

# Configuring DHCP Local Server

This chapter describes how to configure your ERX system to allow non-PPP remote clients to connect to a service provider.

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## Overview

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You can configure the system to allow remote access to non-PPP clients. This configuration is particularly useful for broadband (cable and DSL) environments or environments that use bridged Ethernet over ATM.

Using PPP in these environments requires a PPPoE client for each subscriber's computer. Using Dynamic Host Configuration Protocol (DHCP) local server in these environments requires no additional software for subscribers' computers, because the system provides IP addresses to the computers. It is easier for network operators to support a central system than to maintain software on subscribers' computers.

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

- Subnet mask
- Default router
- DNS server
- Domain name
- NetBIOS name server
- NetBIOS node type
- Lease time

### *Line Module Support*

The following line modules support DHCP local server:

- Ethernet line modules: FE-2, GE/FE
- ATM line modules: E3 ATM, OCx/STMx ATM, T3 ATM

### References

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The DHCP local server complies with RFC 2131 – Dynamic Host Configuration Protocol (March 1997).

For an overview of DHCP, see *DHCP Overview* in *Chapter 1, Configuring Remote Access to the ERX System*.

The system's HTTP local server complies with RFC 2616 – Hypertext Transfer Protocol – HTTP/1.1 (June 1989).

### DHCP Local Server Modes

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

- In equal-access mode, the DHCP local server works with the Juniper Networks Service Deployment System (SDX) and authentication, authorization, accounting, and address assignment utility (AAAA) to provide an advanced subscriber configuration and management service.
- In standalone mode, the DHCP local server provides a basic DHCP service.

## *Equal-Access Mode*

In equal-access mode, the main purpose of the system is to enable access to non-PPP users. The DHCP local server performs the following functions in equal-access mode:

- Assigns a temporary IP address, known as the *token IP address*, which enables the subscriber to access the SDX or the HTTP local server.
- Communicates with the SDX or the HTTP local server.
- Communicates with the RADIUS server.
- Supports RADIUS accounting attributes. This feature allows you to use RADIUS start and stop attributes to track user events such as the lifetime of an IP address.

For a list of supported accounting attributes, see *Subscriber AA Accounting Messages* in *Chapter 2, Configuring RADIUS Attributes*.

- Assigns an IP address with a long lease time, known as the *enduring IP address*, which allows the subscriber to access services.

Non-PPP equal access requires the use of:

- The system's DHCP local server
- Either the SDX or the system's HTTP local server
- The system's AAAA utility
- A RADIUS server

### Service Deployment System

The Service Deployment System (SDX) is a component of Juniper Networks management products. The SDX application provides a Web-based interface that allows subscribers to access services, such as the Internet, an intranet, or an extranet. For more information about the SDX application, see *ERX Product Overview Guide, Chapter 8, Element and Network Management*.

The SDX application performs the following functions:

- Allows subscribers to log in via a Web browser.
- Communicates login parameters to the system via the Common Open Policy Service (COPS) interface.
- Emulates PPP authentication functions.

### HTTP Local Server

The system offers an embedded Web server, known as the HTTP local server. You can configure one HTTP local server per virtual router.

The sole purpose of the HTTP local server is to allow user login and authentication without the SDX. The HTTP local server performs the same functions as the SDX.

### Local Pool Selection and Address Allocation

In equal-access mode, clients are authenticated by AAAA. For unauthenticated clients, the system allocates local token addresses from a special DHCP local pool named default. For authenticated clients, the DHCP local server selects a DHCP pool from which to allocate an address using the framed IP address or pool name parameters. The system checks the parameters against the local DHCP pools in the order presented in Table 7-1. Once the system finds a match, it selects a pool based on the match and does not check further parameters.

**Table 7-1** 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. DHCP local server receives the client's framed IP address from AAAA when the client is authenticated.  If the system 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. The DHCP local server receives the client's pool name when the client is authenticated.

### The Connection Process

The following sequence describes how the subscriber connects to the network for the first time using equal-access mode. Figure 7-1 illustrates the process.

- 1 The subscriber's computer boots and issues a DHCP request.
- 2 The DHCP local server on the system grants the subscriber a token IP address—a unique, private address with a very short lease time in the range 20–30 seconds.

Because the lease time is very short, the subscriber's computer repeatedly requests renewal of the token IP address, and the DHCP local server repeatedly renews the address. This process keeps the subscriber's connection to the network active until the subscriber's computer receives an enduring IP address.

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

- 3 The system installs a policy that:
  - Directs all traffic, with the exception of the DHCP renewal requests, from the subscriber to the SDX application.
  - Specifies a host route for return traffic.
- 4 The subscriber logs in to the SDX application, which matches the user name and password to the subscriber's service profile.

The service profile includes information such as the selected ISP, the QoS, and the virtual router.
- 5 The SDX application sends the subscriber's domain and private address to the RADIUS server via the DHCP server.
- 6 The RADIUS server authenticates the subscriber and returns the authentication to the DHCP local server.
- 7 When the subscriber's computer next requests an IP address, the DHCP local server revokes the token address, forcing the subscriber's computer to issue a DHCP broadcast.
- 8 After standard DHCP negotiations, the DHCP local server supplies an enduring IP address to the subscriber's computer from a local address pool, as described in the previous section.

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

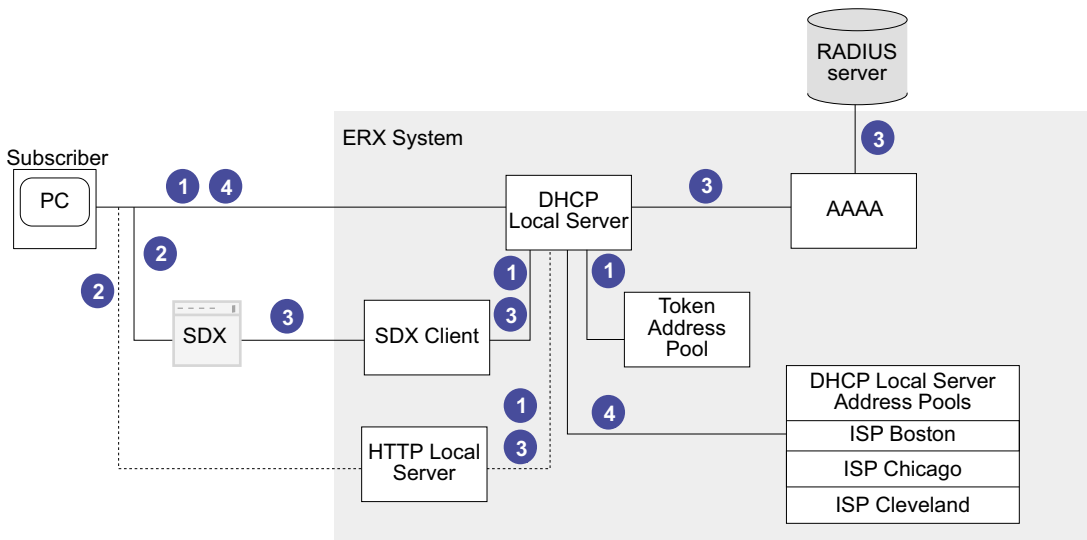
- 9 The subscriber's computer retains the enduring IP address until the subscriber turns off the computer.



**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 to the client, forcing the client to begin the DHCP connection process again.

- 10 The system modifies the subscriber's policy to:
  - Route all traffic, except that addressed to the SDX application, from the new IP address to the correct domain.
  - Route traffic addressed to the SDX to the SDX application.
  - Specify a new host route for return traffic.

This policy maintains the subscribers' connections to the SDX application so that access to other services is available.



- 1 Subscriber's PC receives and requests token IP address.
- 2 Subscriber logs in via SDX or HTTP local server.
- 3 RADIUS server authenticates subscriber.
- 4 Subscriber's PC receives enduring IP address.

**Figure 7-1** Non-PPP equal access via the system

## Standalone Mode

In standalone mode, the DHCP local server operates as a basic DHCP server. Clients are not authenticated and token addresses are not used in standalone mode. The DHCP local server receives DHCP client requests for addresses, selects DHCP local pools from which to allocate addresses, distributes public 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 a public address for a client. Clients are not authenticated by AAAA, and unauthenticated clients are not allocated token addresses.

The DHCP local server selects a pool by matching the local pool's network address to the giaddr or the received interface IP address. The system first attempts to match the giaddr to a local pool network address. If it does not find a match, the system attempts to match the received interface IP address to a local pool network address.

- **Giaddr.** A giaddr, which indicates a client's subnet, can be presented to the DHCP local server in the client's DHCPREQUEST message. The giaddr field in the DHCPREQUEST message usually contains the IP address of a DHCP relay server. The system attempts to match the giaddr address in the DHCPREQUEST message with the network address of a DHCP local pool. If it finds a match, the system uses the matching DHCP local pool.
- **Received interface IP address.** The system uses the IP address of the interface on which the DHCP packet is being processed.

Once the system 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 system attempts to allocate a client's requested IP address. If the requested IP address is not available, the system allocates the next available address in the pool.

## Before You Configure DHCP Local Server

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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 system from different subnets, you must configure an IP address for each subnet on the interface. This action provides connectivity between the subnet and the system.

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 subnet to this interface.
- 3 Assign secondary IP addresses for all other subnets 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 *ERX Routing Protocols Configuration Guide, Vol. 1, Chapter 2, Configuring IP*.

## Configuration Tasks

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This section covers the configuration tasks for equal access and standalone modes.

- 1 For both equal-access and standalone modes, configure the DHCP local server.
- 2 For non-PPP equal access, configure the system to relay DHCP requests from cable modems.
- 3 For non-PPP equal access, configure the system to work with a RADIUS server.
- 4 For non-PPP equal access, configure the system to work with the SDX application, or configure the HTTP local server.

The following sections describe these tasks in detail. For examples of CLI commands, see *Configuration Example* on page 7-17.

## Configuring the DHCP Local Server

To configure the DHCP local server:

- 1 Enable the DHCP local server for either equal-access or standalone mode.

```
host1(config)#service dhcp-local equal-access  
host1(config)#service dhcp-local standalone
```

- 2 Specify the maximum number of IP addresses that the DHCP local server can supply to each VPI, VCI, VLAN, or Ethernet subnet.

```
host1(config)#ip dhcp-local limit ethernet 6
```

- 3 Specify any addresses that the DHCP local server must not assign.

```
host1(config)#ip dhcp-local excluded-address 10.10.3.4
```

- 4 For equal-access mode, configure the DHCP local server to supply token IP addresses.

- a Access Pool Configuration mode for the default address pool.

```
host1(config)#ip dhcp-local pool default
```

- b Specify the token IP addresses that the DHCP local server can assign from the default address pool.

```
host1(config-dhcp-local)#network 10.10.0.0 255.255.255.0
```

- c (Optional) Specify a DNS server.

```
host1(config-dhcp-local)#dns-server 10.10.1.1
```

- d (Optional) Specify a Net-Bios Server.

```
host1(config-dhcp-local)#netbios-name-server 10.10.1.1  
10.10.1.2
```

- e Specify the router that will forward traffic from these IP addresses to destinations on other subnets.

```
host1(config-dhcp-local)#default-router 10.10.1.3
```

- f Specify the lease time for token IP addresses.

```
host1(config-dhcp-local)#lease 0 0 24
```

- g (Optional) Specify the type of Net-Bios Server.

```
host1(config-dhcp-local)#netbios-node-type b-node
```

- h (Optional) Specify a domain name that can be returned to the subscriber if requested.

```
host1(config-dhcp-local)#domain-name ispBoston
```

5 For both equal-access and standalone modes, configure the DHCP local server to supply enduring IP addresses to subscribers who want to access a domain.

a Access DHCP Local Pool Configuration mode for the local address pool.

```
host1(config)#ip dhcp-local pool ispBoston  
host1(config-dhcp-local)#
```

b Specify the enduring IP addresses that the DHCP local server can assign from the local address pool.

```
host1(config-dhcp-local)#network 10.10.0.0 255.255.255.0
```

c (Optional) Specify a DNS server.

```
host1(config-dhcp-local)#dns-server 10.10.1.1
```

d (Optional) Specify a Net-Bios Server.

```
host1(config-dhcp-local)#netbios-name-server 10.10.1.1  
10.10.1.2
```

e Specify the router that will forward traffic from these IP addresses to destinations on other subnets.

```
host1(config-dhcp-local)#default-router 10.10.1.3
```

f Specify the lease time for token IP addresses.

```
host1(config-dhcp-local)#lease 0 0 24
```

g (Optional) Specify the type of Net-Bios Server.

```
host1(config-dhcp-local)#netbios-node-type b-node
```

h (Optional) Specify a domain name that can be returned to the subscriber if requested.

```
host1(config-dhcp-local)#domain-name ispBoston
```

i (Optional) For DHCP standalone mode, reserve an IP address for a specific MAC address.

```
host1(config-dhcp-local)#reserve 10.10.13.8  
0090.1a10.0552
```

j For DHCP standalone mode, set the DHCP server address that is sent to DHCP clients.

```
host1(config-dhcp-local)#server-address 10.10.20.8
```

### ***default-router***

- Use to specify the IP address of the router that the subscriber's computer will use for traffic destined for locations beyond the local subnet.
- Specify the IP address of a primary server, and optionally, specify the IP address of a secondary server.
- Example

```
host1(config-dhcp-local)#default-router 10.10.1.1
```
- Use the **no** version to remove the association between the address pool and the router.

### ***dns-server***

- Use to assign a Domain Name Service (DNS) server to an address pool.
- Some DHCP clients ask the DHCP local server to assign a DNS server.
- Example

```
host1(config-dhcp-local)#dns-server 10.10.1.1
```
- Use the **no** version to remove the association between the address pool and the DNS server.

### ***domain-name***

- Use to specify a domain name that can be returned to the subscriber if requested.
- The name of the domain must match the name you specified for the RADIUS VSA and for AAAA.
- Example

```
host1(config-dhcp-local)#domain-name ispBoston
```
- Use the **no** version to remove the association between the address pool and the domain name.

### ***ip dhcp-local excluded-address***

- Use to specify IP addresses that the DHCP local server should not supply from the default address pool because those addresses are already used by devices on the subnet.
- Specify a single IP address or a start-of-range IP address and an end-of-range IP address.
- You cannot specify IP addresses that the DHCP local server supplies from a local pool.
- Example

```
host1(config)#ip dhcp-local excluded-address 10.10.1.1
```
- Use the **no** version to allow the DHCP local server to supply the specified IP address.

### ***ip dhcp-local limit***

- Use to specify the maximum number of IP addresses that the DHCP local server can supply to each VPI, VCI, VLAN, or Ethernet subnet.
- Example

```
host1(config)#ip dhcp-local limit ethernet 6
```
- Use the **no** version to restore the default situation, in which there is no limit on the number of token IP addresses that the DHCP local server can supply to each VPI, VCI, VLAN, or Ethernet subnet.

### ***ip dhcp-local pool***

- Use to access Pool Configuration mode.
- The DHCP local server uses pool names other than default to maintain configuration information for subscribers to a particular domain.
- The DHCP local server supplies token IP addresses from the address pool named default.
- Example

```
host1(config)#ip dhcp-local pool ispBoston
```
- Use the **no** version to prevent the DHCP local server from supplying IP addresses from the specified pool.

### ***lease***

- Use to specify the time period for which the supplied IP address is valid.
- Specify the number of days, and optionally, the number of hours, minutes, and seconds.
- Specify the keyword **infinite** to specify a lease that does not expire.
- Example

```
host1(config-dhcp-local)#lease 0 0 24
```
- Use the **no** version to restore the default lease time, one day.

### ***netbios-name-server***

- Use to assign a Net-Bios server for subscribers.
- Specify the IP address of a primary server and optionally the address of a secondary server.
- Some DHCP clients ask the DHCP local server to assign a Net-Bios server.
- Example

```
host1(config-dhcp-local)#netbios-name-server 10.10.1.1  
10.10.1.2
```
- Use the **no** version to remove the association between the address pool and the Net-Bios server.

### ***netbios-node-type***

- Use to specify a Net-Bios node type.
- Specify one of the following types of Net-Bios servers:
  - › **b-node** – broadcast
  - › **p-node** – peer-to-peer
  - › **m-node** – mixed
  - › **h-node** – hybrid
- Example

```
host1(config-dhcp-local)#netbios-node-type b-node
```
- Use the **no** version to restore the default situation, in which the node type is unspecified.

### ***network***

- Use to specify the IP addresses that the DHCP local server can provide from an address pool.
- Example

```
host1(config-dhcp-local)#network 10.10.1.0 255.255.255.0
```
- Use the **no** version to remove the network address and mask.
- Specify the **force** keyword with the **no** version to delete the address pool even if the pool is in use.

### ***reserve***

- For standalone mode, use to reserve an IP address for a specific MAC address.
- Example

```
host1(config-dhcp-local)#reserve 10.10.13.8 0090.1a10.0552
```
- Use the **no** version to remove the reservation.

### ***server-address***

- For standalone mode, use to set the DHCP server address that is sent to DHCP clients.
- Example

```
host1(config-dhcp-local)#server-address 10.10.20.0
```
- Use the **no** version to remove the server address.

### ***service dhcp-local***

- Use to enable the DHCP local server to operate in either equal-access mode or standalone mode.
- Example

```
host1(config)#service dhcp-local equal-access
```
- Use the **no** version to disable the DHCP local server.

### *Configuring the System to Work with a RADIUS Server*

To configure the system to work with a RADIUS server, you need to specify the RADIUS server and the authentication protocol. For information about these procedures, see *Configuring Authentication and Accounting Servers* in *Chapter 1, Configuring Remote Access to the ERX System*.

### *Configuring the System to Work with the SDX Application*

If you configure the HTTP local server, you do not need to configure the system to work with the SDX application.

The ERX system has an embedded SDX client that interacts with the SDX. For information about configuring the SDX client, see *Configuring the SDX Client* in *Chapter 1, Configuring Remote Access to the ERX System*.

### *Configuring the HTTP Local Server*

If you configure the system to work with SDX, you do not need to configure the HTTP local server.

You can configure optional parameters on the HTTP local server or accept the default settings. You must enable the HTTP local server, because it is disabled by default. You can configure one HTTP local server per virtual router.

To configure the HTTP local server:

- 1 Access the virtual router context.
- 2 Create the HTTP local server.
- 3 (Optional) Specify a standard IP access list that defines which subscribers can connect to the HTTP local server.
- 4 (Optional) Specify the port on which the HTTP local server receives connection attempts.
- 5 (Optional) Specify the maximum number of connections that can exist between one IP address and the HTTP local server.
- 6 (Optional) Specify the name displayed to subscribers when the HTTP client requests the user information.
- 7 Specify the URL of the *root Web page*—the Web page that appears on the subscriber's computer when the login request is complete.
- 8 (Optional) Specify how often the browser should update the root Web page.

- 9 (Optional) Specify the Web page that appears if the subscriber requests an unknown URL.
- 10 Enable the HTTP local server.
- 11 (Optional) Specify the maximum time that HTTP local servers maintain connections.

### ***ip http access-class***

- Use to allow only subscribers on the specified standard IP access list to connect to the HTTP local server.
- Example

```
host1(config)#ip http access-class chicagoList
```
- Use the **no** version to remove the association between the access list and the HTTP local server.

### ***ip http max-connection-time***

- Use to specify the maximum time that the HTTP local server maintains an inactive connection.
- Specify a time in the range 3–7200 seconds, or 0. A value of 0 is treated as infinity.
- Example

```
host1(config)#ip http max-connection-time 1000
```
- Use the **no** version to restore the default time, 30 seconds.

### ***ip http not-found-url***

- Use to specify the URL of the Web page or message that appears if the subscriber requests a URL that is not available.
- Specify the keyword **root-url** to display the root Web page.
- Example

```
host1(config)#ip http not-found-url
http://extserver/not-found.html
```
- Use the **no** version to display the standard HTTP message “404 not found.”

### ***ip http port***

- Use to specify the port on which the HTTP local server receives connection attempts.
- Specify a port number in the range–65535.
- Example

```
host1(config)#ip http port 8080
```
- Use the **no** version to restore the default port number, 80.

### ***ip http realm***

- Use to specify the name the Web browser displays to subscribers when the HTTP client requests the user information.
- By default, the Web browser displays the virtual router name.
- If subscribers access the same services via different virtual routers, you can specify the same realm name to indicate to subscribers that they are accessing the same services.
- Example

```
host1(config)#ip http realm boston
```
- Use the **no** version to restore the default, the name of the virtual router.

### ***ip http root-refresh***

- Use to specify how often the browser updates the internal root Web page.
- Specify a time in the range 0–65535 seconds.
- You cannot specify a refresh interval for external root URLs.
- By default, the browser does not update the root Web page.
- Example

```
host1(config)#ip http root-refresh 100
```
- Use the **no** version to restore the default time interval, 0 seconds.

### ***ip http root-url***

- Use to specify an external URL for the starting Web page that appears on the subscriber's computer when the subscriber logs in.
- Example

```
host1(config)#ip http root http://externalserver/login.html
```
- Use the **no** version to restore the default internal URL as the starting Web page.

### ***ip http same-host-limit***

- Use to specify the maximum number of connections that can exist between one IP address and the HTTP local server.
- Specify a number in the range 0–1000.
- Example

```
host1(config)#ip http same-host-limit 20
```
- Use the **no** version to restore the default number of allowed connections, 3.

### ***ip http server***

- Use to create or enable the HTTP local server.
- If you do not specify the keyword **server**, the command creates the HTTP local server and the **no** version removes the server.
- If you specify the keyword **server**, the command enables the HTTP local server and the **no** version disables the server.
- Example

```
host1(config)#ip http server
```
- Use the **no** version to delete or disable the HTTP local server.

### *Configuration Example*

Figure 7-2 shows the scenario for this example. Subscribers obtain access to ISP Boston via a system. Subscribers log in via the SDX, and a RADIUS server provides authentication.

The following steps show how to configure this scenario.

- 1 Configure interfaces on the system.

```
host1(config)#interface loopback 0
host1(config-if)#ip address 10.10.1.1 255.255.255.0
host1(config-if)#ip address 10.10.2.1 255.255.255.0
                secondary
host1(config-if)#exit
host1(config)#interface fastEthernet 2/0
host1(config-if)#ip unnumbered loopback 0
```

- 2 Configure the parameters to enable the system to forward authentication requests to the RADIUS server.

```
host1(config)#radius authentication server 10.10.1.2
host1(config)#udp-port 1645
host1(config)#key radius
```

3 Specify the authentication method.

```
host1(config)#aaa authentication ppp default radius
```

Or

```
host1(config)#aaa authentication ppp default none
```

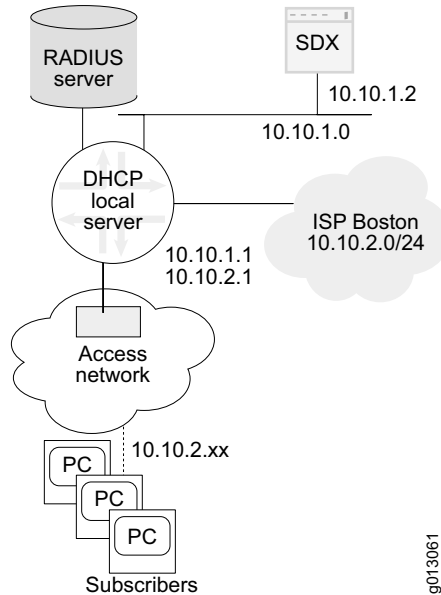


Figure 7-2 Non-PPP equal-access configuration example

4 Enable the DHCP local server.

```
host1(config)#service dhcp-local
```

5 Configure the DHCP local server to assign token IP addresses from the default address pool.

```
host1(config)#ip dhcp-local pool default  
host1(config-dhcp-local)#network 10.10.1.0 255.255.255.0  
host1(config-dhcp-local)#default-router 10.10.1.1  
host1(config-dhcp-local)#lease 0 0 0 20
```

6 Specify the IP addresses that are in use, so that the DHCP local server cannot assign these addresses.

```
host1(config)#ip dhcp-local excluded-address 10.10.1.1  
host1(config)#ip dhcp-local excluded-address 10.10.1.2
```

- 7 Configure the DHCP local server to provide enduring IP addresses to subscribers of ISP Boston.

```
host1(config)#ip dhcp-local pool ispBoston
host1(config-dhcp-local)#network 10.10.2.0 255.255.255.0
host1(config-dhcp-local)#domain-name ispBoston
host1(config-dhcp-local)#default-router 10.10.2.1
host1(config-dhcp-local)#lease 0 0 10
host1(config-dhcp-local)#ip dhcp-local limit atm 5
```

- 8 Configure the SDX client.

```
host1(config)#sscc primary address 10.10.1.2 port 3310
host1(config)#sscc enable
host1(config)#sscc retryTimer 200
```

**HTTP Local Server** If you use the HTTP local server instead of the SDX, omit step 8 in the above example. The following example illustrates how to configure optional parameters for the HTTP local server and to enable it.

```
host1(config)#ip http
host1(config)#ip http access-class validHosts
host1(config)#ip http realm ISP1
host1(config)#ip http max-connection-time 15
host1(config)#ip http same-host-limit 0
host1(config)#ip http not-found-url http://isp.com/bad.html
host1(config)#ip http server
```

## Monitoring DHCP Local Server

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This section describes how to monitor the HTTP local server and the DHCP local server.

### *Monitoring the HTTP Local Server*

This section describes the **show ip http** commands for monitoring the HTTP local server. You can set a statistics baseline for the HTTP local server using the **baseline ip http** command. Use the **delta** keyword with the **show ip http statistics** command to display statistics with the baseline values subtracted.

#### ***baseline ip http***

- Use to set a baseline for HTTP server statistics.
- The system implements the baseline by reading and storing the statistics at the time the baseline is set and then subtracting this baseline whenever baseline-relative statistics are retrieved.
- Example

```
host1#baseline ip http
```
- There is no **no** version.

#### ***show ip http scalar***

- Use to display information about the HTTP local server.
- Field descriptions
  - › Admin status – status of the HTTP local server in the software: enabled or disabled
  - › Access class – name of a standard IP access list that determines which hosts can log onto the HTTP local server
  - › Listening port – port that the HTTP local server uses to track requests for connection
  - › Same host limit – maximum number of connections allowed between one IP address and the DHCP local server
  - › Authentication Realm – connection name that subscribers see when the Web browser requests the user information
  - › Root URL – URL of the Web page displayed when the subscriber logs in
  - › NotFound URL – URL of the Web page displayed when the DHCP local server is not available
  - › Logout URL – URL of the Web page when the subscriber chooses to log out; not currently used
  - › FailLogout URL – URL of the Web page displayed if the logout fails; not currently used

- Example

```
host1#show ip http scalar
Admin status: enabled
  Access class: not defined
  Listening port: 80
  Same host limit: 3
  Authentication Realm: not defined
  Root URL: not defined
  NotFound URL: http://isp.com/bad.html
  Logout URL: not defined
  FailLogout URL: not defined
```

### ***show ip http server***

- Use to display information about the parameters configured for the HTTP local server.
- Field descriptions
  - › Maximum connection length – maximum time that the HTTP local server maintains an inactive connection
  - › Current number of http servers – number of configured Web servers
  - › Number of enabled http servers – number of Web servers enabled
  - › Current number of http connections – number of connections from subscribers to HTTP local servers
  - › Peak number of http connections – highest number of connections from subscribers to HTTP local servers
  - › Maximum number of http connections – maximum number of connections allowed from subscribers to HTTP local servers
- Example

```
host1#show ip http server
Maximum connection length: 30 seconds
  Current number of http servers: 1
  Number of enabled http servers: 1
  Current number of http connections: 0
  Peak number of http connections: 1
  Maximum number of http connections: 1000
```

### ***show ip http statistics***

- Use to display statistics about the connections to the HTTP local server.
- Field descriptions
  - › Server enable count – total number of enabled HTTP local servers
  - › Server disable count – total number of disabled HTTP local servers
  - › Same host enforced – number of connections dropped because the limit for connections from one IP address to the HTTP local server was exceeded
  - › Access class denies – number of connections dropped because of a problem with the standard IP access list that defines the hosts that can access the HTTP local server

- › No resource failures – number of connections dropped because of system memory limitations
  - › Http connections created – total number of HTTP connections established
  - › Http connections terminated – total number of HTTP connections ended
  - › Http connections aged out – total number of HTTP connections that expired because they exceeded the maximum allowed connection time
  - › Urls successfully served – total number of Web pages displayed
  - › Malformed http requests – number of HTTP requests that failed because the format was incorrect
  - › Urls not found – number of Web pages not found
  - › Authentication challenges – number of connection attempts
  - › Authentication failures – number of connection attempts that failed
  - › Http requests dropped – number of requests that failed because they were too long for the buffer (long messages may indicate a security threat)
- Example

```
host1#show ip http statistics delta
  Server enable count: 1
  Server disable count: 0
  Same host enforced: 0
  Access class denies: 0
  No resource failures: 0
  Http connections created: 2
  Http connections terminated: 2
  Http connections aged out: 1
  Urls successfully served: 0
  Malformed http requests: 0
  Urls not found: 0
  Authentication challenges: 1
  Authentication failures: 0
  Http requests dropped: 0
```

### *Monitoring the DHCP Local Server*

This section describes the **show** commands for monitoring the DHCP local server. You can set a statistics baseline for the DHCP local server using the **baseline ip dhcp-local** command. Use the **delta** keyword with the **show ip dhcp-local statistics** command to display statistics with the baseline values subtracted.

#### ***baseline ip dhcp-local***

- Use to set a baseline for DHCP local server statistics.
- The system implements the baseline by reading and storing the statistics at the time the baseline is set and then subtracting this baseline whenever baseline-relative statistics are retrieved.

- Example  

```
host1#baseline ip dhcp-local
```
- There is no **no** version.

### ***show ip dhcp-local binding***

- Use to display the mapping between the token or enduring IP address and the MAC address of the subscriber's computer.
- Field descriptions
  - › Address – token or enduring IP address
  - › Hardware – MAC address of subscriber's computer
  - › Lease – time for which the IP address is available in seconds
- Example

```
host1#show ip dhcp-local binding 192.34.5.67
Dhcp Local Bindings
-----
Address      Hardware          Lease
-----
10.10.1.2    00-B0-D0-3D-53-F1  20
```

### ***show ip dhcp-local excluded***

- Use to display addresses that have been excluded using the **ip dhcp-local excluded-address** command. The DHCP local server does not allocate excluded addresses, because they are already used by devices on the subnet.
- Field descriptions
  - › Pool – name of the pool that contains the excluded address
  - › Low Address – excluded address or first address in a range of addresses
  - › High Address – last address in a range of addresses
- Example

```
host1(config)#show ip dhcp-local excluded
Dhcp Excluded Addresses
-----
Pool          Low           High
Address      Address      Address
-----
default      10.10.1.1
default      10.10.1.5    10.10.1.30
cable2       10.10.2.1
home.com     10.10.3.1
cable4       10.10.4.1
cable5       10.10.5.1
```

### ***show ip dhcp-local limits***

- Use to display the maximum number of leases available for each VPI, VCI, VLAN, and Ethernet subnet.
- Field descriptions
  - › ATM Limit – number of leases available for each VPI and each VCI
  - › VLAN Limit – number of leases available for each VLAN
  - › Ethernet Limit – number of leases available for each Ethernet subnet
- Example

```
host1#show ip dhcp-local limits
DHCP Local Server Address Limits
ATM Limit           - 5
VLAN Limit          - None
Ethernet Limit      - None
```

### ***show ip dhcp-local pool***

- Use to display the IP DHCP local pool configurations.
- Field descriptions
  - › Pool Name – name of the DHCP local pool
  - › Pool Id – ID of the pool
  - › Domain Name – domain name assigned to the pool
  - › Network – IP addresses that the DHCP local server can provide from the pool
  - › Mask – mask that goes with the network address
  - › NETBIOS Node Type – type of Net-Bios server:
    - 1 – broadcast
    - 2 – peer-to-peer
    - 4 – mixed
    - 8 – hybrid
  - › Lease – time for which the supplied IP address is valid
  - › DNS Servers – DNS server(s) assigned to the pool
  - › NETBIOS Name Servers – Net-Bios server assigned to subscribers
  - › Default Routers – default router used for subscribers
  - › Server Address – DHCP server address that is sent to subscribers

- Example

```

host1#show ip dhcp-local pool

*****
Pool Name - ispBoston
Pool Id - 6
Domain Name - ispBoston
Network - 10.10.0.0
Mask - 255.255.255.0
NETBIOS Node Type - 1
Lease - Days:0 Hours:0 Minutes:24 Seconds:0
DNS Servers
    10.10.1.1
NETBIOS Name Servers
    10.10.1.1
    10.10.1.2
Default Routers
    10.10.1.3
Server Address - 10.10.20.8

```

### ***show ip dhcp-local reserved***

- Use to display the static IP address/MAC address pairs that the DHCP local server supplies in standalone mode.
- Field descriptions
  - › Pool – name of pool in which the address is reserved
  - › Address – IP address that is reserved
  - › Hardware – address for which the IP address is reserved
- Example

```

host1#show ip dhcp-local reserved

                                Dhcp Reserved Addresses
                                -----

```

Pool	Address	Hardware
-----	-----	-----
cablemodem	44.44.44.100	12-34-12-34-12-34-00-00-00-00-00-00-00-00-00-00
cablemodem	44.44.44.101	22-33-22-33-22-33-00-00-00-00-00-00-00-00-00-00

**show ip dhcp-local statistics**

- Use to display statistics for the DHCP local server.
- Field descriptions
  - › memUsage – memory in bytes used by DHCP local server
  - › bindings – number of leased IP addresses currently assigned
  - › discover rx – number of DHCP Discover messages received
  - › request (accept) rx – number of DHCP Requests accepted
  - › request (renew) rx – number of DHCP Requests for renewal received
  - › decline rx – number of DHCP Decline messages received
  - › release rx – number of DHCP Release messages received
  - › inform rx – number of DHCP Inform messages received
  - › offer tx – number of DHCP Offers sent
  - › ack tx – number of DHCP Acknowledgments sent
  - › nak tx – number of DHCP NAK messages sent
  - › packets in – number of packets received by the DHCP local server
  - › packets out – number of packets sent by the DHCP local server
  - › unknown msgs – number of messages other than DHCP messages received by the DHCP local server
  - › bad msgs – number of messages with errors received by the DHCP local server
- Example

```
host1#show ip dhcp-local statistics
DHCP Local Server Statistics
-----
Item                Count
-----
memUsage            0
bindings            0
discover rx        0
request(accept) rx 0
request(renew) rx  0
decline rx         0
release rx         0
inform rx          0
offer tx           0
ack tx             0
nak tx             0
packets in         0
packets out        0
unknown msgs       51
bad msgs           0
```