



L2TP Tunnel Switching

This feature module describes the L2TP Tunnel Switching feature. It includes information on the benefits of the new feature, supported platforms, related documents, and configuration information.

This document includes the following sections:

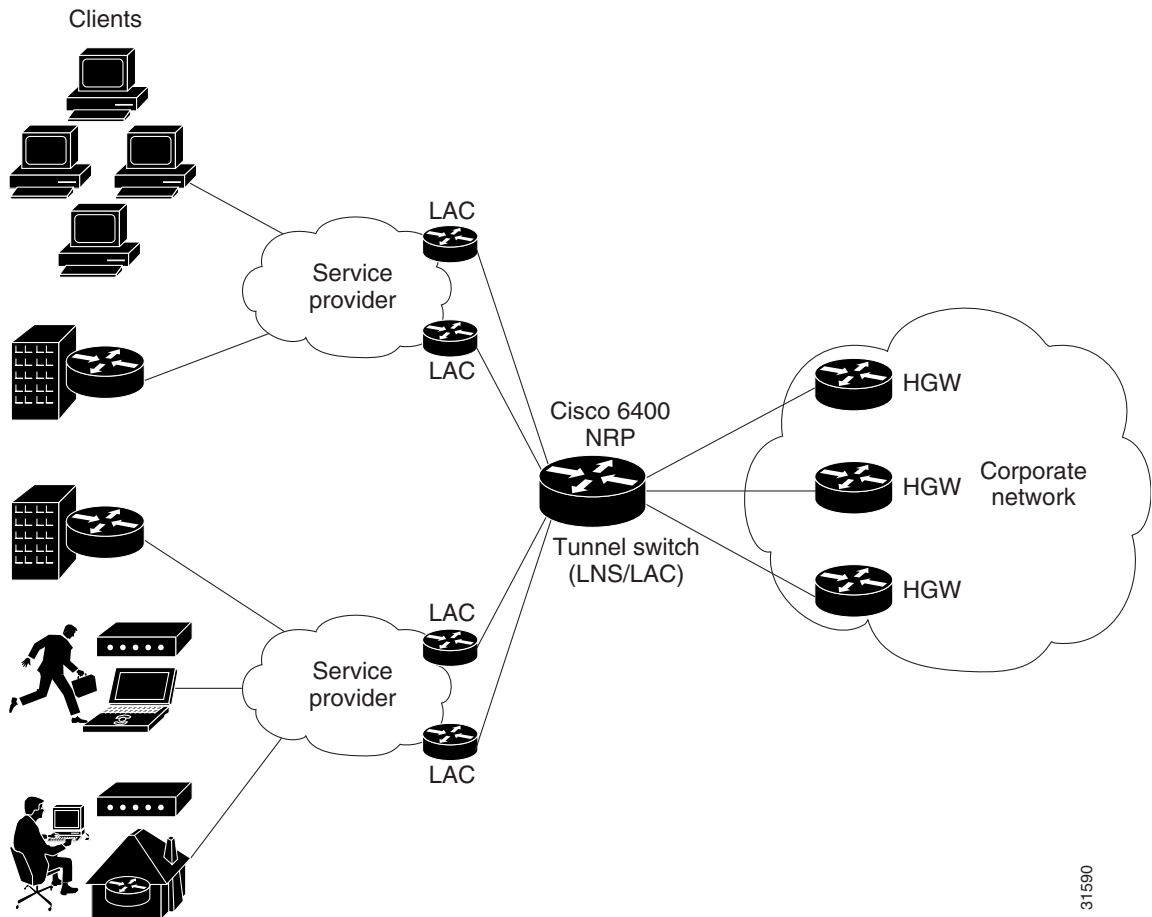
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Feature Overview

The L2TP Tunnel Switching feature enables the Cisco 6400 NRP to terminate tunnels from LACs and forward the sessions through new L2TP tunnels selected independently of the client-supplied domains. The NRP as a tunnel switch performs VPDN tunnel authorization based on the ingress tunnel names that are mapped to specified LNSes.

Figure 1 shows an example network topology using the L2TP tunnel switching feature.

Figure 1 Example Network Topology Using the L2TP Tunnel Switching Feature



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Benefits

Improved Provisioning Scalability

Aggregating LAC tunnels with an L2TP tunnel switch improves provisioning scalability on both the LAC and wholesaler ends.

Improved Permanent Virtual Circuit Interconnect Scalability

In a B-ISDN network, a multihop node can improve PVC interconnect scalability.

Restrictions

When using a RADIUS service profile for tunnel service authorization, the NRP configured as an L2TP tunnel switch must forward all sessions through L2TP tunnels. The L2TP tunnel switch must not terminate any of the sessions.

Related Documents

- *Layer 2 Tunnel Protocol* feature module
- *VPDN Group Reorganization* feature module
- *Cisco 6400 UAC Software Configuration Guide*

Supported Platforms

The L2TP Tunnel Switching feature is supported on the node route processor (NRP) of the Cisco 6400 UAC.

Supported Standards, MIBs, and RFCs

Standards

None

MIBs

None

RFCs

No new or modified RFCs are supported by this feature.

Configuration Tasks

See the following sections for configuration tasks for the L2TP Tunnel Switching feature. All of the listed tasks are required to configure the L2TP tunnel switch.

- Enabling VPDN and Multihop Functionality
- Terminating the Tunnel from the LAC
- Mapping the Ingress Tunnel Name to an LNS
- Performing VPDN Tunnel Authorization Searches by Ingress Tunnel Name



Note

The NRP as a tunnel switch requires at least two VPDN groups: one to handle incoming tunnels from the LAC, and one to create the L2TP tunnels/sessions to the LNS.

Enabling VPDN and Multihop Functionality

To use the L2TP Tunnel Switching feature, you must first enable VPDN and multihop capabilities by entering the following commands beginning in global configuration mode:

	Command	Purpose
Step 1	Router(config)# vpdn enable	Enables VPDN functionality.
Step 2	Router(config)# vpdn multihop	Enables VPDN multihop functionality.

Verifying VPDN and Multihop Functionality

To verify that you enabled VPDN and multihop functionality, use the **show running-config EXEC** command.

Terminating the Tunnel from the LAC

To terminate the tunnel from the LAC, enter the following commands beginning in global configuration mode:

	Command	Purpose
Step 1	Router(config)# username remote-hostname password secret	Configures the secret (password). Must match the secret configured on the LAC.
Step 2	Router(config)# username local-name password secret	Configures the secret (password). Must match <i>secret</i> in Step 1.
Step 3	Router(config)# vpdn-group number	Selects the VPDN group.
Step 4	Router(config-vpdn)# accept-dialin	Accepts incoming L2TP tunnel connections. Enters VPDN accept-dialin group mode.
Step 5	Router(config-vpdn-acc-in)# protocol l2tp	Specifies the Layer 2 Tunnel Protocol.
Step 6	Router(config-vpdn-acc-in)# virtual-template number	Specifies the virtual template interface to use to clone the new virtual access interface.
Step 7	Router(config-vpdn-acc-in)# exit	Returns to VPDN group mode.
Step 8	Router(config-vpdn)# terminate-from hostname remote-hostname	Specifies the host name of the remote LAC that will be required when accepting a VPDN tunnel. Must match <i>remote-hostname</i> in Step 1.
Step 9	Router(config-vpdn)# local name local-name	Specifies the local host name of the tunnel. Must match <i>local-name</i> in Step 2.

Verifying Termination of the Tunnel from the LAC

To verify that you successfully configured the tunnel switch to terminate tunnels from the LAC, use the **show running-config EXEC** command.

Mapping the Ingress Tunnel Name to an LNS

To map the ingress tunnel name to an LNS, complete the following steps beginning in global configuration mode:

	Command	Purpose
Step 1	Router(config)# username <i>username</i> password <i>secret</i>	Configures the secret (password). Username must match LNS's hostname or tunnel ID. Secret must match the secret configured on the LNS.
Step 2	Router(config)# username <i>egress-tunnel-name</i> password <i>secret</i>	Configures the secret (password). Must match <i>secret</i> in Step 1.
Step 3	Router(config)# vpdn-group <i>number</i>	Selects the VPDN group.
Step 4	Router(config- <i>vpdn</i>)# request-dialin	Enables the tunnel switch to request L2TP tunnels to the LNS. Enters VPDN request-dialin group mode.
Step 5	Router(config- <i>vpdn-req-in</i>)# protocol <i>l2tp</i>	Specifies the Layer 2 Tunnel Protocol.
Step 6	Router(config- <i>vpdn-req-in</i>)# multihop hostname <i>ingress-tunnel-name</i>	Initiates a tunnel based on the LAC's hostname or ingress tunnel ID.
Step 7	Router(config- <i>vpdn-req-in</i>)# exit	Returns to VPDN group mode.
Step 8	Router(config- <i>vpdn</i>)# initiate-to ip <i>ip-address</i> [limit <i>limit-number</i>] [priority <i>priority-number</i>]	Specifies the LNS. Optionally specifies the maximum number of sessions per tunnel as well as the priority of the IP address (1 is highest).
Step 9	Router(config- <i>vpdn</i>)# local name <i>egress-tunnel-name</i>	Specifies the local host name of the tunnel. Must match <i>egress-tunnel-name</i> in Step 2.

Verifying the Ingress Tunnel Name to LNS Map

To verify that you successfully mapped the ingress tunnel name to the LNS, use the **show running-config EXEC** command.

Performing VPDN Tunnel Authorization Searches by Ingress Tunnel Name

To specify how to perform VPDN tunnel authorization searches, enter the following command in global configuration mode:

Command	Purpose
Router(config)# vpdn search-order multihop-hostname [<i>domain</i>]	Specifies a search by the configured ingress tunnel name. Optionally specifies to search by domain or DNS if the first search type fails.

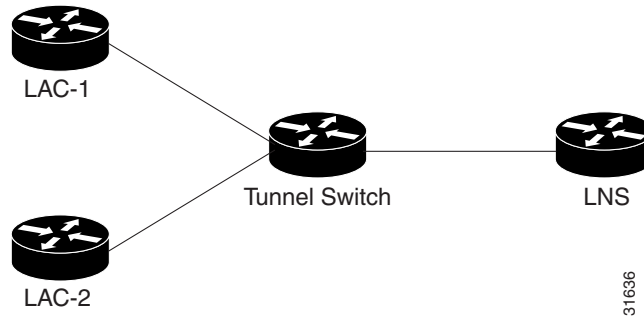
Verifying VPDN Tunnel Authorization Searches by Ingress Tunnel Name

To verify that you successfully configured the tunnel switch to perform VPDN tunnel authorization searches by ingress tunnel name, use the **show running-config EXEC** command.

Configuration Examples

The examples in this section show the configurations necessary for the basic L2TP tunnel switch topology shown in Figure 2. In this topology, a tunnel switch terminates tunnels from two LACs and forwards all the sessions through one tunnel to the LNS.

Figure 2 Example L2TP Tunnel Switch Topology



This section provides the following configuration examples:

- LAC-1 Configuration
- LAC-2 Configuration
- L2TP Tunnel Switch Configuration
- LNS Configuration

LAC-1 Configuration

In the following example, LAC-1 performs tunnel authorization based on domain name and initiates a tunnel to the L2TP tunnel switch:

```
!
vpdn enable
!
username net.com password Secret1
username Tunnel-Switch-In password Secret1
!
vpdn-group 1
 request-dialin
  protocol l2tp
  domain service1.net.com
 initiate-to ip 10.1.1.1
 local name net.com
!
```

LAC-2 Configuration

In the following example, LAC-2 also performs tunnel authorization based on domain name and initiates a tunnel to the L2TP tunnel switch:

```
!  
vpdn enable  
!  
username net.com password Secret2  
username Tunnel-Switch-In password Secret2  
!  
vpdn-group 1  
  request-dialin  
  protocol l2tp  
  domain service2.net.com  
  initiate-to ip 10.1.1.1  
  local name net.com  
!
```

L2TP Tunnel Switch Configuration

In the following example, the NRP is configured as an L2TP tunnel switch. VPDN groups 1 and 2 are used to terminate the tunnels from the LAC. VPDN group 11 is used to initiate the tunnel to the LNS, and it performs tunnel authorization based on the configured ingress tunnel name.

```
!  
vpdn enable  
vpdn multihop  
vpdn search-order multihop-hostname domain  
!  
username net.com password Secret1  
username Tunnel-Switch-In password Secret1  
username net.com password Secret2  
username Tunnel-Switch-In password Secret2  
username LNS password Secret3  
username Tunnel-Switch-Out password Secret3  
!  
vpdn-group 1  
  accept-dialin  
  protocol l2tp  
  virtual-template 1  
  terminate-from hostname net.com  
  local name Tunnel-Switch-In  
!  
vpdn-group 11  
  request-dialin  
  protocol l2tp  
  multihop hostname net.com  
  initiate-to ip 10.2.2.2  
  local name Tunnel-Switch-Out  
!  
interface ATM 0/0/0.1001 point-to-point  
ip address 10.1.1.1 255.255.255.0  
pvc 5/10  
  encapsulation aal5snap  
!
```

```
interface Virtual-Template 1
 ip unnumbered FastEthernet 0/0/0
 no ip directed-broadcast
 no keepalive
 no peer default ip address
 ppp authentication chap
!
```

LNS Configuration

In the following example, the LNS terminates the tunnel from the L2TP tunnel switch:

```
vpdn enable
!
username LNS password Secret3
username Tunnel-Switch-Out password Secret3
!
vpdn-group 1
 accept-dialin
  protocol l2tp
  virtual-template 1
 terminate-from hostname Tunnel-Switch
 local name LNS
!
interface Virtual-Template 1
 ip unnumbered FastEthernet 0/0/0
 no ip directed-broadcast
 ip mroute-cache
 no keepalive
 peer default ip address pool pool-1
 ppp authentication chap
!
```

Command Reference

This section documents new or modified commands. All other commands used with this feature are documented in the Cisco IOS Release 12.1 command reference publications.

- **multihop hostname**
- **vpdn search-order**

multihop hostname

To enable the L2TP tunnel switch to initiate a tunnel based on the LAC host name or ingress tunnel ID, use the **multihop hostname** VPDN request-dialin group configuration mode command. To disable this option, use the **no** form of this command.

multihop hostname *ingress-tunnel-name*

no multihop hostname *ingress-tunnel-name*

Syntax Description	<i>ingress-tunnel-name</i> LAC hostname or ingress tunnel ID.
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Defaults	No default behavior or values.
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Command Modes	VPDN request-dialin group
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Command History	Release	Modification
	12.1(1) DC1	This command was introduced on the Cisco 6400 NRP.

Examples The following example enables the L2TP tunnel switch to forward sessions from LAC-1 through an outgoing tunnel to IP address 10.3.3.3:

```
!
vpdn-group 11
  request-dialin
  protocol l2tp
  multihop hostname LAC-1
  initiate-to ip 10.3.3.3
  local name Tunnel-Switch
!
```

Related Commands	Command	Description
	domain <i>domain-name</i>	Selects VPDN group for tunnel initiation based on domain name.
	dnis <i>dnis-number</i>	Selects VPDN group for tunnel initiation based on DNIS.

vpdn search-order

To specify how the service provider's NAS is to perform VPDN tunnel authorization searches, use the **vpdn search-order** global configuration command. To remove a prior specification, use the **no** form of the command.

```
vpdn search-order {multihop-hostname [domain] [dnis] | domain [dnis] [multihop-hostname]
                 | dnis [domain] [multihop-hostname]}
```

```
no vpdn search-order {multihop-hostname [domain] [dnis] | domain [dnis]
                    [multihop-hostname] | dnis [domain] [multihop-hostname]}
```

Syntax Description

multihop-hostname	Specifies a search on LAC host name or ingress tunnel ID.
domain	Specifies a search on the domain name.
dnis	Specifies a search on the DNIS information.

Defaults

No default behavior or values.

Command Modes

Global configuration

Command History

Release	Modification
11.3(5)AA	This command was introduced.
12.1(1) DC1	The multihop-hostname keyword was added for the Cisco 6400 NRP.

Usage Guidelines

VPDN authorization searches are performed only as specified.

The configuration shows the **vpdn search-order** command setting only if the command is explicitly configured.

Examples

The following example configures an L2TP tunnel switch to perform each VPDN authorization search by the multihop-hostname, and if unsuccessful, search by the domain name.

```
vpdn search-order multihop-hostname domain
```

Glossary

B-ISDN—Broadband ISDN. ITU-T communication standards designed to handle high-bandwidth applications such as video. B-ISDN currently uses ATM technology over SONET-based transmission circuits to provide data rates from 155 to 622 Mbps and beyond.

DNIS—Dialed Number Identification Service. The called party number. Typically, this is a number used by call centers or a central office where different numbers are each assigned to a specific service.

L2TP—Layer 2 Tunnel Protocol. An Internet Engineering Task Force (IETF) standards track protocol defined in RFC 2661 that provides tunneling of PPP. Based upon the best features of L2F and PPTP, L2TP provides an industry-wide interoperable method of implementing VPDN.

LAC—L2TP Access Concentrator. A node that acts as one side of an L2TP tunnel endpoint and is a peer to the L2TP network server (LNS). The LAC sits between an LNS and a remote system and forwards packets to and from each. Packets sent from the LAC to the LNS requires tunneling with the L2TP protocol as defined in this document. The connection from the LAC to the remote system is either local or a PPP link.

LNS—L2TP network server. A node that acts as one side of an L2TP tunnel endpoint and is a peer to the L2TP access concentrator (LAC). The LNS is the logical termination point of a PPP session that is being tunneled from the remote system by the LAC. Analogous to the Layer 2 Forwarding (L2F) home gateway (HGW).

NAS—Network access server. A device providing local network access to users across a remote access network such as the PSTN. A NAS can also serve as a LAC, LNS, or both.

PVC—Permanent virtual circuit or connection. Virtual circuit that is permanently established. PVCs save bandwidth associated with circuit establishment and tear down in situations where certain virtual circuits must exist all the time. In ATM terminology, called a permanent virtual connection.

VPDN—Virtual Private Dialup Networking. A system that permits the physical dialup connection to appear to be connected directly to a home network while actually residing elsewhere on the network. A virtual pipe is connected between the physical dialup connections and the termination point at the home network.

