Tunnel Authentication via RADIUS on Tunnel Terminator

Feature History

Release	Modification
12.2(15)B	This feature was introduced on the Cisco 6400 series, Cisco 7200 series, and Cisco 7400 series.
12.3(4)T	This feature was integrated into Cisco IOS Release 12.3(4)T.

- Feature Overview, page 1
- Supported Platforms, page 3
- Supported Standards, MIBs, and RFCs, page 4
- Prerequisites, page 4
- Configuration Tasks, page 4
- Configuration Examples, page 6
- Command Reference, page 7
- Glossary, page 13

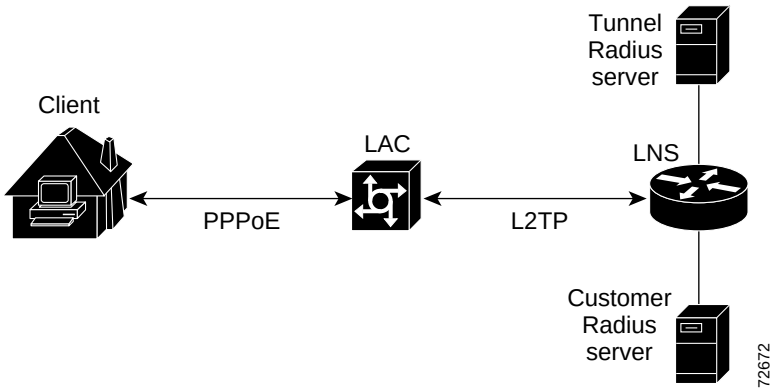
Feature Overview

The Tunnel Authentication via RADIUS on Tunnel Terminator feature allows the Layer 2 Tunneling Protocol (L2TP) network server (LNS) to perform remote authentication and authorization with RADIUS on incoming L2TP access concentrator (LAC) dialin connection requests. This feature also allows the L2TP LAC to perform remote authentication and authorization with RADIUS on incoming L2TP LNS dialout connection requests.

Before the introduction of this feature, the LNS could only perform L2TP tunnel authentication and authorization locally. These processes can be difficult to maintain across numerous LNSs, especially if the number of virtual private dialup network (VPDN) groups is large, because the LAC information must be configured under the VPDN group configurations of the LNS. Remote RADIUS authentication and authorization allows users to store the LAC configurations on the RADIUS server, thereby avoiding the need to store information locally. Thus, the new LAC information can be added to the RADIUS server as necessary, and the group of LNSs can authenticate and authorize by using a common user database on RADIUS.

Figure 1 and the corresponding steps explain how this feature works.

Figure 1 LNS Remote RADIUS Tunnel Authentication and Authorization for L2TP Dialin Calls Topology



- After the LNS receives a start-control-connection request (SCCRQ), it starts tunnel authentication and submits a request to RADIUS with the LAC hostname and the dummy password “cisco.” (If the LNS determines that authorization should be performed locally, it will search the VPDN group configurations.)

Note To change the dummy password, use the **vpdn tunnel authorization password** command.

- If the password sent by the LNS matches the password that is configured in the RADIUS server, the server will return attribute 90 (Tunnel-Client-Auth-ID) and attribute 69 (Tunnel-Password) after the LAC information is located. Otherwise, the RADIUS server replies back with an access-reject, and the LNS drops the tunnel.
- The LNS will check for the following attribute information from the RADIUS reply:
  - Attribute 90 (Tunnel-Client-Auth-ID), which is used as the LAC hostname. If this attribute does not match the LAC hostname, the tunnel will be dropped.
  - Attribute 69 (Tunnel-Password), which is used for the L2TP CHAP-like authentication shared secret. This attribute is compared against the LAC challenge attribute-value pair (AVP) that was received in the SCCRQ. If this attribute does not match the AVP, the tunnel will be dropped.
- If both attributes match, the L2TP tunnel will be established. Thereafter, you can proceed with PPP negotiation and authentication with the remote client.

Note PPP remote authentication is done to a potential different customer RADIUS server by a separate access-request/access-accept sequence. The tunnel authorization may be done by a different tunnel RADIUS server.

New RADIUS Attributes

To help implement this feature, the following two new Cisco-specific RADIUS attributes have been introduced:

- Cisco:Cisco-Avpair = “vpdn:dout-dialer = <LAC dialer number>”—Specifies which LAC dialer to use on the LAC for a dialout configuration.
- Cisco:Cisco-Avpair = “vpdn:vpdn-vtemplate = <vtemplate number>”—Specifies the virtual template number that will be used for cloning on the LNS for a dialin configuration. (This attribute is the RADIUS counterpart for the virtual-template under the vpdn-group configuration.)

Note The service-type in the RADIUS user’s profile for the tunnel initiator should always be set to “Outbound.”

Benefits

This feature allows tunnel authentication and authorization to occur via a remote RADIUS server instead of local configuration on the tunnel terminator. Thus, users no longer have to configure LAC or LNS data in a VPDN group when an LNS or LAC is configured for incoming dialin or dialout L2TP tunnel termination; this information can now be added to a remote RADIUS server, providing a more manageable and scalable solution for L2TP tunnel authentication and authorization on the tunnel terminator.

Restrictions

This is applicable only to L2TP; that is, protocols such as (Layer 2 Forwarding) L2F and Point-to-Point Tunneling Protocol (PPTP) are not supported.

Related Documents

- The chapter “Configuring Virtual Private Networks” in the *Cisco IOS Dial Technologies Configuration Guide*, Release 12.2
- The appendix “RADIUS Attributes” in the *Cisco IOS Security Configuration Guide*, Release 12.2
- *Cisco IOS Dial Technologies Command Reference*, Release 12.2
- *Cisco IOS Security Command Reference*, Release 12.2

Supported Platforms

- Cisco 6400 series
- Cisco 7200 series
- Cisco 7400 series

Availability of Cisco IOS Software Images

Platform support for particular Cisco IOS software releases is dependent on the availability of the software images for those platforms. Software images for some platforms may be deferred, delayed, or changed without prior notice. For updated information about platform support and availability of software images for each Cisco IOS software release, refer to the online release notes or, if supported, Cisco Feature Navigator.

Supported Standards, MIBs, and RFCs

Standards

None

MIBs

None

To obtain lists of supported MIBs by platform and Cisco IOS release, and to download MIB modules, go to the Cisco MIB website on Cisco.com at the following URL:

http://www.cisco.com/public/sw-center/netmgmt/cmtk/mibs.shtml

RFCs

RFC 2868, *RADIUS Attributes for Tunnel Protocol Support*

Prerequisites

Before configuring this feature, you should define a RADIUS server group. For information on completing this task, refer to the chapter “Configuring RADIUS” in the *Cisco IOS Security Configuration Guide*, Release 12.2.

Configuration Tasks

See the following sections for configuration tasks for the Tunnel Authentication via RADIUS on Tunnel Terminator feature. Each task in the list is identified as either required or optional.

- Configuring the LNS or LAC for Remote RADIUS Tunnel Authentication and Authorization (required)
- Verifying Remote RADIUS Tunnel Authentication and Authorization Configurations (optional)

Configuring the LNS or LAC for Remote RADIUS Tunnel Authentication and Authorization

To configure an LNS or LAC for incoming dialin or dialout L2TP tunnel termination, use the following commands in global configuration:

	Command	Purpose
Step 1	`Router(config)# aaa authorization network {default | list-name} method1 [method2...]`	Defines an AAA authorization method list for network services.
Step 2	`Router(config)# vpdn tunnel authorization network {method-list-name | default}`	Specifies the AAA authorization method list that will be used for remote tunnel hostname-based authorization. • If the *list-name* argument was specified in the **aaa authorization** command, you use that list name here. • If the default keyword was specified in the **aaa authorization** command, you must choose that keyword, which specifies the default authorization methods that are listed with the **aaa authorization** command here.
Step 3	`Router(config)# vpdn tunnel authorization virtual-template vtemplate-number`	(Optional) Selects the default virtual template from which to clone virtual access interfaces.
Step 4	`Router(config)# vpdn tunnel authorization password password`	(Optional) Configures a "dummy" password for the RADIUS authorization request to retrieve the tunnel configuration that is based on the remote tunnel hostname. **Note** If this command is not enabled, the password will always be "cisco."

Verifying Remote RADIUS Tunnel Authentication and Authorization Configurations

To verify that the L2TP tunnel is up, use the **show vpdn tunnel** command in EXEC mode. One tunnel and one session must be set up.

```
Router# show vpdn tunnel

L2TP Tunnel and Session Information Total tunnels 1 sessions 1
LocID RemID Remote Name   State  Remote Address  Port  Sessions VPDN Group
4571  61568 csidtw13 est    10.0.195.4      1701  1        ?

LocID RemID TunID Intf          Username               State  Last Chg
4     11    4571  Vi4.1         csidtw9@cisco.com       est    00:02:29

%No active L2F tunnels
%No active PPTP tunnels
%No active PPPoE tunnels
```

To verify that the AAA authorization RADIUS server is configured on the LNS and that the LNS can receive attributes 90 and 69 from the RADIUS server, perform the following steps:

Step 1 Enable the **debug radius** command on the LNS.

Step 2 Enable the **show logging** command on the LNS and ensure that "access-accept" is in the output and that attributes 90 and 69 can be seen in the RADIUS reply.

```
00:32:56: RADIUS: Received from id 21645/5 172.19.192.50:1645, Access-Accept, len 81
00:32:56: RADIUS:  authenticator 73 2B 1B C2 33 71 93 19 - 62 AC 3E BE 0D 13 14 85
00:32:56: RADIUS:  Service-Type          [6]   6   Outbound                  [5]
00:32:56: RADIUS:  Tunnel-Type           [64]  6   00:L2TP                   [3]
00:32:56: RADIUS:  Tunnel-Medium-Type    [65]  6   00:IPv4                   [1]
00:32:56: RADIUS:  Tunnel-Client-Auth-I[90]  6   00:"csidtw13"
00:32:56: RADIUS:  Tunnel-Password       [69]  8   *
00:32:56: RADIUS:  Vendor, Cisco         [26]  29
00:32:56: RADIUS:   Cisco AVpair         [1]   23  "vpdn:vpdn-vtemplate=1"
```

To verify that the L2TP tunnel has been established and that the LNS can perform PPP negotiation and authentication with the remote client, perform the following steps:

Step 1 Enable the **debug ppp negotiation** and **debug ppp authentication** commands on LNS.

Step 2 Enable the **show logging** command on LNS and observe that LNS receives a PPP CHAP challenge and then sends a PPP CHAP "SUCCESS" to the client.

```
00:38:50: ppp3 PPP: Received LOGIN Response from AAA = PASS
00:38:50: ppp3 PPP: Phase is FORWARDING, Attempting Forward
00:38:50: Vi4.1  Tnl/Sn4571/4 L2TP: Session state change from wait-for-service-selection
to established
00:38:50: Vi4.1 PPP: Phase is AUTHENTICATING, Authenticated User
00:38:50: Vi4.1 CHAP: O SUCCESS id 1 len 4
```

Step 3 After PPP authentication is successful, observe from the debug output that PPP negotiation has started, that the LNS has received LCP (IPCP) packets, and that negotiation is successful.

```
00:38:50: Vi4.1 IPCP: State is Open
00:38:50: Vi4.1 IPCP: Install route to 200.1.1.4
```

Configuration Examples

This section provides the following configuration examples:

- L2TP Network Server (LNS) Configuration Example
- RADIUS User Profile for Remote RADIUS Tunnel Authentication Example

L2TP Network Server (LNS) Configuration Example

The following example shows how to configure the LNS to enable remote RADIUS tunnel authentication and authorization:

```
! Define a RADIUS server group
aaa group server radius VPDN-group
 server 64.102.48.91 auth-port 1645 acct-port 1646
!
! RADIUS configurations only
aaa authorization network mymethodlist group VPDN-Group
vpdn tunnel authorization network mymethodlist
vpdn tunnel authorization virtual-template 10
```

RADIUS User Profile for Remote RADIUS Tunnel Authentication Example

The following are examples of RADIUS user profiles for the LNS to terminate L2TP tunnels from a LAC. In the first user profile, the final line is optional if the **vpdn tunnel authorization virtual-template** command is used. Also, the first RADIUS user profile is for L2TP dialin, and the second RADIUS user profile is for L2TP dialout.

The service-type in the RADIUS user's profile for the tunnel initiator should always be set to "Outbound."

```
csidtw13  Password = "cisco"
        Service-Type = Outbound,
        Tunnel-Type = :0:L2TP,
        Tunnel-Medium-Type = :0:IP,
        Tunnel-Client-Auth-ID = :0:"csidtw13",
        Tunnel-Password = :0:"cisco"
        Cisco:Cisco-Avpair = "vpdn:vpdn-vtemplate=1"

csidtw1 Password = "cisco"
        Service-Type = Outbound,
        Tunnel-Type = :0:L2TP,
        Tunnel-Medium-Type = :0:IP,
        Tunnel-Client-Auth-ID = :0:"csidtw1",
        Tunnel-Password = :0:"cisco"
        Cisco:Cisco-Avpair = "vpdn:dout-dialer=2"
```

Command Reference

This section documents new commands. All other commands used with this feature are documented in the Cisco IOS Release 12.2 command reference publications.

- **vpdn tunnel authorization network**
- **vpdn tunnel authorization password**
- **vpdn tunnel authorization virtual-template**

vpdn tunnel authorization network

To enable the Layer 2 Tunneling Protocol (L2TP) network server (LNS) or the L2TP access concentrator (LAC) to perform remote AAA tunnel authentication and authorization, use the **vpdn tunnel authorization network** command in global configuration mode. To disable remote tunnel authentication and authorization and return to the default of local tunnel authentication and authorization, use the **no** form of this command.

vpdn tunnel authorization network {*method-list-name* | **default**}

no vpdn tunnel authorization network {*method-list-name* | **default**}

Syntax Description

method-list-name	If the *list-name* argument was specified in the **aaa authorization network** command, you use that same list name here.
default	If the default keyword was specified in the **aaa authorization network** command, you must choose that keyword, which specifies the default authorization methods that are listed with the **aaa authorization network** command here.

Defaults

If this command is not enabled, the LNS or the LAC will perform authentication locally.

Command Modes

Global configuration

Command History

Release	Modification
12.2(15)B	This command was introduced.
12.3(4)T	This command was integrated into Cisco IOS Release 12.3(4)T.

Usage Guidelines

Use this command to specify the authorization method list that will be used for remote tunnel hostname-based authorization. The method-list (named or default) is defined using the **aaa authorization network** command.

If a method list for tunnel authorization is not specified via the **aaa authorization network** command, local authorization using the local VPDN group configuration will occur.

Note This new method list is only for L2TP tunnel authorization and termination; it is not intended for domain or Dialed Number Identification Service (DNIS)-based authorization that is typically done on the tunnel terminator. Thus, this command can be enabled only on the tunnel terminator—LAC for dialout and LNS for dialin.

Examples

The following example shows how to configure the LNS to enable remote RADIUS tunnel authentication and authorization:

```
! Define a RADIUS server group
aaa group server radius VPDN-group
 server 64.102.48.91 auth-port 1645 acct-port 1646
!
aaa authorization network mymethodlist group VPDN-Group
vpdn tunnel authorization network mymethodlist
vpdn tunnel authorization virtual-template 10
```

Related Commands

Command	Description
aaa authorization	Sets parameters that restrict user access to a network.

vpdn tunnel authorization password

To configure a “dummy” password for the RADIUS authentication request to retrieve the tunnel configuration that is based on the remote tunnel hostname, use the **vpdn tunnel authorization password** command in global configuration mode. To return to the default password, use the **no** form of this command.

vpdn tunnel authorization password *password*

no vpdn tunnel authorization password *password*

Syntax Description

password	Character string, which is truncated after 25 characters.

Defaults

The password is set to “cisco.”

Command Modes

Global configuration

Command History

Release	Modification
12.2(15)B	This command was introduced.
12.3(4)T	This command was integrated into Cisco IOS Release 12.3(4)T.

Usage Guidelines

This command can be used on either the L2TP access concentrator (LAC) or L2TP network server (LNS) when remote RADIUS tunnel authentication is enabled.

Examples

The following example shows how to set the password to configure the LNS to enable remote RADIUS tunnel authentication and authorization and set the password to “tiger”:

```
aaa authorization network mymethodlist group VPDN-Group
vpdn tunnel authorization network mymethodlist
vpdn tunnel authorization virtual-template 10
vpdn tunnel authorization password tiger
```

Related Commands

Command	Description
vpdn tunnel authorization network	Enables the LNS or the LAC to perform remote AAA tunnel authentication and authorization.

vpdn tunnel authorization virtual-template

To select the default virtual template from which to clone virtual access interfaces, use the **vpdn tunnel authorization virtual-template** command in global configuration mode. To remove the default virtual template, use the **no** form of this command.

vpdn tunnel authorization virtual-template *vtemplate-number*

no vpdn tunnel authorization virtual-template *vtemplate-number*

Syntax Description

vtemplate-number	The default virtual template number that will be used for cloning on the local router. Valid values range from 1 to 200.

Defaults

No default behavior or values.

Command Modes

Global configuration

Command History

Release	Modification
12.2(15)B	This command was introduced.
12.3(4)T	This command was integrated into Cisco IOS Release 12.3(4)T.

Usage Guidelines

This command should be used if a virtual template is not specified in the local VPDN group (for local authentication) or in a remote RADIUS configuration (via the vpdn-vtemplate attribute).

Note This command is applicable only on the L2TP network server (LNS).

Examples

The following example shows how to configure the L2TP network server (LNS) to enable remote RADIUS tunnel authentication and authorization and how to specify a default virtual template:

```
! Define a RADIUS server group
aaa group server radius VPDN-group
 server 64.102.48.91 auth-port 1645 acct-port 1646
!
! RADIUS configurations only
aaa authorization network mymethodlist group VPDN-Group
vpdn tunnel authorization network mymethodlist
! Can be used for local vpdn-group tunnel authentication or remote RADIUS tunnel
! authentication
vpdn tunnel authorization virtual-template 10
```

Related Commands

Command	Description
vpdn tunnel authorization network	Enables the LNS or the LAC to perform remote AAA tunnel authentication and authorization.

Glossary

L2TP—Layer 2 Tunnel Protocol. A Layer 2 tunneling protocol that enables an ISP or other access service to create a virtual tunnel to link customer remote sites or remote users with corporate home networks. In particular, a network access server (NAS) at the ISP point of presence (POP) exchanges PPP messages with the remote users and communicates by L2F or L2TP requests and responses with the customer tunnel server to set up tunnels.

LAC—L2TP access concentrator. A network access server (NAS) to which the client directly connects and through which PPP frames are tunneled to the L2TP network server (LNS). The LAC need only implement the media over which L2TP is to operate to pass traffic to one or more LNSs. The LAC may tunnel any protocol carried within PPP. The LAC initiates incoming calls and receives outgoing calls. A LAC is analogous to an L2F network access server.

LNS—L2TP network server. A termination point for L2TP tunnels and an access point where PPP frames are processed and passed to higher layer protocols. An LNS can operate on any platform that terminates PPP. The LNS handles the server side of the L2TP protocol. L2TP relies only on the single medium over which L2TP tunnels arrive. The LNS initiates outgoing calls and receives incoming calls. An LNS is analogous to a home gateway in L2F technology.