Open DHCP Server

Installation and Configuration

Manual

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2 Preface

Open DHCP Server is an Open Source Freeware. It has most of the Industry Standard Features. It attempts to comply with various RFC for Dynamic Host Configuration Protocol. It is released under the GNU Open Source License Agreement.

Although it has most of the features and capabilities required for use by experts, it is still very simple to configure and use. It is also well suited for small and home use by persons not having any knowledge of DHCP Protocol. The most salient features include:-
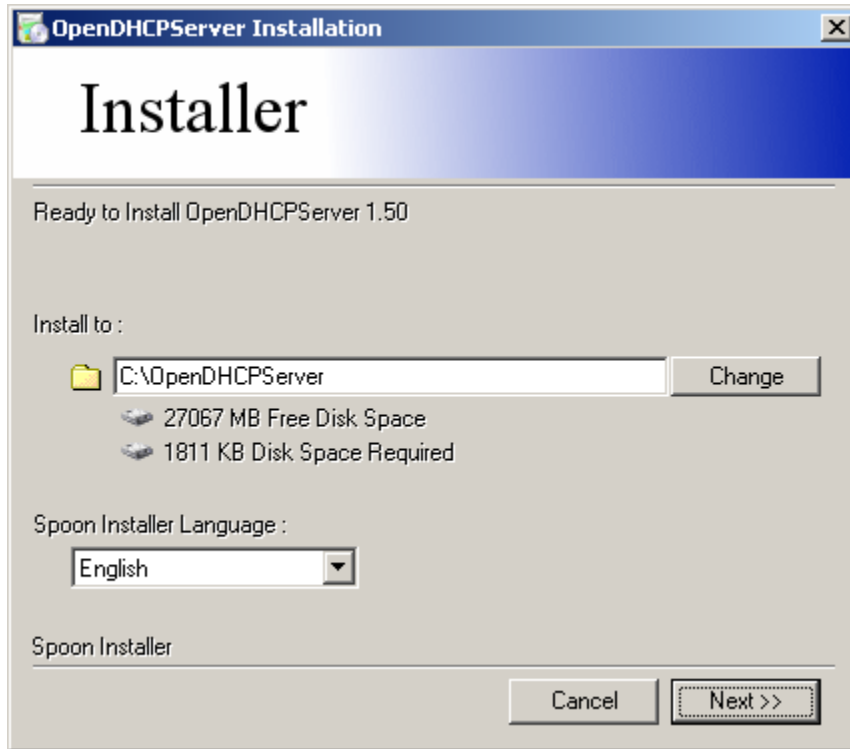
a) Supports upto 125 DHCP ranges.

b) Supports both Static hosts and Dynamic DHCP Ranges.

c) Supports BOOTP and relay agents.

d) Supports multiple zones in single server.

e) Supports all possible DHCP Options straightaway, no need to define option types

f) Supports filtering of DHCP Ranges on Mac Range, Vendor Options and User Options.

g) Options can be Global, DHCP Range Specific or Client specific.

h) Supports Replicated Fail Safe DHCP Operation.

i) Multiple ways to assign option values like strings, IPs, hex strings or byte arrays.

j) Lease Status is displayed on auto refreshing html page

k) Low CPU and executable size, requiring very little memory.

This document covers the basic configuration of **Open DHCP Server.**

3 Installation

3.1 Windows Installation
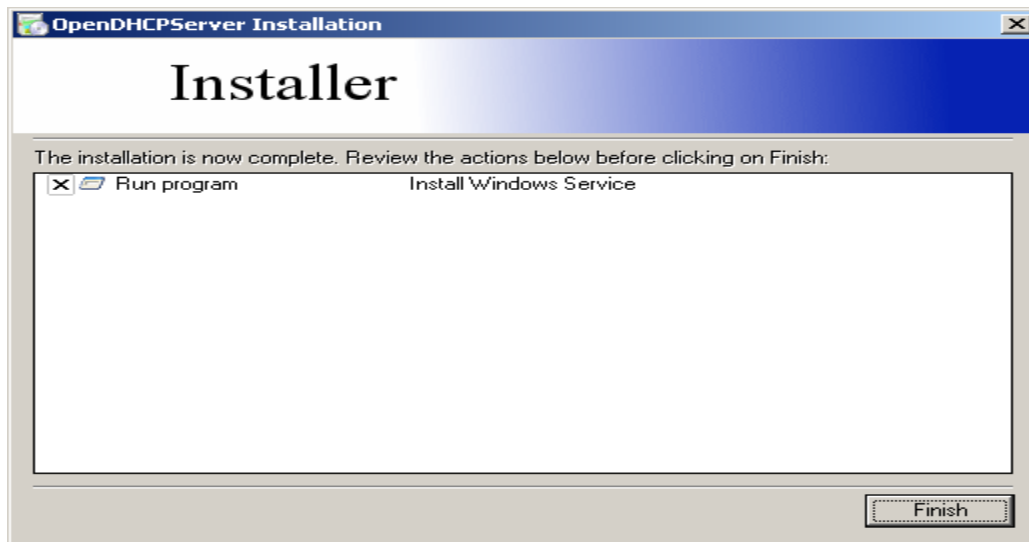
Installation of **Open DHCP Server** on Windows is straightforward. Just run the Installer and it installs.

You should permit it to Install as Windows Service by keeping the checkbox.

If you did not install as service, still want to do that goto installation directory (default c:\OpenDHCPServer) and run InstallService.exe, which will install it as Windows Service. If you want to

remove the Windows Service but just want to keep the install, you can call utility RemoveService.exe. You need to run these utilities as Administrator. You can right click on these files and choose "Run as Administrator".

To fully uninstall Windows version, just go to control panel and use the Uninstall Menu. It will uninstall both Windows Service and program itself.

3.2   Windows Compiling

It is not needed to recompile Open DHCP Server on windows version. 64 bit versions can also run this 32 bit executable. The command for compiling is:-

```
g++ -o OpenDHCPServer.exe OpenDHCPServer.cpp -lwsock32 -liphlpapi -lws2_32
```

3.3   Linux Installation

Expand the GZ archive to any directory (preferably /opt/opendhcp) and change the permission of file opendhcpd with chmod 755 opendhcpd, if needed. Linux Installation is easy too but in Linux, we need to create script files for daemonization. Also compiling may be needed. opendhcp may not run on other operating systems like BDS, Solaris.

3.4   Linux Compiling

The enclosed opendhcpd executable file may only run on Linux 32 bit version. For 64 bit Linux system, you can try:-

```
#g++ opendhcpd.cpp -oopendhcpd -lpthread
#g++ opendhcpd.cpp -oopendhcpd -lpthread -lgcc_s
```

You need C++ compiler for Versions 3 onwards, as these versions use STL. If you have only C Compiler, you need to download and use Version 2.1 only.

3.5   Linux Daemonizing

If your Linux flavor supports chkconfig command, you can use the enclosed rc.opendhcp file to add the service. Just create a symbolic link /etc/init.d/opendhcp to /opt/opendhcp/rc.opendhcp in init.d and make it executable. Also change the file paths (depending on where you have installed the executive and log file directory) in this rc.opendhcp file. Then you can use chkconfig command to add the daemon. You need following command to do the whole job.

```
#ln -s /opt/opendhcp/rc.opendhcp /etc/init.d/opendhcp
#chmod 755 /etc/init.d/opendhcp
#chkconfig --add opendhcp
#chkconfig opendhcp on
```

Last command is for automatic start/stop only. That's all you may need on such Linux flavors.

Some of the Linux flavors like debian support rcconf command, which is very similar to chkconfig command (You may need some changes in the comments section of rc.opendhcp file). If your flavor doesn't support chkconfig or rcconf you can manually do:-

```
#ln -s /opt/opendhcp/rc.opendhcp /etc/rc.d/opendhcp
#chmod 755 /etc/rc.d/Opendhcp
```

For automatic start Add the following line to /etc/rc.d/rc.local file or /etc/inittab file or /etc/rc.d/rc.inet2 file (preferred).

```
# Start the Open DHCP Server daemon:
if [ -x /etc/rc.d/rc.opendhcp ]; then
/etc/rc.d/rc.opendhcp start
fi
```

4   Configuration

The entire configuration for Open DHCP Server is done in file OpenDHCPServer.ini, (opendhcp.ini in Linux), you should find and keep this file in your installation directory. Configuration file has many sections. These sections are described further. Comments in red are for guiding purpose only and should not be copied in actual OpenDHCPServer.ini file. Each section have many entries in the form Name=Value. Any entry starting with punctuation mark is a comment and such entry will be ignored.

4.1   LISTEN_ON

This section restricts the server to listen for DHCP requests on selected interfaces. There may be many interfaces on multi-homed servers. Out of these interfaces, you can still restrict which interface(s) should listen for requests. Open DHCP Server only listens on Static Interfaces which means the IP address is fixed and not obtained from another DHCP Server. Any dynamic interfaces specified here will be ignored. If no interface is specified here, Open DHCP Server listens on all Static Interfaces.

```
[LISTEN_ON]
192.168.0.1
192.168.55.23
```

4.2   LOGGING

Logging level should be specified under section [LOGGING]. Logging will be done only if run as Service. LogLevels can be set as **None**, **Normal** or **All**. It is advisable to keep logging to **Normal**. Normal means errors and DHCP renewal messages. None and All are self-explanatory.

```
[LOGGING]
LogLevel=Normal                                              #Can be None, Normal or All
```

4.3   REPLICATION_SERVERS

Open DHCP Server supports replicated operation. Two instances of Open DHCP Servers can run in the same network. This is unique feature of Open DHCP Server. Both instances work in full co-ordination and leases issued by one server are immediately replicated on other instance using special DHCP INFORM messages. If one server goes down, other can renew leases issued by other server straightaway without the need for DHCPDISCOVER and DHCPOFFER.

```
[REPLICATION_SERVERS]
Primary=192.168.55.254              #Primary or Master DHCP Server
Secondary=192.168.55.23             #Secondary or Replicated DHCP Server
```

4.4   RANGE_SET

DHCP Ranges are required for Dynamic Address allocation. The DHCP Ranges are grouped into [RANGE_SET]s, so that range specific options can be specified for a group of ranges at one place. Each [RANGE_SET] can contain actual DHCP Ranges, Range specific options and Range Filters. Options have option tags (0-254) and values can be specified many different ways. Please Refer to **DHCP Options** and **Range Filters** topics for more info on these. The total ranges together in all [RANGE_SET]s is limited to 125 and there can also be 125 [RANGE_SET]s max. You can specify one or more ranges in each [RANGE_SET] section, in format specified. DHCP Server will allot addresses from these ranges. Static Hosts and BootP clients do not need ranges. You need not specify any [RANGE_SET] if all clients are Static. Next is example of simple DHCP Range and may be sufficient for home/SOHO use.

```
[RANGE_SET]
DHCPRange=192.168.0.1-192.168..254          #Actual DHCP Range
SubnetMask=255.255.255.0                     #Subnet Mask for range
Router=192.168.0.1                           #Default Gateway
AddressTIme=500                              #Lease Expiry Time after which client will renew.
```

The SubnetMask and Router are range specific options and will be added to all DHCP responses falling in this range. Even you need not specify these options in [RANGE_SET] if you have already specified in [GLOBAL_OPTIONS] section. Keywords SubnetMask and Router are option names (specific to Open DHCP Server) but clients are sent with option tags. You can also use option tags directly as below.

```
[RANGE_SET]
DHCPRange=192.168.0.1-192.168..254          #Actual DHCP Range
1=255.255.255.0                              #Subnet Mask for range
3=192.168.0.1                                #Default Gateway
51=500                                       #Lease Expiry Time after which client will renew.
```

You can specify as many options in a [RANGE_SET]. Option values can also be multiple ways please refer to DHCP Options topic. You can also filter [RANGE_SET]s based on client sent values Mac Address, Vendor Class and User Class. This is an advance topic, please refer to DHCP Option topic for more info. Below is an example of a filtered range.

```
[RANGE_SET]
FilterMacRange=00:0d:60:c5:4e:00-00:0d:60:c5:4e:ff          #Mac Filter, can be hex only
FilterMacRange=00:0e:12:c5:4e:00-00:0e:12:c5:4e:ff          #Another Mac Filter can be 30 more
FilterVendorClass="MSFT 5.0"                                 #Vendor Class Filter
FilterVendorClass="MSFT 5.1"                                 #Another Vendor Class Filter
FilterUserClass="My User Class 4.0"                          #User Class Filter using text
FilterUserClass=123,56,87,123,109,0,23,56,156,209,234,56    #Another User Class Filter using bytes
FilterUserClass=00:0d:60:c5:4e:0d:60:c5:4e                  #Another User Class Filter using hex
```

```
DHCPRange=10.0.0.5-10.0.0.10                    #Actual DHCP Range
DHCPRange=10.0.10.1-10.0.10.254                 #One more DHCP Range
SubnetMask=255.255.255.0                        #DHCP option for range set
DomainServer=10.5.6.90, 11.4.5.6                #another option for range set
Router=11.5.6.7, 10.0.99.1                      #router option
```

4.5 GLOBAL_OPTIONS

If some of DHCP Options are common to all the DHCP Ranges and Static Clients, you can specify these under [GLOBAL_OPTIONS] and you need not specify these options in [RANGE_SET] or under static clients. DHCP Options under these sections would supplement (but not replace) client specific options and [RANGE_SET] options. Here only some examples are given, for complete list please refer DHCP Options topic.

```
[GLOBAL_OPTIONS]
SubNetMask=255.255.255.0
DomainServer=192.168.1.1, 192.168.1.2
Router=192.168.1.1
RenewalTime=0
RebindingTime=0
```

4.6 Static Host Sections

You can create Static Host Sections for hosts having fixed IP addresses. A new section against it's MAC Address need to be created for each client. You can specify client specific options under the client section. You need to specify IP Address only. Other options are optional. For BOOTP requests, only these options would be sent. For DHCP requests. Missing Options will be supplemented from matching [RANGE_SET] options (if IP falls in any range) then from [GLOBAL_OPTIONS]. Example of Client section are: First is simple most section where only IP is specified. Other options will be supplemented from [DHCP_RANGE] and [GLOBAL_OPTIONS].

```
[00:41:42:41:42:00]               #This is a client with MAC addr 00:41:42:41:42:00
IP=192.168.0.200                  #Only IP is specified for this client
```

This is another example with some client specific options

```
[00:41:42:41:42:05]               #This is a client with MAC addr 00:41:42:41:42:05
IP=192.168.0.211                  #IP Address for this client, compulsory option
HostName=TestHost                 #DHCP will offer this host name to client
DomainServer=10.5.6.90, 11.4.5.6  #Domain Name Server for client
Router=11.5.6.7, 4.6.7.34         #Default Gateyway for client
```

4.7   HTTP_INTERFACE

Open DHCP Server publishes a page showing the Lease Status. The default IP for this on Windows is 127.0.0.1 or localhost and defaut port is 6789. On Linux it is first interface detected, port still being 6789. You can change both IP and port here. This page refreshes every minute. In case of replicated operation, leases issued by both servers are displayed.
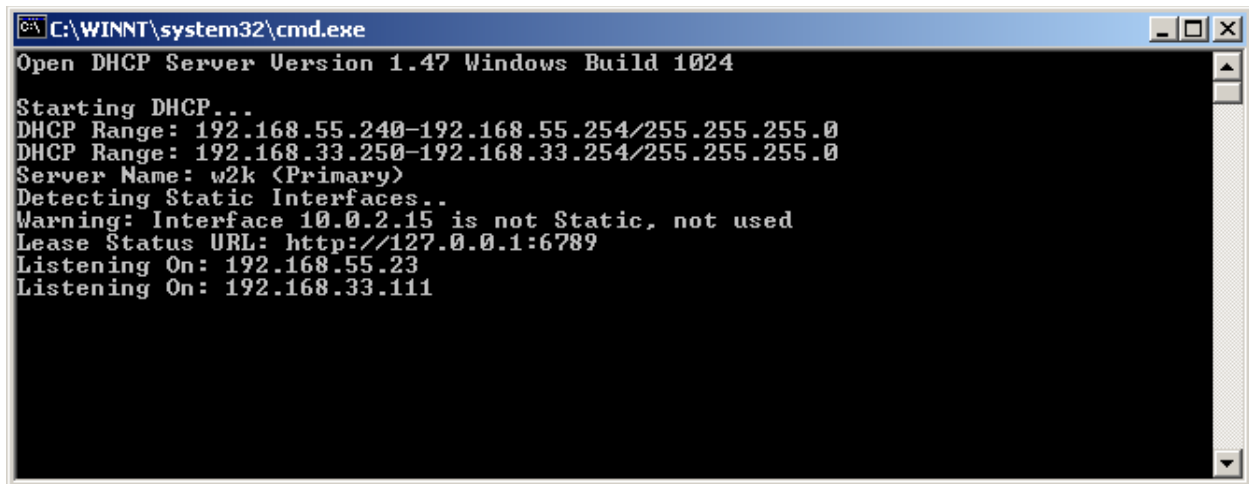
[HTTP_INTERFACE]
192.168.0.3:6789

5 Running of Open DHCP Server

5.1 Windows

You can run Open DHCP Server in two different modes a) As Windows Service b) as StandAlone from Start Menu. For running it as Service you should go to windows Services Control Applet and start the Service called Open DHCP Server. When the service is started, it will put the log in the log directory. Running StandAlone will show all the activity in the Command Window only.
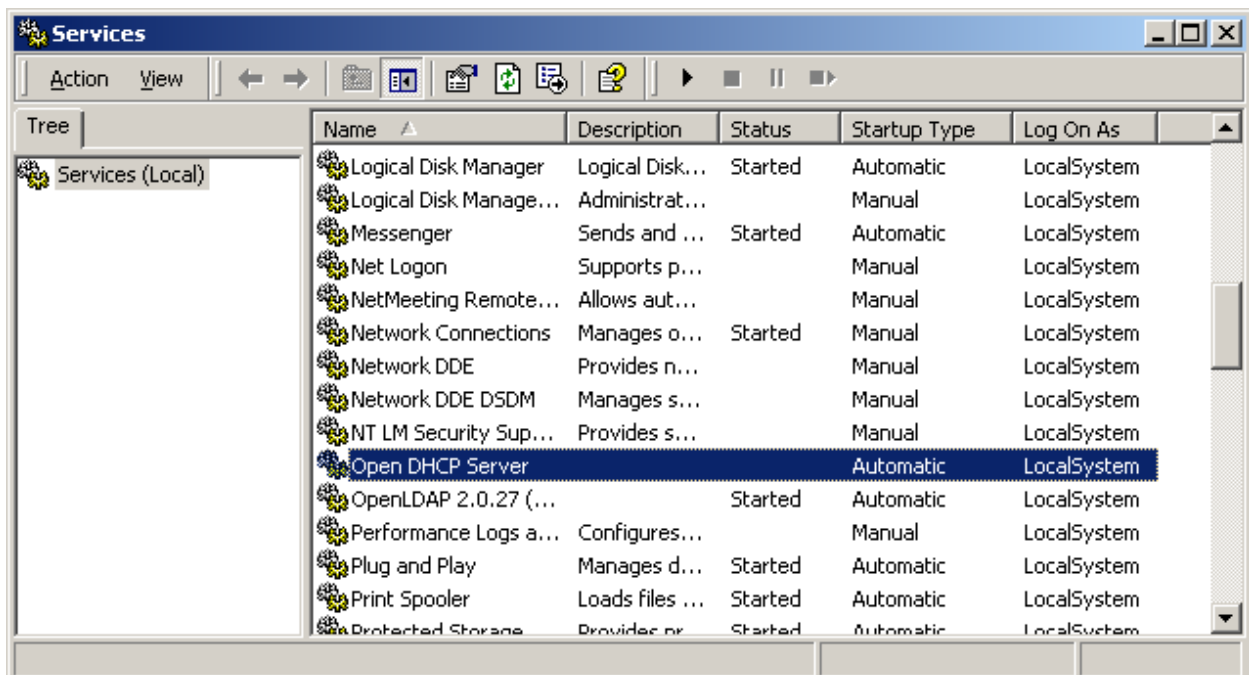

If you are have just installed the Open DHCP Server, run it in StandAlone mode from Start Menu to see if it works fine. For normal operation you should just start the Windows Service in Service Control Panel.

5.2   Linux

In Linux too you can run the opendhcp in modes:-

    a)   Verbatim Mode (using -v argument)
    b)   Daemon (NOT using -v argument)

This program uses 2 or 3 helper files, which should be passed as arguments.

    a)   -i[inifile], where configuration settings can be specified, default is ./etc/opendhcp.ini
    b)   -s[statefile] saves current leases, default is /tmp/opendhcp.state
    c)   -l[logfile] dumps log to this file in daemon mode, default is syslog

You can start/run as:-

```
/opt/opendhcp/opendhcpd                                    #(daemon with default files)
/opt/opendhcp/opendhcpd –v                                 # (verbatim with default files)
/opt/opendhcp/opendhcpd -i inifile -s statefile -l logfile # (as daemon)
/opt/opendhcp/opendhcpd -i inifile -s statefile            #(as daemon)
/opt/opendhcp/opendhcpd  -v -i inifile -s statefile        #(as verbatim)
```

The logfile should include %Y for full year or %y for 2 digit year, %m for month, %d for day of month. These will be replaced with actual values and this will cause different file every day.

```
/opt/opendhcp/opendhcpd -l /opt/opendhcp/log/opendhcp%Y%m%d.log -i/opt/opendhcp/opendhcpd.ini
```

You can also include just %m and %Y if you want monthly log file like:-

```
/opt/opendhcp/opendhcp -l <logDirecory>/opendhcp%Y%m.log -i<someDirecory>/opendhcp.ini
```

Make sure the directory for logfiles exists before running the program. Once you have done the daemonization under section Installation, you can start/stop the opendhcp with commands:-

```
service opendhcp start
service opendhcp stop
```

otherwise you can try:

```
/opt/opendhcp/rc.opendhcp start
/etc/rc.d/opendhcp start
/opt/opendhcp/rc.opendhcp stop
 /etc/rc.d/opendhcp stop
```

6   Process of Allotting Addresses

DHCP Server is **Dynamic Host Configuration Protocol** server, which allots IP addresses to computers automatically. You may manually setup IP addresses on computers but managing them is always troublesome process. On networks, where there are many computers, it is nightmare and error prone. DHCP Server allots address to computers as and when an IP address is requested. DHCP Server maintains a pool of addresses and keeps on allocating and renewing IP addresses from this pool (or statically pre-assigned addresses for some computers).

When an address is allotted to a computer, many more parameters of computer are also set like Domain Name, DHCP Server, router/gateway etc. These are called DHCP Options. DHCP Server can use different IP address pools and options depends on how the request came (which interface, or relay agent), what parameters are send with request.

As the newly booted computer don't have IP address, it uses broadcast for discover a DHCP Server on network, send the request as broadcast and received the allotted address via broadcast till booted computer gets a IP address of its own.

The actual process is:-

A user turns on a computer with a DHCP client.

The client computer sends a broadcast request (called a DISCOVER or DHCPDISCOVER), looking for a DHCP server to answer.

The server receives the DISCOVER packet. Based on availability and usage policies set on the server, the server determines an appropriate address (if any) to give to the client. The server then temporarily reserves that address for the client and sends back to the client an OFFER (or DHCPOFFER) packet, with that address information. The server also configures the client's DHCP Servers, WINS servers, NTP servers, and sometimes other services as well.

The client sends a REQUEST (or DHCPREQUEST) packet, letting the server know that it intends to use the address.

The server sends an ACK (or DHCPACK) packet, confirming that the client has a been given a lease on the address for a server-specified period of time.

When a computer uses a static IP address, it means that the computer is manually configured to use a specific IP address. One problem with static assignment, which can result from user error or inattention to detail, occurs when two computers are configured with the same IP address. This creates a conflict that results in loss of service. Using DHCP to dynamically assign IP addresses minimizes these conflicts.

When DHCP-DISCOVER is received by Open DHCP Server, it does the following:-

a) Look into static hosts, if there is a Static Host entry for that Mac-Address. If one is found, it temporarily allocated that IP to the client and sends the DHCP-OFFER.

b) If no static host is defined against the Mac-Address of client, it now looks into all the DHCP ranges under all RANGE_SETs one by one. Once it finds a usable address in any matching range, it temporarily reserves that address and sends DHCP DISCOVER. The matching range is the one which :-

- Falls in same subnet as that of Relay Agent IP
- If there is no Relay Agent involved, the range falls in same subnet that of IP of interface from which the DISCOVER is received.
- The range has a previously allotted address of same client, which is free or a new free address is available or an expired address of another client is available.
- If any of the RANGE_SET has MacRange specified and client Mac Address falls in the MacRange, ranges of only such RANGE_SET are considered. If no RANGE_SET has matching Mac Range, all [RANGE_SET]s, not having MacRange filter are considered.
- If any of the RANGE_SET has Vender Class specified and client has matching Vendor Class, Ranges of only such RANGE_SET are considered.
- If any of the RANGE_SET has User Class specified and client has match User Class, Ranges of only such RANGE_SET are considered.

If you do not have MacRange, VendorClass and UserClass specified for any range (which are advance filters, used by experts), please ignore last 3 conditions above.

7 Replicated Operation.

The Open DHCP Server have been designed and developed to for replicated operation

If you want to have more than one DHCP Servers (from any other vendor) in your network for redundancy, it is not easy as different DHCP Server may assign different IP address to same host. Also already allotted addresses by one server can be re allotted by different Server. Furthermore, if one instance goes down, other would force DHCP DISCOVER and DHCP OFFER etc. causing break of Service. This may change the allotted address of host.

Open DHCP Server has been designed for well-coordinated replicated operation. Following features make it unique among other DHCP Servers available.

a. All the allotted addresses are immediately replicated to other instance by sending special DHCP INFORM messages keeping the internal database of both servers identical. This prevents issuing of same address to multiple hosts or issuing different address to same host.
b. When once instance goes down, other can simply renew the same lease, moment lease request goes to broadcast mode. This process does not need a DHCP DISCOVER and offer. This feature prevents the break of Service for clients.
c. All the DHCP ranges and option between different instances can be make consistent by simply copying single OpenDHCPServer.ini file

8   DHCP OPTIONS

8.1   Specifying options and values in Open DHCP Server

DHCP Options are sent to client along with DHCP Offer and DHCP Ack. These are various other setting of client like DHCP Server, Router/Gateway, various other default servers like WINS, HTTP Server, Linux Windows Manager etc. There are about 150+ various standard options are available, some of these are Vendor Specific or Server Specific. Each option has an option tag (1 to 254) and the value of option which can be upto 254 bytes.

Open DHCP Server stores DHCP Options at three different levels. These can be stored under [GLOBAL_OPTIONS], [RANGE_SET] or Static Client sections. Option Tag and Option Value are separated by = sign. Global Options are added to each DHCP Offer and DHCP Acknowledgement going out of server, Range specific options are added to each DHCP OFFER/ACK when offered IP falls in DHCP_RANGE and Client specific option sent with DHCP Offer/Ack specific to Static Client.

Options are only supplemented but never replaced. This means if an option has already been specified under Static Client level, value is taken only from Client Specific option; it will not be replaced by value of such option from either RANGE_SET or GLOBAL_OPTIONS. Similarly if an option has value specified under RANGE_SET, value is not replaced in GLOBAL_OPTIONS. However if option is not specified under Client Specific, it will be augmented from RANGE_SET and if RANGE_SET has no such option and Global Options has it, it will be added from Global Options. Global Options are stored as attributes in Configuration entry, Range Specific Options under DHCP Range Entries and Client Specific options are attributes to Static Client Entries.

DHCP Options are specified in all above sections as **OptionTag=value** syntax. Option tags can be number or standard mnemonic text for that Option tag. Mnemonic text is used as remembering numbers is difficult. Open DHCP Server now uses text names (less spaces) stipulated by IANA in document at http://www.iana.org/assignments/bootp-dhcp-parameters/bootp-dhcp-parameters.xml. The server translates these mnemonic text (will be called option names) back to option tags when sending options to clients. List of all option name are listed in next section.

For example Sub Net Mask can be specified as:

```
1=255.255.255.0
```
or
```
SubNetMask=255.255.255.0
```

Similarly DHCP Servers can be specified as:-

```
6=192.168.0.1, 192.168.0.2
DNSServers=192.168.0.1, 192.168.0.2
```

Now the values of these options can be specified in multiple ways. String values can be a quoted string or colon separated hex values or comma separated byte array like:-

DomainName="MyDomain.com"

or

15="MyDomain.com"

or

DomainName=4d:79:44:6f:6d:61:69:6e:2e:63:6f:6d

or

15=4d:79:44:6f:6d:61:69:6e:2e:63:6f:6d

or

DomainName=77,121,68,111,109,97,105,110,44,99,111,109

or

15=77,121,68,111,109,97,105,110,44,99,111,109

All of the above Option Entries work same way for string values. For IP address values, you can use both dot separated values or hex string or byte array like:-

Router = 192.168.0.1 or 3 = 192.168.0.1

or

Router = 192,168,0,1 or 3 = 192,168,0,1

or

Router = c0:a8:00:01 or 3 = c0:a8:00:01

If you have multiple values for an Option you can specify like:-

DomainServer=192.168.0.2, 192.168.0.3

or as 8 consecutive bytes for 2 addresses

DomainServer=192,168,0,2,192,168,0,3

or as 8 consecutive hexbytes for 2 addresses

DomainServer=c0:a8:00:01:c0:a8:00:02

Numerical values can be simply stated as:-

LeaseTime=360 or 51=360

Boolean Options should be specified as:-

AutoConfig=yes or AutoConfig=no or 116=yes or 116=1 or AutoConfig=off

DHCP Range can only be specified as:-

DHCPRange=10.0.0.5-10.0.0.10

There are 3 type of filters for selecting a DHCP Range Set:-

FilterMacRange=00:0d:60:c5:4e:00-00:0d:60:c5:4e:ff

If above filter is specified (as option), the range will be selected if Mac Address falls in this range. You can add 32 Mac Range filters in a Range Set. Multiple entries work like "or" operation. In other words, Range Set will be available to all Mac Addresses falling in any FilterMacRange.

Vendor Class and user Class Filters require exact match to value specified but if multiple values are added to a RangeSet, the client sent values can match with any of specified values. You can use string, byte array or hex bytes for specifying values. These filter although added as options, but are not actual options but filter for client sent options. Hence these filters never go to client with DHCPOFFER or DHCPACK messages.

FilterVendorClass="MSFT 5.0"
FilterUserClass="My User Class 4.0"
FilterUserClass=123,56,87,123,109,0,23,56,156,209,234,56
FilterUserClass=00:0d:60:c5:4e:0d:60:c5:4e

If any entry in a RANGE_SET has matched the filter condition then only that RANGE_SET will be available to client (in fact all RANGE_SETs which has matched the filter condition will be available to client). Remaining RANGE_SETs will no more be available to that client.

8.2   List of DHCP Options Names (in Open DHCP Server)

These are option names used in Open DHCP Server. These are based on IANA names less spaces and dashes. Please refer to http://www.iana.org/assignments/bootp-dhcp-parameters/bootp-dhcp-parameters.xml for more info. You can also use options not listed here using tag names directly.

Tag	Option Name in Open DHCP Server	IANA Name	Meaning
1	SubnetMask	Subnet Mask	Subnet Mask Value
2	TimeOffset	Time Offset	Time Offset in Seconds from UTC (note: deprecated by 100 and 101)
3	Router	Router	N/4 Router addresses
4	TimeServer	Time Server	N/4 Timeserver addresses
5	NameServer	Name Server	N/4 IEN-116 Server addresses
6	DomainServer	Domain Server	N/4 DHCP Server addresses
7	LogServer	Log Server	N/4 Logging Server addresses
8	QuotesServer	Quotes Server	N/4 Quotes Server addresses
9	LPRServer	LPR Server	N/4 Printer Server addresses
10	ImpressServer	Impress Server	N/4 Impress Server addresses
11	RLPServer	RLP Server	N/4 RLP Server addresses
12	Hostname	Hostname	Hostname string
13	BootFileSize	Boot File Size	Size of boot file in 512 byte chunks
14	MeritDumpFile	Merit Dump File	Client to dump and name the file to dump it to
15	DomainName	Domain Name	The DNS domain name of the client

16	SwapServer	Swap Server	Swap Server address
17	RootPath	Root Path	Path name for root disk
18	ExtensionFile	Extension File	Path name for more BOOTP info
19	ForwardOn/Off	Forward On/Off	Enable/Disable IP Forwarding
20	SrcRteOn/Off	SrcRte On/Off	Enable/Disable Source Routing
21	PolicyFilter	Policy Filter	Routing Policy Filters
22	MaxDGAssembly	Max DG Assembly	Max Datagram Reassembly Size
23	DefaultIPTTL	Default IP TTL	Default IP Time to Live
24	MTUTimeout	MTU Timeout	Path MTU Aging Timeout
25	MTUPlateau	MTU Plateau	Path MTU Plateau Table
26	MTUInterface	MTU Interface	Interface MTU Size
27	MTUSubnet	MTU Subnet	All Subnets are Local
28	BroadcastAddress	Broadcast Address	Broadcast Address
29	MaskDiscovery	Mask Discovery	Perform Mask Discovery
30	MaskSupplier	Mask Supplier	Provide Mask to Others
31	RouterDiscovery	Router Discovery	Perform Router Discovery
32	RouterRequest	Router Request	Router Solicitation Address
33	StaticRoute	Static Route	Static Routing Table
34	Trailers	Trailers	Trailer Encapsulation
35	ARPTimeout	ARP Timeout	ARP Cache Timeout
36	Ethernet	Ethernet	Ethernet Encapsulation
37	DefaultTCPTTL	Default TCP TTL	Default TCP Time to Live
38	KeepaliveTime	Keepalive Time	TCP Keepalive Interval
39	KeepaliveData	Keepalive Data	TCP Keepalive Garbage
40	NISDomain	NIS Domain	NIS Domain Name
41	NISServers	NIS Servers	NIS Server Addresses
42	NTPServers	NTP Servers	NTP Server Addresses
44	NETBIOSNameSrv	NETBIOS Name Srv	NETBIOS Name Servers
45	NETBIOSDistSrv	NETBIOS Dist Srv	NETBIOS Datagram Distribution
46	NETBIOSNodeType	NETBIOS Node Type	NETBIOS Node Type
47	NETBIOSScope	NETBIOS Scope	NETBIOS Scope
48	XWindowFont	X Window Font	X Window Font Server
49	XWindowManager	X Window Manager	X Window Display Manager
51	AddressTime	Address Time	IP Address Lease Time
58	RenewalTime	Renewal Time	DHCP Renewal (T1) Time
59	RebindingTime	Rebinding Time	DHCP Rebinding (T2) Time
62	NetWare/IPDomain	NetWare/IP Domain	NetWare/IP Domain Name
63	NetWare/IPOption	NetWare/IP Option	NetWare/IP sub Options
64	NIS-Domain-Name	NIS-Domain-Name	NIS+ v3 Client Domain Name
65	NIS-Server-Addr	NIS-Server-Addr	NIS+ v3 Server Addresses
66	TFTPServerName	Server-Name	TFTP Server Name
67	BootFileOption	Bootfile-Name	Boot File Name
68	HomeAgentAddrs	Home-Agent-Addrs	Home Agent Addresses
69	SMTPServer	SMTP-Server	Simple Mail Server Addresses
70	POP3Server	POP3-Server	Post Office Server Addresses
71	NNTPServer	NNTP-Server	Network News Server Addresses
72	WWWServer	WWW-Server	WWW Server Addresses
73	FingerServer	Finger-Server	Finger Server Addresses
74	IRCServer	IRC-Server	Chat Server Addresses
75	StreetTalkServer	StreetTalk-Server	StreetTalk Server Addresses
76	STDAServer	STDA-Server	ST Directory Assist. Addresses
78	DirectoryAgent	Directory Agent	directory agent information
79	ServiceScope	Service Scope	service location agent scope
83	iSNS	iSNS	Internet Storage Name Service
85	NDSServers	NDS Servers	Novell Directory Services
86	NDSTreeName	NDS Tree Name	Novell Directory Services
87	NDSContext	NDS Context	Novell Directory Services
95	LDAP	LDAP	Lightweight Directory Access Protocol
100	PCode	PCode	IEEE 1003.1 TZ String
101	TCode	TCode	Reference to the TZ Database
112	NetinfoAddress	Netinfo Address	NetInfo Parent Server Address
113	NetinfoTag	Netinfo Tag	NetInfo Parent Server Tag
114	URL	URL	URL

116	AutoConfig	Auto-Config	DHCP Auto-Configuration
117	NameServiceSearch	Name Service Search	Name Service Search
118	SubnetSelectionOption	Subnet Selection Option	Subnet Selection Option
119	DomainSearch	Domain Search	DNS domain search list
120	SIPServersDHCPOption	SIP Servers DHCP Option	SIP Servers DHCP Option
121	ClasslessStaticRouteOption	Classless Static Route Option	Classless Static Route Option
122	CCC	CCC	CableLabs Client Configuration
128	TFTPPhoneServer	TFTP Server IP address (for IP Phone software load)	
129	CallServerIPaddress	Call Server IP address	
130	Discriminationstring	Discrimination string (to identify vendor)	
131	RemotestatisticsserverIPaddress	Remote statistics server IP address	
135	HTTPProxyPhone	HTTP Proxy for phone-specific applications	
141	SIPUAServiceDomains	SIP UA Service Domains	SIP UA Service Domains
150	TFTPserverAddress	TFTP server address	
176	IPTelephone	IP Telephone (Tentatively Assigned - 2005-06-23)	
209	ConfigurationFile	Configuration File	Configuration file
210	PathPrefix	Path Prefix	Path Prefix Option
211	RebootTime	Reboot Time	Reboot Time
255	End	End	None

8.3   Open DHCP Server specific DHCP Header Field Options

There are some Open DHCP Server special options, although configured as Options which do not go as vendor options but are used to fill the DHCP Header fields only.

| | BootFileName | Boot File Field in DHCP Header | 126 Bytes Max |
| | NextServer | PXE TFTP Server Field in DHCP Header | N/4 IP |

9 Debugging

9.1 Windows

- Check network hardware and ensure that client machines have different host names from server and each other.
- No other service should be running on Server on ports 67. If you get error like port 67 already in use means some other DHCP program or proxy server with DHCP service is running. Use any port scanner program like Active Ports to detect which program is listening on these ports. It is also possible that another copy of DHCP server itself is running or Microsoft connection sharing (ICS) is running, which uses these ports.
- If you still get error Static Interfaces/Listening Ports not available, it may be because of 1) Another DHCP Server is running or Interfaces specified on [LISTEN-ON] section are not available. If your interface may not be ready when your computer/Service starts and due to this service fails to start, use Window's recovery option in Services applet to try starting service at later time.
- Look at OpenDHCPServer.log (if running as service) or Run in standalone mode, it will provide all debug   information as it verbatim the activities.
- If you use Broadband router, which also has DHCP Server, this program may still run, but some hosts configured by other DHCP Server may not use this DHCP Service. Please disable DHCP Service on Broadband Router.
- DHCPserver.state file backs up current leases and is read back when server restarts. If you want to clean previous leases, you may delete this file and restart the server.
- If you are not able to receive DHCP Discover messages from clients, make sure that DHCP Server and client are on same physical network (not separated by routers). If it is separated by routers and it is same subnet, please allow routers to pass broadcast messages to Server on Port 67. If these are different subnets, use the BOOTP relay agent.

9.2 Linux

- Ensure that you run this program as root only.
- Check network hardware and ensure that client machines has different host names from server and each other.
- No other service should be running on Server on ports 67. If you get error like port 67 already in use means some other DHCP program or proxy server with DHCP service is running. Use netstat command to detect which program is listening on these ports. It is also possible that another copy of opendhcpd itself is running. If you get error Static Interfaces/Listening Ports not available, it may be because of 1) Another dhcp Server is running or Interfaces specified on [LISTEN_ON] section are not available or you have just restated the server and TCP port is not yet closed, then wait for some time.
- Look at log file (if running as service) or Run in standalone mode, it will provide all debug information as it verbatim the activities.

- If you use Braodband router, which also has DHCP Server, this program may still run, but some hosts configured by other DHCP Server may not use this DNS Service. Please disable the DHCP Service on Broadband router. Please disable the DHCP Server on Broadband router.
- /tmp/opendhcp.state file backs up current leases and is read back when server restarts. If you want to clean previous leases, you may delete this file and restart the server.
- Errors like "libstdc++.so.?: cannot open shared object file: No such file or directory" are possible in some Linux flavours. Please recompile the program or create symbolic links:-
  ln -s /usr/local/lib/libstdc++.so.? /usr/lib/libstdc++.so.?
  ln -s /usr/local/lib/libgcc_s.so.? /usr/lib/libgcc_s.so.?
  (? is library version as reported in error) or add the library path (directory where above file is) to env variable LD_LIBRARY_PATH.
- If you are not able to receive DHCP Discover messages from clients, make sure that DHCP Server and client are on same physical network (not separated by routers). If it is separated by routers and it is same subnet, please allow routers to pass broadcast messages to Server on Port 67. If these are different subnets, use the BOOTP relay agents.