Chapter 18

DHCP Local Server Overview

This chapter provides an overview of the DHCP local server on the E-series router. This chapter contains the following sections:

Embedded DHCP Local Server Overview

The router offers an embedded DHCP server, known as the DHCP local server. The DHCP local server has two modes: equal-access and standalone.

NOTE: E-series routers also support an embedded DHCP version 6 (DHCPv6) local server. The DHCPv6 local server provides a subset of the features of the DHCP local server. For information about configuring the DHCPv6 local server, see *Configuring the DHCPv6 Local Server* on page 403.

- In equal-access mode, the DHCP local server works with the Juniper Networks SRC software to provide an advanced subscriber configuration and management service.
- In standalone mode, the DHCP local server provides a basic DHCP service, and also allows you to configure AAA authentication for incoming DHCP clients. Also, after successful authentication, the DHCP local server uses the information in the client's AAA subscriber record together with the client's DHCP parameters to select the IP address pool used for address assignment.

  DHCP local server also supports RADIUS accounting, including interim accounting, in standalone mode. This feature allows you to use RADIUS start and stop attributes to track user events such as the lifetime of an IP address.

DHCP Local Server and Client Configuration

You can use DHCP to configure the router to allow remote access to non-PPP clients. DHCP-based access is also an alternative to PPP in environments such as Public Wireless LANs (PWLANs). In PWLANS, a user scans for available broadband networks, then is redirected to a web-based authentication mechanism to request service.

DHCP provides address assignment information for users. Authentication, authorization, and accounting are separate processes, and are up to the Internet service provider (ISP) to define.

The DHCP local server can configure a client with the following DHCP options:

- Default router
- DNS server
- Domain name
- Lease time
- Grace period for address lease
- NetBIOS name server
- NetBIOS node type
- Subnet mask

For additional information on managing client bindings, see *Viewing and Deleting DHCP Client Bindings*, in *Chapter 17, DHCP Overview*.

NOTE: You cannot configure both the DHCP local server and one of the following in the same virtual router: DHCP external server, DHCP relay, or DHCP relay proxy. If you issue the **set dhcp relay** command when a local server has been configured, the local server is deactivated.

Equal-Access Mode Overview

In equal-access mode, the router enables access to non-PPP users. Non-PPP equal access requires the use of the router's DHCP local server and SRC software, which communicates with a RADIUS server.

The DHCP local server performs the following functions in equal-access mode:

- Communicates with SRC software.
- Assigns an IP address that enables the subscriber to access services.

Local Pool Selection and Address Allocation

The DHCP local server selects a DHCP pool from which to allocate an address using the framed IP address or pool name parameters. The router compares the parameters with the local DHCP pools in the order presented in Table 72. When the router finds a match, it selects a pool based on the match and does not examine other parameters.

Table 72: Local Pool Selection in Equal-Access Mode

Field	How the DHCP Local Server Uses the Field
Framed IP address	The client's RADIUS entry can be configured with a framed IP address, which the DHCP local server can get from the SRC software. If the router selects a pool using a framed IP address, the DHCP local server attempts to allocate the framed IP address from the pool. If the framed IP address is not available, then the server allocates the next available address in the pool to the client.
Pool name	Each DHCP local pool has a pool name. The client's RADIUS entry can also be configured with a pool name, which the DHCP local server can get from the SRC software. The SRC software must be configured to send RADIUS attributes to DHCP.
Domain name	You can use a domain name as the name of a DHCP local pool. If the client logs onto the SRC software and RADIUS authenticates the client using a domain name, the DHCP local server receives the domain name from the SRC software. If the client's domain name does not match the name of the DHCP local pool, the router attempts to match the client's domain name to the domain name field within the pool.
Giaddr	A DHCP local pool is configured with a network address. A gateway IP address (giaddr), which indicates a client's subnetwork, can be presented to the DHCP local server in the client's DHCP request message. The giaddr field in the DHCP request message usually contains the IP address of a DHCP relay server. The router attempts to match the giaddr address in the DHCP request message with the network address of a DHCP local pool.

The Connection Process

The following sequence describes how the subscriber connects to the network for the first time using equal-access mode. Figure 11 illustrates the process.

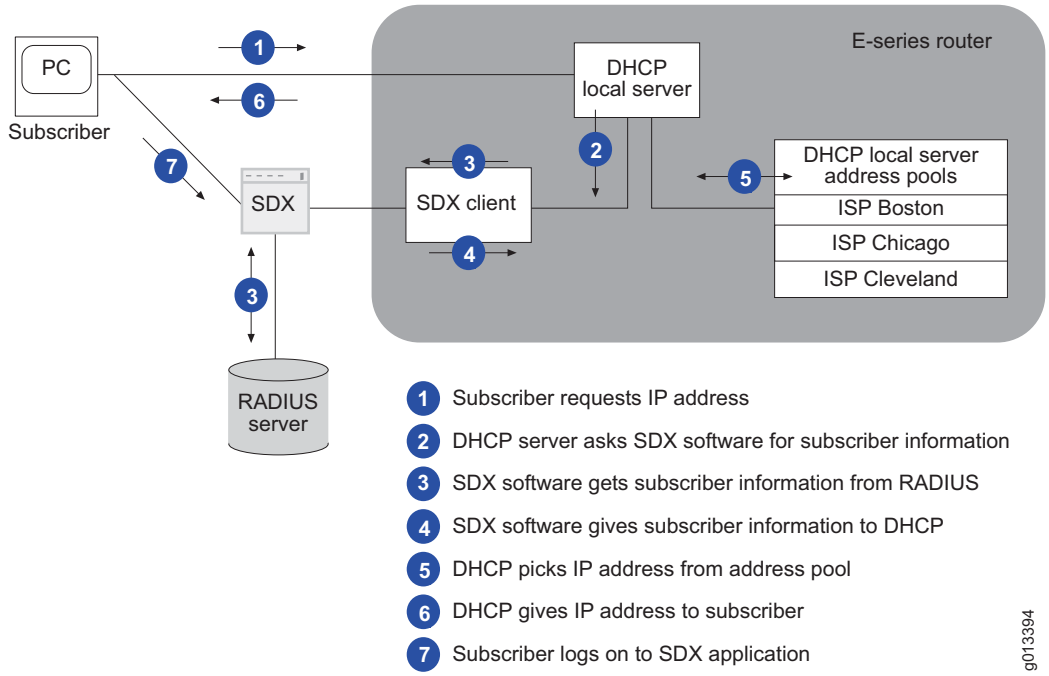
1. The subscriber's computer boots and issues a DHCP request.
2. The DHCP local server uses the SRC client to issue a COPS request to retrieve address pool information.
3. After standard DHCP negotiations, the DHCP local server supplies an IP address to the subscriber's computer from a local address pool, as described in the previous section.

   The router maintains a host route that maps the IP address to the router's interface associated with the subscriber's computer.

4. The subscriber's computer retains the IP address until the subscriber turns off the computer.

NOTE: If a DHCP client attempts to renew its address and the DHCP server receives the request on a different interface than the interface that the client originally used, the DHCP server sends a NAK message to the client, forcing the client to begin the DHCP connection process again.

Figure 11: Non-PPP Equal Access via the Router



Standalone Mode Overview

In standalone mode, the DHCP local server operates as a basic DHCP server. Clients are not authenticated by default; however, you can optionally configure the DHCP local server to use AAA authentication for the incoming clients. The DHCP local server receives DHCP client requests for addresses, selects DHCP local pools from which to allocate addresses, distributes addresses to the clients, and maintains the resulting DHCP bindings in a server management table.

Local Pool Selection and Address Allocation

In standalone mode, the DHCP local server selects a pool to allocate an address for a client; the SRC software is never notified or queried. The process used depends on whether AAA authentication is configured.

- If AAA authentication is not configured, the DHCP local server selects a pool by matching the local pool network address to the giaddr or the received interface IP address. The router first attempts to match the giaddr to a local pool network address. If it does not find a match, the router attempts to match the received interface IP address to a local pool network address.

  - Giaddr—A giaddr, which indicates a client's subnetwork, can be presented to the DHCP local server in the client DHCP REQUEST message. The giaddr field in the DHCP request message usually contains the IP address of a DHCP relay server. The router attempts to match the giaddr address in the DHCP request message with the network address of a DHCP local pool. If it finds a match, the router uses the matching DHCP local pool.

  - Received interface IP address—The router uses the IP address of the interface on which the DHCP packet is being processed.

  After the router selects a DHCP local pool, the DHCP local server first tries to find a reserved IP address for the client in the selected pool. If no reserved address is available, the router attempts to allocate a client's requested IP address. If the requested IP address is not available, the router allocates the next available address in the pool. If a grace period is configured for the pool, the router assigns the grace period to the allocated address.

- If AAA authentication is configured (as described in *Configuring AAA Authentication for DHCP Local Server Standalone Mode* on page 401) and the authentication is successful, the local server selects an IP address pool based on the following precedence:

  1. If AAA specifies an IP address, the DHCP local server finds the address pool containing the address, then allocates that address.

  2. If AAA specifies an address pool name, the local server finds the pool with the matching name and allocates an address from that pool.

  3. The local server finds the address pool whose name matches the client's domain.

  4. The local server finds the address pool whose domain name matches the client's domain.

  5. The local server finds the address pool whose IP network matches the client's DHCP giaddr.

  6. The local server finds the address pool whose interface matches the interface on which the client's DHCP request was received.

Server Management Table

For each client that makes requests of the DHCP local server, the router keeps an entry in the server management table. The entry defines client-specific information and state information. The router uses this table to identify clients when it receives subsequent messages and to maintain the state of each client within the DHCP protocol. In addition, the table contains information that may be transferred to and from the SRC software.

DHCP Local Server Prerequisites

Before you configure DHCP local server, you need to configure interfaces. You can configure ATM or Ethernet interfaces for DHCP local server. These interfaces can be numbered or unnumbered. Because subscribers connect to the router from different subnetworks, you must configure an IP address for each subnetwork on the interface. This action provides connectivity between the subnetwork and the router.

To configure a numbered IP address for DHCP local server:

1. Select an ATM or Ethernet interface.
2. Assign the primary IP address for one subnetwork to this interface.
3. Assign secondary IP addresses for all other subnetworks to this interface.

To configure an unnumbered IP address for DHCP local server:

1. Specify a loopback interface.
2. Assign the primary IP address for one subnet to the loopback interface.
3. Assign secondary IP addresses for all other subnets to the loopback interface.
4. Select an ATM or Ethernet interface.
5. Configure an unnumbered IP address associated with the loopback interface on the ATM or Ethernet interface.

For information about defining IP addresses, see *JUNOSe IP, IPv6, and IGP Configuration Guide, Chapter 1, Configuring IP*.

DHCP Local Server Configuration Tasks

This section covers the configuration tasks for equal-access and standalone modes. Perform the appropriate procedure:

1. For both equal-access and standalone modes, configure the DHCP local server.

   See *Configuring AAA Authentication for DHCP Local Server Standalone Mode* in *Chapter 19, Configuring DHCP Local Server* for a sample configuration.

2. For standalone mode, optionally configure the router to use AAA authentication for DHCP requests from subscribers.

   See *Configuring AAA Authentication for DHCP Local Server Standalone Mode* in *Chapter 19, Configuring DHCP Local Server* for a sample configuration.

3. For non-PPP equal access, configure the router to work with the SRC software.

   See *Configuring the Router to Work with the SRC Software* in *Chapter 19, Configuring DHCP Local Server* for a sample configuration.