Chapter 35

Dynamic Host Configuration Protocol (DHCP)

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Introduction

This chapter describes the Dynamic Host Configuration Protocol (DHCP) support provided by the router, and how to configure the router to act as a DHCP or BOOTP server. DHCP is defined in RFC 2131.

DHCP provides a method for passing configuration information to hosts on a TCP/IP network. DHCP is based on its predecessor Bootstrap Protocol (BOOTP), but adds automatic allocation of reusable network addresses and additional configuration options.

When the router is configured as a DHCP server, it allocates IP addresses and other IP configuration parameters to clients (hosts), when the client requests them. This lets you configure your IP network without manually configuring every client. Note that each client must also be configured to receive its IP address automatically.

As well as addresses, a DHCP server assigns a wide range of parameters to clients, including subnet information and mask, domain and hostname, server addresses, keepalive times, MTUs, boot settings, encapsulation settings, time settings, and TCP settings.

Configuring the DHCP Server

On the router, DHCP is based on *DHCP policies*. Policies are predefined sets of configuration information items. Each policy defines IP configuration information for the clients that are attached to a single IP interface. Each policy has at least one IP address *range* attached to it. A range is a list of consecutively numbered IP addresses. When the DHCP server uses a policy to supply DHCP information to a client, it assigns the client an unused IP address from the policy's IP address ranges.

DHCP and its predecessor BOOTP are both supported, but are disabled by default.

To configure the router as a DHCP server:

1. Enable IP and give the desired interface an IP address and subnet mask. This IP address needs to be in the subnet that you wish to assign to hosts that are connected to that interface. Use the command:

   ```
   enable ip

   add ip interface
   ```

   See Chapter 14, Internet Protocol (IP) for information about configuring IP interfaces. If the interface is a VLAN, you may have to create it first.

2. Create a DHCP policy using the command:

   ```
   create dhcp policy=name leasetime={lease-time|infinity}
      [inherit=name]
   ```

3. Assign an IP address range to the policy. This range must be in the same subnet as the IP address that you assigned to the interface. Use the command:

   ```
   create dhcp range=name ip=ipadd number=number policy=name
      [gateway=ipadd] [probe={arp|icmp}]
   ```

4. Assign any other desired configuration settings to the policy, using the command:

   ```
   add dhcp policy=name [other-options]
   ```

   The server uses that policy on that interface. Repeat this process with as many interfaces and policies as required.

5. Enable the DHCP server, using the command:

   ```
   enable dhcp
   ```

IP settings are assigned to hosts for a specified time (the *lease time*). You can use DHCP to allocate some or all of:

- A dynamic IP address, which is available to the host for a limited amount of time (specified as the lease time) and is then reclaimed by the server. The server can then allocate it to another device on request. This allows you to share a limited number of IP addresses among devices and is useful when devices do not need to access the Internet at all times.

  To configure this, give the policy a lease time less than INFINITY when you create it, using the command:

  ```
  create dhcp policy=name leasetime=lease-time
  ```

- A permanent IP address, which is made available to the client on request and never reclaimed. This is referred to as "Automatic" allocation.

  To configure this, give the policy a lease time of INFINITY when you create it, using the command:

  ```
  create dhcp policy=name leasetime=infinity
  ```

- A manual or static IP address, which is allocated to a particular client. The client is identified by its MAC address. This lets you use DHCP to manage most of your network automatically, while having unchanging IP addresses on key devices such as servers.

  To configure this, add a static entry to the IP address range, using the command:

  ```
  add dhcp range=name address=macadd ip=ipadd
  ```

BOOTP requests can be satisfied by policies with leases set to INFINITY.

BOOTP Relay Agents

If the router is acting as a DHCP server for clients on subnets that are not directly connected to one of the router's interfaces, the DHCP messages are relayed through intermediate routers by a BOOTP relay agent. The BOOTP relay agent must be configured on the intermediate routers by using the commands:

```
enable bootp relay

add bootp relay
```

For more information, see "BOOTP Relay Agent" on page 14-45 of Chapter 14, Internet Protocol (IP).

Configuring the DHCP Client

An interface on the router can also be configured as a DHCP client, using the command:

```
add ip interface=interface ipaddress=dhcp [other-options...]
```

and enable remote address assignment, using the command:

```
enable ip remoteassign
```

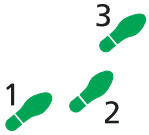
For more information, see "DHCP Client" on page 14-13 of Chapter 14, Internet Protocol (IP).

DHC Files

Information about the state of the DHCP server is stored in flash memory in a binary file with the extension `dhc`. This information includes which IP addresses are allocated and the remaining lease time for the addresses. If the router is restarted, the DHC file ensures that the server retains this information for the clients it is currently serving.

Configuration Example

The following example illustrates how to configure a router to act as a DHCP server in a small site. The site has a limited range of IP addresses and users use IP for short periods of time. The dynamic DHCP mechanism is the most appropriate for this situation. The router on the LAN is configured to provide DHCP services to the PCs on the local LAN.



To configure DHCP

1. **Enable the DHCP Server.**

   To enable DHCP, use the command:

   ```
   enable dhcp
   ```

2. **Create a policy.**

   A policy is created setting the base configuration information required by the client hosts, using the commands:

   ```
   create dhcp policy=base lease=7200
   add dhcp policy=base subnet=255.255.255.0
   add dhcp policy=base router=192.168.1.1
   add dhcp policy=base dnsserver=192.168.1.254,
      192.168.1.253
   ```

3. **Create a range.**

   To create a range that defines the list of IP address where the policy applies, use the command:

   ```
   create dhcp range=office policy=base ip=192.168.1.16
      number=32
   ```

4. **Test the configuration.**

   To check that DHCP is functioning correctly, use the commands:

```
show dhcp
show dhcp policy
show dhcp range
show dhcp client
```

5. **Configure a printer.**

   To configure a printer with the MAC address of 00-00-0c-00-28-73 that talks BOOTP, use the commands:

```
enable dhcp bootp
create dhcp policy=prnt lease=infinity inherit=base
add dhcp range=office policy=prnt IP=192.168.1.31
   address=00-00-0c-00-28-73
```

Command Reference

This section describes the commands available on the router to configure and manage the Dynamic Host Configuration Protocol (DHCP) on the router.

DHCP requires the IP module to be enabled and configured correctly. See Chapter 14, Internet Protocol (IP) for detailed descriptions of the commands required to enable and configure IP.

The shortest valid command is denoted by capital letters in the Syntax section. See "Conventions" on page xcv of Preface in the front of this manual for details of the conventions used to describe command syntax. See Appendix A, Messages for a complete list of messages and their meanings.

add dhcp policy

Syntax

```
ADD DHCP POLIcy=name [ARPTImeout=seconds]
   [BOOTFilesize=bootfilesize] [BROADcastaddress=ipadd]
   [COOKIeserver=ipadd,ipadd...]
   [DNSServer=ipadd,ipadd...] [DOmainname=string]
   [ETHERENcap={ON|OFF}] [EXTENSIonpath=string]
   [FIle=string] [HOSTname=string]
   [IMPREssserver=ipadd,ipadd...] [INTMTu=68..65535]
   [IPForwarding={ENAbled|DIsabled}] [IPMTU=576..65535]
   [IPPLAteau=mtu,mtu...] [IPTIMeout=seconds] [IPTTL=ttl]
   [LOGServer=ipadd,ipadd...] [LPRServer=ipadd,ipadd...]
   [MASKDiscovery={ON|OFF}] [MASKSupplier={ON|OFF}]
   [MERITdumpfile=longstring] [NAMEserver=ipadd,ipadd...]
   [NBDDservers=ipadd,ipadd...]
   [NBNAmeservers=ipadd,ipadd...] [NBNOdetype={B-node|
   P-node|M-node|H-node}] [NBSCope=string]
   [NISDomain=string] [NISErvers=ipadd,ipadd...]
   [NTPServers=ipadd,ipadd...]
   [POLICYFiltering=ipadd,ipadd...]
   [RESOUrceserver=ipadd,ipadd...] [ROOTPath=longstring]
```

```
[ROUter=ipadd,ipadd...] [ROUTERDiscovery={ON|OFF}]
[ROUTERSolicit=ipadd] [SERVER=ipadd]
[SERVERNAme=server-name] [SOURcerouting={ENAbled|
DIsabled}] [STATicroute=ipadd,ipadd...] [SUBLOcal={ON|
OFF}] [SUBNetmask=ipadd] [SWAPServer=ipadd]
[T1TIme=seconds] [T2TIme=seconds] [TCPGarbage={ON|OFF}]
[TCPKeepalive=seconds] [TCPTtl=ttl]
[TIMEOffset=utc-offset] [TIMEServer=ipadd,ipadd...]
[TRAILerencap={ON|OFF}]
[XDISplayservers=ipadd,ipadd...]
[XFONtservers=ipadd,ipadd...]
```

where:

- *name* is a character string 1 to 15 characters long. It may contain any printable character.
- *seconds* is a time, time offset or timeout value in seconds.
- *bootfilesize* is the length in 512-octet blocks of the default boot image for the client.
- *ipadd* is an IP address in dotted decimal notation.
- *string* is a character string 1 to 99 characters long. It may contain any printable character.
- *longstring* is a character string 1 to 254 characters long. It may contain any printable character.
- *ttl* is a number from 1 and 255.
- *server-name* is a character string 1 to 63 characters long. It may contain any printable character.
- *utc-offset* is a time offset in seconds from Coordinated Universal Time (UTC).

Description This command adds an option to an existing DHCP policy. The POLICY parameter specifies the name of the policy where the option is to be added.

The ARPTIMEOUT parameter specifies the timeout in seconds for ARP cache entries.

The BOOTFILESIZE parameter specifies the length in 512-octet blocks of the default boot image for the client.

The BROADCASTADDRESS parameter specifies the broadcast address in use on the client's subnet.

The COOKIESERVER parameter specifies a list of RFC 865 cookie servers available to the client. Cookie servers are specified by IP address. A maximum of up to 32 IP addresses can be specified in a comma separated list. Servers should be listed in order of preference.

The DNSSERVER parameter specifies a list of Domain Name System (RFC 1035) name servers available to the client. Domain Name System name servers are specified by IP address. A maximum of up to 32 IP addresses can be specified in a comma separated list. Servers should be listed in order of preference.

The DOMAINNAME parameter specifies the domain name that the client should use when resolving host names via the Domain Name System.

The ETHERENCAP parameter specifies whether the client should use Ethernet Version 2 (RFC 894) or IEEE 802.3 (RFC 1042) encapsulation for Ethernet interfaces (eth and vlan). A value of OFF indicates that the client should use RFC 894 encapsulation. A value of ON means that the client should use RFC 1042 encapsulation.

The EXTENSIONPATH parameter specifies a string to specify a file, retrievable via TFTP, which contains information that can be interpreted in the same way as the 64-octet vendor extension field within the BOOTP response.

The FILE parameter specifies the boot file name for the client.

The HOSTNAME parameter specifies the name of the client. The name may or may not be qualified with the local domain name. See RFC 1035 for character set restrictions.

The IMPRESSSERVER parameter specifies a list of Imagen Impress servers available to the client. Imagen Impress servers are specified by IP address. A maximum of up to 32 IP addresses can be specified in a comma separated list. Servers should be listed in order of preference.

The INTMTU parameter specifies the interface's Maximum Transmission Unit (MTU), in bytes. This is the maximum packet size that the client can transmit over this interface at the physical layer (for example, Ethernet). Higher-layer packets (for example, IP datagrams) that are bigger than this is fragmented by the client and reassembled at the receiving end.

The IPFORWARDING parameter specifies whether the client should configure its IP layer for packet forwarding. A value of DISABLE disables IP forwarding, and a value of ENABLE enables IP forwarding.

The IPMTU parameter specifies the size, in bytes, of the largest IP packet the client should be prepared to reassemble from packets that were fragmented at the physical layer. The client discards IP packets that are larger than this value.

The IPPLATEAU parameter specifies a table of MTU sizes to use when performing Path MTU Discovery as defined in RFC 1191. The table is formatted as a list of 16-bit unsigned integers, ordered from smallest to largest. The minimum MTU value cannot be smaller than 68.

The IPTIMEOUT parameter specifies the timeout (in seconds) to use when aging Path MTU values discovered by the mechanism defined in RFC 1191

The IPTTL parameter specifies the default time-to-live that the client should use on outgoing datagrams. The TTL is specified as an octet with a value between 1 and 255.

The LOGSERVER parameter specifies a list of MIT-LCS UDP log servers available to the client. Log servers are specified by IP address. A maximum of up to 32 IP addresses can be specified in a comma separated list. Servers should be listed in order of preference.

The LPRSERVER parameter specifies a list of RFC 1179 line printer servers available to the client. Line printer servers are specified by IP address. A maximum of up to 32 IP addresses can be specified in a comma separated list. Servers should be listed in order of preference.

The MASKDISCOVERY parameter specifies whether the client should perform subnet mask discovery using ICMP. A value of OFF indicates that the client

should not perform mask discovery. A value of ON means that the client should perform mask discovery.

The MASKSUPPLIER parameter specifies whether the client should respond to subnet mask requests using ICMP. A value of OFF indicates that the client should not respond. A value of ON means that the client should respond.

The MERITDUMPFILE parameter specifies the path name of a file where the client's core image should be dumped in the event the client crashes. The path name is formatted as a character string consisting of characters from the NVT ASCII character set.

The NAMESERVER parameter specifies a list of IEN116 name servers available to the client. IEN116 servers are specified by IP address. A maximum of up to 32 IP addresses can be specified in a comma separated list. Servers should be listed in order of preference.

The NBDDSERVERS parameter specifies a list of RFC 1001/1002 NetBIOS datagram distribution servers (NBDD) listed in order of preference. NetBIOS datagram distribution servers are specified by IP address. A maximum of up to 32 IP addresses can be specified in a comma separated list.

The NBNAMESERVERS parameter specifies a list of RFC 1001/1002 NetBIOS name servers (NBNS) listed in order of preference. NetBIOS name servers are specified by IP address. A maximum of up to 32 IP addresses can be specified in a comma separated list.

The NBNODETYPE parameter specifies the NetBIOS node type that allows NetBIOS over TCP/IP clients to be configured as described in RFC 1001/1002.

The NBSCOPE parameter specifies the NetBIOS over TCP/IP scope parameter for the client as specified in RFC 1001/1002.

The NISDOMAIN parameter specifies the name of the client's NIS domain. The domain is formatted as a character string consisting of characters from the NVT ASCII character set.

The NISERVERS parameter specifies a list of IP addresses indicating NIS servers available to the client. NIS servers are specified by IP address. A maximum of up to 32 IP addresses can be specified in a comma separated list. Servers should be listed in order of preference.

The NTPSERVERS parameter specifies a list of IP addresses indicating NTP servers available to the client. NTP servers are specified by IP address. A maximum of up to 32 IP addresses can be specified in a comma separated list. Servers should be listed in order of preference.

The POLICYFILTERING parameter specifies policy filters for non-local source routing. The filters consist of a list of IP addresses and masks that specify destination/mask pairs with which to filter incoming source routes. Any source-routed datagram whose next hop address does not match one of the filters should be discarded by the client. Policy filters are specified by IP address. A maximum of up to 32 IP addresses can be specified in a comma separated list.

The RESOURCESERVER parameter specifies a list of RFC 887 Resource Location servers available to the client. Resource Location servers are specified by IP address. A maximum of up to 32 IP addresses can be specified in a comma separated list. Servers should be listed in order of preference.

The ROOTPATH parameter specifies the path name that contains the client's root disk. The path name is formatted as a character string consisting of characters from the NVT ASCII character set.

The ROUTER parameter specifies a list of IP addresses for routers on the client's subnet. Routers are specified by IP address. A maximum of up to 32 IP addresses can be specified in a comma separated list. Routers should be listed in order of preference.

The ROUTERDISCOVERY parameter specifies whether the client should solicit routers using the Router Discovery mechanism defined in RFC 1256. A value of OFF indicates that the client should not perform router discovery. A value of ON means that the client should perform router discovery.

The ROUTERSOLICIT parameter specifies the address where the client should transmit router solicitation requests.

The SERVER parameter specifies the address of the server to use in the next step of the client's bootstrap process. As the router is not capable of providing an operating system executable this option allows the IP address of an appropriate TFTP server to be set.

The SERVERNAME parameter specifies the name of the server host. This is passed to the client.

The SOURCEROUTING parameter specifies whether the client should configure its IP layer to allow forwarding of datagrams with non-local source routes. A value of DISABLE disallows forwarding of such datagrams, and a value of ENABLE allows forwarding.

The STATICROUTE parameter specifies a list of static routes that the client should install in its routing cache. If multiple routes to the same destination are specified, they are listed in descending order of priority. The routes consist of a list of IP address pairs. The first address is the destination address, and the second address is the router for the destination. A maximum of up to 32 IP addresses can be specified in a comma separated list. The default route (0.0.0.0) is an illegal destination for a static route.

The SUBLOCAL parameter specifies whether the client may assume that all subnets of the IP network where the client is connected use the same MTU as the subnet of that network where the client is directly connected. A value of ON indicates that all subnets share the same MTU. A value of OFF means that the client should assume that some subnets of the directly connected network may have smaller MTUs.

The SUBNETMASK parameter specifies the client's subnet mask as defined in RFC 950. If you intend to use subnet or supernet addressing when you create DHCP ranges, you should include this option in the policy before you create the range.

The SWAPSERVER parameter specifies the IP address of the client's swap server.

The T1TIME parameter specifies the time interval, in seconds, from address assignment until the client transitions to the RENEWING state.

The T2TIME parameter specifies the time interval, in seconds, from address assignment until the client transitions to the REBINDING state.

The TCPGARBAGE parameter specifies whether the client should send TCP keepalive messages with a octet of garbage for compatibility with older implementations. A value of OFF indicates that a garbage octet should not be sent. A value of ON indicates that a garbage octet should be sent.

The TCPKEEPALIVE parameter specifies the interval (in seconds) that the client TCP should wait before sending a keepalive message on a TCP connection. A value of zero indicates that the client should not generate keepalive messages on connections unless specifically requested by an application.

The TCPTTL parameter specifies the default time-to-live value that the client should use when sending TCP segments.

The TIMEOFFSET parameter specifies the offset of the client's subnet in seconds from Coordinated Universal Time (UTC).

The TIMESERVER parameter specifies a list of RFC 868 time servers available to the client. Time servers are specified by IP address. A maximum of up to 32 IP addresses can be specified in a comma separated list. Servers should be listed in order of preference.

The TRAILERENCAP parameter specifies whether the client should negotiate the use of trailers (RFC 893) when using the ARP protocol. A value of OFF indicates that the client should not attempt to use trailers. A value of ON means that the client should attempt to use trailers.

The XDISPLAYSERVERS parameter specifies a list of IP addresses of systems that are running the X Window System Display Manager and are available to the client. A maximum of up to 32 IP addresses can be specified in a comma separated list. Addresses should be listed in order of preference.

The XFONTSERVERS parameter specifies a list of X Window System Font servers available to the client. X Window System Font servers are specified by IP address. A maximum of up to 32 IP addresses can be specified in a comma separated list. Servers should be listed in order of preference.

Examples

To create a policy called "base" with subnet mask, router and DNS server options, use the command:

```
add dhcp poli=base subn=255.255.255.0 rou=202.36.163.21
   dnss=192.168.100.50,192.168.100.33
```

Related Commands

create dhcp policy
delete dhcp policy
destroy dhcp policy
set dhcp policy
show dhcp policy

add dhcp range

Syntax `ADD DHCP RANge=`*`name`* `Address=`*`macadd`* `IP=`*`ipadd`* `[POLIcy=`*`name`*`]`

where:

- *name* is a character string 1 to 15 characters long. It may contain any printable character.
- *ipadd* is an IP address in dotted decimal notation.
- *macadd* is a hardware address of the form xx-xx-xx-xx-xx-xx, where xx is a two-digit hexadecimal number with leading zeros if necessary.

Description This command adds a static entry to an existing DHCP range. The RANGE parameter specifies the name of an existing DHCP range.

The IP parameter specifies the IP address of the host to add to the range. The ADDRESS parameter defines the MAC address for the static host entry. The POLICY parameter specifies the name of a policy to give the host entry.

Examples To add a static entry to the range "remote" for the device with MAC address 00-00-0c-00-28-73, use the command:

```
add dhcp ran=remote ip=192.168.1.31 a=00-00-0c-00-28-73
```

Related Commands
create dhcp range
delete dhcp range
destroy dhcp range
set dhcp range
show dhcp range

create dhcp policy

Syntax `CREate DHCP POLIcy=`*`name`* `LEASEtime={`*`lease-time`*`|INFinity} [INHerit=`*`name`*`]`

where:

- *name* is a character string 1 to 15 characters long. It may contain any printable character.
- *lease-time* is a time in seconds from 1 to 4294967295.

Description This command creates a DHCP policy. Policies define the configuration information that are given to the requesting IP host. The POLICY parameter specifies the name of the policy to create. This name is used in other commands to identify the policy.

The LEASETIME parameter specifies the time period for which the IP address is leased to the requesting IP client. For BOOTP requests, LEASETIME must be set to INFINITY. If dynamic IP address allocation is not required, then set LEASETIME to INFINITY.

Routers that comply with RFC 1541 but not with RFC 2131 may not be able to accept a lease time of less than 3600 seconds (1 hour).

The INHERIT parameter specifies the name of an existing policy whose settings are inherited by the new policy. This parameter allows the building of hierarchical policies and reduces the number of commands to create similar policies.

Examples To create a DHCP policy called “base” with a default lease time of two hours, use the command:

```
cre dhcp poli=base lease=7200
```

Related Commands
add dhcp policy
delete dhcp policy
destroy dhcp policy
set dhcp policy
show dhcp policy

create dhcp range

Syntax

```
CREate DHCP RANge=name IP=ipadd NUMber=number POLIcy=name
   [GATEway=ipadd] [PRObe={ARP|ICMP}]
```

where:

- *name* is a character string 1 to 15 characters long. It may contain any printable character.
- *ipadd* is an IP address in dotted decimal notation.
- *number* is a number from 1 to 255.

Description This command creates a DHCP range. The server tries to fulfil BOOTP or DHCP requests from hosts with IP addresses in the defined ranges. The RANGE parameter specifies the name of the range to create.

The POLICY parameter specifies the name of a default policy to give the range. Individual host entries in the range can later be set to other defined policies.

The IP address parameter defines the IP address of the start of the range.

If the range you specify includes network or broadcast addresses, these are not added to the pool of available addresses.

The NUMBER parameter defines how many host entries from the start IP address are to be included in the range.

The GATEWAY parameter specifies the IP address of a remote BOOTP relay agent. This parameter is needed if the range of IP addresses specified are not on a local interface.

The PROBE parameter specifies how the DHCP server checks whether an IP address is being used by other hosts. If ARP is specified, the server sends ARP requests to determine if an address is in use. If ICMP is specified, the server

sends ICMP Echo Requests (pings). ARP cannot be specified if the GATEWAY parameter is specified or if the network uses Proxy ARP. The default is ICMP.

Examples To create a range called "office", which uses the policy "base", with 32 IP addresses starting at 192.168.1.16, use the command:

```
cre dhcp ran=office poli=base ip=192.168.1.16 num=32
```

Related Commands

add dhcp range
delete dhcp range
destroy dhcp range
set dhcp range
show dhcp range

delete dhcp policy

Syntax

```
DELete DHCP POLIcy=name [ARPTImeout] [BOOTFilesize]
   [BROADcastaddress] [COOKIeserver] [DNSServer]
   [DOmainname] [ETHERENcap] [EXTENSIonpath] [FIle]
   [HOSTname] [IMPREssserver] [INTMTu] [IPForwarding]
   [IPMTU] [IPPLATeau] [IPTIMeout] [IPTTL] [LOGServer]
   [LPRServer] [MASKDiscovery] [MASKSupplier]
   [MERITdumpfile] [NAMEserver] [NBDDservers]
   [NBNAmeservers] [NBNOdetype] [NBSCope] [NISDomain]
   [NISErvers] [NTPServers] [POLICYFiltering]
   [RESOUrceserver] [ROOTPath] [ROUter] [ROUTERDiscovery]
   [ROUTERSolicit] [SERVER] [SERVERNAme] [SOURcerouting]
   [STATicroute] [SUBLOcal] [SUBNetmask] [SWAPServer]
   [T1TIme] [T2TIme] [TCPGarbage] [TCPKeepalive] [TCPTtl]
   [TIMEOffset] [TIMEServer] [TRAILerencap]
   [XDISplayservers] [XFONtservers]
```

where *name* is a character string 1 to 15 characters long. It may contain any printable character.

Description This command deletes an existing option from a DHCP policy. The POLICY parameter specifies the name of the policy from which the option is to be deleted.

The ARPTIMEOUT parameter specifies the timeout in seconds for ARP cache entries.

The BOOTFILESIZE parameter specifies the length in 512-octet blocks of the default boot image for the client.

The BROADCASTADDRESS parameter specifies the broadcast address in use on the client's subnet.

The COOKIESERVER parameter specifies a list of RFC 865 cookie servers available to the client. Servers should be listed in order of preference.

The DNSSERVER parameter specifies a list of Domain Name System (RFC 1035) name servers available to the client. Servers should be listed in order of preference.

The DOMAINNAME parameter specifies the domain name that the client should use when resolving hostnames via the Domain Name System.

The ETHERENCAP parameter specifies whether the client should use Ethernet Version 2 (RFC 894) or IEEE 802.3 (RFC 1042) encapsulation for Ethernet interfaces (eth and vlan). A value of OFF indicates that the client should use RFC 894 encapsulation. A value of ON means that the client should use RFC 1042 encapsulation.

The EXTENSIONPATH parameter specifies a string to specify a file, retrievable via TFTP, which contains information that can be interpreted in the same way as the 64-octet vendor -extension field within the BOOTP response.

The FILE parameter specifies the boot file name for the client.

The HOSTNAME parameter specifies the name of the client. The name may or may not be qualified with the local domain name. See RFC 1035 for character set restrictions.

The IMPRESSSERVER parameter specifies a list of Imagen Impress servers available to the client. Servers should be listed in order of preference.

The INTMTU parameter specifies the MTU to use on this interface. The MTU is specified as a 16-bit unsigned integer. The minimum legal value for the MTU is 68.

The IPFORWARDING parameter specifies whether the client should configure its IP layer for packet forwarding. A value of DISABLE disables IP forwarding, and a value of ENABLE enables IP forwarding.

The IPMTU parameter specifies the maximum size datagram that the client should be prepared to reassemble. The minimum value legal value is 576.

The IPPLATEAU parameter specifies a table of MTU sizes to use when performing Path MTU Discovery as defined in RFC 1191. The table is formatted as a list of 16-bit unsigned integers, ordered from smallest to largest. The minimum MTU value cannot be smaller than 68.

The IPTIMEOUT parameter specifies the timeout (in seconds) to use when aging Path MTU values discovered by the mechanism defined in RFC1191

The IPTTL parameter specifies the default time-to-live that the client should use on outgoing datagrams. The TTL is specified as an octet with a value between 1 and 255.

The LOGSERVER parameter specifies a list of MIT-LCS UDP log servers available to the client. Servers should be listed in order of preference.

The LPRSERVER parameter specifies a list of RFC 1179 line printer servers available to the client. Servers should be listed in order of preference.

The MASKDISCOVERY parameter specifies whether the client should perform subnet mask discovery using ICMP. A value of OFF indicates that the client should not perform mask discovery. A value of ON means that the client should perform mask discovery.

The MASKSUPPLIER parameter specifies whether the client should respond to subnet mask requests using ICMP. A value of OFF indicates that the client should not respond. A value of ON means that the client should respond.

The MERITDUMPFILE parameter specifies the path name of a file where the client's core image should be dumped if the client crashes. The path name is formatted as a character string consisting of characters from the NVT ASCII character set.

The NAMESERVER parameter specifies a list of IEN116 name servers available to the client. Servers should be listed in order of preference.

The NBDDSERVERS parameter specifies a list of RFC 1001/1002 NetBIOS datagram distribution servers (NBDD) listed in order of preference.

The NBNAMESERVERS parameter specifies a list of RFC 1001/1002 NetBIOS name servers (NBNS) listed in order of preference.

The NBNODETYPE parameter specifies the NetBIOS node type that allows NetBIOS over TCP/IP clients to be configured as described in RFC 1001/1002.

The NBSCOPE parameter specifies the NetBIOS over TCP/IP scope parameter for the client as specified in RFC 1001/1002.

The NISDOMAIN parameter specifies the name of the client's NIS domain. The domain is formatted as a character string consisting of characters from the NVT ASCII character set.

The NISERVERS parameter specifies a list of IP addresses indicating NIS servers available to the client. Servers should be listed in order of preference.

The NTPSERVERS parameter specifies a list of IP addresses indicating NTP servers available to the client. Servers should be listed in order of preference.

The POLICYFILTERING parameter specifies policy filters for non-local source routing. The filters consist of a list of IP addresses and masks that specify destination/mask pairs with which to filter incoming source routes. Any source-routed datagram whose next hop address does not match one of the filters should be discarded by the client.

The RESOURCESERVER parameter specifies a list of RFC 887 Resource Location servers available to the client. Servers should be listed in order of preference.

The ROOTPATH parameter specifies the path name that contains the client's root disk. The path name is formatted as a character string consisting of characters from the NVT ASCII character set.

The ROUTER parameter specifies a list of IP addresses for routers on the client's subnet. Routers should be listed in order of preference.

The ROUTERDISCOVERY parameter specifies whether the client should solicit routers using the Router Discovery mechanism defined in RFC 1256. A value of OFF indicates that the client should not perform router discovery. A value of ON means that the client should perform router discovery.

The ROUTERSOLICIT parameter specifies the address where the client should transmit router solicitation requests.

The SERVER parameter specifies the address of the server to use in the next step of the client's bootstrap process. As the router is not capable of providing an operating system executable this option allows the IP address of an appropriate TFTP server to be set.

The SERVERNAME parameter specifies the name of the server host. This is passed to the client.

The SOURCEROUTING parameter specifies whether the client should configure its IP layer to allow forwarding of datagrams with non-local source routes. A value of DISABLE disallows forwarding of such datagrams, and a value of ENABLE allows forwarding.

The STATICROUTE parameter specifies a list of static routes that the client should install in its routing cache. If multiple routes to the same destination are specified, they are listed in descending order of priority. The routes consist of a list of IP address pairs. The first address is the destination address, and the second address is the router for the destination. The default route (0.0.0.0) is an illegal destination for a static route.

The SUBLOCAL parameter specifies whether the client may assume that all subnets of the IP network where the client is connected use the same MTU as the subnet of that network where the client is directly connected. A value of ON indicates that all subnets share the same MTU. A value of OFF means that the client should assume that some subnets of the directly connected network may have smaller MTUs.

The SUBNETMASK parameter specifies the client's subnet mask as defined in RFC 950.

The SWAPSERVER parameter specifies the IP address of the client's swap server.

The T1TIME parameter specifies the time interval, in seconds, from address assignment until the client transitions to the RENEWING state.

The T2TIME parameter specifies the time interval, in seconds, from address assignment until the client transitions to the REBINDING state.

The TCPGARBAGE parameter specifies whether the client should send TCP keepalive messages with a octet of garbage for compatibility with older implementations. A value of OFF indicates that a garbage octet should not be sent. A value of ON indicates that a garbage octet should be sent.

The TCPKEEPALIVE parameter specifies the interval (in seconds) that the client TCP should wait before sending a keepalive message on a TCP connection. A value of zero indicates that the client should not generate keepalive messages on connections unless specifically requested by an application.

The TCPTTL parameter specifies the default time-to-live value that the client should use when sending TCP segments.

The TIMEOFFSET parameter specifies the offset of the client's subnet in seconds from Coordinated Universal Time (UTC).

The TIMESERVER parameter specifies a list of RFC 868 time servers available to the client. Servers should be listed in order of preference.

The TRAILERENCAP parameter specifies whether the client should negotiate the use of trailers (RFC 893) when using the ARP protocol. A value of OFF indicates that the client should not attempt to use trailers. A value of ON means that the client should attempt to use trailers.

The XDISPLAYSERVERS parameter specifies a list of IP addresses of systems that are running the X Window System Display Manager and are available to the client. Addresses should be listed in order of preference.

The XFONTSERVERS parameter specifies a list of X Window System Font servers available to the client. Servers should be listed in order of preference.

Examples To remove the LPRSERVER option from the policy "base", use the command:

```
del dhcp poli=base lprs
```

Related Commands
add dhcp policy
create dhcp policy
destroy dhcp policy
set dhcp policy
show dhcp policy

delete dhcp range

Syntax `DELete DHCP RANge=`*`name`* `IP=`*`ipadd`*

where:

- *name* is a character string 1 to 15 characters long. It may contain any printable character.
- *ipadd* is an IP address in dotted decimal notation.

Description This command deletes an existing static host entry from a DHCP range. The IP host entry reverts to the default settings for the range.

The RANGE parameter specifies the name of the range. The IP address parameter specifies the host entry to return to the default range settings.

Examples To delete the static entry 192.168.1.31 from the range "remote", use the command:

```
del dhcp ran=remote ip=192.168.1.31
```

Related Commands
add dhcp range
create dhcp range
destroy dhcp range
show dhcp range

destroy dhcp policy

Syntax `DESTroy DHCP POLIcy=`*`name`*

where *name* is a character string 1 to 15 characters long. It may contain any printable character.

Description This command destroys an existing policy. The POLICY parameter specifies the name of the policy to destroy. If the policy is currently being used by any host entry, then an error message is displayed and the command fails.

Examples To destroy policy “admin”, use the command:

```
dest dhcp poli=admin
```

Related Commands
add dhcp policy
create dhcp policy
delete dhcp policy
set dhcp policy
show dhcp policy

destroy dhcp range

Syntax `DESTroy DHCP RANge=`*`name`*

where *name* is a character string 1 to 15 characters long. It may contain any printable character.

Description This command destroys an existing DHCP range. The RANGE parameter specifies the name of the range to destroy.

Examples To destroy the range “remote”, use the command:

```
dest dhcp ran=remote
```

Related Commands
add dhcp range
create dhcp range
delete dhcp range
show dhcp range

disable dhcp

Syntax `DISable DHCP [BOOTp] [DEBug]`

Description This command disables the DHCP module. All BOOTP or DHCP requests received while the module is disabled are ignored.

If the optional parameter BOOTP is specified, then the reception of BOOTP requests is disabled.

The optional DEBUG parameter disables debugging of the DHCP module.

Examples To disable BOOTP serving, use the command:

```
dis dhcp boot
```

Related Commands **enable dhcp**
show dhcp

enable dhcp

Syntax `ENAble DHCP [BOOTp] [DEBug]`

Description This command enables the DHCP module. All BOOTP or DHCP requests received while the module is disabled are ignored.

If the optional parameter BOOTP is specified, then the reception of BOOTP requests is enabled.

The optional DEBUG parameter enables debugging of the DHCP module. Debugging information is sent to the port or Telnet session where the command was entered.

Examples To enable the DHCP server, use the command:

```
ena dhcp
```

Related Commands **disable dhcp**
show dhcp

set dhcp

Syntax `SET DHCP EXTendid={ON|OFF}`

Description This command sets the DHCP extended identification option. An extended client ID is used when connecting multiple router interfaces to the same DHCP server.

The EXTENDID parameter specifies whether DHCP clients uses an extended client ID when communicating with a DHCP server. If OFF is specified, the client ID value is the hardware address of the client interface. If ON is specified, the client ID value is extended to include an internal interface identifier, uniquely distinguishing different interfaces on a device. The default is OFF.

The SET DHCP EXTENDID command affects new DHCP clients and has no impact on existing ones. If extended DHCP identification is needed, then DHCP EXTENDID must be set to ON before DHCP clients are created. DHCP clients using this option set to ON are incompatible with static DHCP server entries as they do not match the extended ID. To set DHCP clients see the **add ip interface** command on page 14-77 of Chapter 14, Internet Protocol (IP).

Examples To enable the use of extended client ID values when connecting a multiple switch interfaces to the same DHCP server, use the command:

```
set dhcp ext=on
```

Related Commands **show dhcp**

set dhcp policy

Syntax

```
SET DHCP POLICY=name [ARPTImeout=seconds]
   [BOOTFilesize=bootfilesize] [BROADcastaddress=ipadd]
   [COOKIeserver=ipadd,ipadd...]
   [DNSServer=ipadd,ipadd...] [DOmainname=string]
   [ETHERENcap={ON|OFF}] [EXTENSIonpath=string]
   [FIle=string] [HOSTname=string]
   [IMPREssserver=ipadd,ipadd...] [INTMTu=68..65535]
   [IPForwarding={ENAbled|DIsabled}] [IPMTU=576..65535]
   [IPPLATeau=mtu,mtu...] [IPTIMeout=seconds] [IPTTL=ttl]
   [LEASETIME={lease-time|INFINITY}]
   [LOGServer=ipadd,ipadd...] [LPRServer=ipadd,ipadd...]
   [MASKDiscovery={ON|OFF}] [MASKSupplier={ON|OFF}]
   [MERITdumpfile=longstring] [NAMEserver=ipadd,ipadd...]
   [NBDDservers=ipadd,ipadd...]
   [NBNAmeservers=ipadd,ipadd...] [NBNOdetype={B-node|
   P-node|M-node|H-node}] [NBSCope=string]
   [NISDomain=string] [NISErvers=ipadd,ipadd...]
   [NTPServers=ipadd,ipadd...]
   [POLICYFiltering=ipadd,ipadd...]
   [RESOUrceserver=ipadd,ipadd...] [ROOTPath=longstring]
   [ROUter=ipadd,ipadd...] [ROUTERDiscovery={ON|OFF}]
   [ROUTERSolicit=ipadd] [SERVER=ipadd]
   [SERVERNAme=server-name] [SOURcerouting={ENAbled|
   DIsabled}] [STATicroute=ipadd,ipadd...] [SUBLOcal={ON|
   OFF}] [SUBNetmask=ipadd] [SWAPServer=ipadd]
   [T1TIme=seconds] [T2TIME=seconds] [TCPGarbage={ON|OFF}]
   [TCPKeepalive=seconds] [TCPTtl=ttl]
   [TIMEOffset=utc-offset] [TIMEServer=ipadd,ipadd...]
   [TRAILerencap={ON|OFF}]
   [XDISplayservers=ipadd,ipadd...]
   [XFONtservers=ipadd,ipadd...]
```

where:

- *name* is a character string 1 to 15 characters long. It may contain any printable character.
- *seconds* is a time, time offset, or timeout value in seconds.
- *bootfilesize* is the length in 512-octet blocks of the default boot image for the client.
- *ipadd* is an IP address in dotted decimal notation.
- *string* is a character string 1 to 99 characters long. It may contain any printable character.
- *lease-time* is a time in seconds from 1 to 4294967295.
- *longstring* is a character string 1 to 254 characters long. It may contain any printable character.
- *ttl* is a number from 1 and 255.
- *server-name* is a character string 1 to 63 characters long. It may contain any printable character.
- *utc-offset* is a time offset in seconds from Coordinated Universal Time (UTC).

Description This command modifies an existing option in a DHCP policy. The POLICY parameter specifies the name of the policy containing the option to be modified.

The ARPTIMEOUT parameter specifies the timeout in seconds for ARP cache entries.

The BOOTFILESIZE parameter specifies the length in 512-octet blocks of the default boot image for the client.

The BROADCASTADDRESS parameter specifies the broadcast address in use on the client's subnet.

The COOKIESERVER parameter specifies a list of RFC 865 cookie servers available to the client. Cookie servers are specified by IP address. A maximum of up to 32 IP addresses can be specified in a comma separated list. Servers should be listed in order of preference.

The DNSSERVER parameter specifies a list of Domain Name System (RFC 1035) name servers available to the client. Domain Name System name servers are specified by IP address. A maximum of up to 32 IP addresses can be specified in a comma separated list. Servers should be listed in order of preference.

The DOMAINNAME parameter specifies the domain name that the client should use when resolving hostnames via the Domain Name System.

The ETHERENCAP parameter specifies whether the client should use Ethernet Version 2 (RFC 894) or IEEE 802.3 (RFC 1042) encapsulation for Ethernet interfaces (eth and vlan). A value of OFF indicates that the client should use RFC 894 encapsulation. A value of ON means that the client should use RFC 1042 encapsulation.

The EXTENSIONPATH parameter specifies a string to specify a file, retrievable via TFTP, which contains information that can be interpreted in the same way as the 64-octet vendor extension field within the BOOTP response.

The FILE parameter specifies the boot file name for the client.

The HOSTNAME parameter specifies the name of the client. The name may or may not be qualified with the local domain name. See RFC 1035 for character set restrictions.

The IMPRESSSERVER parameter specifies a list of Imagen Impress servers available to the client. Imagen Impress servers are specified by IP address. A maximum of up to 32 IP addresses can be specified in a comma separated list. Servers should be listed in order of preference.

The INTMTU parameter specifies the interface's Maximum Transmission Unit (MTU), in bytes. This is the maximum packet size that the client can transmit over this interface at the physical layer (for example, Ethernet). Higher-layer packets (for example, IP datagrams) that are bigger than this is fragmented by the client and reassembled at the receiving end.

The IPFORWARDING parameter specifies whether the client should configure its IP layer for packet forwarding. A value of DISABLE disables IP forwarding, and a value of ENABLE enables IP forwarding.

The IPMTU parameter specifies the size, in bytes, of the largest IP packet the client should be prepared to reassemble from packets that were fragmented at the physical layer. The client discards IP packets that are larger than this value.

The IPPLATEAU parameter specifies a table of MTU sizes to use when performing Path MTU Discovery as defined in RFC 1191. The table is formatted as a list of 16-bit unsigned integers, ordered from smallest to largest. The minimum MTU value cannot be smaller than 68.

The IPTIMEOUT parameter specifies the timeout (in seconds) to use when aging Path MTU values discovered by the mechanism defined in RFC1191

The IPTTL parameter specifies the default time-to-live that the client should use on outgoing datagrams. The TTL is specified as an octet with a value between 1 and 255.

The LEASETIME parameter specifies the time period for which the IP address is leased to the requesting IP client. For BOOTP requests, LEASETIME must be set to INFINITY. If dynamic IP address allocation is not required, then set LEASETIME to INFINITY.

Routers that comply with RFC 1541 but not with RFC 2131 may not be able to accept a lease time of less than 3600 seconds (1 hour).

The LOGSERVER parameter specifies a list of MIT-LCS UDP log servers available to the client. Log servers are specified by IP address. A maximum of up to 32 IP addresses can be specified in a comma separated list. Servers should be listed in order of preference.

The LPRSERVER parameter specifies a list of RFC 1179 line printer servers available to the client. Line printer servers are specified by IP address. A maximum of up to 32 IP addresses can be specified in a comma separated list. Servers should be listed in order of preference.

The MASKDISCOVERY parameter specifies whether the client should perform subnet mask discovery using ICMP. A value of OFF indicates that the client should not perform mask discovery. A value of ON means that the client should perform mask discovery.

The MASKSUPPLIER parameter specifies whether the client should respond to subnet mask requests using ICMP. A value of OFF indicates that the client should not respond. A value of ON means that the client should respond.

The MERITDUMPFILE parameter specifies the path name of a file where the client's core image should be dumped in the event the client crashes. The path name is formatted as a character string consisting of characters from the NVT ASCII character set.

The NAMESERVER parameter specifies a list of IEN116 name servers available to the client. IEN116 servers are specified by IP address. A maximum of up to 32 IP addresses can be specified in a comma separated list. Servers should be listed in order of preference.

The NBDDSERVERS parameter specifies a list of RFC 1001/1002 NetBIOS datagram distribution servers (NBDD) listed in order of preference. NetBIOS datagram distribution servers are specified by IP address. A maximum of up to 32 IP addresses can be specified in a comma separated list.

The NBNAMESERVERS parameter specifies a list of RFC 1001/1002 NetBIOS name servers (NBNS) listed in order of preference. NetBIOS name servers are specified by IP address. A maximum of up to 32 IP addresses can be specified in a comma separated list.

The NBNODETYPE parameter specifies the NetBIOS node type that allows NetBIOS over TCP/IP clients to be configured as described in RFC 1001/1002.

The NBSCOPE parameter specifies the NetBIOS over TCP/IP scope parameter for the client as specified in RFC 1001/1002.

The NISDOMAIN parameter specifies the name of the client's NIS domain. The domain is formatted as a character string consisting of characters from the NVT ASCII character set.

The NISERVERS parameter specifies a list of IP addresses indicating NIS servers available to the client. NIS servers are specified by IP address. A maximum of up to 32 IP addresses can be specified in a comma separated list. Servers should be listed in order of preference.

The NTPSERVERS parameter specifies a list of IP addresses indicating NTP servers available to the client. NTP servers are specified by IP address. A maximum of up to 32 IP addresses can be specified in a comma separated list. Servers should be listed in order of preference.

The POLICYFILTERING parameter specifies policy filters for non-local source routing. The filters consist of a list of IP addresses and masks that specify destination/mask pairs with which to filter incoming source routes. Any source-routed datagram whose next hop address does not match one of the filters should be discarded by the client. Policy filters are specified by IP address. A maximum of up to 32 IP addresses can be specified in a comma separated list.

The RESOURCESERVER parameter specifies a list of RFC 887 Resource Location servers available to the client. Resource Location servers are specified by IP address. A maximum of up to 32 IP addresses can be specified in a comma separated list. Servers should be listed in order of preference.

The ROOTPATH parameter specifies the path name that contains the client's root disk. The path name is formatted as a character string consisting of characters from the NVT ASCII character set.

The ROUTER parameter specifies a list of IP addresses for routers on the client's subnet. Routers are specified by IP address. A maximum of up to 32 IP addresses can be specified in a comma separated list. Routers should be listed in order of preference.

The ROUTERDISCOVERY parameter specifies whether the client should solicit routers using the Router Discovery mechanism defined in RFC 1256. A value of OFF indicates that the client should not perform router discovery. A value of ON means that the client should perform router discovery.

The ROUTERSOLICIT parameter specifies the address where the client should transmit router solicitation requests.

The SERVER parameter specifies the address of the server to use in the next step of the client's bootstrap process. As the router is not capable of providing an operating system executable, this option allows the IP address of an appropriate TFTP server to be set.

The SERVERNAME parameter specifies the name of the server host. This is passed to the client.

The SOURCEROUTING parameter specifies whether the client should configure its IP layer to allow forwarding of datagrams with non-local source routes. A value of DISABLE disallows forwarding of such datagrams, and a value of ENABLE allows forwarding.

The STATICROUTE parameter specifies a list of static routes that the client should install in its routing cache. If multiple routes to the same destination are specified, they are listed in descending order of priority. The routes consist of a list of IP address pairs. The first address is the destination address, and the second address is the router for the destination. A maximum of up to 32 IP addresses can be specified in a comma separated list. The default route (0.0.0.0) is an illegal destination for a static route.

The SUBLOCAL parameter specifies whether the client may assume that all subnets of the IP network where the client is connected use the same MTU as the subnet of that network where the client is directly connected. A value of ON indicates that all subnets share the same MTU. A value of OFF means that the client should assume that some subnets of the directly connected network may have smaller MTUs.

The SUBNETMASK parameter specifies the client's subnet mask as defined in RFC 950. If you intend to use subnet or supernet addressing when you create DHCP ranges, you should include this option in the policy before you create the range.

The SWAPSERVER parameter specifies the IP address of the client's swap server.

The T1TIME parameter specifies the time interval, in seconds, from address assignment until the client transitions to the RENEWING state.

The T2TIME parameter specifies the time interval, in seconds, from address assignment until the client transitions to the REBINDING state.

The TCPGARBAGE parameter specifies whether the client should send TCP keepalive messages with a octet of garbage for compatibility with older implementations. A value of OFF indicates that a garbage octet should not be sent. A value of ON indicates that a garbage octet should be sent.

The TCPKEEPALIVE parameter specifies the interval (in seconds) that the client TCP should wait before sending a keepalive message on a TCP connection. A value of zero indicates that the client should not generate keepalive messages on connections unless specifically requested by an application.

The TCPTTL parameter specifies the default time-to-live value that the client should use when sending TCP segments.

The TIMEOFFSET parameter specifies the offset of the client's subnet in seconds from Coordinated Universal Time (UTC).

The TIMESERVER parameter specifies a list of RFC 868 time servers available to the client. Time servers are specified by IP address. A maximum of up to 32 IP addresses can be specified in a comma separated list. Servers should be listed in order of preference.

The TRAILERENCAP parameter specifies whether the client should negotiate the use of trailers (RFC 893) when using the ARP protocol. A value of OFF indicates that the client should not attempt to use trailers. A value of ON means that the client should attempt to use trailers.

The XDISPLAYSERVERS parameter specifies a list of IP addresses of systems that are running the X Window System Display Manager and are available to the client. A maximum of up to 32 IP addresses can be specified in a comma separated list. Addresses should be listed in order of preference.

The XFONTSERVERS parameter specifies a list of X Window System Font servers available to the client. X Window System Font servers are specified by IP address. A maximum of up to 32 IP addresses can be specified in a comma separated list. Servers should be listed in order of preference.

Examples To change the DN server for policy “base”, use the command:

```
set dhcp poli=base dnss=192.168.100.51
```

Related Commands
add dhcp policy
create dhcp policy
delete dhcp policy
destroy dhcp policy
show dhcp policy

set dhcp range

Syntax `SET DHCP RANge=`*`name`* `PRObe={ARP|ICMP}`

where *name* is a character string 1 to 15 characters long. It may contain any printable character.

Description This command modifies the server’s method for probing IP addresses in the specified range.

The PROBE parameter specifies how the DHCP server checks whether an IP address is being used by other hosts. If ARP is specified, the server sends ARP requests to determine if an address is in use. If ICMP is specified, the server sends ICMP Echo Requests (pings). The default is ICMP.

Note that ARP cannot be specified if the range includes a gateway (by specifying the GATEWAY parameter when it was created), or if the network uses Proxy ARP.

Examples To set the range "office" to use ARP packets to probe IP addresses, use the command:

```
set dhcp ran=office pro=arp
```

Related Commands
add dhcp range
create dhcp range
delete dhcp range
destroy dhcp range
show dhcp range

show dhcp

Syntax `SHow DHCP`

Description This command displays the state of the DHCP module (Figure 35-1, Table 35-1 on page 35-27).

Figure 35-1: Example output from the **show dhcp** command

```
DHCP Server

 State ............... enabled
 BOOTP Status ....... enabled
 DEBUG Status ....... enabled
 Extended Client ID . enabled
 Policies ........... poll
                      prnt
 Ranges ............,. develop (202.36.163.6 - 202.36.163.22)
                     remote (192.168.100.92 - 192.168.100.124)
 In Messages ........ 3
 Out Messages ....... 3
 In DHCP Messages ... 3
 Out DHCP Messages .. 3
 In BOOTP Messages .. 0
 Out BOOTP Messages . 0

DHCP Client

 Interface .......... eth0
 Client Identifier .. 00-00-cd-03-b3-4c-00-80-00-01
 State ............... bound
 Server ............. 10.194.0.10
 Assigned Domain ....
 Assigned IP ........ 10.194.0.1
 Assigned Mask ...... 255.255.255.255
 Assigned Gateway ... 0.0.0.0
 Assigned DNS ....... 0.0.0.0
```

Table 35-1: Parameters in the output of the **show dhcp** command

Parameter	Meaning
State	Whether the status of the DHCP server is enabled or disabled.
BOOTP Status	Whether the status of BOOTP serving is enabled or disabled.
Extended Client ID	Whether extended client IDs are transmitted by this device; either Enabled or Disabled.
BOOTP Status	Whether the status of BOOTP serving is enabled or disabled.
Policies	A list of the policies that have been defined.
Ranges	A list of the ranges that have been defined.
In Messages	The total number of DHCP or BOOTP messages received by the router.
Out Messages	The total number of DHCP or BOOTP messages transmitted by the router.
In DHCP Messages	The number of DHCP messages received by the router.
Out DHCP Messages	The number of DHCP messages transmitted by the router.

Table 35-1: Parameters in the output of the **show dhcp** command (continued)

Parameter	Meaning
In BOOTP Messages	The number of BOOTP messages received by the router.
Out BOOTP Messages	The number of BOOTP messages transmitted by the router.
Interface	The interface(s) this client is active on.
Client Identifier	The identifying token used in DHCP messages for this client.
State	The current state of the DHCP client; either Renewing, Rebinding, Selecting, Requesting, Bound, or Init.
Server	The DHCP server this client is connected to.
Assigned Domain	The domain name provided for this client by the DHCP server.
Assigned IP	The IP address assigned to this client by the DHCP server.
Assigned Mask	The IP address mask matching the address assigned to this client.
Assigned Gateway	The network gateway IP address provided by the DHCP server.
Assigned DNS	The Domain Name Server IP address provided by the DHCP server.

Examples To display the current configuration of the DHCP server, use the command:

```
sh dhcp
```

Related Commands

disable dhcp
enable dhcp
set dhcp
show dhcp client
show dhcp policy
show dhcp range

show dhcp client

Syntax `SHow DHCP CLIEnt[=`*`ipaddress`*`] [RANge=`*`name`*`]`

Description This command displays information about the currently defined range client entries (Figure 35-2 on page 35-29, Table 35-2 on page 35-29). If the RANGE parameter is specified, then the clients in the specified range are displayed. If an IP address is specified on the CLIENT parameter, then information for that IP address is displayed.

Figure 35-2: Example output from the **show dhcp client** command

```
DHCP Client Entries

IP Address      ClientId                  State   Type   Expiry
-------------------------------------------------------------------------------
202.36.163.14   00-00-c0-00-00-01         unused  static never
202.36.163.15   00-00-c0-00-00-02         unused  static never
202.36.163.16   00-00-c0-00-00-03         unused  static never
202.36.163.17   00-00-c0-00-00-04         unused  static never
202.36.163.18   00-00-c0-00-00-05         unused  static never
202.36.163.19   00-00-c0-00-00-06         unused  static never
202.36.163.20   08-00-5a-a1-02-3f         inuse   auto   never
202.36.163.21   00-00-c0-c9-c6-7b         inuse   auto   never
202.36.163.22   08-00-09-0d-16-e7         inuse   auto   never
202.36.163.23                            unused  auto   never
202.36.163.24                            unused  auto   never
202.36.163.25                            unused  auto   never
202.36.163.26                            unused  auto   never
202.36.163.27                            unused  auto   never
202.36.163.28   00-40-10-02-e8-a3         inuse   auto   never

192.168.100.92  00-00-c0-c9-c6-21         inuse   dyn    19-Jun-1997 12:30:51
192.168.100.93                           unused  dyn
192.168.100.94                           unused  dyn
192.168.100.95                           unused  dyn
192.168.100.96                           unused  dyn
192.168.100.97                           unused  dyn
192.168.100.98                           unused  dyn
192.168.100.99                           unused  dyn
192.168.100.110                          unused  dyn
192.168.100.111                          unused  dyn
192.168.100.112                          unused  dyn
192.168.100.113                          unused  dyn
192.168.100.114                          unused  dyn
192.168.100.115                          reclaim dyn
192.168.100.116                          reclaim dyn
192.168.100.117                          reclaim dyn
192.168.100.118                          reclaim dyn
```

Table 35-2: Parameters in the output of the **show dhcp client** command

Parameter	Meaning
IP Address	An IP address from the range of available IP addresses.
ClientId	The hardware address of the client, if any, that has been assigned the IP address.
State	The state of the IP address: Unused - not currently in use and is available for assignment Inuse - currently assigned to a client Reclaim - currently being reclaimed
Type	The type of allocation mechanism applied to the IP address: Static - manual allocation Auto - automatic allocation Dyn - dynamic allocation
Expiry	The expiry date for dynamically allocated IP addresses.

Examples To display information about the clients in a range named “remote”, use the command:

```
sh dhcp clie ran=remote
```

Related Commands
show dhcp
show dhcp policy
show dhcp range

show dhcp policy

Syntax `SHow DHCP POLIcy[=name]`

Description This command displays information about the currently defined policies (Figure 35-3, Table 35-3 on page 35-30). If a policy name is specified, then information about the specified policy is displayed.

Figure 35-3: Example output from the **show dhcp policy** command

```
DHCP Policies

Name: pol1
  Base Policy: none
  01 subnetmask .... 255.255.255.0
  03 router ........ 202.36.163.21
  06 dnsserver ..... 192.168.100.50  192.168.100.33
  51 leasetime ..... 3600

Name: prnt
  Base Policy: pol1
  01 subnetmask .... (pol1) 255.255.255.0
  03 router ........ (pol1) 202.36.163.21
  06 dnsserver ..... (pol1) 192.168.100.50  192.168.100.33
  51 leasetime ..... (prnt) infinity
```

Table 35-3: Parameters in the output of the **show dhcp policy** command .

Parameter	Meaning
Name	The name of the policy.
Base Policy	The base policy inherited by this policy.
options...	A list of the options configured for the policy. Each entry includes the DHCP option identifier, the parameter keyword and the current value(s) of the option.

Examples To display information about the policy “base”, use the command:

```
sh dhcp poli=base
```

Related Commands
add dhcp policy
create dhcp policy
delete dhcp policy
destroy dhcp policy
set dhcp policy

show dhcp
show dhcp client
show dhcp range

show dhcp range

Syntax `SHow DHCP RANge[=name]`

Description This command displays information about currently defined ranges (Figure 35-4 on page 35-31, Table 35-4 on page 35-32). If a range name is specified, then information about it is displayed.

This command also displays counters for DHCP and BOOTP. BOOTP is used to transport DHCP messages. If the router is acting as a DHCP server for clients on subnets that are not directly connected to one of the router's interfaces, the DHCP messages are relayed through intermediate routers acting as BOOTP relay agents.

Figure 35-4: Example output from the **show dhcp range** command

```
DHCP Ranges

Name: remote
  Policy ..................... pol1
  Probe Type ................. ICMP
  Start Address .............. 192.168.100.92
  End Address ................ 192.168.100.124
  Reclaim Status ............. Deferred
  Next reclaim in ............ 5 seconds
  Used Address(es) ........... 192.168.100.92    192.168.100.94    192.168.100.95
                               192.168.100.96
  Free Address(es) ........... 192.168.100.93    192.168.100.97    192.168.100.98
                               192.168.100.99    192.168.100.100   192.168.100.101
                               192.168.100.102
  Reclaiming Address(es) ..... 192.168.100.103   192.168.100.104   192.168.100.105
                               192.168.100.106   192.168.100.107   192.168.100.108
                               192.168.100.109   192.168.100.110   192.168.100.111
                               192.168.100.112   192.168.100.113   192.168.100.114
                               192.168.100.115   192.168.100.116   192.168.100.117
                               192.168.100.118   192.168.100.119   192.168.100.120
                               192.168.100.121   192.168.100.122   192.168.100.123
  In DHCP Messages ........... 0
  In Discover Messages ....... 0
  In Request Messages ........ 0
  In Decline Messages ........ 0
  In Release Messages ........ 0
  Out DHCP Messages .......... 0
  Out Offer Messages ......... 0
  Out Ack Messages ........... 0
  Out Nak Messages ........... 0
  In BOOTP Messages .......... 0
  Out BOOTP Messages ......... 0
```

Table 35-4: Parameters in the output of the **show dhcp range** command

Parameter	Meaning
Name	Name of the range.
Policy	Policy that is applied to entries in the range.
Probe Type	Whether the DHCP server's method for probing IP addresses is ICMP or ARP.
Start Address	First IP address in the range.
End Address	Last IP address in the range.
Reclaim Status	Whether IP addresses are currently being reclaimed for clients: In progress Yes Stopped No Deferred No available route to the IP address being reclaimed
Next reclaim in	For ranges with deferred status, the time until the next reclaim is attempted.
Used Address(es)	List of IP addresses currently assigned to clients.
Free Address(es)	List of IP addresses currently available for assignment.
Reclaiming Address(es)	List of IP addresses currently being reclaimed from clients.
In DHCP Messages	Total number of DHCP messages the server received for this range.
In Discover Messages	Number of DHCP Discover messages the server received for this range. A client broadcasts these messages to initiate a DHCP session.
In Request Messages	Number of DHCP Request messages the server received for this range. A client uses this message to request parameters from a server that has offered them, to check that a previously allocated address is still correct (for example, after the client has rebooted) and to extend its lease of an address.
In Decline Messages	Number of DHCP Decline messages the server received for this range. When a client is offered an address, it may use ARP to check the address. The client sends a Decline message if it discovers that the IP address the server has offered it is already being used by another device.
In Release Messages	Number of DHCP Release messages the server received for this range. A client sends this message to relinquish an address when it no longer requires it. This makes the address available to another client.
Out DHCP Messages	Total number of DHCP messages the server transmitted for this range.
Out Offer Messages	Number of DHCP Offer messages the server sent for this range. The server sends this message in response to a client Discover message to offer configuration parameters to the client.
Out Ack Messages	Number of DHCP Acknowledgment messages the server sent for this range. The server sends this message in response to a client Request message, to supply the client with configuration parameters.
Out Nak Messages	Number of DHCP Negative Acknowledgment messages the server sent for this range. The server sends this message in response to a client Request message to tell the client that the IP address the client believes it has is wrong, the IP address the server offered is no longer available, or the client's lease has expired.

Table 35-4: Parameters in the output of the **show dhcp range** command (continued)

Parameter	Meaning
In BOOTP Messages	Number of BOOTP messages the server received for this range.
Out BOOTP Messages	Number of BOOTP messages the server transmitted for this range.

Examples To display information about a range named "remote", use the command:

```
sh dhcp rang=remote
```

Related Commands

add dhcp range
create dhcp range
delete dhcp range
destroy dhcp range
set dhcp range
show dhcp
show dhcp client
show dhcp policy