

PPPoE

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Feature history for PPPoE

Table 1: Feature History

Feature Name	Release Information	Description
Configure PPPoE over ATM	Cisco IOS XE Catalyst SD-WAN Release 17.4.1a Cisco vManage Release 20.4.1	This feature provides support for configuring PPPoEoA on Cisco IOS XE Catalyst SD-WAN devices. PPPoEoA uses AAL5MUX encapsulation which delivers better efficiency compared to other encapsulation methods.

PPPoE

A Point-to-Point Protocol over Ethernet (PPPoE) is a network protocol that

- connects multiple users over an Ethernet local area network to a remote site through common customer premises equipment,
- is commonly used in broadband aggregation such as by digital subscriber line (DSL), and
- provides authentication with the CHAP or PAP protocol.

In the Cisco Catalyst SD-WAN overlay network, CCisco IOS XE Catalyst SD-WAN devices can run the PPPoE client. The PPPoE server component is not supported. It is recommended that you configure quality

of service (QoS) and shaping rate on a PPPoE Dialer interface. Queuing based QoS policies on both Dialer interface and PPPoE-enabled physical interface at the same time, is not supported.

PPPoE-enabled physical interfaces are supported on ATM PVCs and Ethernet interfaces. A dialer interface must be used for cloning virtual access. Multiple PPPoE client sessions can be configured on an Ethernet interface, but each session must use a separate dialer interface and a separate dialer pool.

The Cisco Catalyst SD-WAN implementation of PPPoE does not support the Compression Control Protocol (CCP) options, as defined in RFC 1962.

PPPoE over ATM

A PPPoEoA is a protocol encapsulation method that

- uses ATM Adaptation Layer 5 Multiplexed Encapsulation (AAL5MUX) to carry PPPoE over ATM permanent virtual circuits (PVCs),
- provides efficiency gain over AAL5 LLC/SNAP encapsulation, and
- reduces Subnetwork Access Protocol (SNAP) encapsulation bandwidth usage by using multiplexed (MUX) encapsulation to reduce the number of cells needed to carry voice packets.

You can configure PPPoE over ATM interfaces (PPPoEoA) on Cisco IOS XE Catalyst SD-WAN devices that support ADSL. Deploying the PPPoEoA over ATM AAL5MUX feature in a VoIP environment results in improved throughput and bandwidth usage.

Supported platforms for PPPoE over ATM

The following platforms support PPPoE over ATM:

- Cisco 1100 4G/6G Series Integrated Services routers.
- Cisco1100 Series Integrated Service routers.
- Cisco1109 Series Integrated Service routers.
- Cisco111x Series Integrated Service routers.
- Cisco1111x Series Integrated Service routers.
- Cisco1120 Series Integrated Service routers.
- Cisco1160 Series Integrated Service routers.

Configure PPPoE using templates

To use Cisco SD-WAN Manager templates to configure PPPoE on Cisco IOS XE Catalyst SD-WAN device, you create three feature templates and one device template:

- Create a VPN-Interface-PPP feature template to configure PPP parameters for the PPP virtual interface.
- Create a VPN-Interface-PPP-Ethernet feature template to configure a PPPoE-enabled interface.

- Optionally, create a VPN feature template to modify the default configuration of VPN 0.
- Create a device template that incorporates the VPN-Interface-PPP, VPN-Interface-PPP-Ethernet, and VPN feature templates.

Follow these steps to configure PPPoE using feature templates.

Procedure

Step 1 Create a VPN-Interface-PPP feature template to configure PPP parameters for the PPP virtual interface.

a) From the Cisco SD-WAN Manager menu, choose **Configuration** > **Templates**.
b) Click **Feature Templates**, and click **Add Template**.

In Cisco vManage Release 20.7.1 and earlier releases, **Feature Templates** is titled **Feature**.

c) Choose Cisco IOS XE Catalyst SD-WAN device Cloud or a router model.
d) Choose the **VPN-Interface-PPP** template.
e) In the template, configure the following parameters:

Table 2:

Parameter Field	Procedure
Template Name	Enter a name for the template. It can be up to 128 alphanumeric characters.
Description	Enter a description for the template. It can be up to 2048 alphanumeric characters.
Shutdown	Click **No** to enable the PPP virtual interface.
Interface Name	Enter the number of the PPP interface. It can be from 1 through 31.
Description (optional)	Enter a description for the PPP virtual interface.
Authentication Protocol	Select either CHAP or PAP to configure one authentication protocol, or select PAP and CHAP to configure both. For CHAP, enter the hostname and password provided by your ISP. For PAP, enter the username and password provided by your ISP. If you are configuring both PAP and CHAP, to use the same username and password for both, click Same Credentials for PAP and CHAP.
AC Name (optional)	Select the PPP tab, and in the AC Name field, enter the name of the the name of the access concentrator used by PPPoE to route connections to the Internet.
IP MTU	Click **Advanced**, and in the IP MTU field, ensure that the IP MTU is at least 8 bytes less than the MTU on the physical interface. The maximum MTU for a PPP interface is 1492 bytes. If the PPPoE server does not specify a maximum receive unit (MRU), the MTU value for the PPP interface is used as the MRU. Starting from Cisco vManage Release 20.9.1, there is 8 bytes overheads deduced based on the specified IP MTU value when configuration is pushed to the device.
Save	To save the feature template, click **Save**.

Step 2 Create a VPN-Interface-PPP-Ethernet feature template to enable the PPPoE client on the physical interfaces.

a) From the Cisco SD-WAN Manager menu, choose **Configuration** > **Templates**.
b) Click **Feature Templates**, and click **Add Template**.

In Cisco vManage Release 20.7.1 and earlier releases, **Feature Templates** is titled **Feature**.

c) Choose Cisco IOS XE Catalyst SD-WAN device Cloud or a router model.
d) Choose the **VPN-Interface-PPP-Ethernet** template.
e) In the template, configure the following parameters:

Parameter Field	Procedure
Template Name	Enter a name for the template. It can be up to 128 alphanumeric characters.
Description	Enter a description for the template. It can be up to 2048 alphanumeric characters.
Shutdown	Click **No** to enable the PPPoE-enabled interface.
Interface Name	Enter the name of the physical interface in VPN 0 to associate with the PPP interface.
Description (optional)	Enter a description for the PPPoE-enabled interface.
IP Confguration	Assign an IP address to the physical interface: • To use DHCP, select Dynamic. The default administrative distance of routes learned from DHCP is 1. • To configure the IP address directly, enter of the IPv4 address of the interface.
DHCP Helper (optional)	Enter up to four IP addresses for DHCP servers in the network.
Save	To save the feature template, click **Save**.

Step 3 Create a VPN feature template to configure the PPPoE-enabled interface in VPN 0, the transport VPN.

a) From the Cisco SD-WAN Manager menu, choose **Configuration** > **Templates**.
b) Click **Feature Templates**, and click **Add Template**.

In Cisco vManage Release 20.7.1 and earlier releases, **Feature Templates** is titled **Feature**.

c) Choose Cisco IOS XE Catalyst SD-WAN device Cloud or a router model.
d) Choose the **VPN** template.
e) In the template, configure the following parameters:

Parameter Field	Procedure
Template Name	Enter a name for the template. It can be up to 128 alphanumeric characters.
Description	Enter a description for the template. It can be up to 2048 alphanumeric characters.
VPN Identifier	Enter VPN identifier 0.
Name	Enter aname for the VPN.

Parameter Field	Procedure
Other interface parameters	Configure the desired interface properties.
Save	To save the feature template, click **Save**.

Step 4 Create a device template that incorporates the VPN-Interface-PPP, VPN-Interface-PPP-Ethernet, and VPN feature templates.

a) From the Cisco SD-WAN Manager menu, choose **Configuration** > **Templates**.
b) Click **Device Templates**, and then click **Create Template**.

In Cisco vManage Release 20.7.1 and earlier releases, **Device Templates** is titled **Device**.

c) From the **Create Template** drop-down list, choose From Feature Template.

From the **Device Model** drop-down list, choose the type of device for which you are creating the device template.

Cisco SD-WAN Manager displays the feature templates for the device type you selected. Required templates are indicated with an asterisk (*).

Enter a name and description for the device template. These fields are mandatory. The template name cannot contain special characters.

d) In **Transport & Management VPN**, under **VPN 0**, from the drop-down list of available templates, select the desired feature template. The list of available templates are the ones that you have previously created.
e) In **Additional VPN 0 Templates**, click the plus sign (+) next to **VPN Interface PPP**.
f) From **VPN-Interface-PPP** and **VPN-Interface-PPP-Ethernet** fields, select the feature templates to use.
g) To configure multiple PPPoE-enabled interfaces in VPN 0, click the plus sign (+) next to Sub-Templates.
h) To include additional feature templates in the device template, in the remaining sections, select the feature templates in turn, and from the drop-down list of available templates, select the desired template. The list of available templates are the ones that you have previously created. Ensure that you select templates for all mandatory feature templates and for any desired optional feature templates.
i) To create the device template, click **Create**.

Step 5 Attach a device template to a device.

a) From the Cisco SD-WAN Manager menu, choose **Configuration** > **Templates**.
b) Click **Device Templates**, and then click **Create Template**.

In Cisco vManage Release 20.7.1 and earlier releases, **Device Templates** is titled **Device**.

c) Choose a template.
d) Click …, and click **Attach Device**.
e) Search for a device or select a device from the Available Device(s) column to the left.
f) Click the arrow pointing right to move the device to the Selected Device(s) column on the right.
g) Click **Attach**.

Configure PPPoE over ATM using templates

Follow these steps to configure PPPoE using the device CLI template in Cisco SD-WAN Manager.

Procedure

Step 1 From the Cisco SD-WAN Manager menu, choose **Configuration** > **Templates**.

Step 2 From **Device Templates**, click **Create Template**.

In Cisco vManage Release 20.7.x and earlier releases, **Device Templates** is titled **Device**.

Step 3 From the **Create Template** drop-down list, select **CLI Template**.

Step 4 From the **Device Model** drop-down list, select the type of device for which you are creating the template.

a) In **Template Name**, enter a name for the template. The name can be up to 128 characters and can contain only alphanumeric characters.

b) In **Template Description**, enter a description of the template. The description can be up to 2048 characters and can contain only alphanumeric characters.

Step 5 Choose **Device configuration**.

Using this option, you can provide IOS-XE configuration commands that appear in the output of the **show sdwan running-config** command.

Step 6 (Optional) To load the running config of a connected device, select it from the Load Running config from reachable device list and click **Search**.

Step 7 In CLI Configuration, enter the configuration either by typing it, cutting and pasting it, or uploading a file.

```
Device(config)# interface atm number
Device(config)# no ip address
Device(config)# interface atm number point-to-point
Device(config)# no atm enable-ilmi-trap
Device(config)# encapsulation aal5mux  pppoe-client
Device(config)# pppoe-client dial-pool-number number
Device(config)# interface Dialer dialer-rotary-group-number
Device(config)# mtu bytes
Device(config)# ip address negotiated
Device(config-if)# encapsulation encapsulation-type
Device(config)# load-interval seconds
Device(config)# dialer pool number
Device(config)# dialer-group group-number
Device(config)# ppp mtu adaptive
Device(config)# ppp chap hostname hostname
Device(config)# ppp chap password secret
Device(config)# ppp ipcp address required
Device(config)# ppp link reorders
```

Step 8 To convert an actual configuration value to a variable, select the value and click Create Variable. Enter the variable name, and click Create Variable. You can also type the variable name directly, in the format {{*variable-name*}}; for example, {{hostname}}.

Step 9 Click **Add**. The new device template is displayed in the Device Template table. The **Type** column shows **CLI** to indicate that the device template was created from CLI text.

Configuration examples for PPPoE

PPPoE server on IPv4 interfaces

This example shows configuring PPPoE server on IPv4 interfaces:

```
!
interface Dialer100
 mtu 1492
 ip address negotiated
 encapsulation ppp
 ip tcp adjust-mss 1460
 dialer pool 100
 dialer down-with-vInterface
 ppp authentication chap callin
 ppp chap hostname cisco
 ppp chap password 7 1511021F07257A767B
 ppp ipcp route default
```

To replace a template configured with PPPoE as WAN interface with a regular interface in Dialer100, remove the IP address assigned to the dialer interface using the **no ip address** command, and then add a new IP address for the dialer interface.

PPPoE over ATM interfaces

This example shows configuring PPPoE over ATM interfaces.

```
Device(config)# interface ATM0/1/0
Device(config)# no ip address
Device(config)# no atm enable-ilmi-trap
!
Device(config)# interface ATM0/1/0.10 point-to-point
Device(config)# no atm enable-ilmi-trap
Device(config)# cdp enable
Device(config)# pvc 22/62
Device(config)# ubr 1045
Device(config-if)# encapsulation aal5mux pppoe-client
Device(config)# pppoe-client dial-pool-number 120
!
!
Device(config)# interface Dialer 120
Device(config)# mtu 1492
Device(config)# ip address negotiated
Device(config)# ip nat outside
Device(config-if)# encapsulation ppp
Device(config)# load-interval 30
Device(config)# dialer pool 120
Device(config)# dialer-group 1
Device(config)# ppp mtu adaptive
Device(config)# ppp chap hostname test@cisco.com
Device(config)# ppp chap password 0 cisco
Device(config)# ppp ipcp address required
Device(config)# ppp link reorders
!
```