

32 UDP Forwarding

UDP is a connectionless transport protocol that is used for applications that do not require the establishment of a session and end-to-end error checking, such as email and file transfer. This chapter describes the UDP relay function in the switch, which allows UDP broadcast packets to be forwarded across groups and VLANs that have IP routing enabled. The UDP relay allows you to use nonroutable protocols in a routing environment. (For information about IP routing, see Chapter 31, “IP Routing.”)

◆ Note ◆

BOOTP/DHCP relay has previously been available on the switch. It is now part of an expanded feature that includes relays for NetBIOS and generic services.

The relay may be configured for the following services:

- Bootstrap Protocol (BOOTP)/Dynamic Host Configuration Protocol (DHCP)
- NetBIOS Name Server (NBNS)
- NetBIOS Datagram Distribution Server (NBDD)
- Generic applications, such as Trivial File Transfer Protocol (TFTP)

The UDP services, their corresponding well-known port numbers, and configurable options on the switch are listed here.

Service	UDP Port No.	Configurable Options
BOOTP/DHCP	67/68	Next-hop address (up to 8) Forward delay Maximum hops
NBNS	137	Next-hop address (up to 8) Forwarding VLANs (up to 32)
NBDD	138	Next-hop address (up to 8) Forwarding VLANs (up to 32)
Generic	user-configured	Next-hop address (up to 8) Forwarding VLANs (up to 32)

UDP Relay and RIF Stripping

Routing Information Field (RIF) stripping is required for transparent bridge ports in source route environments and may also be useful in non-source route environments. For an introduction to RIF stripping, see Chapter 21, “Managing Token Ring.”

In a source route environment, where RIF stripping is enabled for transparent bridging to Ethernet, UDP relay clients should not be more than one switch away from the DHCP server. (In RIF stripping, 2 bytes are stripped from the RIF and each bridge adds 2 bytes to the RIF. Packets with a RIF greater than 2 bytes are discarded.)

In non-source route environments, RIF stripping may be required if DHCP clients are token ring stations. Token ring stations may have packets with RIFs even though source routing is not enabled on the station. RIF stripping is required if there is bridging to Ethernet, FDDI, or 802.3 LANE anywhere along the path between the client and the DHCP server. RIF stripping should be enabled on the first non-token ring port in the path. The number of bridges on the path does not matter.

UDP Relay Hardware/Software Support

The UDP forwarding feature has the following hardware/software support:

- UDP relay is supported on any OmniSwitch or Omni Switch/Router (OmniS/R).
- To relay DHCP requests from authentication clients in a default group to a DHCP server in an authenticated group, the **avlbootpmode** command must be used in addition to the **relayc** command described in this chapter. See the Authentication Services chapter of the *Switched Network Solutions User Manual* for information about the **avlbootpmode** command.

UDP Relay Configuration Screen

To configure any of the UDP relays, use the **relayc** command. The **relayc** command is listed in the IP submenu. (For more information about IP commands, see Chapter 31, “IP Routing.”) The screen display is similar to the following:

```

                UDP Relay Configuration

1) BOOTP/DHCP Enabled      : No
2) NBNS Enabled            : No
3) NBDD Enabled            : No
4) +Generic Services Menu

Command {Item=Value/?/Help/Quit/Redraw/Save} (Redraw) :
```

Use the UDP Relay Configuration screen to enable any of the relays and display more configuration options for enabled relays. The following sections describe each UDP service and how to configure each of the relays using the User Interface (UI). A UDP statistics screen may also be displayed.

◆ Note ◆

For general information about the UI, see Chapter 8, “The User Interface.”

BOOTP/DHCP Relay

The switch supports a UDP relay function that allows Bootstrap Protocol (BOOTP) and Dynamic Host Configuration Protocol (DHCP) packets to pass between AutoTracker Groups.

◆ Note ◆

A BOOTP/DHCP relay may be configured for authenticated groups as well. See *BOOTP/DHCP Relay and Authentication* on page 32-5 and the Authentication Services chapter of the *Switched Network Solutions User Manual*.

Through UI software, you can turn the relay function on or off and specify the IP addresses of DHCP servers, the delay before the relay forwards a request, and the maximum number of hops a packet may be forwarded through the network.

Alternately the relay function may be provided by an external router connected to the switch; in this case, the relay would be configured on the external router.

Overview of DHCP

DHCP provides a framework for passing configuration information to Internet hosts on a TCP/IP network. It is based on the Bootstrap Protocol (BOOTP), adding the ability to automatically allocate reusable network addresses and additional configuration options. DHCP consists of the following two components:

- A protocol for delivering host-specific configuration parameters from a DHCP server to a host.
- A mechanism for allocating network addresses to hosts.

DHCP is built on a client-server model in which a designated DHCP server allocates network addresses and delivers configuration parameters to dynamically configured hosts. It supports the following three mechanisms for IP address allocation:

Automatic	DHCP assigns a permanent IP address to a host.
Dynamic	DHCP assigns an IP address to a host for a limited period of time (or until the host explicitly relinquishes the address).
Manual	The network administrator assigns a host's IP address and DHCP simply conveys the assigned address to the host.

A particular network will use one or more of these mechanisms, depending on the policies of the network administrator.

For information about configuring DHCP servers, see the IP Control chapter of the *Switched Network Solutions User Manual*.

DHCP and the OmniSwitch or OmniS/R

The unique characteristics of the DHCP protocol require a good plan before setting up the switch in a DHCP environment. Since DHCP clients initially have no IP address, placement of these clients in an AutoTracker VLAN is hard to determine. In simple networks (i.e., one group, one VLAN) AutoTracker rules do not need to be deployed to support the BOOTP/DHCP relay functionality.

In multiple group configurations, AutoTracker rules can be deployed to strategically support the relay function. Two types of AutoTracker IP policies are appropriate for DHCP environments. The first is the IP protocol policy that puts all IP type frames into a single VLAN regardless of network address. The second is the IP network policy that groups IP users based on their specific IP address.

Besides AutoTracker rules, the network administrator must be aware that some network environments may contain DHCP-ready and non-DHCP clients. Such configurations are supported by the switch's BOOTP relay function.

BOOTP/DHCP Relay and Source Routing

In source route environments (where VLAN framing type is set for source routing) and DHCP clients are not directly attached to the switch but have one or more bridges between them, the **mpm.cmd** or **mpx.cmd** file must be modified so that replies from the DHCP server can get through the bridge.

Typically a router caches the client's RIF information for source routing when the client responds to an ARP, but if the client does not yet know its IP address it cannot reply to an ARP and no RIF information is cached on the router. Unicast replies to the client before the RIF is cached are discarded by the router. Forcing the BOOTP reply to be broadcast eliminates this problem.

Use the **edit** command to make this change to the **mpm.cmd** or **mpx.cmd** file (see Chapter 11, "Managing Files," for instructions on using the **edit** command).

Add the following command:

```
bootpBcastReply=1
```

Reboot the switch to force the broadcast. Replies from the DHCP server to the client will be broadcast from the router as STE or ARE packets so they can be sent through the bridge.

BOOTP/DHCP Relay and Authentication

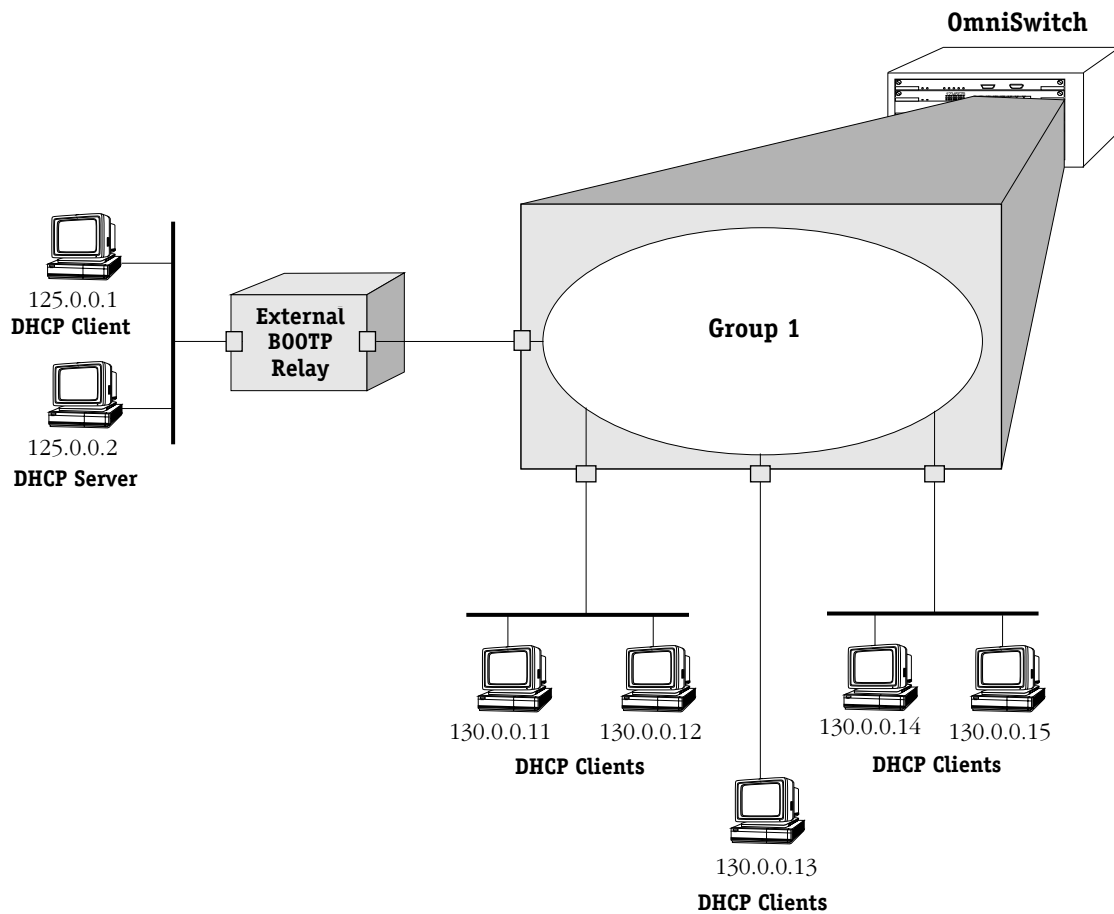
Authentication clients may use DHCP to get an IP address. For Telnet authentication clients, an IP address is required for authentication. The DHCP server may be located in the default group, an authenticated group, or both. If authentication clients will be getting an IP address from a DHCP server located in an authenticated group, a BOOTP/DHCP relay should be set up using the **relayc** command described in this chapter.

In addition, the router port address of the authenticated group must also be configured for the relay through the **avlbootpmode** command. See the Authentication Services chapter of the *Switched Network Solutions User Manual* for more information about this command.

External BOOTP Relay

The BOOTP relay may be configured on a router that is external to the switch. In this application example the switched network has a single AutoTracker Group configured with multiple segments. All of the network hosts are DHCP-ready, meaning they obtain their network address from the DHCP server. The DHCP server resides behind an external network router, which supports the BOOTP relay functionality.

One requirement for routing DHCP frames is that the router must support BOOTP relay functionality to be able to forward DHCP frames. In this example, BOOTP relay is supported within an external router, which forwards request frames from the incoming router port to the outgoing router port attached to the OmniSwitch.



DHCP Clients are Members of the Same VLAN

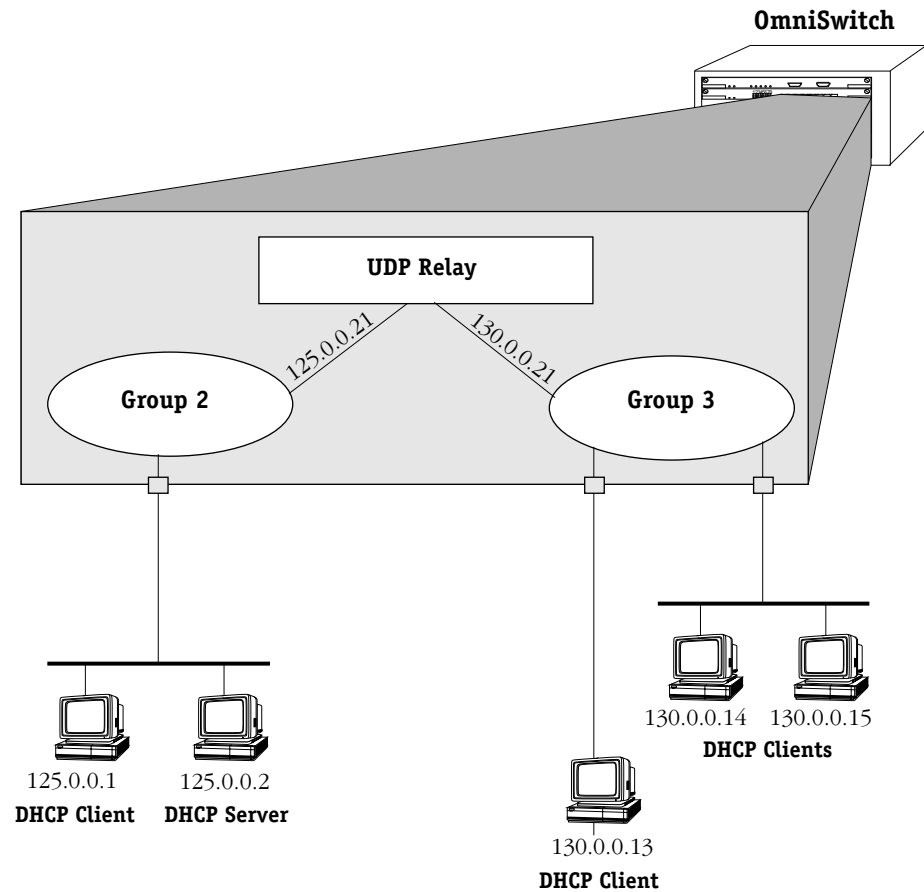
The external router inserts the subnet address of the first hop segment into the DHCP request frames from the DHCP clients. This subnet address allows the DHCP server to locate the segment that the requesting client resides on. In this example, all clients attached to the OmniSwitch are DHCP-ready and will have the same subnet address (130.0.0.0) inserted into each of the requests by the router's BOOTP relay function. The DHCP server will assign a different IP address to each of the clients. The switch does not need an IP address assigned and all DHCP clients will be members of either a default VLAN or an IP protocol VLAN.

Internal BOOTP/DHCP Relay

The internal BOOTP/DHCP relay is configured using the UDP forwarding feature in the switch, available through the **relayc** command. See *UDP Relay Configuration Screen* on page 32-3.

Example 1

This application example shows a network with two AutoTracker Groups, each with multiple segments. All network clients are DHCP-ready and the DHCP server resides on just one of the groups. This example is much like the first application example, except that the BOOTP relay function is configured inside the switch.



DHCP Clients in Two Groups

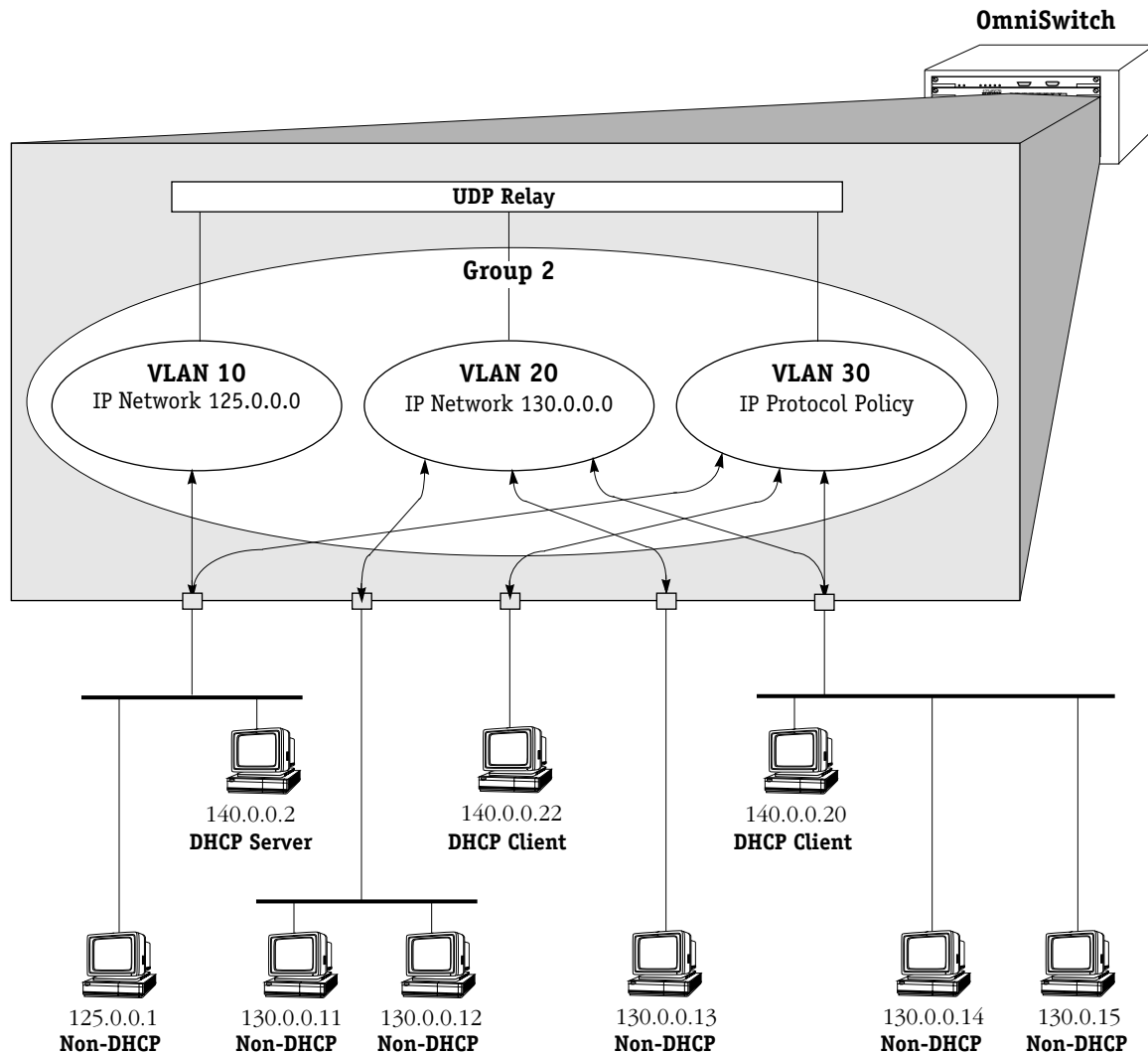
During initialization, each network client forwards a DHCP request frame to the DHCP server using the local broadcast address. For those stations locally attached, the frame will simply be switched.

In the example above, the DHCP server and clients in the same group must be members of the same VLAN so that the policies match (they could also all be members of the default VLAN). One way to accomplish this is to use an IP protocol policy that places all IP frames in the same VLAN. An IP network policy would not work in this case because the DHCP clients will not have an IP network address until *after* they communicate with the DHCP server.

Because the clients in group 3 are not on the same segment as the DHCP server, they must request an IP address via the BOOTP relay routing entity in the switch. When a DHCP request frame is received by the BOOTP relay entity, it will be forwarded from group 3 to group 2. All the DHCP-ready clients in group 3 must be members of the same VLAN, and the switch must have the BOOTP relay function configured.

Example 2

This application example has a single group in a network with a mix of DHCP-ready and non-DHCP clients. DHCP-ready and non-DHCP clients can coexist in the same network, group, or segment. There are two types of AutoTracker policies defined within the group—IP address and IP protocol.



AutoTracker IP Policy Places DHCP Clients in Same VLAN

Whenever AutoTracker receives an IP frame, it examines the frame for an IP network layer policy match. In the case of DHCP, the client generates an IP frame without an IP address. Without an IP address, AutoTracker will not be able to place the client into a VLAN based on IP address. Therefore, the client will become a member of the VLAN defined by a general IP Protocol policy (i.e., VLAN 30).

In this example, the VLAN defined by an IP protocol policy is used *as a mechanism to group the DHCP server and associated clients*. The DHCP server is local, so all clients requesting an IP address will be allocated an IP address on the same subnet.

◆ **Note** ◆

This configuration works if you require only one DHCP subnet. All clients received on the same router port will be assigned to the same VLAN.

Note that the client's request frames will also be received and forwarded by the BOOTP relay if it is configured.

The non-DHCP workstations will be assigned to VLANs defined by Network Address policies. These workstations already have manually configured IP addresses. They don't require a server to dynamically assign them an address. AutoTracker will move these workstations into the VLANs with IP network address policies (VLAN 10 and VLAN 20).

It is true that these non-DHCP workstations also match the IP protocol policy. However, Network Address policies have precedence over IP protocol policies. If AutoTracker finds a match on a Network Address policy, it does not look for a protocol policy match.

Enabling BOOTP/DHCP Relay

To enable UDP relay for BOOTP/DHCP:

At the prompt for the UDP Relay Configuration screen (the UDP Relay Configuration screen is displayed using the **relayc** command described in *UDP Relay Configuration Screen* on page 32-3), enter the following:

1=y

The screen redisplay with more configuration options for BOOTP/DHCP.

UDP Relay Configuration

```

1) BOOTP/DHCP Enabled           : Yes
  11) Server Address{list/add/delete} : UNSET
  12) Forward Delay              : 3
  13) Maximum Hops              : 4
2) NBNS Enabled                 : No
3) NBDD Enabled                 : No
4) +Generic Services Menu
  
```

Command {Item=Value/?/Help/Quit/Redraw/Save} (Redraw) :

The parameters are defined here.

Server Address

This parameter allows you to list, add, or delete the server address(es) to which the BOOTP/DHCP relay will forward. The default is **UNSET**. When you have configured at least one valid address, the value redisplay as **SET**. Up to 8 addresses may be configured. *The server address cannot be an internal DHCP server configured through the IP Control feature. For more information about IP Control, see the **Switched Network Solutions User Manual**.*

Forward Delay

The amount of time (typically in seconds, but determined by the client) the BOOTP/DHCP relay will wait before forwarding a request to the server address. This delay gives a local server a chance to respond to a client before the relay forwards it further out in the network. This value may range from 1 to 65535.

Maximum Hops

The maximum number of relays that a packet can go through while traversing the network. This limit keeps packets from “looping” through the network. Set this value to the maximum number of BOOTP/DHCP relays you expect packets to traverse. This value may range from 1 to 16.

Configuring BOOTP/DHCP Relay Parameters

At least one server address must be configured for the BOOTP/DHCP relay. To configure the server address:

1. On the UDP Relay Configuration screen prompt, enter

11=a

A screen displays similar to the following:

FORWARD TO Server List

Item	Server address	Server Name (if known)
------	----------------	------------------------

Enter IP address or host name of server to be added to the list ['h' for help/<ret> to exit]

2. Enter the IP address, which may be a specific host on the network or a subnet broadcast address. The address should be in dotted decimal format (i.e., 198.206.181.12) or hexadecimal address (i.e., 0xc6ceb501). Alternately you may enter a host name (i.e., system.com) if the DNS resolver is enabled on the switch through the **res** command. The screen redisplay with the entry.
3. Repeat the previous step to add all the addresses to which you want to forward to. Press **Enter** when you are finished adding addresses. The screen redisplay with the Server Address field set to **SET**.
4. Make any changes to Forward Delay or Maximum Hops.
5. Enter **s** to save your changes. If the relay has just been enabled, the system initializes the relay. If the relay is already running, it is stopped and reinitialized with the changes.
6. Enter **q** to quit the UDP Relay Configuration screen.

NetBIOS Relays

The switch supports a UDP relay function that allows Network Basic Input/Output System (NetBIOS) messages to be sent across groups or VLANs.

Overview of NetBIOS

NetBIOS is an applications interface that allows computers on Ethernet or token ring LANs to communicate with one another. An enhanced version of the protocol is used by networking operating systems such as LAN Manager and Windows NT.

With NetBIOS, each client and host in the LAN has a unique NetBIOS name. Stations in a NetBIOS network broadcast queries to verify that their names are unique on the LAN. Names may be verified by using the NetBIOS Name Server (NBNS) protocol, which sends messages to a well-known UDP port (137). Name requests are sent to an IP subnet broadcast address or the unicast address of the server.

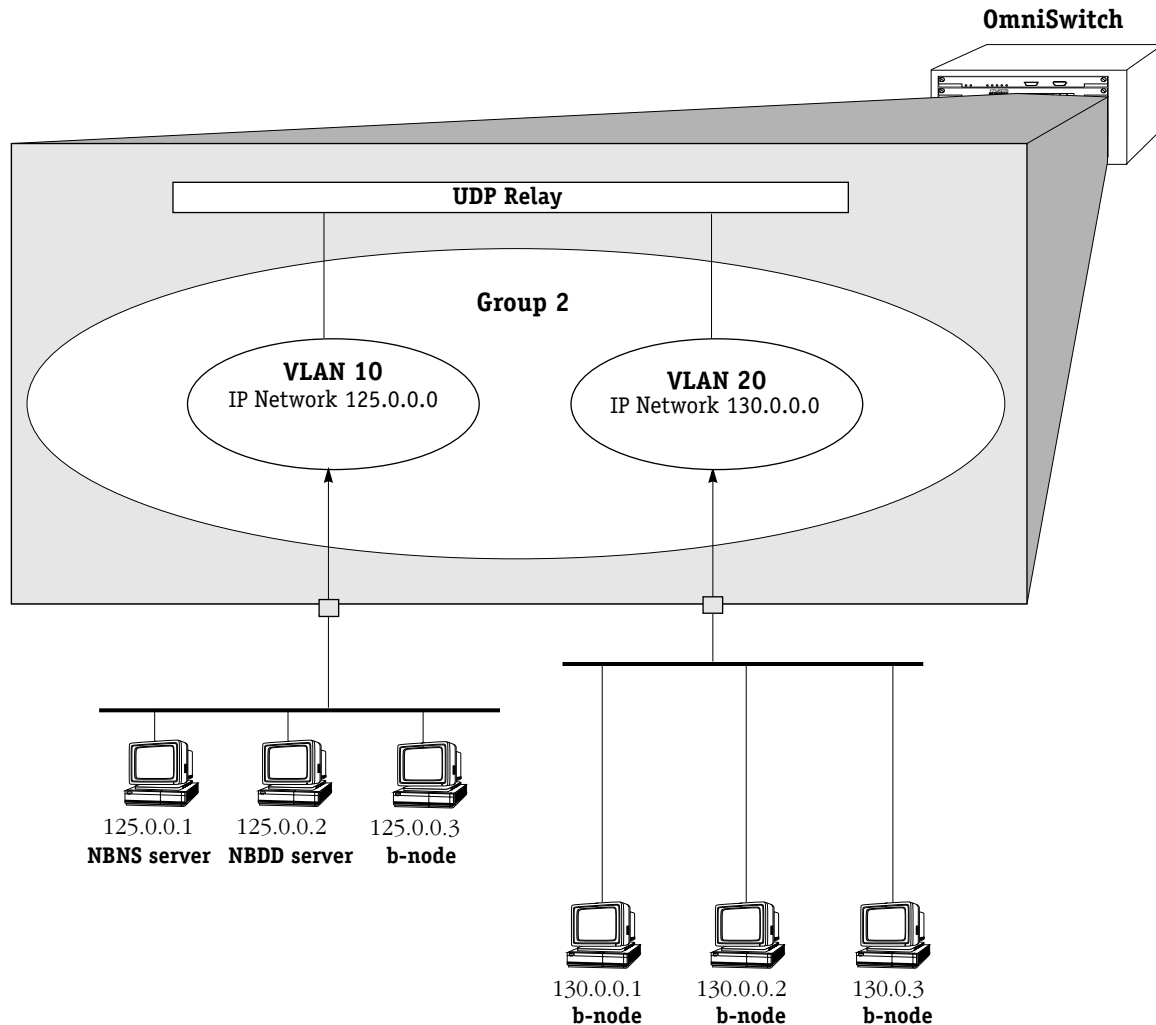
The NetBIOS protocol also has a datagram service that allows an application to exchange datagrams with a specific application or to broadcast and receive datagrams on a VLAN. A NetBIOS Datagram Distribution (NBDD) server may be installed in the network to provide this service, which uses a well-known UDP port number (138).

NetBIOS may be configured to run over TCP/IP using the various modes defined in RFC_1001 and RFC_1002. These modes are defined in terms of *nodes* and determine how NetBIOS stations (or nodes) in the network register their NetBIOS names and resolve (or map) these names to IP addresses. Each NetBIOS PC has a node type. The nodes are defined as follows:

- Broadcast node (b-node)—These nodes use broadcast for name registration and resolution. Since routers do not forward broadcast traffic, b-node clients in different networks will not be able to communicate
- Point-to-point node (p-node)—In this environment, each station knows the address of the server. Unicast queries are sent directly to the name and datagram servers. This method does not use broadcast.
- Mixed-mode node (m-node)—This mode uses a combination of b-node and p-node.

NetBIOS Relay Application

The UDP relay function in the switch extends b-node functionality across the internet. An example application is shown here.



NetBIOS Relay Application

In this example, NBNS and NBDD relays should be configured to forward to VLAN 10 and VLAN 20. The VLANs must be selected for forwarding, or you can configure the subnet address of the VLANs as next-hop addresses. The server addresses could be configured as next-hop addresses, but since the assignment of the NBNS and NBDD servers are by definition dynamic, configuring the VLAN number or the IP address of the VLAN ensures that the relay will function even if a server address changes.

Configuring NBNS Relay

Each NetBIOS PC has a name unique for its local network. If you are using NetBIOS broadcast queries to resolve names and NetBIOS clients are located in different groups or VLANs, you should configure UDP relay for NBNS.

The relays are enabled from the UDP Relay Configuration screen and are configured in similar ways. The UDP Relay Configuration screen is displayed using the **relayc** command described in *UDP Relay Configuration Screen* on page 32-3. To enable the NBNS relay, enter **2=y**. (To enable the NBDD relay, enter see *Configuring NBDD Relay* on page 32-16.)

The UDP Relay Configuration screen redisplay is similar to the following:

UDP Relay Configuration

```

1) BOOTP/DHCP Enabled           : Yes
  11) Server Address{list/add/delete} : UNSET
  12) Forward Delay              : 3
  13) Maximum Hops               : 4
2) NBNS Enabled                 : Yes
  21) Next-hop Address {list/add/delete} : UNSET
  22) Forward to VLANs {list/add/delete} : UNSET
3) NBDD Enabled                 :No
4) +Generic Services Menu

```

Command {Item=Value/?/Help/Quit/Redraw/Save} (Redraw) :

Either a Next-hop Address *or* a Forward to VLANs value must be configured for the relay.

Next-hop Address

Use this parameter to list, add, or delete the server address(es) to which the NBNS UDP relay will forward. The default is **UNSET**. The value redisplay as **SET** when at least one address is configured. Up to 8 addresses may be configured. You can list, add, or delete addresses by entering **21=l**, **21=a**, or **21=d** on the command line.

Forward to VLANs

Use this parameter to list, add, or delete VLANs to which the NBNS UDP relay will forward. This default is **UNSET**. This value redisplay as **SET** when at least one VLAN is configured. Up to 32 VLANs may be configured. You can list forwarding VLANs, or add or delete VLANs from the forwarding list by entering **22=l**, **22=a**, or **22=d** on the command line. Entries marked with an asterisk indicate the VLANs to which the relay will forward.

Next-Hop Addresses for NBNS

At least one next-hop address (or a forwarding VLAN as described in *Forwarding VLANs for NBNS Relay* on page 32-15) must be configured.

To *add* a next-hop address for NBNS relay:

1. On the UDP Relay Configuration screen command, enter the following:

21=I

A screen similar to the following displays:

FORWARD TO Server List

Item	Server address	Server Name (if known)
1)	172. 28. 5.212	

Enter IP address or host name of server to be added to list ['h' for help/<ret> to exit]:

2. Enter the IP address of the next hop. Enter the address in dotted decimal format (i.e., 198.206.181.12), a hexadecimal address (i.e., 0xc6ceb501). A host name (i.e., system.com) may be entered if the DNS resolver is enabled using the **res** command.

◆ Note ◆

This address may be the unicast address of the server or a subnet broadcast address of the subnet where the server is located. Using a unicast address is not recommended because an NBNS by definition may shift part or all of its responsibility to another node in the network segment.

3. Enter any additional addresses up to a maximum of 8. Press **<Enter>** to return to the UDP Relay Configuration screen.
4. Enter **s** to save the changes.

To *delete* next-hop addresses for the NBNS relay:

1. Enter **22=d** at the command prompt of the UDP Relay Configuration screen. The FORWARD TO Server List displays.
2. Enter the item number that corresponds to the entry that you want to delete. Repeat this step to delete any additional entries.
3. Press **<Enter>** to return to the UDP Relay Configuration screen.
4. Enter **s** to save the changes.

Forwarding VLANs for NBNS Relay

At least one forwarding VLAN (or a next-hop address as described in *Next-Hop Addresses for NBNS* on page 32-14) must be configured for NBNS relay.

To *select* forwarding VLANs for NBNS relay:

1. On the command line of the UDP Relay Configuration screen, enter the following:

22=I

A screen similar to the following displays:

Available/Selected VLANs

Item	Group ID:VLAN ID	MASK	IP ADDR
1)	1:1	255.255. 0. 0	172. 23. 9.105 *

* = selected for forwarding

Enter item number of VLAN to be selected ['h'f or help/<ret> to exit] :

2. Enter the item number of the group/VLAN that you want to select. Repeat this step for all the groups/VLANs you want to select.
3. Press **<Enter>** to return to the command line for the UDP Relay Configuration screen.
4. Enter **s** to save the changes.

To *deselect* forwarding VLANs:

1. On the UDP Relay Configuration screen, enter

22=d

The Available/Selected VLANs screen displays.

2. Enter the item number of the group/VLAN that you want to select. Repeat this step for all the groups/VLANs you want to select.
3. Press **<Enter>** to return to the command line for the UDP Relay Configuration screen.
4. Enter **s** to save the changes.

Configuring NBDD Relay

If you want to send NetBIOS datagrams across networks, you should enable the NBDD relay. To enable the NBDD relay, enter **3=y** at the command prompt of the UDP Relay Configuration screen. The screen redisplay is similar to the following:

```

                        UDP Relay Configuration

1) BOOTP/DHCP Enabled      : Yes
   11) Server Address{list/add/delete} : UNSET
   12) Forward Delay       : 3
   13) Maximum Hops        : 4
2) NBNS Enabled            : Yes
   21) Next-hop Address {list/add/delete} : UNSET
   22) Forward to VLANs {list/add/delete} : UNSET
3) NBDD Enabled            : Yes
   31) Next-hop Address {list/add/delete} : UNSET
   32) Forward to VLANs {list/add/delete} : UNSET
4) +Generic Services Menu
  
```

Command {Item=Value/?/Help/Quit/Redraw/Save} (Redraw) :

Either a Next-hop Address *or* a Forward to VLANs value must be configured for the relay.

Next-hop Address

Use this parameter to list, add, or delete the server address(es) to which the NBNS UDP relay will forward. The default is **UNSET**. This value redisplay as **SET** when at least one address is configured. Up to 8 addresses may be configured. You can list, add, or delete addresses by entering **31=l**, **31=a**, or **31=d** on the command line.

Forward to VLANs

Use this parameter to list, add, or delete VLANs to which the NBNS UDP relay will forward. This default is **UNSET**. This value changes to **SET** when at least one VLAN is configured. Up to 32 VLANs may be configured. You can list forwarding VLANs, or add or delete VLANs from the forwarding list by entering **32=l**, **32=a**, or **32=d** on the command line. Entries marked with an asterisk indicate the VLANs to which the relay will forward.

Next-Hop Addresses for NBDD

At least one next-hop address (or a forwarding VLAN as described in *Forwarding VLANs for NBDD Relay* on page 32-18) must be configured for the relay.

To *add* a next-hop address for NBDD relay:

1. At the command prompt for the UDP Relay Configuration screen, enter the following:

32=a

A screen similar to the following displays:

FORWARD TO Server List		
Item	Server address	Server Name (if known)
1)	172. 28. 5.212	

Enter IP address or host name of server to be added to list ['h' for help/<ret> to exit]:

2. Enter the IP address of the next hop. Enter the address in dotted decimal format (i.e., 198.206.181.12), a hexadecimal address (i.e., 0xc6ceb501). A host name (i.e., system.com) may be entered if the DNS resolver is enabled using the **res** command.

◆ Note ◆

This address may be the unicast address of the server or a subnet broadcast address of the subnet where the server is located. Using a unicast address is not recommended because an NBNS by definition may shift part or all of its responsibility to another node in the network segment.

3. Enter any additional addresses up to a maximum of 8. Press **<Enter>** to return to the UDP Relay Configuration screen.
4. Enter **s** to save the changes.

To *delete* next-hop addresses for the NBDD relay:

1. Enter **32=d** at the command prompt of the UDP Relay Configuration screen. The FORWARD TO Server List displays.
2. Enter the item number that corresponds to the entry that you want to delete. Repeat this step to delete any additional entries.
3. Press **<Enter>** to return to the UDP Relay Configuration screen.
4. Enter **s** to save the changes.

Forwarding VLANs for NBDD Relay

You may select or deselect VLANs to which the NBDD relay will forward. At least one forwarding VLAN (or a next-hop address as described in *Next-Hop Addresses for NBDD* on page 32-17) must be configured for the relay.

To *select* forwarding VLANs for NBDD relay:

- 1. On the command line of the UDP Relay Configuration screen, enter the following:

32=a

A screen similar to the following displays:

Available/Selected VLANS					
Item	Group ID:VLAN ID	MASK		IP ADDR	
1)	1:1	255.255.	0. 0	172. 23. 9.105	*
* = selected for forwarding					

Enter item number of VLAN to be selected ['h'f or help/<ret> to exit] :

- 2. Enter the item number of the group/VLAN that you want to select. Repeat this step for all the groups/VLANs you want to select.
- 3. Press <Enter> to return to the command line for the UDP Relay Configuration screen.
- 4. Enter s to save the changes.

To *deselect* forwarding VLANs:

- 1. On the UDP Relay Configuration screen, enter

32=d

The Available/Selected VLANs screen displays. Asterisks indicate VLANs selected for forwarding.

- 2. Enter the item number of the group/VLAN that you want to deselect. Repeat this step for all the groups/VLANs you want to deselect.
- 3. Press <Enter> to return to the command line for the UDP Relay Configuration screen.
- 4. Enter s to save the changes.

Generic Service UDP Relay

UDP relay may be configured for generic services. Generic services may include applications such as Trivial File Transfer Protocol (TFTP), Domain Name System (DNS), IEN-116 Name Server. You will need to know the well-known UDP port number if you want to configure these services.

Generic Services Menu

To configure a relay for a generic service, on the command line for the UDP Relay Configuration screen, enter **4**. A menu similar to the following displays:

```
4) +Generic Services Menu
    41) +Modify existing Generic Services Menu
    42) +Delete existing Generic Service Menu
    43) +Add new Generic Service Menu
```

Submenu Command {Item/?/Help/Quit/Redraw} {Redraw} :

Adding a Generic Service

Use the Add new Generic Service Menu to create a new generic service. On the Generic Services Menu, enter **43**. A screen similar to the following displays:

```
43) +Add new Generic Service Menu
    431) Description of new Service      :
    432) Forwarded port                  : UNSET
    433) Next-hop Address {list/add/delete} : UNSET
    434) Forward to VLANs {list/add/delete} : UNSET
```

Command {Item/?/Help/Quit/Done/Redraw} {Redraw} :

The required parameters are Forwarded port, and *either* Next-hop Address *or* Forward to VLANs. A description of the generic service is optional.

The **Done** command on this screen saves the current changes but does not activate the relay. The relay will be reinitialized and activated with the changes when **Save** is entered on the UDP Relay Configuration screen.

Description of new Service

A description of the service you want to configure.

Forwarded port

The corresponding well-known UDP port number for the service. For example, TFTP uses port 69. The default is **UNSET**. When you set this parameter, the relevant port number displays.

Next-hop Address

Use this parameter to list, add, or delete the server address(es) to which the NBNS UDP relay will forward. The default is **UNSET**. Up to 8 addresses may be configured. The value displays as **SET** when at least one address is configured. You can list, add, or delete addresses by entering **433=l**, **433=a**, or **433=d** on the command line.

Forward to VLANs

Use this parameter to list, add, or delete VLANs to which the NBNS UDP relay will forward. This default is **UNSET**. This value redisplay as **SET** when at least one VLAN is configured. Up to 32 VLANs may be configured. You can list forwarding VLANs, or add or delete VLANs from the forwarding list by entering **434=l**, **434=a**, or **434=d** on the command line.

To configure a generic service:

1. On the Add new Generic Service menu, enter a description of the generic service. For example:

431=TFTP

2. Enter the relevant UDP port number. For example:

432=69

3. At least one next-hop address must be configured. To add an address, enter:

433=a

The screen displays similar to the following:

FORWARD TO Server List

Item	Server address	Server Name (if known)
------	----------------	------------------------

Enter IP address or host name of server to be added to list ['h' for help/<ret> to exit]:

4. Enter the next-hop address in dotted decimal format (i.e., 198.206.181.12), a hexadecimal address (i.e., 0xc6ceb501). A host name (i.e., system.com) may be entered if the DNS resolver is enabled using the **res** command.
5. When you are finished entering next-hop addresses, press **<Enter>** to return to the prompt for the Add new Generic Services menu.
6. Select any VLANs for the relay to forward to. At the prompt, enter

434=a

A screen similar to the following displays:

Available/Selected VLANS

Item	Group ID:VLAN ID	MASK	IP ADDR
1)	1:1	255.255. 0. 0	172. 23. 9.105 *

* = selected for forwarding

Enter item number of VLAN to be selected ['h'f or help/<ret> to exit] :

7. Enter the item number of the group/VLAN that you want to select. Repeat this step for all the groups/VLANs you want to select. An asterisk displays next to all selected VLANs.
8. Press **<Enter>** to return to the Add new Generic Services menu. Add any other generic services in this way.
9. Enter **d** to keep the current changes and return to the Generic Services menu. Enter **d** to return to the UDP Relay Configuration screen.
10. Enter **s** to save the changes and reinitialize the relay.

Modifying a Generic Service

Use the Configured Generic Services screen to modify an existing generic service. On the Generic Services Menu, enter **41**. A screen similar to the following displays:

Configured Generic Services				
Item (1)	State enabled	Port Number 80	Description TFTP	Servers/Vlans 198.172. 5. 4
Enter item number of service to be modified ['h' for help/<ret> to exit] :				

The parameters are defined here.

Item

A unique number assigned by the switch to the generic service in the order the services were configured using the Add new Generic Service screen.

State

The current state of the service, enabled or deleted. The service is enabled as soon as it is added using the Add new Generic Service screen.

Port Number

The well-known UDP number configured for the generic service on the Add new Generic Service screen.

Description

The description of the generic service configured on the Add new Generic Service screen.

Servers/Vlans

The servers or VLANs that the relay will forward to.

To modify an existing generic service:

1. On the Configured Generic Services screen, enter the item number of the relevant service. The Modify existing Generic Services Menu displays similar to the following:

```

41) +Modify existing Generic Service Menu
411) Description of Service being modified : TFTP
412) Forwarded port                        : 80
413) Next-hop Address {list/add/delete}    : SET
414) Forward to VLANs {list/add/delete}    : SET

Command {Item/?/Help/Quit/Done/Redraw} {Redraw} :

```

2. Modify any of the parameters in the same way you configured them (described in *Adding a Generic Service* on page 32-19).
3. Enter **d** to keep the current changes and return to the Generic Services Menu. (The relay will not be initialized with the changes until you save them on the UDP Relay Configuration screen.)

4. Enter **d** to return to the UDP Relay Configuration screen.
5. Enter **s** to save the changes and reinitialize the relay.

Deleting a Generic Service

To delete a generic service:

1. On the Generic Services Menu, enter **42**. The Configured Generic Services screen displays similar to the following:

Configured Generic Services				
Item	State	Port Number	Description	Servers/Vlans
(1)	enabled	80	TFTP	198.172. 5. 4

Enter item number of service to be deleted ['h' for help/<ret> to exit] :

The parameters are defined in *Modifying a Generic Service* on page 32-21.

2. Enter the item number of the service you want to delete. A message similar to the following displays:

Are you sure you want to delete item 1? [y/n] (n) :

3. Enter **y** to delete the service. The Configured Generic Services screen redisplay with the State parameter changed to **deleted**. At this point, the service is marked for deletion but has not actually been deleted from the configuration.

Configured Generic Services				
Item	State	Port Number	Description	Servers/Vlans
(1)	deleted	80	TFTP	198.172. 5. 4

Enter item number of service to be deleted ['h' for help/<ret> to exit] :

4. Select any other services to be marked for deletion. Press **<Enter>** to return to the Generic Services Menu.
5. Enter **q** to return to the UDP Relay Configuration screen.
6. Enter **s** to save the changes and delete the selected service(s).

Viewing UDP Relay Statistics

Use the **relays** command to display statistics about configured UDP relays. The **relays** command is listed in the IP submenu. For information about other IP commands, see Chapter 31, “IP Routing.”

The screen display for UDP statistics is similar to the following:

UDP RELAY PACKETS RECEIVED/TRANSMITTED					
SERVICE	PORT	PKTS RCVD	RCV RATE(pkts/s)	PKTS XMTD	XMT RATE(pkts/s)
1	67/68	0	0.000	0	0.000
2	137	6	0.010	0	0.000

NOTE: Rates are average number of packets/s since last query.
Time since last query: 0 days, 0 hours, 10 minutes, 6 seconds.

UDP RELAY TRANSMIT PACKETS DISCARDED				
SERVICE	RVC PORT	DEST VLAN/SVR		PKTS
1	67/68	172. 28.	5. 21	0
1	67/68	198.172.	34. 2	0
1	67/68	198.172.	34. 5	0
2	137	172. 23.	9.105	6
2	137	172. 28.	5.212	6

The fields are defined here.

SERVICE. The number assigned by the switch to the UDP service, in order that the services were configured.

PORT. The well-known UDP port number associated with the type of service. For example, BOOTP/DHCP is 67/68. This number is manually configured for generic services.

PKTS RCVD. The total number of packets received by the relay for the indicated service.

RCV RATE(pkts/s). The average rate, in packets per second, that packets were received for the indicated service since the last time the **relays** command was entered.

PKTS XMTD. The total number of packets transmitted from the relay for the indicated service.

XMT RATE(pkts/s). The average rate, in packets per second, that packets were transmitted for the indicated service since the last time the **relays** command was entered.

RVC PORT. The UDP port number associated with the service

DEST VLAN/SVR. The IP address of the VLANs to which the indicated relay is forwarding. Forwarding VLANs are configurable for each type of relay.

PKTS. The number of packets forwarded to the indicated VLAN.

