



# Configuration Enhancements for Broadband Scalability

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The Configuration Enhancements for Broadband Scalability feature reduces the amount of memory that is used per terminated PPP session by creating virtual access subinterfaces. Depending on the configuration of the source virtual template, virtual access subinterfaces may be available. This feature also introduces a command to determine if a virtual template is compatible with virtual access subinterfaces.

## History for the Configuration Enhancements for Broadband Scalability Feature

Release	Modification
12.2(13)T	This feature was introduced.
12.2(15)B	This feature was integrated into Cisco IOS Release 12.2(15)B.
12.2(28)SB	This feature was integrated into Cisco IOS Release 12.2(28)SB.

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## Feature Overview

The following sections describe the use of virtual access subinterfaces:

- [Virtual Access Subinterfaces, page 2](#)
- [Virtual Template Compatibility with Subinterfaces, page 2](#)

## Virtual Access Subinterfaces

The **virtual-template** command has not been changed. Therefore, existing features, functions, and configurations are not affected. By default, the **virtual-template subinterface** command is enabled.

The virtual template manager will determine if the set of options configured on the virtual template are all supported on a subinterface. Virtual access subinterfaces will be created for all virtual templates that support subinterfaces. If the user has entered any commands that are not supported on a subinterface, a full virtual access interface will be created and cloned for all PPP sessions using that virtual template. If the **virtual-template subinterface** command is disabled, full virtual access interfaces will always be created.

Different applications can use the same virtual template even if one application is subinterface-capable and another is not. The virtual template manager will be notified whether the application supports virtual access subinterfaces and create the appropriate resource.

The **ppp multilink** and **ppp callback accept** commands will not necessarily prevent subinterfaces from being created. Often, these commands are present in a virtual template configuration, but PPP does not negotiate them. If neither of these features is negotiated, virtual access subinterfaces will be created. If one or both of these features is negotiated, subinterfaces will not be created. The router will automatically determine if subinterfaces will be created depending on how PPP is negotiated on a case-by-case basis.

## Virtual Template Compatibility with Subinterfaces

The **test virtual-template subinterface** command determines whether a virtual template can support the creation of a virtual access subinterface. If the virtual template contains commands that prevent the creation of subinterfaces, the **test virtual-template subinterface** command identifies and displays these commands.

If the creation of virtual access subinterfaces is disabled by the **no virtual-template subinterface** command, the **test virtual-template subinterface** command produces no output.

The **debug vtemplate subinterface** command is introduced to display new debug messages that will be generated if the user enters configuration commands on the virtual template that are not valid on a subinterface. These messages will be generated only if the **debug vtemplate subinterface** command is enabled, the **virtual-template subinterface** command is enabled, and a virtual template is configured that can support the creation of subinterfaces. If the creation of virtual access subinterfaces is disabled by the **no virtual-template subinterface** command, the **debug vtemplate subinterface** command produces no output.

## Benefits

The Configuration Enhancements for Broadband Scalability feature reduces the amount of memory that is used per terminated PPP session by creating virtual access subinterfaces. These virtual access subinterfaces, along with improvements that are transparent to the user, speed up the cloning process.

## Restrictions

This feature is not intended to improve the scalability of the following features:

- Scaling for dial-out
- Scaling for PPP callback
- Scaling virtual profiles
- Scaling Multilink PPP (MLP)
- PPP over X (PPPoX) applications that terminate PPP on physical interfaces

## Configuration Tasks

To configure a router to always create full virtual access interfaces instead of virtual access subinterfaces, use the following commands beginning in privileged EXEC mode:



### Note

The **virtual-template subinterface** command is enabled by default and does not appear in the running configuration.

	Command	Purpose
Step 1	Router# <b>configure terminal</b>	Enters global configuration mode.
Step 2	Router# <b>no virtual-template subinterface</b>	Disables the creation of virtual access subinterfaces. <b>Note</b> The <b>virtual-template subinterface</b> command is enabled by default.

# Verifying Virtual Template Compatibility with Virtual Access Subinterfaces

To test a virtual template to determine if it is compatible with the creation of virtual access subinterfaces, use the following commands beginning in privileged EXEC mode:

	Command	Purpose
Step 1	<pre>Router# test virtual-template template subinterface Subinterfaces cannot be created using Virtual-Template1 Interface commands:   traffic-shape rate 50000 8000 8000 1000</pre>	<p>Tests the specified virtual template to determine if it is compatible with the creation of virtual access subinterfaces. The output generated by the <b>test virtual-template 1 subinterface</b> command describes the compatibility of the virtual template with the creation of subinterfaces.</p> <p>This example shows output indicating that the virtual template is not compatible. This output also includes a list of the commands that are configured on the virtual template and that are causing the incompatibility.</p>

## Configuration Examples

This section provides the following configuration examples:

- [Virtual Access Subinterface Configuration: Example, page 4](#)
- [Testing a Virtual Template for Compatibility with Subinterfaces: Example, page 6](#)

### Virtual Access Subinterface Configuration: Example

The following example shows a virtual template that is compatible with virtual access subinterfaces:



#### Note

The **virtual-access subinterface** command is enabled by default and does not appear in running configurations. Only the **no virtual-access subinterface** command will appear in running configurations.

```
interface Virtual-Template1
  ip unnumbered Loopback0
peer default ip address pool pool-1
  ppp authentication chap
  ppp multilink
```

The following example shows a configuration where the creation of virtual access subinterfaces has been disabled by the **no virtual-access subinterface** command. When this command is configured, virtual-access interfaces are not registered with the SNMP code on the router. In network environments that do not use SNMP to manage PPP sessions, this saves the memory and CPU processing that would be used to register the virtual-access interfaces with the SNMP code.

```
Current configuration :6003 bytes
!
```

```
! Last configuration change at 10:59:02 EDT Thu Sep 19 2002
!
version 12.2
service timestamps debug datetime msec
service timestamps log datetime msec
no service password-encryption
service internal
service udp-small-servers
service tcp-small-servers
!
hostname ioswan5-lns
!
enable password lab
!
username cisco password 0 cisco
clock timezone EST -5
clock summer-time EDT recurring
aaa new-model
!
!
aaa authentication ppp default local
aaa authorization network default local
aaa session-id common
ip subnet-zero
no ip gratuitous-arps
ip cef
!
!
no ip domain lookup
ip name-server 10.44.11.21
ip name-server 10.44.11.206
!
ip vrf vpn1
 rd 10:1
  route-target export 10:1
  route-target import 10:1
!
vpdn enable
!
vpdn-group 1
 accept-dialin
  protocol l2tp
  virtual-template 1
 terminate-from hostname ioswan5-lac
 local name tunnel1
 l2tp tunnel password 7 01100F175804
!
!
!
no virtual-template subinterface
no virtual-template snmp
virtual-template 1 pre-clone 10
!
!
!
buffers small permanent 20000
buffers middle permanent 7500
!
!
!
interface Loopback1
 ip address 10.111.1.1 255.255.255.0
```

## Testing a Virtual Template for Compatibility with Subinterfaces: Example

This example shows the process for testing a virtual template to determine if it can support virtual access subinterfaces. The following command displays the configuration for virtual template 1:

```
Router# show running interface virtual-template 1
```

```
Building configuration...
!
interface Virtual-Template1
 ip unnumbered Loopback0
 peer default ip address pool pool-1
 ppp authentication chap
 traffic-shape rate 50000 8000 8000 1000
end
```

The **test virtual-template 1 subinterface** command tests virtual template 1 to determine if it can support subinterfaces. The output shows that the **traffic-shape rate 50000 8000 8000 1000** command that is configured on virtual template 1 prevents the virtual template from being able to support subinterfaces.

```
Router# test virtual-template 1 subinterface
Subinterfaces cannot be created using Virtual-Template1
Interface commands:
 traffic-shape rate 50000 8000 8000 1000
```

## Additional References

The following sections provide references related to the Configuration Enhancements for Broadband Scalability feature.

## Related Documents

Related Topic	Document Title
Virtual templates	“Configuring Virtual Template Interfaces” chapter in the <i>Cisco IOS Dial Technologies Configuration Guide</i> , Release 12.4
Virtual profiles	“Configuring Virtual Profiles” chapter in the <i>Cisco IOS Dial Technologies Configuration Guide</i> , Release 12.4

## Standards

Standard	Title
None	—

## MIBs

MIB	MIBs Link
None	To locate and download MIBs for selected platforms, Cisco IOS releases, and feature sets, use Cisco MIB Locator found at the following URL: <a href="http://www.cisco.com/go/mibs">http://www.cisco.com/go/mibs</a>

## RFCs

RFC	Title
None	—

## Technical Assistance

Description	Link
The Cisco Technical Support & Documentation website contains thousands of pages of searchable technical content, including links to products, technologies, solutions, technical tips, and tools. Registered Cisco.com users can log in from this page to access even more content.	<a href="http://www.cisco.com/techsupport">http://www.cisco.com/techsupport</a>

# Command Reference

This section documents modified commands only.

- [debug vtemplate subinterface](#)
- [test virtual-template subinterface](#)
- [virtual-template subinterface](#)

# debug vtemplate subinterface

To display debugging messages relating to virtual access subinterfaces, use the **debug vtemplate subinterface** command in privileged EXEC mode. To disable debugging output, use the **no** form of this command.

**debug vtemplate subinterface**

**no debug vtemplate subinterface**

**Syntax Description** This command has no arguments or keywords.

**Defaults** No default behavior or values.

**Command Modes** Privileged EXEC

Command History	Release	Modification
	12.2(8)B	This command was introduced.
	12.2(13)T	The command was integrated into Cisco IOS Release 12.2(13)T.
	12.2(15)T	This command was integrated into Cisco IOS Release 12.2(15)T.
	12.2(28)SB	This command was integrated into Cisco IOS Release 12.2(28)SB.

**Usage Guidelines** These debugging messages are displayed if the user configures virtual templates with commands that are incompatible with virtual access subinterfaces.

**Examples** The following example displays virtual access subinterface debugging messages:

```
Router# debug vtemplate subinterface

Virtual Template subinterface debugging is on
Router#
Router#
Sep 19 15:09:41.989:VT[Vt11]:Config prevents subinterface creation
  carrier-delay 45
  ip rtp priority 2000 2010 500
```

[Table 1](#) describes the significant fields shown in the display.

**Table 1** *debug vtemplate subinterface Field Descriptions*

Field	Description
VT	Indicates that this is a debug virtual template subinterface message.
[Vt11]:	Indicates that this message concerns virtual template 11.

**Table 1** *debug vtemplate subinterface Field Descriptions (continued)*

<b>Field</b>	<b>Description</b>
Config prevents subinterface creation	Indicates that this virtual template cannot support the creation of virtual access subinterfaces.
carrier-delay 45 ip rtp priority 2000 2010 500	These are the commands that make the virtual template incompatible with subinterfaces.

**Related Commands**

<b>Command</b>	<b>Description</b>
<b>test virtual-template subinterface</b>	Tests a virtual template to determine if it can support virtual access subinterfaces.
<b>virtual-template subinterface</b>	Enables the creation of virtual access subinterfaces.

# test virtual-template subinterface

To determine if a virtual template can support the creation of subinterfaces, use the **test virtual-template subinterface** command in privileged EXEC mode.

**test virtual-template** *template* **subinterface**

<b>Syntax Description</b>	<i>template</i>	The identifying string of the virtual template to be tested.
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<b>Defaults</b>	No default behavior or values.	
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<b>Command Modes</b>	Privileged EXEC	
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<b>Command History</b>	<b>Release</b>	<b>Modification</b>
	12.2(13)T	This command was introduced.
	12.2(15)B	This command was integrated into Cisco IOS Release 12.2(15)B.
	12.2(28)SB	This command was integrated into Cisco IOS Release 12.2(28)SB.

<b>Usage Guidelines</b>	This command tests the specified virtual template to determine if it can support the creation of virtual access subinterfaces. If the virtual template cannot support subinterfaces, this command lists the commands that are configured on the virtual template and that are incompatible with subinterfaces.	
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<b>Examples</b>	The following example tests virtual template 1 to determine if it can support subinterfaces. The output shows that the <b>traffic-shape rate 50000 8000 8000 1000</b> command that is configured on virtual template 1 prevents the virtual template from being able to support subinterfaces.	
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```
Router# test virtual-template 1 subinterface
Subinterfaces cannot be created using Virtual-Template1
Interface specific commands:
traffic-shape rate 50000 8000 8000 1000
```

<b>Related Commands</b>	<b>Command</b>	<b>Description</b>
	<b>debug vtemplate subinterface</b>	Displays debug messages relating to virtual access subinterfaces.
	<b>virtual-template subinterface</b>	Enables the creation of virtual access subinterfaces.

# virtual-template subinterface

To enable the creation of virtual access subinterfaces, use the **virtual-template subinterface** command in global configuration mode. To disable the creation of virtual access subinterfaces, use the **no** form of this command.

**virtual-template subinterface**

**no virtual-template subinterface**

**Syntax Description** This command has no arguments or keywords.

**Defaults** This command is enabled by default.

**Command Modes** Global configuration

Command History	Release	Modification
	12.2(13)T	This command was introduced.
	12.2(15)B	The command was integrated into Cisco IOS Release 12.2(15)B.
	12.2(28)SB	This command was integrated into Cisco IOS Release 12.2(28)SB.

**Usage Guidelines** This command does not appear in running configurations. Only the **no** form of the command will appear in running configurations.

**Examples** The following example disables the creation of virtual access subinterfaces:

```
no virtual-template subinterface
```

Related Commands	Command	Description
	<b>debug vtemplate subinterface</b>	Displays debug messages relating to virtual access subinterfaces.
	<b>test virtual-template subinterface</b>	Tests a virtual template to determine if it can support virtual access subinterfaces.

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■ virtual-template subinterface