

PPP IPv4 Address Conservation in Dual Stack Environments

The IPv4 Address Conservation in Dual Stack Environments feature enables service providers with a limited pool of IPv4 addresses to manage a large number of subscribers and conserve this address pool. A dual-stack environment is one in which service providers have both IPv4 addresses and IPv6 prefixes in their networks. A subscriber requests an IPv4 address, which it releases after a defined time interval. This same address can then be reassigned to any other subscriber, thereby allowing service providers to conserve the available IPv4 address space.

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Prerequisites for PPP IPv4 Address Conservation in Dual Stack Environments

- You need to understand authentication, authorization, and accounting (AAA) and PPP before configuring IPv4 address conservation.
- A RADIUS server must be configured for centralized AAA.
- The customer premises equipment (CPE) must support a dual-stack environment and must have the intelligence to trigger the release of any IPv4 addresses not being used by applications at the CPE for a specified interval.
- The broadband remote access server (BRAS) must be able to send an IPv4 address request from a CPE device to the RADIUS server, a notification to the RADIUS server when an IPv4 address is allocated to the CPE device, and a notification to the RADIUS server when the CPE device releases the IPv4 address.
- The RADIUS server must be configured to assign only IPv6 prefixes during link control protocol (LCP) authentication, assign only IPv4 addresses when the BRAS sends an address allocation request, and

return released IPv4 addresses to the free pool of addresses in response to the BRAS IPv4 address-release notification.

Restrictions for PPP IPv4 Address Conservation in Dual Stack Environments

A local IP address pool must not be configured on the BRAS.

Information About PPP IPv4 Address Conservation in Dual Stack Environments

IPv4 Address Conservation in Dual Stack Environments

A subscriber in the service provider's network receives an IPv6 prefix from the RADIUS server in the initial authentication access-accept response. The broadband remote access server (BRAS) performs a uniqueness check to ensure that the IPv6 prefix has not been assigned to another subscriber. The BRAS then receives an Internet Protocol Control Protocol (IPCP) request for an IPv4 address from the subscriber. Next, the BRAS adds a number of attributes including the subscriber username and the Cisco vendor-specific attribute (VSA) for IPv4 address saving to the request, and sends this information to the RADIUS server. The VSA information tells the RADIUS server that this is a request for an existing session and the username identifies the subscriber making the request. The RADIUS server then sends an IPv4 address in the access-accept response. The BRAS checks that the IPv4 address that is to be assigned is not being used by any other subscriber. If a duplicate address is found, the session is torn down, otherwise the session is authorized. If the subscriber sends another request for an IPv4 address without terminating the earlier session, the BRAS does not send this request to the RADIUS server; instead, it uses the IPv4 address returned in the previous authorization exchange. When the subscriber terminates the session, the BRAS releases the IPv4 address and resets the authorization flag for this subscriber. This ensures that if the same subscriber requests an IPv4 address again, the request will be forwarded to the RADIUS server.

In addition, we recommend that you configure the following features on the BRAS. For a detailed description of the commands required to configure these features, see the Cisco IOS Broadband Access Aggregation and DSL Command Reference .

Note None of these features are mandatory for the IPv4 address conservation feature to work.

PPP IP Unique Address and Prefix Detection

The PPP IP Unique Address and Prefix Detection feature checks the uniqueness of IPv4 addresses and IPv6 prefixes on the broadband remote access server (BRAS). PPP disconnects the session if it detects a duplicate IPv4 address and IPv6 prefix.

PPP Local NCP Override

The PPP Local NCP Override feature configures the broadband remote access server (BRAS) to track the attributes received in the authorization from the RADIUS server, verifies the permitted Network Control Protocol (NCP), rejects the current NCP, and overrides the local dual-stack configuration.

AAA Delayed Accounting

The AAA Delayed Accounting feature delays the generation of accounting "start" records until the user IP address is established. When this feature is configured, the broadband remote access server (BRAS) sends an accounting "start" record to the RADIUS server when the appropriate network control protocol (NCP) is established.

How to Configure IPv4 Address Conservation in Dual Stack Environments

Configuring PPP IPv4 Address Conservation in Dual Stack Environments

Before you begin

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **ppp ip address-save aaa-acct-vsa** *vsa-string*
4. **end**
5. **debug ppp ip address-save**

DETAILED STEPS

Procedure

	Command or Action	Purpose
Step 1	**enable** **Example:** `Router> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Router# configure terminal`	Enters global configuration mode.
Step 3	**ppp ip address-save aaa-acct-vsa** *vsa-string* **Example:**	Enables IPv4 address conservation and defines the vendor-specific attribute value.

	Command or Action	Purpose
	`Router(config)# ppp ip address-save aaa-acct-vsa enable`	
Step 4	**end** **Example:** `Router(config)# end`	Exits global configuration mode and returns to privileged EXEC mode.
Step 5	**debug ppp ip address-save** **Example:** `Router# debug ppp ip address-save`	Displays debugging information for the IPv4 address conservation feature.

Configuration Examples for PPP IPv4 Address Conservation in Dual Stack Environments

Example: PPP IPv4 Address Conservation in Dual Stack Environments

The following example shows how to enable the PPP IPv4 Address Conservation in Dual Stack Environments feature.

```
Router> enable
Router# configure terminal
Router(config)# ppp ip address-save aaa-acct-vsa enable
Router(config)# end
```

Additional References

Related Documents

Related Topic	Document Title
Broadband Access Aggregation and DSL commands	Cisco IOS Broadband Access Aggregation and DSL Command Reference

Technical Assistance

Description	Link
The Cisco Support and Documentation website provides online resources to download documentation, software, and tools. Use these resources to install and configure the software and to troubleshoot and resolve technical issues with Cisco products and technologies. Access to most tools on the Cisco Support and Documentation website requires a Cisco.com user ID and password.	http://www.cisco.com/cisco/web/support/index.html

Feature Information for PPP IPv4 Address Conservation in Dual Stack Environments

The following table provides release information about the feature or features described in this module. This table lists only the software release that introduced support for a given feature in a given software release train. Unless noted otherwise, subsequent releases of that software release train also support that feature.

Use Cisco Feature Navigator to find information about platform support and Cisco software image support. To access Cisco Feature Navigator, go to www.cisco.com/go/cfn. An account on Cisco.com is not required.

Table 1: Feature Information for PPP IPv4 Address Conservation In Dual Stack Environments

Feature Name	Releases	Feature Information
PPP IPv4 Address Conservation in Dual Stack Environments	Cisco IOS XE Release 3.5S	The IPv4 Address Conservation in Dual Stack Environments feature enables service providers with a limited pool of IPv4 addresses to manage a large number of subscribers and conserve this address pool. A subscriber is allocated an IPv4 address, which it releases after a defined time interval. This same address can then be reassigned to another subscriber that requests an IPv4 address. The following commands were introduced: **debug ip address-save**, **ppp ip address-save aaa-acct-vsa**.