpip' and select: Minimum Configuration & Startup to reconfigure tcpip.

Reader's Comments

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END OF DOCUMENT (dhcp.server.config.tcp, 4FAX# 5934)