

Understanding and Configuring **PPPoE in Packet Tracer**



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NETWORKING

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Understanding and Configuring PPPoE in Packet Tracer

Introduction

This document teaches how PPPoE works and how to configure it on a Cisco router in Packet Tracer. PPPoE is used when you want user-based authentication and dynamic IP address assignment over an Ethernet connection. Instead of giving every user a static IP or relying on simple access, PPPoE creates a logical point-to-point session for each user.

How PPPoE works

PPPoE is essentially PPP wrapped inside Ethernet frames.

The process happens in two main phases:

First, the client and server perform PPPoE discovery. The client looks for a PPPoE server, and the server responds. Once both sides agree, a PPPoE session is created.

Second, PPP negotiation begins. During this phase, authentication occurs (CHAP in this lab), and the server assigns an IP address to the client. Each client gets its own logical interface on the router, even though they all connect through the same physical interface.

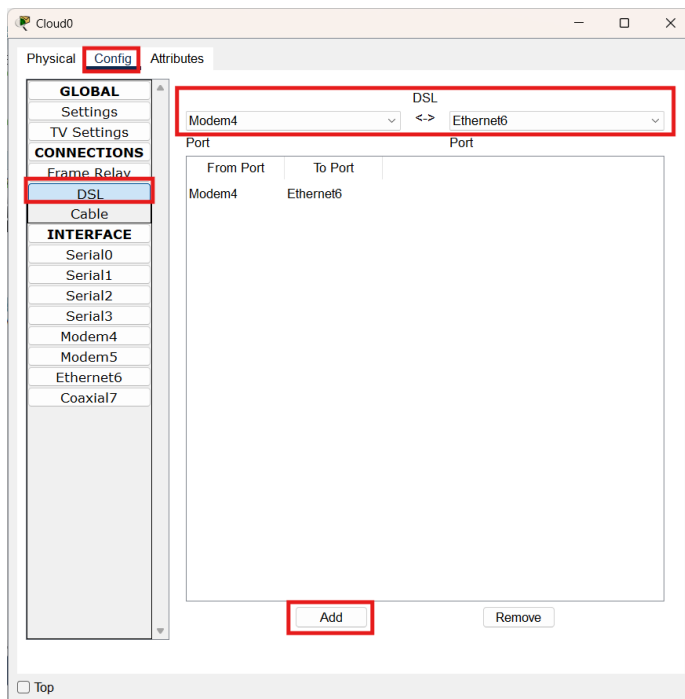
This is why PPPoE scales well and is widely used by ISPs.

Step 1: Preparing the router

Before configuring PPPoE, the router must be prepared with basic settings. Setting a hostname helps identify the device during troubleshooting. Disabling DNS lookup prevents delays when incorrect commands are entered. Configuring an enable secret password secures privileged access to the router.

These steps do not affect PPPoE directly, but they are considered best practice and make the lab smoother and more realistic.

One of the **most important steps** is to connect cloud 0 with the DSL modem as shown in the figure below.



Step 2: Configuring the Ethernet interface

PPPoE runs over Ethernet, so the physical interface connected to the client or cloud must be configured and active. This interface must have an IP address, even though PPPoE itself is a Layer 2 protocol.

The IP address assigned here serves two purposes.

First, it allows the router to participate in Layer 3 routing.

Second, it can be borrowed by virtual interfaces using the “ip unnumbered” feature later in the document.

If this interface is down or incorrectly addressed, PPPoE discovery will fail and clients will not be able to connect.

```
interface <name>
```

```
ip address <IP> <subnet mask>
```

```
No shutdown
```

Use **show ip interface brief** to confirm the interface is up.

Step 3: Creating the PPPoE group

The PPPoE group defines how the router handles incoming PPPoE sessions. It acts as a control structure that links PPPoE discovery on the physical interface to a virtual interface template.

When a client attempts to connect, the router uses this group to determine which virtual template should be cloned. Without a PPPoE group, the router has no instructions on how to process PPPoE sessions.

```
bba-group pppoe <name of group>
```

```
virtual-template <id number>
```

At this stage, the router is ready to accept PPPoE discovery requests.

Step 4: Understanding and configuring the virtual template

PPPoE clients do not connect directly to a physical interface. Instead, the router dynamically creates a virtual interface for each client session. These virtual interfaces are created based on a virtual template.

The virtual template defines how client sessions behave. In this lab, it borrows the IP address of the Ethernet interface, assigns IP addresses to clients from a local pool, and enforces CHAP authentication.

At this stage, no virtual interfaces are visible yet. They will only appear when a client successfully connects.

```
interface virtual-Template <id number>
```

```
ip unnumbered <write interface connected to dsl>
```

```
peer default ip address pool #name of group
```

```
ppp authentication chap
```

Step 5: Creating the IP address pool

PPPoE clients require IP addresses to communicate on the network. Instead of assigning addresses manually, the router uses a local IP pool.

This pool defines the range of IP addresses that can be assigned to clients. Each authenticated client receives one IP address from this pool. If the pool runs out of addresses, new clients will not be able to connect.

This mechanism is similar in concept to DHCP but is tied directly to PPP sessions.

```
ip local pool #name of group <beginning ip range> <end ip range>
```

Step 6: Enabling PPPoE on the interface

Even after defining the PPPoE group and virtual template, the router will not respond to PPPoE discovery requests unless PPPoE is explicitly enabled on the physical interface.

Enabling PPPoE on the interface activates the discovery process and binds the interface to the previously created PPPoE group. This step is critical. Missing it is one of the most common reasons PPPoE configurations fail.

```
interface <enter the interface connected>
```

```
pppoe enable group <group name>
```


Step 7: Configuring user authentication

Authentication ensures that only authorized users can establish a PPPoE session. In this lab, CHAP authentication is used.

User credentials are stored locally on the router. When a client attempts to connect, the router challenges the client and verifies the credentials. If the username or password does not match, the session is terminated.

CHAP is preferred over PAP because the password is never sent in clear text.

```
username <username> Password <password>
```

Step 8: Configuring the PPPoE client

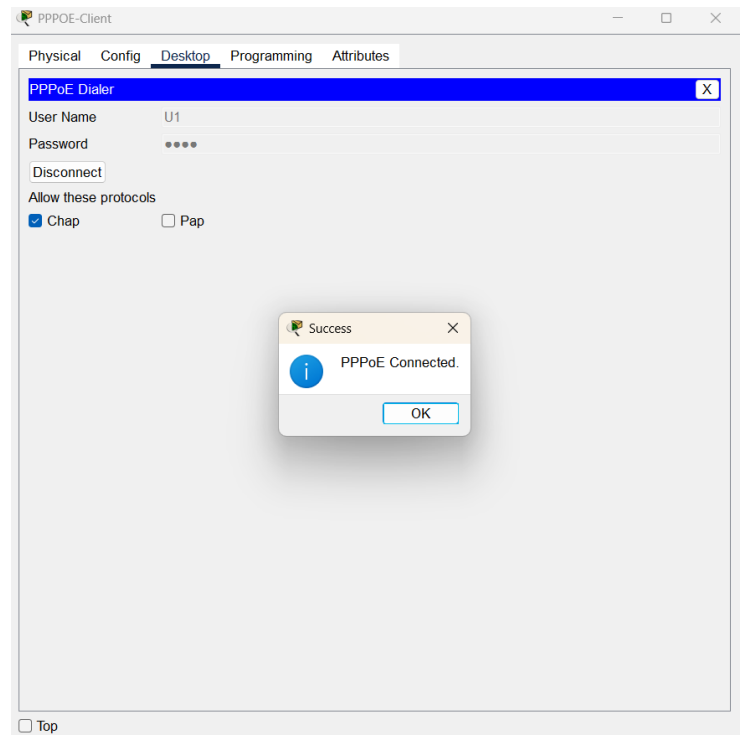
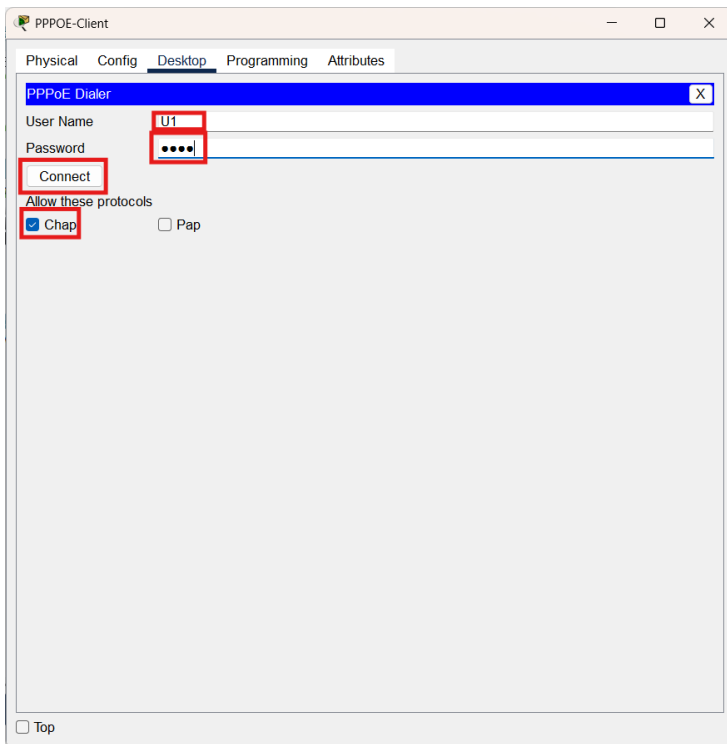
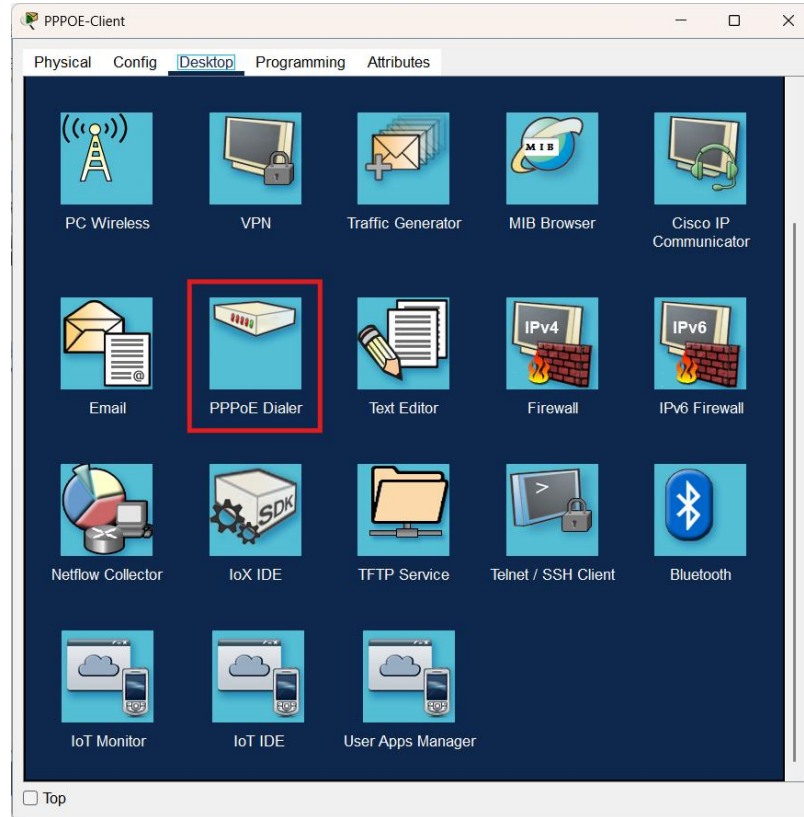
On the client side, the PC uses the PPPoE dialer provided by Packet Tracer. The user enters the configured username and password and initiates the connection.

If authentication succeeds, a PPPoE session is established. The router then creates a virtual-access interface for the client and assigns an IP address from the local pool.

From the user's perspective, this feels similar to connecting to an ISP using a broadband dialer.

To do that, on the pppoe dialer enter username and password and make sure the pop up comes that PPPOE IS CONNECTED

Then go to CMD and enter ipconfig and check the dialer IP if it is given.



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