



Cisco IOS Broadband Access Aggregation and DSL Command Reference

Release 12.4

Corporate Headquarters
Cisco Systems, Inc.
170 West Tasman Drive
San Jose, CA 95134-1706
USA
<http://www.cisco.com>
Tel: 408 526-4000
800 553-NETS (6387)
Fax: 408 526-4100

Text Part Number: 78-17461-01



THE SPECIFICATIONS AND INFORMATION REGARDING THE PRODUCTS IN THIS MANUAL ARE SUBJECT TO CHANGE WITHOUT NOTICE. ALL STATEMENTS, INFORMATION, AND RECOMMENDATIONS IN THIS MANUAL ARE BELIEVED TO BE ACCURATE BUT ARE PRESENTED WITHOUT WARRANTY OF ANY KIND, EXPRESS OR IMPLIED. USERS MUST TAKE FULL RESPONSIBILITY FOR THEIR APPLICATION OF ANY PRODUCTS.

THE SOFTWARE LICENSE AND LIMITED WARRANTY FOR THE ACCOMPANYING PRODUCT ARE SET FORTH IN THE INFORMATION PACKET THAT SHIPPED WITH THE PRODUCT AND ARE INCORPORATED HEREIN BY THIS REFERENCE. IF YOU ARE UNABLE TO LOCATE THE SOFTWARE LICENSE OR LIMITED WARRANTY, CONTACT YOUR CISCO REPRESENTATIVE FOR A COPY.

The Cisco implementation of TCP header compression is an adaptation of a program developed by the University of California, Berkeley (UCB) as part of UCB's public domain version of the UNIX operating system. All rights reserved. Copyright © 1981, Regents of the University of California.

NOTWITHSTANDING ANY OTHER WARRANTY HEREIN, ALL DOCUMENT FILES AND SOFTWARE OF THESE SUPPLIERS ARE PROVIDED "AS IS" WITH ALL FAULTS. CISCO AND THE ABOVE-NAMED SUPPLIERS DISCLAIM ALL WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING, WITHOUT LIMITATION, THOSE OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE AND NONINFRINGEMENT OR ARISING FROM A COURSE OF DEALING, USAGE, OR TRADE PRACTICE.

IN NO EVENT SHALL CISCO OR ITS SUPPLIERS BE LIABLE FOR ANY INDIRECT, SPECIAL, CONSEQUENTIAL, OR INCIDENTAL DAMAGES, INCLUDING, WITHOUT LIMITATION, LOST PROFITS OR LOSS OR DAMAGE TO DATA ARISING OUT OF THE USE OR INABILITY TO USE THIS MANUAL, EVEN IF CISCO OR ITS SUPPLIERS HAVE BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.

CCSP, CCVP, the Cisco Square Bridge logo, Follow Me Browsing, and StackWise are trademarks of Cisco Systems, Inc.; Changing the Way We Work, Live, Play, and Learn, and iQuick Study are service marks of Cisco Systems, Inc.; and Access Registrar, Aironet, BPX, Catalyst, CCDA, CCDP, CCIE, CCIP, CCNA, CCNP, Cisco, the Cisco Certified Internetwork Expert logo, Cisco IOS, Cisco Press, Cisco Systems, Cisco Systems Capital, the Cisco Systems logo, Cisco Unity, Enterprise/Solver, EtherChannel, EtherFast, EtherSwitch, Fast Step, FormShare, GigaDrive, GigaStack, HomeLink, Internet Quotient, IOS, IP/TV, iQ Expertise, the iQ logo, iQ Net Readiness Scorecard, LightStream, Linksys, MeetingPlace, MGX, the Networkers logo, Networking Academy, Network Registrar, *Packet*, PIX, Post-Routing, Pre-Routing, ProConnect, RateMUX, ScriptShare, SlideCast, SMARTnet, The Fastest Way to Increase Your Internet Quotient, and TransPath are registered trademarks of Cisco Systems, Inc. and/or its affiliates in the United States and certain other countries.

All other trademarks mentioned in this document or Website are the property of their respective owners. The use of the word partner does not imply a partnership relationship between Cisco and any other company. (0601R)

Any Internet Protocol (IP) addresses used in this document are not intended to be actual addresses. Any examples, command display output, and figures included in the document are shown for illustrative purposes only. Any use of actual IP addresses in illustrative content is unintentional and coincidental.

Cisco IOS Broadband Access Aggregation and DSL Command Reference
© 2006 Cisco Systems, Inc. All rights reserved.



About Cisco IOS Software Documentation for Release 12.4 BBA-i

Using Cisco IOS Software for Release 12.4 BBA-xv

Introduction BBA-1

Cisco IOS Broadband and DSL Commands BBA-3



About Cisco IOS Software Documentation for Release 12.4

This chapter describes the objectives, audience, organization, and conventions of Cisco IOS software documentation. It also provides sources for obtaining documentation, technical assistance, and additional publications and information from Cisco Systems. It contains the following sections:

- [Documentation Objectives, page i](#)
- [Audience, page i](#)
- [Documentation Organization for Cisco IOS Release 12.4, page ii](#)
- [Document Conventions, page viii](#)
- [Obtaining Documentation, page ix](#)
- [Documentation Feedback, page x](#)
- [Cisco Product Security Overview, page xi](#)
- [Obtaining Technical Assistance, page xii](#)
- [Obtaining Additional Publications and Information, page xiii](#)

Documentation Objectives

Cisco IOS software documentation describes the tasks and commands available to configure and maintain Cisco networking devices.

Audience

The Cisco IOS software documentation set is intended primarily for users who configure and maintain Cisco networking devices (such as routers and switches) but who may not be familiar with the configuration and maintenance tasks, the relationship among tasks, or the Cisco IOS software commands necessary to perform particular tasks. The Cisco IOS software documentation set is also intended for those users experienced with Cisco IOS software who need to know about new features, new configuration options, and new software characteristics in the current Cisco IOS software release.

Documentation Organization for Cisco IOS Release 12.4

The Cisco IOS Release 12.4 documentation set consists of the configuration guide and command reference pairs listed in [Table 1](#) and the supporting documents listed in [Table 2](#). The configuration guides and command references are organized by technology. For the configuration guides:

- Some technology documentation, such as that for DHCP, contains features introduced in Releases 12.2T and 12.3T and, in some cases, Release 12.2S. To assist you in finding a particular feature, a roadmap document is provided.
- Other technology documentation, such as that for OSPF, consists of a chapter and accompanying Release 12.2T and 12.3T feature documents.



Note

In some cases, information contained in Release 12.2T and 12.3T feature documents augments or supersedes content in the accompanying documentation. Therefore it is important to review all feature documents for a particular technology.

[Table 1](#) lists the Cisco IOS Release 12.4 configuration guides and command references.

Table 1 Cisco IOS Release 12.4 Configuration Guides and Command References

Configuration Guide and Command Reference Titles	Description
IP	
Cisco IOS IP Addressing Services Configuration Guide , Release 12.4 Cisco IOS IP Addressing Services Command Reference , Release 12.4	The configuration guide is a task-oriented guide to configuring IP addressing and services, including Network Address Translation (NAT), Domain Name System (DNS), and Dynamic Host Configuration Protocol (DHCP). The command reference provides detailed information about the commands used in the configuration guide.
Cisco IOS IP Application Services Configuration Guide , Release 12.4 Cisco IOS Application Services Command Reference , Release 12.4	The configuration guide is a task-oriented guide to configuring IP application services, including IP access lists, Web Cache Communication Protocol (WCCP), Gateway Load Balancing Protocol (GLBP), Server Load Balancing (SLB), Hot Standby Router Protocol (HSRP), and Virtual Router Redundancy Protocol (VRRP). The command reference provides detailed information about the commands used in the configuration guide.
Cisco IOS IP Mobility Configuration Guide , Release 12.4 Cisco IOS IP Mobility Command Reference , Release 12.4	The configuration guide is a task-oriented guide to configuring Mobile IP and Cisco Mobile Networks. The command reference provides detailed information about the commands used in the configuration guide.
Cisco IOS IP Multicast Configuration Guide , Release 12.4 Cisco IOS IP Multicast Command Reference , Release 12.4	The configuration guide is a task-oriented guide to configuring IP multicast, including Protocol Independent Multicast (PIM), Internet Group Management Protocol (IGMP), Distance Vector Multicast Routing Protocol (DVMRP), and Multicast Source Discovery Protocol (MSDP). The command reference provides detailed information about the commands used in the configuration guide.
Cisco IOS IP Routing Protocols Configuration Guide , Release 12.4 Cisco IOS IP Routing Protocols Command Reference , Release 12.4	The configuration guide is a task-oriented guide to configuring IP routing protocols, including Border Gateway Protocol (BGP), Intermediate System-to-Intermediate System (IS-IS), and Open Shortest Path First (OSPF). The command reference provides detailed information about the commands used in the configuration guide.

Table 1 Cisco IOS Release 12.4 Configuration Guides and Command References (continued)

Configuration Guide and Command Reference Titles	Description
Cisco IOS IP Switching Configuration Guide , Release 12.4 Cisco IOS IP Switching Command Reference , Release 12.4	The configuration guide is a task-oriented guide to configuring IP switching features, including Cisco Express Forwarding (CEF), fast switching, and Multicast Distributed Switching (MDS). The command reference provides detailed information about the commands used in the configuration guide.
Cisco IOS IPv6 Configuration Guide , Release 12.4 Cisco IOS IPv6 Command Reference , Release 12.4	The configuration guide is a task-oriented guide to configuring IP version 6 (IPv6), including IPv6 broadband access, IPv6 data-link layer, IPv6 multicast routing, IPv6 quality of service (QoS), IPv6 routing, IPv6 services and management, and IPv6 tunnel services. The command reference provides detailed information about the commands used in the configuration guide.
Cisco IOS Optimized Edge Routing Configuration Guide , Release 12.4 Cisco IOS Optimized Edge Routing Command Reference , Release 12.4	The configuration guide is a task-oriented guide to configuring Optimized Edge Routing (OER) features, including OER prefix learning, OER prefix monitoring, OER operational modes, and OER policy configuration. The command reference provides detailed information about the commands used in the configuration guide.
Security and VPN	
Cisco IOS Security Configuration Guide , Release 12.4 Cisco IOS Security Command Reference , Release 12.4	The configuration guide is a task-oriented guide to configuring various aspects of security, including terminal access security, network access security, accounting, traffic filters, router access, and network data encryption with router authentication. The command reference provides detailed information about the commands used in the configuration guide.
QoS	
Cisco IOS Quality of Service Solutions Configuration Guide , Release 12.4 Cisco IOS Quality of Service Solutions Command Reference , Release 12.4	The configuration guide is a task-oriented guide to configuring quality of service (QoS) features, including traffic classification and marking, traffic policing and shaping, congestion management, congestion avoidance, and signaling. The command reference provides detailed information about the commands used in the configuration guide.
LAN Switching	
Cisco IOS LAN Switching Configuration Guide , Release 12.4 Cisco IOS LAN Switching Command Reference , Release 12.4	The configuration guide is a task-oriented guide to local-area network (LAN) switching features, including configuring routing between virtual LANs (VLANs) using Inter-Switch Link (ISL) encapsulation, IEEE 802.10 encapsulation, and IEEE 802.1Q encapsulation. The command reference provides detailed information about the commands used in the configuration guide.
Multiprotocol Label Switching (MPLS)	
Cisco IOS Multiprotocol Label Switching Configuration Guide , Release 12.4 Cisco IOS Multiprotocol Label Switching Command Reference , Release 12.4	The configuration guide is a task-oriented guide to configuring Multiprotocol Label Switching (MPLS), including MPLS Label Distribution Protocol, MPLS traffic engineering, and MPLS Virtual Private Networks (VPNs). The command reference provides detailed information about the commands used in the configuration guide.
Network Management	
Cisco IOS IP SLAs Configuration Guide , Release 12.4 Cisco IOS IP SLAs Command Reference , Release 12.4	The configuration guide is a task-oriented guide to configuring the Cisco IOS IP Service Level Assurances (IP SLAs) feature. The command reference provides detailed information about the commands used in the configuration guide.

Table 1 Cisco IOS Release 12.4 Configuration Guides and Command References (continued)

Configuration Guide and Command Reference Titles	Description
Cisco IOS NetFlow Configuration Guide , Release 12.4 Cisco IOS NetFlow Command Reference , Release 12.4	The configuration guide is a task-oriented guide to NetFlow features, including configuring NetFlow to analyze network traffic data, configuring NetFlow aggregation caches and export features, and configuring Simple Network Management Protocol (SNMP) and NetFlow MIB features. The command reference provides detailed information about the commands used in the configuration guide.
Cisco IOS Network Management Configuration Guide , Release 12.4 Cisco IOS Network Management Command Reference , Release 12.4	The configuration guide is a task-oriented guide to network management features, including performing basic system management, performing troubleshooting and fault management, configuring Cisco Discovery Protocol (CDP), configuring Cisco Networking Services (CNS), configuring DistributedDirector, and configuring Simple Network Management Protocol (SNMP). The command reference provides detailed information about the commands used in the configuration guide.
Voice	
Cisco IOS Voice Configuration Library , Release 12.4 Cisco IOS Voice Command Reference , Release 12.4	The configuration library is a task-oriented collection of configuration guides, application guides, a troubleshooting guide, feature documents, a library preface, a voice glossary, and more. It also covers Cisco IOS support for voice call control protocols, interoperability, physical and virtual interface management, and troubleshooting. In addition, the library includes documentation for IP telephony applications. The command reference provides detailed information about the commands used in the configuration library.
Wireless / Mobility	
Cisco IOS Mobile Wireless Gateway GPRS Support Node Configuration Guide , Release 12.4 Cisco IOS Mobile Wireless Gateway GPRS Support Node Command Reference , Release 12.4	The configuration guide is a task-oriented guide to understanding and configuring a Cisco IOS Gateway GPRS Support Node (GGSN) in a 2.5G General Packet Radio Service (GPRS) and 3G Universal Mobile Telecommunication System (UMTS) network. The command reference provides detailed information about the commands used in the configuration guide.
Cisco IOS Mobile Wireless Home Agent Configuration Guide , Release 12.4 Cisco IOS Mobile Wireless Home Agent Command Reference , Release 12.4	The configuration guide is a task-oriented guide to understanding and configuring the Cisco Mobile Wireless Home Agent, which is an anchor point for mobile terminals for which Mobile IP or Proxy Mobile IP services are provided. The command reference provides detailed information about the commands used in the configuration guide.
Cisco IOS Mobile Wireless Packet Data Serving Node Configuration Guide , Release 12.4 Cisco IOS Mobile Wireless Packet Data Serving Node Command Reference , Release 12.4	The configuration guide is a task-oriented guide to understanding and configuring the Cisco Packet Data Serving Node (PDSN), a wireless gateway between the mobile infrastructure and standard IP networks that enables packet data services in a Code Division Multiple Access (CDMA) environment. The command reference provides detailed information about the commands used in the configuration guide.

Table 1 Cisco IOS Release 12.4 Configuration Guides and Command References (continued)

Configuration Guide and Command Reference Titles	Description
Cisco IOS Mobile Wireless Radio Access Networking Configuration Guide , Release 12.4 Cisco IOS Mobile Wireless Radio Access Networking Command Reference , Release 12.4	The configuration guide is a task-oriented guide to understanding and configuring Cisco IOS Radio Access Network products. The command reference provides detailed information about the commands used in the configuration guide.
Long Reach Ethernet (LRE) and Digital Subscriber Line (xDSL)	
Cisco IOS Broadband and DSL Configuration Guide , Release 12.4 Cisco IOS Broadband and DSL Command Reference , Release 12.4	The configuration guide is a task-oriented guide to configuring broadband access aggregation and digital subscriber line features. The command reference provides detailed information about the commands used in the configuration guide.
Cisco IOS Service Selection Gateway Configuration Guide , Release 12.4 Cisco IOS Service Selection Gateway Command Reference , Release 12.4	The configuration guide is a task-oriented guide to configuring Service Selection Gateway (SSG) features, including subscriber authentication, service access, and accounting. The command reference provides detailed information about the commands used in the configuration guide.
Dial—Access	
Cisco IOS Dial Technologies Configuration Guide , Release 12.4 Cisco IOS Dial Technologies Command Reference , Release 12.4	The configuration guide is a task-oriented guide to configuring lines, modems, and ISDN services. This guide also contains information about configuring dialup solutions, including solutions for remote sites dialing in to a central office, Internet service providers (ISPs), ISP customers at home offices, enterprise WAN system administrators implementing dial-on-demand routing, and other corporate environments. The command reference provides detailed information about the commands used in the configuration guide.
Cisco IOS VPDN Configuration Guide , Release 12.4 Cisco IOS VPDN Command Reference , Release 12.4	The configuration guide is a task-oriented guide to configuring Virtual Private Dialup Networks (VPDNs), including information about Layer 2 tunneling protocols, client-initiated VPDN tunneling, NAS-initiated VPDN tunneling, and multihop VPDN. The command reference provides detailed information about the commands used in the configuration guide.
Asynchronous Transfer Mode (ATM)	
Cisco IOS Asynchronous Transfer Mode Configuration Guide , Release 12.4 Cisco IOS Asynchronous Transfer Mode Command Reference , Release 12.4	The configuration guide is a task-oriented guide to configuring Asynchronous Transfer Mode (ATM), including WAN ATM, LAN ATM, and multiprotocol over ATM (MPOA). The command reference provides detailed information about the commands used in the configuration guide.
WAN	
Cisco IOS Wide-Area Networking Configuration Guide , Release 12.4 Cisco IOS Wide-Area Networking Command Reference , Release 12.4	The configuration guide is a task-oriented guide to configuring wide-area network (WAN) features, including: Layer 2 Tunneling Protocol Version 3 (L2TPv3); Frame Relay; Link Access Procedure, Balanced (LAPB); and X.25. The command reference provides detailed information about the commands used in the configuration guide.

Table 1 Cisco IOS Release 12.4 Configuration Guides and Command References (continued)

Configuration Guide and Command Reference Titles	Description
System Management	
Cisco IOS Configuration Fundamentals Configuration Guide , Release 12.4 Cisco IOS Configuration Fundamentals Command Reference , Release 12.4	The configuration guide is a task-oriented guide to using Cisco IOS software to configure and maintain Cisco routers and access servers, including information about using the Cisco IOS command-line interface (CLI), loading and maintaining system images, using the Cisco IOS file system, using the Cisco IOS Web browser user interface (UI), and configuring basic file transfer services. The command reference provides detailed information about the commands used in the configuration guide.
Cisco IOS Interface and Hardware Component Configuration Guide , Release 12.4 Cisco IOS Interface and Hardware Component Command Reference , Release 12.4	The configuration guide is a task-oriented guide to configuring and managing interfaces and hardware components, including dial shelves, LAN interfaces, logical interfaces, serial interfaces, and virtual interfaces. The command reference provides detailed information about the commands used in the configuration guide.
IBM Technologies	
Cisco IOS Bridging and IBM Networking Configuration Guide , Release 12.4 Cisco IOS Bridging Command Reference , Release 12.4 Cisco IOS IBM Networking Command Reference , Release 12.4	The configuration guide is a task-oriented guide to configuring: - Bridging features, including: transparent and source-route transparent (SRT) bridging, source-route bridging (SRB), Token Ring Inter-Switch Link (TRISL), and Token Ring Route Switch Module (TRRSM). - IBM network features, including: data-link switching plus (DLSw+), serial tunnel (STUN), and block serial tunnel (BSTUN); Logical Link Control, type 2 (LLC2), and Synchronous Data Link Control (SDLC); IBM Network Media Translation, including SDLC Logical Link Control (SDLLC) and Qualified Logical Link Control (QLLC); downstream physical unit (DSPU), Systems Network Architecture (SNA) service point, SNA Frame Relay Access, Advanced Peer-to-Peer Networking (APPN), native client interface architecture (NCIA) client/server topologies, and IBM Channel Attach. The two command references provide detailed information about the commands used in the configuration guide.
Additional and Legacy Protocols	
Cisco IOS AppleTalk Configuration Guide , Release 12.4 Cisco IOS AppleTalk Command Reference , Release 12.4	The configuration guide is a task-oriented guide to configuring the AppleTalk protocol. The command reference provides detailed information about the commands used in the configuration guide.
Cisco IOS DECnet Configuration Guide , Release 12.4 Cisco IOS DECnet Command Reference , Release 12.4	The configuration guide is a task-oriented guide to configuring the DECnet protocol. The command reference provides detailed information about the commands used in the configuration guide.
Cisco IOS ISO CLNS Configuration Guide , Release 12.4 Cisco IOS ISO CLNS Command Reference , Release 12.4	The configuration guide is a task-oriented guide to configuring International Organization for Standardization (ISO) Connectionless Network Service (CLNS). The command reference provides detailed information about the commands used in the configuration guide.

Table 1 Cisco IOS Release 12.4 Configuration Guides and Command References (continued)

Configuration Guide and Command Reference Titles	Description
Cisco IOS Novell IPX Configuration Guide , Release 12.4 Cisco IOS Novell IPX Command Reference , Release 12.4	The configuration guide is a task-oriented guide to configuring the Novell Internetwork Packet Exchange (IPX) protocol. The command reference provides detailed information about the commands used in the configuration guide.
Cisco IOS Terminal Services Configuration Guide , Release 12.4 Cisco IOS Terminal Services Command Reference , Release 12.4	The configuration guide is a task-oriented guide to configuring terminal services, including DEC, local-area transport (LAT), and X.25 packet assembler/disassembler (PAD). The command reference provides detailed information about the commands used in the configuration guide.

Table 2 lists the documents and resources that support the Cisco IOS Release 12.4 software configuration guides and command references.

Table 2 Cisco IOS Release 12.4 Supporting Documents and Resources

Document Title	Description
Cisco IOS Master Commands List , Release 12.4	An alphabetical listing of all the commands documented in the Cisco IOS Release 12.4 command references.
Cisco IOS New, Modified, Replaced, and Removed Commands , Release 12.4	A listing of all the new, modified, replaced and removed commands since Cisco IOS Release 12.3, grouped by Release 12.3T maintenance release and ordered alphabetically within each group.
Cisco IOS New and Modified Commands , Release 12.3	A listing of all the new, modified, and replaced commands since Cisco IOS Release 12.2, grouped by Release 12.2T maintenance release and ordered alphabetically within each group.
Cisco IOS System Messages, Volume 1 of 2 Cisco IOS System Messages, Volume 2 of 2	Listings and descriptions of Cisco IOS system messages. Not all system messages indicate problems with your system. Some are purely informational, and others may help diagnose problems with communications lines, internal hardware, or the system software.
Cisco IOS Debug Command Reference , Release 12.4	An alphabetical listing of the debug commands and their descriptions. Documentation for each command includes a brief description of its use, command syntax, and usage guidelines.
Release Notes , Release 12.4	A description of general release information, including information about supported platforms, feature sets, platform-specific notes, and Cisco IOS software defects.
Dictionary of Internetworking Terms and Acronyms	Compilation and definitions of the terms and acronyms used in the internetworking industry.

Table 2 Cisco IOS Release 12.4 Supporting Documents and Resources (continued)

Document Title	Description
RFCs	RFCs are standards documents maintained by the Internet Engineering Task Force (IETF). Cisco IOS software documentation references supported RFCs when applicable. The full text of referenced RFCs may be obtained at the following URL: http://www.rfc-editor.org/
MIBs	MIBs are used for network monitoring. To locate and download MIBs for selected platforms, Cisco IOS releases, and feature sets, use Cisco MIB Locator found at the following URL: http://www.cisco.com/go/mibs

Document Conventions

Within Cisco IOS software documentation, the term *router* is generally used to refer to a variety of Cisco products (for example, routers, access servers, and switches). Routers, access servers, and other networking devices that support Cisco IOS software are shown interchangeably within examples. These products are used only for illustrative purposes; that is, an example that shows one product does not necessarily indicate that other products are not supported.

The Cisco IOS documentation set uses the following conventions:

Convention	Description
^ or Ctrl	The ^ and Ctrl symbols represent the Control key. For example, the key combination ^D or Ctrl-D means hold down the Control key while you press the D key. Keys are indicated in capital letters but are not case sensitive.
<i>string</i>	A string is a nonquoted set of characters shown in italics. For example, when setting an SNMP community string to <i>public</i> , do not use quotation marks around the string or the string will include the quotation marks.

Command syntax descriptions use the following conventions:

Convention	Description
bold	Bold text indicates commands and keywords that you enter literally as shown.
<i>italics</i>	Italic text indicates arguments for which you supply values.
[x]	Square brackets enclose an optional element (keyword or argument).
	A vertical line indicates a choice within an optional or required set of keywords or arguments.
[x y]	Square brackets enclosing keywords or arguments separated by a vertical line indicate an optional choice.
{x y}	Braces enclosing keywords or arguments separated by a vertical line indicate a required choice.

Nested sets of square brackets or braces indicate optional or required choices within optional or required elements. For example:

Convention	Description
[x {y z}]	Braces and a vertical line within square brackets indicate a required choice within an optional element.

Examples use the following conventions:

Convention	Description
<code>screen</code>	Examples of information displayed on the screen are set in Courier font.
bold screen	Examples of text that you must enter are set in Courier bold font.
< >	Angle brackets enclose text that is not printed to the screen, such as passwords, and are used in contexts in which the italic document convention is not available, such as ASCII text.
!	An exclamation point at the beginning of a line indicates a comment line. (Exclamation points are also displayed by the Cisco IOS software for certain processes.)
[]	Square brackets enclose default responses to system prompts.

The following conventions are used to attract the attention of the reader:



Caution

Means *reader be careful*. In this situation, you might do something that could result in equipment damage or loss of data.



Note

Means *reader take note*. Notes contain helpful suggestions or references to material not covered in the manual.



Timesaver

Means the *described action saves time*. You can save time by performing the action described in the paragraph.

Obtaining Documentation

Cisco documentation and additional literature are available on Cisco.com. Cisco also provides several ways to obtain technical assistance and other technical resources. These sections explain how to obtain technical information from Cisco Systems.

Cisco.com

You can access the most current Cisco documentation at this URL:

<http://www.cisco.com/techsupport>

You can access the Cisco website at this URL:

<http://www.cisco.com>

You can access international Cisco websites at this URL:

http://www.cisco.com/public/countries_languages.shtml

Product Documentation DVD

Cisco documentation and additional literature are available in the Product Documentation DVD package, which may have shipped with your product. The Product Documentation DVD is updated regularly and may be more current than printed documentation.

The Product Documentation DVD is a comprehensive library of technical product documentation on portable media. The DVD enables you to access multiple versions of hardware and software installation, configuration, and command guides for Cisco products and to view technical documentation in HTML. With the DVD, you have access to the same documentation that is found on the Cisco website without being connected to the Internet. Certain products also have .pdf versions of the documentation available.

The Product Documentation DVD is available as a single unit or as a subscription. Registered Cisco.com users (Cisco direct customers) can order a Product Documentation DVD (product number DOC-DOCDVD=) from Cisco Marketplace at this URL:

<http://www.cisco.com/go/marketplace/>

Ordering Documentation

Beginning June 30, 2005, registered Cisco.com users may order Cisco documentation at the Product Documentation Store in the Cisco Marketplace at this URL:

<http://www.cisco.com/go/marketplace/>

Nonregistered Cisco.com users can order technical documentation from 8:00 a.m. to 5:00 p.m. (0800 to 1700) PDT by calling 1 866 463-3487 in the United States and Canada, or elsewhere by calling 011 408 519-5055. You can also order documentation by e-mail at tech-doc-store-mkpl@external.cisco.com or by fax at 1 408 519-5001 in the United States and Canada, or elsewhere at 011 408 519-5001.

Documentation Feedback

You can rate and provide feedback about Cisco technical documents by completing the online feedback form that appears with the technical documents on Cisco.com.

You can send comments about Cisco documentation to bug-doc@cisco.com.

You can submit comments by using the response card (if present) behind the front cover of your document or by writing to the following address:

Cisco Systems
Attn: Customer Document Ordering
170 West Tasman Drive
San Jose, CA 95134-9883

We appreciate your comments.

Cisco Product Security Overview

Cisco provides a free online Security Vulnerability Policy portal at this URL:

http://www.cisco.com/en/US/products/products_security_vulnerability_policy.html

From this site, you can perform these tasks:

- Report security vulnerabilities in Cisco products.
- Obtain assistance with security incidents that involve Cisco products.
- Register to receive security information from Cisco.

A current list of security advisories and notices for Cisco products is available at this URL:

<http://www.cisco.com/go/psirt>

If you prefer to see advisories and notices as they are updated in real time, you can access a Product Security Incident Response Team Really Simple Syndication (PSIRT RSS) feed from this URL:

http://www.cisco.com/en/US/products/products_psirt_rss_feed.html

Reporting Security Problems in Cisco Products

Cisco is committed to delivering secure products. We test our products internally before we release them, and we strive to correct all vulnerabilities quickly. If you think that you might have identified a vulnerability in a Cisco product, contact PSIRT:

- Emergencies—security-alert@cisco.com

An emergency is either a condition in which a system is under active attack or a condition for which a severe and urgent security vulnerability should be reported. All other conditions are considered nonemergencies.

- Nonemergencies—psirt@cisco.com

In an emergency, you can also reach PSIRT by telephone:

- 1 877 228-7302
- 1 408 525-6532



Tip

We encourage you to use Pretty Good Privacy (PGP) or a compatible product to encrypt any sensitive information that you send to Cisco. PSIRT can work from encrypted information that is compatible with PGP versions 2.x through 8.x.

Never use a revoked or an expired encryption key. The correct public key to use in your correspondence with PSIRT is the one linked in the Contact Summary section of the Security Vulnerability Policy page at this URL:

http://www.cisco.com/en/US/products/products_security_vulnerability_policy.html

The link on this page has the current PGP key ID in use.

Obtaining Technical Assistance

Cisco Technical Support provides 24-hour-a-day award-winning technical assistance. The Cisco Technical Support & Documentation website on Cisco.com features extensive online support resources. In addition, if you have a valid Cisco service contract, Cisco Technical Assistance Center (TAC) engineers provide telephone support. If you do not have a valid Cisco service contract, contact your reseller.

Cisco Technical Support & Documentation Website

The Cisco Technical Support & Documentation website provides online documents and tools for troubleshooting and resolving technical issues with Cisco products and technologies. The website is available 24 hours a day, at this URL:

<http://www.cisco.com/techsupport>

Access to all tools on the Cisco Technical Support & Documentation website requires a Cisco.com user ID and password. If you have a valid service contract but do not have a user ID or password, you can register at this URL:

<http://tools.cisco.com/RPF/register/register.do>



Note

Use the Cisco Product Identification (CPI) tool to locate your product serial number before submitting a web or phone request for service. You can access the CPI tool from the Cisco Technical Support & Documentation website by clicking the **Tools & Resources** link under Documentation & Tools. Choose **Cisco Product Identification Tool** from the Alphabetical Index drop-down list, or click the **Cisco Product Identification Tool** link under Alerts & RMAs. The CPI tool offers three search options: by product ID or model name; by tree view; or for certain products, by copying and pasting **show** command output. Search results show an illustration of your product with the serial number label location highlighted. Locate the serial number label on your product and record the information before placing a service call.

Submitting a Service Request

Using the online TAC Service Request Tool is the fastest way to open S3 and S4 service requests. (S3 and S4 service requests are those in which your network is minimally impaired or for which you require product information.) After you describe your situation, the TAC Service Request Tool provides recommended solutions. If your issue is not resolved using the recommended resources, your service request is assigned to a Cisco engineer. The TAC Service Request Tool is located at this URL:

<http://www.cisco.com/techsupport/servicerequest>

For S1 or S2 service requests or if you do not have Internet access, contact the Cisco TAC by telephone. (S1 or S2 service requests are those in which your production network is down or severely degraded.) Cisco engineers are assigned immediately to S1 and S2 service requests to help keep your business operations running smoothly.

To open a service request by telephone, use one of the following numbers:

Asia-Pacific: +61 2 8446 7411 (Australia: 1 800 805 227)

EMEA: +32 2 704 55 55

USA: 1 800 553-2447

For a complete list of Cisco TAC contacts, go to this URL:

<http://www.cisco.com/techsupport/contacts>

Definitions of Service Request Severity

To ensure that all service requests are reported in a standard format, Cisco has established severity definitions.

Severity 1 (S1)—Your network is “down,” or there is a critical impact to your business operations. You and Cisco will commit all necessary resources around the clock to resolve the situation.

Severity 2 (S2)—Operation of an existing network is severely degraded, or significant aspects of your business operation are negatively affected by inadequate performance of Cisco products. You and Cisco will commit full-time resources during normal business hours to resolve the situation.

Severity 3 (S3)—Operational performance of your network is impaired, but most business operations remain functional. You and Cisco will commit resources during normal business hours to restore service to satisfactory levels.

Severity 4 (S4)—You require information or assistance with Cisco product capabilities, installation, or configuration. There is little or no effect on your business operations.

Obtaining Additional Publications and Information

Information about Cisco products, technologies, and network solutions is available from various online and printed sources.

- Cisco Marketplace provides a variety of Cisco books, reference guides, documentation, and logo merchandise. Visit Cisco Marketplace, the company store, at this URL:
<http://www.cisco.com/go/marketplace/>
- *Cisco Press* publishes a wide range of general networking, training and certification titles. Both new and experienced users will benefit from these publications. For current Cisco Press titles and other information, go to Cisco Press at this URL:

<http://www.ciscopress.com>

- *Packet* magazine is the Cisco Systems technical user magazine for maximizing Internet and networking investments. Each quarter, Packet delivers coverage of the latest industry trends, technology breakthroughs, and Cisco products and solutions, as well as network deployment and troubleshooting tips, configuration examples, customer case studies, certification and training information, and links to scores of in-depth online resources. You can access Packet magazine at this URL:

<http://www.cisco.com/packet>

- *iQ Magazine* is the quarterly publication from Cisco Systems designed to help growing companies learn how they can use technology to increase revenue, streamline their business, and expand services. The publication identifies the challenges facing these companies and the technologies to help solve them, using real-world case studies and business strategies to help readers make sound technology investment decisions. You can access iQ Magazine at this URL:

<http://www.cisco.com/go/iqmagazine>

or view the digital edition at this URL:

<http://ciscoiq.texterity.com/ciscoiq/sample/>

- *Internet Protocol Journal* is a quarterly journal published by Cisco Systems for engineering professionals involved in designing, developing, and operating public and private internets and intranets. You can access the Internet Protocol Journal at this URL:
<http://www.cisco.com/ipj>
- Networking products offered by Cisco Systems, as well as customer support services, can be obtained at this URL:
<http://www.cisco.com/en/US/products/index.html>
- Networking Professionals Connection is an interactive website for networking professionals to share questions, suggestions, and information about networking products and technologies with Cisco experts and other networking professionals. Join a discussion at this URL:
<http://www.cisco.com/discuss/networking>
- World-class networking training is available from Cisco. You can view current offerings at this URL:
<http://www.cisco.com/en/US/learning/index.html>



Using Cisco IOS Software for Release 12.4

This chapter provides helpful tips for understanding and configuring Cisco IOS software using the command-line interface (CLI). It contains the following sections:

- [Understanding Command Modes, page xv](#)
- [Getting Help, page xvi](#)
- [Using the no and default Forms of Commands, page xix](#)
- [Saving Configuration Changes, page xx](#)
- [Filtering Output from the show and more Commands, page xx](#)
- [Finding Additional Feature Support Information, page xxi](#)

For an overview of Cisco IOS software configuration, see the [Cisco IOS Configuration Fundamentals Configuration Guide](#).

For information on the conventions used in the Cisco IOS software documentation set, see the “[About Cisco IOS Software Documentation for Release 12.4](#)” chapter.

Understanding Command Modes

You use the CLI to access Cisco IOS software. Because the CLI is divided into many different modes, the commands available to you at any given time depend on the mode that you are currently in. Entering a question mark (?) at the CLI prompt allows you to obtain a list of commands available for each command mode.

When you log in to the CLI, you are in user EXEC mode. User EXEC mode contains only a limited subset of commands. To have access to all commands, you must enter privileged EXEC mode, normally by using a password. From privileged EXEC mode you can issue any EXEC command—user or privileged mode—or you can enter global configuration mode. Most EXEC commands are one-time commands. For example, **show** commands show important status information, and **clear** commands clear counters or interfaces. The EXEC commands are not saved when the software reboots.

Configuration modes allow you to make changes to the running configuration. If you later save the running configuration to the startup configuration, these changed commands are stored when the software is rebooted. To enter specific configuration modes, you must start at global configuration mode. From global configuration mode, you can enter interface configuration mode and a variety of other modes, such as protocol-specific modes.

ROM monitor mode is a separate mode used when the Cisco IOS software cannot load properly. If a valid software image is not found when the software boots or if the configuration file is corrupted at startup, the software might enter ROM monitor mode.

Table 1 describes how to access and exit various common command modes of the Cisco IOS software. It also shows examples of the prompts displayed for each mode.

Table 1 Accessing and Exiting Command Modes

Command Mode	Access Method	Prompt	Exit Method
User EXEC	Log in.	Router>	Use the logout command.
Privileged EXEC	From user EXEC mode, use the enable command.	Router#	To return to user EXEC mode, use the disable command.
Global configuration	From privileged EXEC mode, use the configure terminal command.	Router(config)#	To return to privileged EXEC mode from global configuration mode, use the exit or end command.
Interface configuration	From global configuration mode, specify an interface using an interface command.	Router(config-if)#	To return to global configuration mode, use the exit command. To return to privileged EXEC mode, use the end command.
ROM monitor	From privileged EXEC mode, use the reload command. Press the Break key during the first 60 seconds while the system is booting.	>	To exit ROM monitor mode, use the continue command.

For more information on command modes, see the “Using the Cisco IOS Command-Line Interface” chapter in the *Cisco IOS Configuration Fundamentals Configuration Guide*.

Getting Help

Entering a question mark (?) at the CLI prompt displays a list of commands available for each command mode. You can also get a list of keywords and arguments associated with any command by using the context-sensitive help feature.

To get help specific to a command mode, a command, a keyword, or an argument, use one of the following commands:

Command	Purpose
help	Provides a brief description of the help system in any command mode.
<i>abbreviated-command-entry?</i>	Provides a list of commands that begin with a particular character string. (No space between command and question mark.)
<i>abbreviated-command-entry</i> <Tab>	Completes a partial command name.
?	Lists all commands available for a particular command mode.
<i>command ?</i>	Lists the keywords or arguments that you must enter next on the command line. (Space between command and question mark.)

Example: How to Find Command Options

This section provides an example of how to display syntax for a command. The syntax can consist of optional or required keywords and arguments. To display keywords and arguments for a command, enter a question mark (?) at the configuration prompt or after entering part of a command followed by a space. The Cisco IOS software displays a list and brief description of available keywords and arguments. For example, if you were in global configuration mode and wanted to see all the keywords or arguments for the **arap** command, you would type **arap ?**.

The <cr> symbol in command help output stands for “carriage return.” On older keyboards, the carriage return key is the Return key. On most modern keyboards, the carriage return key is the Enter key. The <cr> symbol at the end of command help output indicates that you have the option to press **Enter** to complete the command and that the arguments and keywords in the list preceding the <cr> symbol are optional. The <cr> symbol by itself indicates that no more arguments or keywords are available and that you must press **Enter** to complete the command.

Table 2 shows examples of how you can use the question mark (?) to assist you in entering commands. The table steps you through configuring an IP address on a serial interface on a Cisco 7206 router that is running Cisco IOS Release 12.0(3).

Table 2 How to Find Command Options

Command	Comment
Router> enable Password: <password> Router#	Enter the enable command and password to access privileged EXEC commands. You are in privileged EXEC mode when the prompt changes to Router#.
Router# configure terminal Enter configuration commands, one per line. End with CNTL/Z. Router(config)#	Enter the configure terminal privileged EXEC command to enter global configuration mode. You are in global configuration mode when the prompt changes to Router(config)#.
Router(config)# interface serial ? <0-6> Serial interface number Router(config)# interface serial 4 ? / Router(config)# interface serial 4/ ? <0-3> Serial interface number Router(config)# interface serial 4/0 ? <cr> Router(config)# interface serial 4/0 Router(config-if)#	Enter interface configuration mode by specifying the serial interface that you want to configure using the interface serial global configuration command. Enter ? to display what you must enter next on the command line. In this example, you must enter the serial interface slot number and port number, separated by a forward slash. When the <cr> symbol is displayed, you can press Enter to complete the command. You are in interface configuration mode when the prompt changes to Router(config-if)#.

Table 2 *How to Find Command Options (continued)*

Command	Comment
<pre>Router(config-if)# ? Interface configuration commands: . . . ip Interface Internet Protocol config commands keepalive Enable keepalive lan-name LAN Name command llc2 LLC2 Interface Subcommands load-interval Specify interval for load calculation for an interface locaddr-priority Assign a priority group logging Configure logging for interface loopback Configure internal loopback on an interface mac-address Manually set interface MAC address mls mls router sub/interface commands mpoa MPOA interface configuration commands mtu Set the interface Maximum Transmission Unit (MTU) netbios Use a defined NETBIOS access list or enable name-caching no Negate a command or set its defaults nrzi-encoding Enable use of NRZI encoding ntp Configure NTP . . . Router(config-if)#</pre>	Enter ? to display a list of all the interface configuration commands available for the serial interface. This example shows only some of the available interface configuration commands.
<pre>Router(config-if)# ip ? Interface IP configuration subcommands: access-group Specify access control for packets accounting Enable IP accounting on this interface address Set the IP address of an interface authentication authentication subcommands bandwidth-percent Set EIGRP bandwidth limit broadcast-address Set the broadcast address of an interface cgmp Enable/disable CGMP directed-broadcast Enable forwarding of directed broadcasts dvmrp DVMRP interface commands hello-interval Configures IP-EIGRP hello interval helper-address Specify a destination address for UDP broadcasts hold-time Configures IP-EIGRP hold time . . . Router(config-if)# ip</pre>	Enter the command that you want to configure for the interface. This example uses the ip command. Enter ? to display what you must enter next on the command line. This example shows only some of the available interface IP configuration commands.

Table 2 *How to Find Command Options (continued)*

Command	Comment
<pre>Router(config-if)# ip address ? A.B.C.D IP address negotiated IP Address negotiated over PPP Router(config-if)# ip address</pre>	Enter the command that you want to configure for the interface. This example uses the ip address command. Enter ? to display what you must enter next on the command line. In this example, you must enter an IP address or the negotiated keyword. A carriage return (<cr>) is not displayed; therefore, you must enter additional keywords or arguments to complete the command.
<pre>Router(config-if)# ip address 172.16.0.1 ? A.B.C.D IP subnet mask Router(config-if)# ip address 172.16.0.1</pre>	Enter the keyword or argument that you want to use. This example uses the 172.16.0.1 IP address. Enter ? to display what you must enter next on the command line. In this example, you must enter an IP subnet mask. A <cr> is not displayed; therefore, you must enter additional keywords or arguments to complete the command.
<pre>Router(config-if)# ip address 172.16.0.1 255.255.255.0 ? secondary Make this IP address a secondary address <cr> Router(config-if)# ip address 172.16.0.1 255.255.255.0</pre>	Enter the IP subnet mask. This example uses the 255.255.255.0 IP subnet mask. Enter ? to display what you must enter next on the command line. In this example, you can enter the secondary keyword, or you can press Enter. A <cr> is displayed; you can press Enter to complete the command, or you can enter another keyword.
<pre>Router(config-if)# ip address 172.16.0.1 255.255.255.0 Router(config-if)#</pre>	In this example, Enter is pressed to complete the command.

Using the no and default Forms of Commands

Almost every configuration command has a **no** form. In general, use the **no** form to disable a function. Use the command without the **no** keyword to reenable a disabled function or to enable a function that is disabled by default. For example, IP routing is enabled by default. To disable IP routing, use the **no ip routing** command; to reenable IP routing, use the **ip routing** command. The Cisco IOS software command reference publications provide the complete syntax for the configuration commands and describe what the **no** form of a command does.

Configuration commands can also have a **default** form, which returns the command settings to the default values. Most commands are disabled by default, so in such cases using the **default** form has the same result as using the **no** form of the command. However, some commands are enabled by default and

have variables set to certain default values. In these cases, the **default** form of the command enables the command and sets the variables to their default values. The Cisco IOS software command reference publications describe the effect of the **default** form of a command if the command functions differently than the **no** form.

Saving Configuration Changes

Use the **copy system:running-config nvram:startup-config** command or the **copy running-config startup-config** command to save your configuration changes to the startup configuration so that the changes will not be lost if the software reloads or a power outage occurs. For example:

```
Router# copy system:running-config nvram:startup-config
Building configuration...
```

It might take a minute or two to save the configuration. After the configuration has been saved, the following output appears:

```
[OK]
Router#
```

On most platforms, this task saves the configuration to NVRAM. On the Class A flash file system platforms, this task saves the configuration to the location specified by the CONFIG_FILE environment variable. The CONFIG_FILE variable defaults to NVRAM.

Filtering Output from the show and more Commands

You can search and filter the output of **show** and **more** commands. This functionality is useful if you need to sort through large amounts of output or if you want to exclude output that you need not see.

To use this functionality, enter a **show** or **more** command followed by the “pipe” character (`|`); one of the keywords **begin**, **include**, or **exclude**; and a regular expression on which you want to search or filter (the expression is case-sensitive):

```
command | {begin | include | exclude} regular-expression
```

The output matches certain lines of information in the configuration file. The following example illustrates how to use output modifiers with the **show interface** command when you want the output to include only lines in which the expression “protocol” appears:

```
Router# show interface | include protocol

FastEthernet0/0 is up, line protocol is up
Serial4/0 is up, line protocol is up
Serial4/1 is up, line protocol is up
Serial4/2 is administratively down, line protocol is down
Serial4/3 is administratively down, line protocol is down
```

For more information on the search and filter functionality, see the “Using the Cisco IOS Command-Line Interface” chapter in the [Cisco IOS Configuration Fundamentals Configuration Guide](#).

Finding Additional Feature Support Information

If you want to use a specific Cisco IOS software feature, you will need to determine in which Cisco IOS software images that feature is supported. Feature support in Cisco IOS software images is dependant on three main factors: the software version (called the “Release”), the hardware model (the “Platform” or “Series”), and the “Feature Set” (collection of specific features designed for a certain network environment). Although the Cisco IOS software documentation set documents feature support information for Release 12.4 as a whole, it does not generally provide specific hardware and feature set information.

To determine the correct combination of Release (software version), Platform (hardware version), and Feature Set needed to run a particular feature (or any combination of features), use Feature Navigator.

Feature Navigator is a web-based tool available on Cisco.com at <http://www.cisco.com/go/fn>. Feature Navigator is available only for registered users of Cisco.com. If you do not have an account or have forgotten your username or password, click Cancel at the login dialog box and follow the instructions that appear.

Software features may also have additional limitations or restrictions. For example, a minimum amount of system memory may be required. Or there may be known issues for features on certain platforms that have not yet been resolved (called “Caveats”). For the latest information about these limitations, see the release notes for the appropriate Cisco IOS software release. Release notes provide detailed installation instructions, new feature descriptions, system requirements, limitations and restrictions, caveats, and troubleshooting information for a particular software release.



Introduction

This document describes the commands used to configure broadband features with Cisco IOS software.

Prior to Cisco IOS Release 12.3(14)T, the commands for configuring broadband features were presented in the *Cisco IOS Wide-Area Networking Command Reference*.

For information about configuration, refer to the *Cisco IOS Broadband Access Aggregation and SL Configuration Guide*, Release 12.4.



Cisco IOS Broadband and DSL Commands

This chapter presents the Cisco IOS broadband and DSL commands.

ac name

To specify the name of the access concentrator to be used in PPPoE Active Discovery Offers (PADO), use the **ac name** command in BBA group configuration mode. To remove this specification, use the **no** form of this command.

ac name *name*

no ac name *name*

Syntax Description	<i>name</i> Name of the access concentrator to be used in PADOs.							
Defaults	If the name of the access concentrator is not specified, the name of the router is used as the access concentrator name.							
Command Modes	BBA group configuration							
Command History	<table><tr><th>Release</th><th>Modification</th></tr><tr><td>12.2(15)T</td><td>This command was introduced.</td></tr><tr><td>12.3(7)XI3</td><td>This command was integrated into Cisco IOS Release 12.3(7)XI3.</td></tr></table>		Release	Modification	12.2(15)T	This command was introduced.	12.3(7)XI3	This command was integrated into Cisco IOS Release 12.3(7)XI3.
Release	Modification							
12.2(15)T	This command was introduced.							
12.3(7)XI3	This command was integrated into Cisco IOS Release 12.3(7)XI3.							
Usage Guidelines	The ac name command allows you to advertise a unique access concentrator name other than the router name to PPPoE clients.							
Examples	The following example shows the configuration of the name “region1” as the access concentrator name to be used in PADOs: <pre>bba-group pppoe global virtual-template 1 ac name region1</pre>							
Related Commands	<table><tr><th>Command</th><th>Description</th></tr><tr><td>bba-group pppoe</td><td>Creates a PPPoE profile.</td></tr></table>		Command	Description	bba-group pppoe	Creates a PPPoE profile.		
Command	Description							
bba-group pppoe	Creates a PPPoE profile.							

atm pppatm link reset

To configure the system to bring down PPP over ATM (PPPoA) sessions when the virtual circuit (VC) is deactivated, use the **atm pppatm link reset** command in subinterface configuration mode. To return to the default behavior (PPPoA sessions are not brought down), use the **no** form of this command.

atm pppatm link reset

no atm pppatm link reset

Syntax Description

This command has no arguments or keywords.

Defaults

PPPoA sessions are not brought down when the VC is deactivated.

Command Modes

Subinterface configuration

Command History

Release	Modification
12.3	This command was introduced.

Usage Guidelines

Use the **atm pppatm link reset** command to configure the system to place PPPoA sessions in a nonoperational state when a VC is deactivated. This command is useful on customer premises equipment (CPE) that is not configured with Dialer. On L2TP access concentrators (LACs), issues of scalability make it useful to allow PPPoA sessions to remain up when a VC is deactivated.

Examples

In the following example, PPPoA sessions on permanent virtual circuit (PVC) 3/501 will be brought down when that PVC is deactivated:

```
interface ATM4/0
  atm pppatm link reset
  pvc 3/501
    encapsulation aal5snap
    protocol ppp virtual-template 1
  !

interface virtual-template 1
  no ip address
  ppp chap hostname boston
  ppp chap password 7 111F1111
  ppp multilink
  ppp multilink group 1

interface multilink1
  ip unnumbered loopback 0
  ppp multilink
  ppp multilink group 1
```

atm route-bridge

To configure an interface to use the ATM routed bridge encapsulation (RBE), use the **atm route-bridge** command in interface configuration mode.

atm route-bridge *protocol*

Syntax Description

<i>protocol</i>	Protocol to be route-bridged. IP and IPv6 are the only protocols that can be route-bridged using ATM RBE.
-----------------	---

Defaults

ATM routed bridge encapsulation is not configured.

Command Modes

Interface configuration

Command History

Release	Modification
12.0(5)DC	This command was introduced.
12.1(2)T	This command was integrated in Cisco IOS Release 12.1(2)T.
12.3(4)T	The ipv6 keyword was added to support RBE of IPv6 packets as specified in RFC 1483.

Usage Guidelines

Routing of IPv6 Packets

IPv6 packets can be routed using RBE only over ATM point-to-point subinterfaces.

Routing of IP packets and IPv6 half-bridging, bridging, PPP over Ethernet (PPPoE), or other Ethernet 802.3-encapsulated protocols can be configured on the same subinterface.

Router Advertisements with IPv6

Router advertisements are suppressed by default. For stateless autoconfiguration, router advertisements must be allowed with the **no ipv6 nd suppress-ra** command. For static configuration, router advertisement is not required; however, the aggregator should either have the RBE interface on the same subnet as the client or have a static IPv6 route to that subnet through the RBE interface.

Examples

IP Encapsulation Example

The following example configures ATM routed bridge encapsulation on an interface:

```
interface atm 4/0.100 point-to-point
 ip address 172.16.5.9 255.255.255.0
 pvc 0/32
 atm route-bridge ip
```


IPv6 Encapsulation Example

The following example shows a typical configuration on an RBE interface to allow routing of IPv6 encapsulated Ethernet packets. IPv6 packets sent out of the subinterface are encapsulated over Ethernet over the RBE interface.

```
interface ATM1/0.1 point-to-point
  ipv6 enable
  ipv6 address 3FEE:12E1:2AC1:EA32::/64
  no ipv6 nd suppress-ra
  atm route-bridge ipv6
pvc 1/101
```

In this example, the **ipv6 enable** command allows the routing of IPv6 packets. The **ipv6 address** command specifies an IPv6 address for the interface and an IPv6 prefix to be advertised to a peer. The **no ipv6 nd suppress-ra** command enables router advertisements on the interface.

IPv6 Routing and Bridging of Other Traffic Example

The following example shows a configuration in which IPv6 packets are routed and all other packets are bridged.

```
interface ATM1/0.1 point-to-point
  ipv6 enable
  ipv6 address 3FEE:12E1:2AC1:EA32::/64
  atm route-bridge ipv6
  bridge-group 1
pvc 1/101
```

IP and IPv6 Routing with Bridging of Other Protocols Example

IP and IPv6 routing can be configured on the same interface as shown in this example. All other packets are bridged. PPPoE could also be configured on this same interface.

```
interface ATM1/0.1 point-to-point
  ipv6 enable
  ipv6 address 3FEE:12E1:2AC1:EA32::/64
  ip address 10.0.0.1 255.255.255.0
  atm route-bridge ipv6
  atm route-bridge ip
  bridge-group 1
pvc 1/101
```

Static Configuration Example

The following example shows the IPv6 static route configured. Unlike, IP, the IPv6 interface on an aggregator is always numbered and, minimally, has a link local IPv6 address.

```
router# configure terminal
router(config)# ipv6 route 3FEE:12E1:2AC1:EA32::/64 atm1/0.3
router(config)# end
router#
```

show ipv6 interface Example

Notice in this **show ipv6 interface** output display that each RBE link has its own subnet prefix. Unlike proxy ARP in IPv4 RBE configurations, the aggregator does not require proxy ND in IPv6 RBE deployments.

```
router# show ipv6 interface atm1/0.1

ATM1/0.1 is up, line protocol is up
  IPv6 is enabled, link-local address is FE80::203:FDFE:FE3B:B400
  Global unicast address(es):
    3FEE:12E1:2AC1:EA32::, subnet is 3FEE:12E1:2AC1:EA32::/64
```

```

Joined group address(es):
  FF02::1
  FF02::2
  FF02::1:FF00:0
  FF02::1:FF3B:B400
MTU is 4470 bytes
ICMP error messages limited to one every 100 milliseconds
ICMP redirects are enabled
ND DAD is enabled, number of DAD attempts: 1
ND reachable time is 30000 milliseconds
ND advertised reachable time is 0 milliseconds
ND advertised retransmit interval is 0 milliseconds
ND router advertisements are sent every 200 seconds
ND router advertisements live for 1800 seconds
Hosts use stateless autoconfig for addresses

```

Related Commands

Command	Description
no ipv6 nd suppress-ra	Suppresses IPv6 router advertisement transmissions on a LAN interface.

bba-group pppoe

To create a PPP over Ethernet (PPPoE) profile, use the **bba-group pppoe** command in global configuration mode. To delete a PPPoE profile, use the **no** form of this command.

bba-group pppoe {*group-name* | **global**}

no bba-group pppoe {*group-name* | **global**}

Syntax Description

<i>group-name</i>	Name of the PPPoE profile.
global	PPPoE profile that serves as the default profile for any PPPoE port—Ethernet interface, VLAN, or permanent virtual circuit (PVC)—that has not been assigned a specific PPPoE profile.

Defaults

A PPPoE profile is not configured.

Command Modes

Global configuration

Command History

Release	Modification
12.2(15)T	This command was introduced.
12.3(7)XI3	This command was integrated into Cisco IOS Release 12.3(7)XI3.

Usage Guidelines

PPPoE profiles contain the configuration for a group of PPPoE sessions. Once a profile has been defined, it can be assigned to a PPPoE port (Ethernet interface, VLAN, or PVC), a virtual circuit (VC) class, or an ATM PVC range. PPPoE profiles can also be used with PPP over ATM (PPPoA)/PPPoE autosense. Multiple PPPoE profiles can be created and assigned to different ports.

The global PPPoE profile serves as the default profile for any port that has not been assigned a specific PPPoE profile.

Examples

The following example shows the configuration of a global PPPoE profile and a profile called “vpn1”. PPPoE sessions established on PVCs that use the VC class “class-pppoe-global” will use the global profile. PVCs in the range “range-pppoe-1” will use the “vpn1” profile.

```
bba-group pppoe global
  virtual-template 1
  sessions max limit 8000
  sessions per-vc limit 8
  sessions per-mac limit 2
!
bba-group pppoe vpn1
  virtual-template 1
  sessions per-vc limit 2
  sessions per-mac limit 1
!
vc-class atm class-pppoe-global
```

```

protocol pppoe
!
interface ATM1/0.10 multipoint
 range range-pppoe-1 pvc 100 109
  protocol pppoe group vpn1
!
interface ATM1/0.20 multipoint
 class-int class-pppoe-global
 pvc 0/200

```

Related Commands

Command	Description
encapsulation aal5autopp virtual-template	Enables PPPoA/PPPoE autosense.
pppoe enable	Enables PPPoE sessions on an Ethernet interface or subinterface.
protocol pppoe (ATM VC)	Enables PPPoE sessions to be established on PVCs.
sessions max limit	Configures a PPPoE global profile with the maximum number of PPPoE sessions permitted on a router and sets the PPPoE session-count threshold.
sessions per-mac limit	Sets the maximum number of PPPoE sessions allowed per MAC address in a PPPoE profile.
sessions per-vc limit	Sets the maximum number of PPPoE sessions to be established over a VC and sets the PPPoE session-count threshold.
sessions per-vlan limit	Sets the maximum number of PPPoE sessions per VLAN in a PPPoE profile.

class-range

To assign a virtual circuit (VC) class to an ATM permanent virtual circuit (PVC) range, use the **class-range** command in PVC range configuration mode. To remove the VC class, use the **no** form of this command.

class-range *class-name*

no class-range *class-name*

Syntax Description

<i>class-name</i>	Name of the VC class.
-------------------	-----------------------

Defaults

No VC class is assigned to the PVC range.

Command Modes

PVC range configuration

Command History

Release	Modification
12.1(5)T	This command was introduced.

Usage Guidelines

When you create a VC class for an ATM PVC range, you can use the following commands to define your parameters: **abr**, **broadcast**, **cbr**, **encapsulation aal5**, **ilmi manage**, **inarp**, **oam-pvc**, **oam retry**, **protocol**, **ubr**, **ubr+**, **vbr-nrt**, and **vbr-rt**.

Parameters that are configured for a PVC range through discrete commands entered in PVC range configuration mode supersede VC class parameters assigned to an ATM PVC range using the **class-range** command.

Examples

In the following example, a class called “classA” is created and then applied to an ATM PVC range called “range-pppoa-1”:

```
! The following commands create the class classA:
vc-class atm classA
  ubr 10000
  encapsulation aal5snap
```

```
! The following commands apply classA to an ATM PVC range:
interface atm 6/0.110 multipoint
  range range-pppoa-1 pvc 0/102 0/199
  class-range classA
```

Related Commands	Command	Description
	shutdown (PVC-in-range)	Deactivates an individual PVC within a PVC range.
	shutdown (PVC range)	Deactivates an ATM PVC range.

clear pppoe

To clear PPP over Ethernet (PPPoE) sessions, use the **clear pppoe** command in privileged EXEC mode.

clear pppoe {**interface** *type number* [**vc** {[*vpi*]/*vci* | *vc-name*]} [**vlan** *vlan-id*] | **rmac** *mac-address* [**sid** *session-id*] | **all**}

Syntax Description

interface <i>type number</i>	Interface keyword followed by the interface type and number.
vc [<i>vpi</i>]/ <i>vci</i>	(Optional) Virtual circuit (VC) keyword followed by a virtual path identifier (VPI), virtual channel identifier (VCI). A slash (/) follows the VPI.
<i>vc-name</i>	(Optional) Name of the VC.
vlan <i>vlan-id</i>	(Optional) VLAN identifier.
rmac <i>mac-address</i>	(Optional) Remote MAC address.
sid <i>session-id</i>	(Optional) Session identifier.
all	(Optional) Specifies that all PPPoE sessions will be cleared.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.2(13)T	This command was introduced.
12.3(2)T	The vlan <i>vlan-id</i> keyword and argument were added.

Usage Guidelines

Use the **clear pppoe all** command to clear all PPPoE sessions.

Use the **interface** keyword and arguments and the **vlan** keyword and argument to clear PPPoE sessions on a specific Ethernet 802.1Q VLAN.

Use the **interface**, **vc**, and **vlan** keywords and arguments to clear PPPoE over 802.1Q VLAN sessions on an ATM PVC.

Examples

The following example clears all PPPoE sessions:

```
Router# clear pppoe all
```

clear pppoe derived

To clear the cached PPP over Ethernet (PPPoE) configuration of a PPPoE profile and force the PPPoE profile to reread the configuration from the assigned subscriber profile, use the **clear pppoe derived** command in privileged EXEC mode.

clear pppoe derived group *group-name*

Syntax Description

group <i>group-name</i>	PPPoE profile for which the cached PPPoE configuration will be cleared.
--------------------------------	---

Command Modes

Privileged EXEC

Command History

Release	Modification
12.2(15)T	This command was introduced.
12.2(27)SB	This command was integrated into Cisco IOS Release 12.2(27)SB.

Usage Guidelines

A subscriber profile can be configured locally on the router or remotely on a authentication, authorization, and accounting (AAA) server. The PPPoE configuration that is derived from a subscriber profile is cached locally under the PPPoE profile. Use the **clear pppoe derived** command to clear the cached PPPoE configuration of a specified PPPoE profile and force the PPPoE profile to reread the configuration from the assigned subscriber profile.

A subscriber profile contains a list of PPPoE service names. The PPPoE server will advertise the service names that are listed in the subscriber profile to each PPPoE client connection that uses the configured PPPoE profile. A subscriber profile is assigned to a PPPoE profile by using the **service profile** command in BBA group configuration mode.

Examples

The following example clears the cached PPPoE configuration for PPPoE profile “sp_group_a”. The PPPoE profile will reread the configuration from the subscriber profile that is assigned to that PPPoE profile.

```
clear pppoe derived group sp_group_a
```

Related Commands

Command	Description
service profile	Assigns a subscriber profile to a PPPoE profile.
show pppoe derived	Displays the cached PPPoE configuration that is derived from the subscriber profile for a specified PPPoE profile.
subscriber profile	Defines Subscriber Service Switch policy for searches of a subscriber profile database.

clear pppoe relay context

To clear the PPP over Ethernet (PPPoE) relay context created for relaying PPPoE Active Discovery (PAD) messages, use the **clear pppoe relay context** command in privileged EXEC mode.

clear pppoe relay context {all | id *session-id*}

Syntax Description

all	Clears all relay contexts.
id <i>session-id</i>	Clears a specific relay context identified in the output of the show pppoe relay context all command.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.3(4)T	This command was introduced.
12.2(27)SB	This command was integrated into Cisco IOS Release 12.2(27)SB.

Usage Guidelines

Use this command to clear relay contexts created for relaying PAD messages.

Examples

The following example clears all PPPoE relay contexts created for relaying PAD messages:

```
Router# clear pppoe relay context all
```

Related Commands

Command	Description
show pppoe relay context all	Displays PPPoE relay contexts created for relaying PAD messages.
show pppoe session	Displays information about currently active PPPoE sessions.

controller shdsl

To configure a controller for single-pair high-bit-rate digital subscriber line (SHDSL) mode, use the **controller shdsl** command in global configuration mode.

controller shdsl *number*

Syntax Description

<i>number</i>	Controller number. The valid controller number is 0.
---------------	--

Defaults

Controller number: 0

Command Modes

Global configuration

Command History

Release	Modification
11.3(5)AAA	This command was introduced.
12.2(8)T	This command was implemented on Cisco IAD2420 series IADs.

Usage Guidelines

This command is used to configure the controller mode and the controller number.

Examples

The following example enters SHDSL controller mode on controller number 0 and configures ATM mode on a Cisco IAD2420 series IAD:

```
Router# controller shdsl 0
Router# mode atm
```

Related Commands

Command	Description
show controller shdsl	Displays the controller status and statistics.

dsl equipment-type

To configure the digital subscriber line (DSL) ATM interface to function as central office or customer premises equipment, use the **dsl equipment-type** command in interface configuration mode. To restore the default equipment type, use the **no** form of this command.

dsl equipment-type {co | cpe} ignore-error-duration *seconds*

no dsl equipment-type

Syntax Description

co	Configures the DSL ATM interface to function as central office equipment.
cpe	Configures the DSL ATM interface to function as customer premises equipment.
ignore-error-duration <i>seconds</i>	Sets the number of seconds for which errors are ignored. The valid range is from 15 to 30. The default is 0.

Defaults

cpe
Seconds: 0

Command Modes

Interface configuration

Command History

Release	Modification
12.2(4)XL	This command was integrated into Cisco IOS Release 12.2(4)XL on the G.SHDSL WIC on the Cisco 2600 series routers.
12.2(8)T	This command was integrated into Cisco IOS Release 12.2(8)T on the G.SHDSL WAN interface card (WIC) on the Cisco 2600 series and Cisco 3600 series routers.
12.2(13)T	The ignore-error-duration keyword was added to interoperate with metalink chipset digital subscriber line access multiplexers (DSLAMs).

Usage Guidelines

This configuration command applies to a specific ATM interface. You must specify the ATM interface before you enter this command.

The ATM interface must be in the shutdown state before you enter this command.

Examples

The following example shows how to configure DSL ATM interface 1/1 to function as central office equipment:

```
Router# configure terminal
```

```
Enter configuration commands, one per line. End with CNTL/Z.
```

```
Router(config)# interface atm 1/1
```

```
Router(config-if)# dsl equipment-type co ignore-error-duration 18
```

```
Router(config-if)# end
```

```
Router# clear interface atm 0/1
```

Related Commands

Command	Description
dsl linerate	Specifies a line rate for the DSL ATM interface.
dsl operating-mode gshdsl	Specifies an operating mode of the DSL ATM interface.

dsl gain-setting rx-offset

To add an offset to the receive (Rx) gain in a modem, use the **dsl gain-setting rx-offset** command in global configuration mode.

dsl gain-setting rx-offset *decimal*

Syntax Description	<i>decimal</i>	Offset (in dB) to the Rx gain. The valid range is from -5 dB to 3 dB, with a granularity of 0.5 dB.
--------------------	----------------	---

Defaults	0 dB (no offset)
----------	------------------

Command Modes	Global configuration
---------------	----------------------

Command History	Release	Modification
	12.2(8)YN	This command was introduced.
	12.3(2)T	This command was integrated into Cisco IOS Release 12.3(2)T.

Usage Guidelines	In most cases this command does not need to be used because the default value should be adequate. If the service provider improves the line rates, as often happens, using this and other DSL commands will not improve the DSL performance.
------------------	--

Examples	The following example shows how to add an offset of -2 to the receive (Rx) gain of the modem: <pre>dsl gain-setting rx-offset -2</pre>
----------	---

Related Commands	Command	Description
	dsl gain-setting tx-offset	Adds an offset on the Tx gain in the modem and affects the DSP front end.
	dsl max-tone-bits	Limits of the number of bits that are loaded into each upstream tone.
	dsl noise-margin	Adds an offset on the Rx target noise margin of the modem. The offset is added to the calculated target noise margin.

dsl gain-setting tx-offset

To add an offset to the transmit gain in a modem, use the **dsl gain-setting tx-offset** command in global configuration mode.

dsl gain-setting tx-offset *decimal*

Syntax Description	<i>decimal</i>	Offset (in dB) to the transmit gain. The valid range is from -10 dB to 3 dB, with a granularity of 0.5 dB.
---------------------------	----------------	--

Defaults	0 dB (no offset)
-----------------	------------------

Command Modes	Global configuration
----------------------	----------------------

Command History	Release	Modification
	12.2(8)YN	This command was introduced.
	12.3(2)T	This command was integrated into Cisco IOS Release 12.3(2)T.

Usage Guidelines	In most cases this command does not need to be used because the default value should be adequate. If the service provider improves the line rates, as often happens, using this and other DSL commands will not improve the DSL performance.
-------------------------	--

Examples	The following example shows how to add an offset of .5 to the transmit (Tx) gain of the modem: dsl gain-setting tx-offset .5
-----------------	---

Related Commands	Command	Description
	dsl gain-setting rx-offset	Adds an offset on the Rx gain in the modem and affects the analog front end.
	dsl max-tone-bits	Limits the number of bits that are loaded into each upstream tone.
	dsl noise-margin	Adds an offset on the Rx target noise margin of the modem. The offset is added to the calculated target noise margin.

dsl linerate

To specify a line rate for the digital subscriber line (DSL) ATM interface, use the **dsl linerate** command in interface configuration mode. To restore the default line rate, use the **no** form of this command.

dsl linerate {*kbps* | **auto**}

no dsl linerate

Syntax Description

<i>kbps</i>	Line rate, in kilobits per second, for the DSL ATM interface. Allowable entries are 72, 136, 200, 264, 392, 520, 776, 1032, 1160, 1544, 2056, and 2312 .
auto	Configures the DSL ATM interface to automatically train for an optimal line rate by negotiating with the far-end digital subscriber line access multiplexer (DSLAM) or WAN interface card (WIC).

Defaults

The DSL ATM interface automatically synchronizes its line rate with the far-end DSLAM or WIC.

Command Modes

Interface configuration

Command History

Release	Modification
12.2(4)XL	This command was integrated into Cisco IOS Release 12.2(4)XL on the G.SHDSL WIC on the Cisco 2600 series routers.
12.2(8)T	This command was integrated into Cisco IOS Release 12.2(8)T on the G.SHDSL WIC on the Cisco 2600 series and Cisco 3600 series routers.

Usage Guidelines

This configuration command applies to a specific ATM interface. You must specify the ATM interface before you enter this command.

The ATM interface must be in the shutdown state before you enter this command.

Examples

The following example shows how to configure DSL ATM interface 0/1 to operate at a line rate of 1040 kbps.

```
Router# configure terminal
```

```
Enter configuration commands, one per line. End with CNTL/Z.
```

```
Router(config)# interface atm 0/1
```

```
Router(config-if)# dsl linerate 1040
```

```
Router(config-if)# end
```

```
Router# clear interface atm 0/1
```

Related Commands	Command	Description
	dsl equipment-type	Configures the DSL ATM interface to function as CO equipment or CPE.
	dsl operating-mode	Specifies an operating mode of the DSL ATM interface.
	gshdsl	

dsl max-tone-bits

To set a limit on the number of bits that are loaded into each upstream tone, use the **dsl max-tone-bits** command in global configuration mode.

dsl max-tone-bits *integer*

Syntax Description

<i>integer</i>	Number of bits that are loaded into each upstream tone. The valid range is from 2 to 14.
----------------	--

Defaults

14 bits per tone, which is the ADSL maximum standard

Command Modes

Global configuration

Command History

Release	Modification
12.2(8)YN	This command was introduced.
12.3(2)T	This command was integrated into Cisco IOS Release 12.3(2)T.

Usage Guidelines

In most cases this command does not need to be used because the default value should be adequate. If the service provider improves the line rates, as often happens, using this and other DSL commands will not improve the DSL performance.

Examples

The following example sets 10 as the maximum number of bits to be loaded into each upstream tone:

```
dsl max-tone-bits 10
```

Related Commands

Command	Description
dsl gain-setting rx-offset	Adds an offset to the Rx gain in the modem and affects the analog front end.
dsl gain-setting tx-offset	Adds an offset on the Tx gain in the modem and affects the DSP front end.
dsl noise-margin	Adds an offset on the Rx target noise margin of the modem. The offset is added to the calculated target noise margin.

dsl noise-margin

To add an offset to the receive (Rx) target noise margin of a modem, use the **dsl noise-margin** command in global configuration mode.

dsl noise-margin *decimal*

Syntax Description	<i>decimal</i>	Offset (in dB) to the Rx target noise margin. The valid range is from -3 dB to 3 dB, with a granularity of 0.5 dB.
---------------------------	----------------	--

Defaults	0 dB (no offset)
-----------------	------------------

Command Modes	Global configuration
----------------------	----------------------

Command History	Release	Modification
	12.2(8)YN	This command was introduced.
	12.3(2)T	This command was integrated into Cisco IOS Release 12.3(2)T.

Usage Guidelines	In most cases this command does not need to be used because the default value should be adequate. If the service provider improves the line rates, as often happens, using this and other digital subscriber line (DSL) commands will not improve the DSL performance.
-------------------------	--

Examples	The following example shows how to add an offset of -.5 to the noise margin:
-----------------	--

```
dsl noise-margin -.5
```

Related Commands	Command	Description
	dsl gain-setting rx-offset	Adds an offset on the Rx gain in the modem and affects the analog front end.
	dsl gain-setting tx-offset	Adds an offset to the Tx gain in the modem and affects the DSP front end.
	dsl max-tone-bits	Limits the number of bits that are loaded into each upstream tone.

dsl operating-mode



Caution

This command is for testing or lab environments only. Using a configuration other than the default configuration for the digital subscriber line (DSL) operating mode can lead to unpredictable behavior on the asymmetric digital subscriber line (ADSL).

To modify the operating mode of the digital subscriber line for an ATM interface, use the **dsl operating-mode** command in interface configuration mode.

The following syntax is used with the Cisco WIC-1ADSL:

dsl operating-mode {auto | ansi-dmt | itu-dmt | splitterless}

no dsl operating-mode {auto | ansi-dmt | itu-dmt | splitterless}

The following syntax is used with the Cisco WIC-1ADSL-I-DG:

dsl operating-mode {auto | etsi | itu-dmt} [tone low]

no dsl operating-mode {auto | etsi | itu-dmt} [tone low]

Syntax Description

auto	Configure the ADSL line after automatic negotiation with the DSLAM located at the Central Office.
ansi-dmt	Configure the ADSL line to train in the ANSI T1.413 Issue 2 mode.
itu-dmt	Configure the ADSL line to train in the G.992.1 mode.
splitterless	Configure the ADSL line to train in the G.Lite mode.
etsi	Configure the ADSL line to train in the ETSI mode.
tone low	Enables the WIC-1ADSL-I-DG to use carrier tones 29 through 48. The absence of tone low tells the WIC-1ADSL-I-DG to use carrier tones 33 through 56. The latter tone set is used when the WIC is operating in accordance with Deutsche Telekom specification U-R2.

Defaults

The default DSL operating mode is **auto**.

Command Modes

Interface configuration

Command History

Release	Modification
12.1(3)XJ	This command was introduced on the Cisco 1700 series routers.
12.2(2)T	This command was integrated into Cisco IOS Release 12.2(2)T.
12.2(13)ZH	This command was modified to include the keyword splitterless for the Cisco WIC-1ADSL, and syntax (including tone low) for the Cisco WIC-1ADSL-I-DG.

Release	Modification
12.2(15)ZJ	The command changes made in Cisco IOS Release 12.2(13)ZH were integrated into Cisco IOS Release 12.2(15)ZJ.
12.3(4)T	The command changes made in Cisco IOS Release 12.2(13)ZJ were integrated into Cisco IOS Release 12.3(4)T.

Usage Guidelines



Caution

This command is for testing or lab environments only. Using a configuration other than the default configuration for the DSL operating mode can lead to unpredictable behavior on the ADSL line.

Examples

The following example shows how to configure the DSL operating mode for ATM interface 0:

```
Router# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)# interface atm 0
Router(config-if)# dsl operating-mode itu-dmt
Router(config-if)# end
Router#
```

Related Commands

Command	Description
show diag	Displays diagnostic information about the memory on an ADSL-WIC and the ADSL line training log.
show dsl interface atm	Displays information specific to the ADSL for a specified ATM interface.

dsl operating-mode (ADSL over ISDN)

To specify the operating mode of the digital subscriber line (DSL) for an ATM interface, use the **dsl operating-mode** command in interface configuration mode. To restore the default operating mode, use the **no** form of this command.

dsl operating-mode {annexb-ur2 | etsi | auto}

no dsl operating-mode {annexb-ur2 | etsi | auto}

Syntax Description

annexb-ur2	Specifies the Deutsche Telekom U-R2 (interface) mode, which transmits and receives ADSL signals according to the ITU-T G.992.1 Annex B standard. This mode supports upstream bins (analog modems) numbered 33 to 53 and downstream bins numbered 64 to 255.
etsi	Specifies Alcatel proprietary ETSI mode, which supports upstream bins numbered 29 to 48 and downstream bins numbered 64 to 255.
auto	Configures a modem to switch between etsi mode and annexb-ur2 mode for connection, following the sequence described in the “Usage Guidelines” section.

Defaults

Mode: **etsi**

Command Modes

Interface configuration

Command History

Release	Modification
12.2(4)YA	This command was introduced.
12.2(15)T	This command was implemented on the Cisco 820 series and the Cisco SOHO 70, 76, 77, and 77H platforms.

Usage Guidelines

In auto mode, a modem first tries to connect using **etsi** mode. If the connection fails, the modem retries a set number of times. If the modem fails to connect after several retries using **etsi** mode, the modem automatically switches to **annexb-ur2** mode and tries several times to connect using **annexb-ur2** mode. If the modem fails to connect after several retries using **annexb-ur2** mode, the modem automatically switches back to **etsi** mode and tries to connect.

The modem continues switching between modes, in sequence as described, until the modem reaches the state SHOWTIME (which signifies that the connection attempt was successful) and connects using one of the modes. This switching process is designed specifically for expediting DSL modem performance.

Examples

The following example shows how to configure the DSL to operate in **etsi** mode:

```
Router# configure terminal
```

Enter configuration commands, one per line. End with CNTL/Z.

■ dsl operating-mode (ADSL over ISDN)

```
Router(config)# interface atm 0  
Router(config-if)# dsl operating-mode etsi  
Router(config-if)# end
```

Related Commands

Command	Description
show dsl interface atm	Displays information specific to the ADSL for a specified ATM interface.

dsl operating-mode gshdsl

To specify the operating mode of the digital subscriber line (DSL) for an ATM interface, use the **dsl operating-mode** command in interface configuration mode. To restore the default operating mode, use the **no** form of this command.

dsl operating-mode gshdsl symmetric annex {A | B}

no dsl operating-mode

Syntax Description

symmetric	Configures the DSL ATM interface to operate in symmetrical mode per ITU G.991.2.
annex	Specifies the regional operating parameters.
A	Configures the regional operating parameters for North America. This value is the default.
B	Configures the regional operating parameters for Europe.

Defaults

Region: A

Command Modes

Interface configuration

Command History

Release	Modification
12.1(3)XJ	This command was introduced on the Cisco 1700 series routers.
12.2(2)T	This command was integrated into Cisco IOS Release 12.2(2)T for the Cisco 1700 series routers.
12.2(4)XL	This command was integrated into Cisco IOS Release 12.2(4)XL for the G.SHDSL WAN interface card (WIC) on the Cisco 2600 series routers.
12.2(8)T	This command was integrated into Cisco IOS Release 12.2(8)T on the G.SHDSL WIC on the Cisco 2600 series and Cisco 3600 series routers.

Usage Guidelines

This configuration command applies to a specific ATM interface. You must specify the ATM interface before you enter this command.

The ATM interface must be in the shutdown state before you enter this command.

Examples

The following example shows how to configure DSL ATM interface 0/0 to operate in G.SHDSL mode:

```
Router# configure terminal
```

```
Enter configuration commands, one per line. End with CNTL/Z.
```

```
Router(config)# interface atm 0/0
```

```
Router(config-if)# dsl operating-mode gshdsl symmetric annex A
```

```
Router(config-if)# end
```

```
Router# clear interface atm 0/1
```

■ dsl operating-mode gshdsl

Related Commands	Command	Description
	show ipv6 rip	Displays information about current IPv6 RIP processes.

ip tcp adjust-mss

To adjust the maximum segment size (MSS) value of TCP SYN packets going through a router, use the **ip tcp adjust-mss** command in interface configuration mode. To return the MSS value to the default setting, use the **no** form of this command.

ip tcp adjust-mss *max-segment-size*

no ip tcp adjust-mss *max-segment-size*

Syntax Description

<i>max-segment-size</i>	Maximum segment size, in bytes. The range is from 500 to 1460.
-------------------------	--

Defaults

If the **ip tcp adjust-mss** command is not configured, the MSS is determined by the originating host.

Command Modes

Interface configuration

Command History

Release	Modification
12.2(4)T	This command was introduced.
12.2(8)T	This command was changed from ip adjust-mss to ip tcp adjust-mss .
12.2(27)SBA	This command was integrated into Cisco IOS Release 12.2(27)SBA.

Usage Guidelines

When a host (usually a PC) initiates a TCP session with a server, it negotiates the IP segment size by using the MSS option field in the TCP SYN packet. The value of the MSS field is determined by the maximum transmission unit (MTU) configuration on the host. The default MSS value for a PC is 1500 bytes.

The PPP over Ethernet (PPPoE) standard supports a MTU of only 1492 bytes. The disparity between the host and PPPoE MTU size can cause the router in between the host and the server to drop 1500-byte packets and terminate TCP sessions over the PPPoE network. Even if the path MTU (which detects the correct MTU across the path) is enabled on the host, sessions may be dropped because system administrators sometimes disable the ICMP error messages that must be relayed from the host in order for path MTU to work.

The **ip tcp adjust-mss** command helps prevent TCP sessions from being dropped by adjusting the MSS value of the TCP SYN packets.

The **ip tcp adjust-mss** command is effective only for TCP connections passing through the router.

In most cases, the optimum value for the *max-segment-size* argument is 1452 bytes. This value plus the 20-byte IP header, the 20-byte TCP header, and the 8-byte PPPoE header add up to a 1500-byte packet that matches the MTU size for the Ethernet link.

If you are configuring the **ip mtu** command on the same interface as the **ip tcp adjust-mss** command, it is recommended that you use the following commands and values:

- **ip tcp adjust-mss 1452**
- **ip mtu 1492**

Examples

The following example shows the configuration of a PPPoE client with the MSS value set to 1452:

```

vpdn enable
no vpdn logging
!
vpdn-group 1
request-dialin
protocol pppoe
!
interface Ethernet0
 ip address 192.168.100.1.255.255.255.0
 ip tcp adjust-mss 1452
 ip nat inside
!
interface ATM0
 no ip address
 no atm ilmi-keepalive
 pvc 8/35
  pppoe client dial-pool-number 1
!
dsl equipment-type CPE
dsl operating-mode GSHDSL symmetric annex B
dsl linerate AUTO
!
interface Dialer1
 ip address negotiated
 ip mtu 1492
 ip nat outside
 encapsulation ppp
 dialer pool 1
 dialer-group 1
 ppp authentication pap callin
 ppp pap sent-username sohodyn password 7 141B1309000528
!
ip nat inside source list 101 Dialer1 overload
ip route 0.0.0.0.0.0.0.0 Dialer1
access-list permit ip 192.168.100.0.0.0.0.255 any

```

Related Commands

Command	Description
ip mtu	Sets the MTU size of IP packets sent on an interface.

max bandwidth

To specify the total amount of outgoing bandwidth available to switched virtual circuits (SVCs) in the current configuration, use the **max bandwidth** command in interface-ATM-VC configuration mode. To remove the current bandwidth setting, use the **no** form of this command.

max bandwidth *kbps*

no max bandwidth *kbps*

Syntax Description	<i>kbps</i>	Total amount of outgoing bandwidth in kilobits per second available to all SVCs in the current configuration.
---------------------------	-------------	---

Defaults	No default behavior or values
-----------------	-------------------------------

Command Modes	Interface-ATM-VC configuration
----------------------	--------------------------------

Command History	Release	Modification
	12.1(3)T	This command was introduced.

Usage Guidelines	Only the guaranteed cell rate of an SVC is counted toward the maximum bandwidth.
-------------------------	--

Examples	In following example, an SVC called “anna” on ATM interface 2/0/0 is configured using the max bandwidth command to allow a maximum of 50 Mbps of bandwidth to be used by all of the SVCs in this configuration:
-----------------	--

```
interface ATM 2/0/0
  svc anna
  encapsulation aal5auto
  protocol ppp virtual-template 1
  max bandwidth 50000
```

Related Commands	Command	Description
	max vc	Specifies the maximum number of SVCs that can be established using the current configuration.

max vc

To specify the maximum number of switched virtual circuits (SVCs) that can be established using the current configuration, use the **max vc** command in interface-ATM-VC configuration mode. To restore the maximum number of SVCs to the default setting, use the **no** form of this command.

max vc *number*

no max vc *number*

Syntax Description

<i>number</i>	Maximum number of SVCs to be established using the current SVC configuration.
---------------	---

Defaults

4096 SVCs

Command Modes

Interface-ATM-VC configuration

Command History

Release	Modification
12.1(3)T	This command was introduced.

Examples

In following example, an SVC called “anna” on ATM interface 2/0/0 is configured using the **max vc** command to allow a maximum of 100 SVCs to be established using this configuration:

```
interface ATM 2/0/0
  svc anna
  encapsulation aal5auto
  protocol ppp virtual-template 1
  max vc 100
```

Related Commands

Command	Description
max bandwidth	Specifies the maximum amount of bandwidth available to all SVCs in the current configuration.
svc	Creates an ATM SVC.

pppoe enable

To enable PPP over Ethernet (PPPoE) sessions on an Ethernet interface or subinterface, use the **pppoe enable** command in the appropriate configuration mode. To disable PPPoE, use the **no** form of this command.

pppoe enable [**group** *group-name*]

no pppoe enable

Syntax Description

group	(Optional) Specifies that a PPPoE profile will be used by PPPoE sessions on the interface.
<i>group-name</i>	(Optional) Name of the PPPoE profile to be used by PPPoE sessions on the interface.

Defaults

PPPoE is disabled by default.

Command Modes

Interface configuration
VLAN configuration
VLAN range configuration

Command History

Release	Modification
12.1(2)T	This command was introduced.
12.1(5)T	This command was modified to enable PPPoE on IEEE 802.1Q encapsulated VLAN interfaces.
12.2(15)T	The group option was added.
12.3(2)T	This command was implemented in VLAN configuration mode and VLAN range configuration mode.
12.3(7)XI3	This command was integrated into Cisco IOS Release 12.3(7)XI3.

Usage Guidelines

If a PPPoE profile is not specified by using the **group** option, PPPoE sessions will be established using values from the global PPPoE profile. PPPoE profiles must be configured using the **bba-group pppoe** command.

Examples

PPPoE on an Ethernet Interface: Example

The following example enables PPPoE sessions on Ethernet interface 1/0. PPPoE sessions will be established using the PPPoE parameters in the global PPPoE profile.

```
Router(config)# interface ethernet 1/0
Router(config-if)# pppoe enable
!
Router(config)# bba-group pppoe global
Router(config-bba-group)# virtual-template 1
```

```
Router(config-bba-group)# sessions max limit 8000
Router(config-bba-group)# sessions per-vc limit 8
Router(config-bba-group)# sessions per-mac limit 2
```

PPPoE on an 802.1Q VLAN Subinterface: Example

The following example shows how to enable PPPoE on an 802.1Q VLAN subinterface. PPPoE sessions will be established using the PPPoE parameters in PPPoE profile “vpn1”.

```
Router(config)# interface ethernet 2/3.1
Router(config-if)# encapsulation dot1q 1
Router(config-if)# pppoe enable group vpn1
!
Router(config)# bba-group pppoe vpn1
Router(config-bba-group)# virtual-template 1
Router(config-bba-group)# sessions per-vc limit 2
Router(config-bba-group)# sessions per-mac limit 1
```

PPPoE on an 802.1Q VLAN Main Interface: Example

The following example shows how to configure PPPoE over a range of 802.1Q VLANs on Fast Ethernet interface 0/0. The VLAN range is configured on the main interface, and therefore each VLAN will not use up a separate subinterface.

```
Router(config)# interface fastethernet 0/0
Router(config-if)# no ip address
Router(config-if)# no ip mroute-cache
Router(config-if)# duplex half
Router(config-if)# vlan-range dot1q 20 30
Router(config-if-vlan-range)# pppoe enable group PPPOE
Router(config-if-vlan-range)# exit-vlan-config
```

Related Commands

Command	Description
bba-group pppoe	Creates a PPPoE profile.
debug pppoe	Displays debugging information for PPPoE sessions.
sessions max limit	Configures a PPPoE global profile with the maximum number of PPPoE sessions permitted on a router and sets the PPPoE session-count threshold.
sessions per-vlan limit	Specifies the maximum number of PPPoE sessions under each VLAN.

pppoe limit max-sessions

To specify the maximum number of PPP over Ethernet (PPPoE) sessions that will be permitted on a router, use the **pppoe limit max-sessions** command in VPDN group configuration mode. To remove this specification, use the **no** form of this command.

pppoe limit max-sessions *number-of-sessions*

no pppoe limit max-sessions

Syntax Description

<i>number-of-sessions</i>	Maximum number of PPPoE sessions that will be permitted on the router. The range is from 0 to the maximum number of interfaces on the router.
---------------------------	---

Defaults

Maximum *number-of-sessions* is not set.

Command Modes

VPDN group configuration

Command History

Release	Modification
12.2(1)DX	This command was introduced.
12.2(2)DD	This command was integrated into Cisco IOS Release 12.2(2)DD.
12.2(4)B	This command was integrated into Cisco IOS Release 12.2(4)B.
12.2(13)T	This command was integrated into Cisco IOS Release 12.2(13)T.
12.2(27)SB	This command was integrated into Cisco IOS Release 12.2(27)SB.

Usage Guidelines

PPPoE session limits configured using the **pppoe limit per-vc**, **pppoe limit per-vlan**, **pppoe max-sessions**, **pppoe max-sessions** (VC), and **pppoe max-sessions** (subinterface) commands take precedence over limits configured for the router using the **pppoe limit max-sessions** command.

Examples

The following example shows a limit of 100 PPPoE sessions configured for the router.

```
vpdn enable

vpdn-group 1
 accept dialin
  protocol pppoe
  virtual-template 1
 pppoe limit max-sessions 100
```

Related Commands	Command	Description
	debug vpdn pppoe-errors	Displays PPPoE protocol errors that prevent a session from being established or errors that cause an established session to be closed.
	pppoe limit per-mac	Specifies the maximum number of PPPoE sessions to be sourced from a MAC address.
	pppoe limit per-vc	Specifies the maximum number of PPPoE sessions permitted on all VCs.
	pppoe limit per-vlan	Specifies the maximum number of PPPoE sessions permitted on a VLAN.
	pppoe max-sessions	Specifies the maximum number of PPPoE sessions permitted on an ATM PVC, PVC range, VC class, or Ethernet subinterface.

pppoe limit per-mac

To specify the maximum number of PPPoE sessions to be sourced from a MAC address, use the **pppoe limit per-mac** command in VPDN configuration mode.

pppoe limit per-mac *number*

Syntax Description	<i>number</i>	Maximum number of PPPoE sessions that can be sourced from a MAC address.
--------------------	---------------	--

Defaults	100 sessions
----------	--------------

Command Modes	VPDN configuration
---------------	--------------------

Command History	Release	Modification
	12.1(1)T	This command was introduced.

Examples	The following example sets a limit of 10 sessions to be sourced from a MAC address: pppoe limit per-mac 10
----------	---

Related Commands	Command	Description
	pppoe limit per-vc	Specifies the maximum number of PPPoE sessions to be established over a VC.
	pppoe limit per-vlan	Specifies the maximum number of PPPoE sessions under each VLAN.

pppoe limit per-vc

To specify the maximum number of PPPoE sessions to be established over a VC, use the **pppoe limit per-vc** command in VPDN configuration mode.

pppoe limit per-vc *number*

Syntax Description	<i>number</i>	Maximum number of PPPoE sessions that can be established over an ATM PVC.
--------------------	---------------	---

Defaults	100 sessions
----------	--------------

Command Modes	VPDN configuration
---------------	--------------------

Command History	Release	Modification
	12.1(1)T	This command was introduced.

Examples	The following example sets a limit of 10 sessions to be established over a VC: pppoe limit per-vc 10
----------	---

Related Commands	Command	Description
	pppoe limit max-sessions	Specifies the maximum number of PPPoE sessions to be sourced from a MAC address.
	pppoe limit per-vlan	Specifies the maximum number of PPPoE sessions under each VLAN.

pppoe limit per-vlan

To specify the maximum number of PPP over Ethernet (PPPoE) sessions permitted under each virtual LAN (VLAN), use the **pppoe limit per-vlan** command in VPDN configuration mode. To remove this specification, use the **no** form of this command.

pppoe limit per-vlan *number*

no pppoe limit per-vlan

Syntax Description	<i>number</i>	Maximum number of PPP over Ethernet sessions permitted under each VLAN.
--------------------	---------------	---

Defaults	100 PPPoE sessions per VLAN
----------	-----------------------------

Command Modes	VPDN configuration
---------------	--------------------

Command History	Release	Modification
	12.1(5)T	This command was introduced.

Usage Guidelines	If the pppoe max-session command is configured on a VLAN, that command will take precedence over the pppoe limit per-vlan command. The pppoe limit per-vlan command applies to all VLANs on which the pppoe max-session command has not been configured.
------------------	--

The **pppoe limit per-vlan** command must be configured after the accept dial-in VPDN group has been configured using the **accept-dialin** VPDN configuration command.

Examples	The following example shows a maximum of 200 PPPoE sessions configured for an 802.1Q VLAN subinterface:
----------	---

```
interface FastEthernet0/0.10
 encapsulation dot1Q 10
 pppoe enable
!
vpdn enable
vpdn-group 1
 accept dialin
  protocol pppoe
  virtual-template 1
 pppoe limit per-vlan 200
```

Related Commands	Command	Description
	accept dial-in	Creates an accept dial-in VPDN subgroup.
	debug vpdn pppoe-data	Displays data packets of PPPoE sessions.

Command	Description
debug vpdn pppoe-error	Displays PPPoE protocol errors that prevent a session from being established or errors that cause an established session to be closed.
debug vpdn pppoe-events	Displays PPPoE protocol messages about events that are part of normal session establishment or shutdown.
debug vpdn pppoe-packet	Displays each PPPoE protocol packet exchanged.
pppoe enable	Enables PPPoE sessions on an Ethernet interface.
pppoe limit max-sessions	Specifies the maximum number of PPPoE sessions to be sourced from a MAC address.
pppoe limit per-vc	Specifies the maximum number of PPPoE sessions to be established over a VC.
pppoe max-sessions	Specifies the maximum number of PPPoE sessions permitted under a VLAN.

pppoe max-sessions

To specify the maximum number of PPP over Ethernet (PPPoE) sessions that will be permitted on an ATM permanent virtual circuit (PVC), PVC range, virtual circuit (VC) class, or Ethernet subinterface, use the **pppoe max-sessions** command in the appropriate mode. To remove this specification, use the **no** form of this command.

pppoe max-sessions *number-of-sessions*

no pppoe max-sessions

Syntax Description

number-of-sessions

Maximum number of PPPoE sessions that will be permitted.

Note The PPPoE session limit in the case of a PVC range applies to *each* PVC in the range. This limit is not cumulative on *all* PVCs belonging to the range.

Defaults

Maximum number of sessions is not set.

Command Modes

Ethernet subinterface configuration
Interface-ATM-VC configuration
VC-class configuration
ATM PVC range configuration
PVC-in-range configuration

Command History

Release	Modification
12.1(5)T	This command was introduced.
12.2(4)T	This command was modified to limit PPPoE sessions on ATM PVCs, PVC ranges, and VC classes.

Usage Guidelines

PPPoE sessions can be limited in the following ways:

- The **pppoe limit max-sessions** command limits the total number of PPPoE sessions on the router, regardless of the type of medium the sessions are using.
- The **pppoe limit per-mac** command limits the number of PPPoE sessions that can be sourced from a single MAC address. This limit also applies to all PPPoE sessions on the router.
- The **pppoe limit per-vc** and **pppoe limit per-vlan** commands limit the number of PPPoE sessions on all PVCs or VLANs on the router. The **pppoe max-sessions** command limits the number of PPPoE sessions on a specific PVC or VLAN. Limits created for a specific PVC or VLAN using the **pppoe max-session** command take precedence over the global limits created with the **pppoe limit per-vc** and **pppoe limit per-vlan** commands.

PPPoE session limits created on an ATM PVC take precedence over limits created in a VC class or ATM PVC range.

PPPoE session limits created in an ATM PVC range take precedence over limits created in a VC class.

Examples**Ethernet Subinterface Example**

The following example shows a limit of 200 PPPoE sessions configured for the subinterface:

```
interface FastEthernet 0/0.10
 encapsulation dot1Q 10
 pppoe enable
 pppoe max-sessions 200
```

ATM PVC Example

The following example shows a limit of 10 PPPoE sessions configured for the PVC:

```
interface ATM1/0.102 multipoint
 pvc 3/304
 encapsulation aal5snap
 protocol pppoe
 pppoe max-sessions 10
```

VC Class Example

The following example shows a limit of 20 PPPoE sessions that will be permitted per PVC in the VC class called “main”:

```
vc-class atm main
 pppoe max-sessions 20
```

ATM PVC Range Example

The following example shows a limit of 30 PPPoE sessions that will be permitted per PVC in the PVC range called “range-1”:

```
interface atm 6/0.110 multipoint
 range range-1 pvc 100 4/199
 encapsulation aal5snap
 protocol ppp virtual-template 2
 pppoe max-sessions 30
```

Individual PVC Within a PVC Range Example

The following example shows a limit of 10 PPPoE sessions configured for “pvc1”, which is part of the ATM PVC range called “range1”:

```
interface atm 6/0.110 multipoint
 range range1 pvc 100 4/199
 pvc-in-range pvc1 3/104
 pppoe max-sessions 10
```

Related Commands

Command	Description
debug vpdn pppoe-errors	Displays PPPoE protocol errors that prevent a session from being established or errors that cause an established session to be closed.
pppoe limit max-sessions	Specifies the maximum number of PPPoE sessions that will be permitted on a router.
pppoe limit per-mac	Specifies the maximum number of PPPoE sessions to be sourced from a MAC address.
pppoe limit per-vc	Specifies the maximum number of PPPoE sessions permitted on all VCs.
pppoe limit per-vlan	Specifies the maximum number of PPPoE sessions permitted on a VLAN.

pppoe service

To add a PPP over Ethernet (PPPoE) service name to a local subscriber profile, use the **pppoe service** command in subscriber profile configuration mode. To remove a PPPoE service name from a subscriber profile, use the **no** form of this command.

pppoe service *service-name*

no pppoe service *service-name*

Syntax Description

<i>service-name</i>	Name of the PPPoE service to be added to the subscriber profile.
---------------------	--

Defaults

A PPPoE service name is not part of a subscriber profile.

Command Modes

Subscriber profile configuration

Command History

Release	Modification
12.3(4)T	This command was introduced.

Usage Guidelines

A subscriber profile contains a list of PPPoE service names. Use the **pppoe service** command to add PPPoE service names to a local subscriber profile.

When you configure PPPoE service selection, you define a RADIUS service profile for each service name, list the service names that you want to advertise in a subscriber profile, and then assign the subscriber profile to a PPPoE profile. The PPPoE server will advertise the service names that are listed in the subscriber profile to each PPPoE client connection that uses the configured PPPoE profile.

Examples

The following example shows PPPoE service names being added to the subscriber profile called “listA”:

```
!  
! Configure the AAA default authorization method  
aaa new-model  
aaa authorization network default local  
!  
! Configure the subscriber profile  
subscriber profile listA  
  pppoe service gold_isp_A  
  pppoe service silver_isp_A  
  pppoe service isp_xyz  
!  
! Configure the PPPoE profile  
bba-group pppoe group_A  
  virtual-template 1  
  sessions per-vc 5  
  service profile listA  
!  
! Attach the PPPoE profile to a PVC
```

pppoe service

```
interface atm1/0.1
 pvc 2/200
  protocol PPPoE group group_A
!
```

Related Commands

Command	Description
clear pppoe derived	Clears the cached PPPoE configuration of a PPPoE profile and forces the PPPoE profile to reread the configuration from the assigned subscriber profile.
service profile	Assigns a subscriber profile to a PPPoE profile.
show pppoe derived	Displays the cached PPPoE configuration that is derived from the subscriber profile for a specified PPPoE profile.
subscriber profile	Defines Subscriber Service Switch policy for searches of a subscriber profile database.

pppoe-client dial-pool-number

To configure a PPP over Ethernet (PPPoE) client and to specify dial-on-demand routing (DDR) functionality, use the **pppoe-client dial-pool-number** command in either interface configuration mode or ATM virtual circuit configuration mode. To disable any configured functionality, use the **no** form of this command.

pppoe-client dial-pool-number *number* [**dial-on-demand**]

no pppoe-client dial-pool-number *number* [**dial-on-demand**]

Syntax Description

<i>number</i>	Unique number of a dial group configured with the dialer-group dialer interface command.
dial-on-demand	(Optional) Enables DDR functionality for the PPPoE connection.

Defaults

A PPPoE client is not configured, and DDR functionality is disabled.

Command Modes

Interface configuration
ATM virtual circuit configuration

Command History

Release	Modification
12.1(3)XG	This command was introduced.
12.2(2)T	This command was integrated into Cisco IOS Release 12.2(2)T.
12.2(13)T	The dial-on-demand keyword was added to allow the configuration of DDR interesting traffic control list functionality.

Usage Guidelines

One permanent virtual circuit (PVC) will support only one PPPoE client. Multiple PPPoE clients can run concurrently on different permanent virtual circuits (PVCs), but each PPPoE client must use a separate dialer interface and a separate dialer pool.

Use this command to configure dial-on-demand routing (DDR) interesting traffic control list functionality of the dialer interface with a PPP over Ethernet (PPPoE) client. When the DDR functionality is configured for this command, the following DDR commands must also be configured: **dialer-group**, **dialer hold-queue**, **dialer idle-timeout**, and **dialer-list**.

Tips for Configuring the Dialer Interface

If you are configuring a hard-coded IP address under the dialer interface, you can configure a default IP route using the **ip route** command as follows:

```
ip route 0.0.0.0 0.0.0.0 dialer1
```

But if you are configuring a negotiated IP address using the **ip address negotiated** command under the dialer interface, you must configure a default IP route using the **ip route** command as follows:

```
ip route 0.0.0.0 0.0.0.0 dialer1 permanent
```

The reason is that the dialer interface will lose its IP address when a PPPoE session is brought down (even if the dialer does not go down), and hence the route removal routine will take effect and remove all IP routes pointed at the dialer interface, even the default IP route. Although the default IP route will be added back about one minute later by IP background processes, you may risk losing incoming packets during the interval.

Examples

PPPoE Client DDR Idle-Timer on an Ethernet Interface

The following example shows how to configure the PPPoE client DDR idle-timer on an Ethernet interface and includes the required DDR commands:

```
!
vpdn enable
no vpdn logging
!
vpdn-group 1
 request-dialin
 protocol pppoe
!
interface Ethernet1
 pppoe enable
 pppoe-client dial-pool-number 1 dial-on-demand
!
interface Dialer1
 ip address negotiated
 ip mtu 1492
 encapsulation ppp
 dialer pool 1
 dialer idle-timeout 180 either
 dialer hold-queue 100
 dialer-group 1
!
dialer-list 1 protocol ip permit
!
ip route 0.0.0.0 0.0.0.0 Dialer1
```

PPPoE client DDR Idle-Timer on an ATM PVC

The following example shows how to configure the PPPoE client DDR idle-timer on an ATM PVC interface and includes the required DDR commands:

```
!
vpdn enable
no vpdn logging
!
vpdn-group 1
 request-dialin
 protocol pppoe
!
interface ATM2/0
 pvc 2/100
 pppoe-client dial-pool-number 1 dial-on-demand
!
interface Dialer1
 ip address negotiated
 ip mtu 1492
 encapsulation ppp
 dialer pool 1
 dialer idle-timeout 180 either
 dialer hold-queue 100
 dialer-group 1
!
```

```
dialer-list 1 protocol ip permit
!
ip route 0.0.0.0 0.0.0.0 Dialer1
```

Related Commands

Command	Description
debug vpdn pppoe-data	Displays PPPoE session data packets.
debug vpdn pppoe-errors	Displays PPPoE protocol errors that prevent a session from being established or errors that cause an established session to be terminated.
debug vpdn pppoe-events	Displays PPPoE protocol messages about events that are part of normal session establishment or shutdown.
debug vpdn pppoe-packets	Displays each PPPoE protocol packet exchanged.
dialer-group	Controls access by configuring a virtual access interface to belong to a specific dialing group.
dialer hold-queue	Allows interesting outgoing packets to be queued until a modem connection is established.
dialer idle-timeout	Specifies the idle time before the line is disconnected.
dialer-list	Defines a DDR dialer list to control dialing by protocol or by a combination of protocol and an access list.

protocol pppoe (ATM VC)

To enable PPP over Ethernet (PPPoE) sessions to be established on permanent virtual circuits (PVCs), use the **protocol pppoe** command in the appropriate configuration mode. To disable PPPoE, use the **no** form of this command.

protocol pppoe [**group** *group-name*]

no protocol pppoe [**group** *group-name*]

Syntax Description

group	(Optional) Specifies a PPPoE profile to be used by PPPoE sessions on the interface.
<i>group-name</i>	(Optional) Name of the PPPoE profile to be used by PPPoE sessions on the interface.

Defaults

PPPoE is not enabled.

Command Modes

ATM VC configuration
 ATM VC class configuration
 ATM PVC range configuration
 ATM PVC-in-range configuration

Command History

Release	Modification
12.2(15)T	This command was introduced.
12.3(7)X13	This command was integrated into Cisco IOS Release 12.3(7)X13.

Usage Guidelines

If a PPPoE profile is not specified by using the **group** option, PPPoE sessions will be established using values from the global PPPoE profile. PPPoE profiles must be configured using the **bba-group pppoe** command.

Examples

The following example shows PPPoE configured in virtual circuit (VC) class “class-pppoe-global” and on the range of PVCs from 100 to 109. PVCs that use VC class “class-pppoe-global” will establish PPPoE sessions using the parameters configured in the global PPPoE profile. PVCs in the PVC range will use PPPoE parameters defined in PPPoE profile “vpn1”.

```
bba-group pppoe global
  virtual-template 1
  sessions max limit 8000
  sessions per-vc limit 8
  sessions per-mac limit 2
!
bba-group pppoe vpn1
  virtual-template 1
  sessions per-vc limit 2
  sessions per-mac limit 1
```

```
!  
vc-class atm class-pppoe-global  
  protocol pppoe  
!  
interface ATM1/0.10 multipoint  
  range range-pppoe-1 pvc 100 109  
  protocol pppoe group vpn1  
!  
interface ATM1/0.20 multipoint  
  class-int class-pppoe-global  
  pvc 0/200  
!  
  pvc 0/201  
!
```

Related Commands

Command	Description
bba-group pppoe	Creates a PPPoE profile.
debug pppoe	Displays debugging information for PPPoE sessions.
sessions max limit	Configures a PPPoE global profile with the maximum number of PPPoE sessions permitted on a router and sets the PPPoE session-count threshold.
sessions per-mac limit	Sets the maximum number of PPPoE sessions allowed per MAC address in a PPPoE profile.
sessions per-vc limit	Sets the maximum number of PPPoE sessions to be established over a VC and sets the PPPoE session-count threshold.

protocol pppovlan dot1q

To configure an ATM PVC to support PPPoE over a specific IEEE 802.1Q VLAN or range of VLANs, use the **protocol pppovlan dot1q** command in ATM VC configuration or VC class configuration mode. To disable ATM PVC support for PPPoE for a specific IEEE 802.1Q VLAN or a range of VLANs, use the **no** form of this command.

protocol pppovlan dot1q {*vlan-id* | *start-vlan-id end-vlan-id*} [**group** *group-name*]

no protocol pppovlan dot1q {*vlan-id* | *start-vlan-id end-vlan-id*} [**group** *group-name*]

Syntax Description	<i>vlan-id</i>	VLAN identifier. Valid values range from 1 to 4095.
	<i>start-vlan-id</i>	VLAN identifier of the first VLAN in the range. Valid values range from 1 to 4095.
	<i>end-vlan-id</i>	VLAN identifier of the last VLAN in the range. Valid values range from 1 to 4095.
	group	(Optional) Specifies that a PPPoE profile will be used by PPPoE sessions on the interface.
	<i>group-name</i>	(Optional) Name of the PPPoE profile to be used by PPPoE sessions on the interface.

Defaults ATM PVC support for PPPoE over 802.1Q VLAN encapsulation is not enabled.

Command Modes ATM VC configuration
VC class configuration

Command History	Release	Modification
	12.3(2)T	This command was introduced.

Usage Guidelines The **protocol pppovlan dot1q** command enables an ATM PVC to support PPPoE over 802.1Q VLAN traffic that uses bridged RFC 1483 encapsulation.

An ATM PVC will drop 802.1Q traffic that is configured for non-PPPoE VLANs.

PPPoE over 802.1Q VLANs over ATM is supported on the PPPoE server only.

Examples The following example shows how to configure an ATM PVC to support PPPoE over a range of 802.1Q VLANs:

```
bba-group pppoe PPPOEOA
 virtual-template 1
 sessions per-mac limit 1

interface virtual-template 1
 ip address 10.10.10.10 255.255.255.0
```

```
mtu 1492

interface atm 4/0.10 multipoint
 pvc 10/100
  protocol pppovlan dot1q range 10 30 group PPPOEOA
```

Related Commands

Command	Description
debug pppoe	Displays debugging information for PPPoE sessions.

pvc-in-range

To configure an individual permanent virtual circuit (PVC) within a PVC range, use the **pvc-in-range** command in PVC range configuration mode. To delete the individual PVC configuration, use the **no** form of this command.

pvc-in-range [*pvc-name*] [*vpi/vci*]

no pvc-in-range [*pvc-name*] [*vpi/vci*]

Syntax Description

<i>pvc-name</i>	(Optional) Name given to the PVC. The PVC name can have a maximum of 15 characters.
<i>vpi/</i>	(Optional) ATM network virtual path identifier (VPI) for this PVC. In the absence of the “/” and a <i>vpi</i> value, the <i>vpi</i> value defaults to 0. The <i>vpi</i> value ranges from 0 to 255.
<i>vci</i>	(Optional) ATM network virtual channel identifier (VCI) for this PVC. The <i>vci</i> value ranges from 32 to 2047.

Defaults

No default behavior or values

Command Modes

PVC range configuration

Command History

Release	Modification
12.1(5)T	This command was introduced.

Usage Guidelines

The **pvc-in-range** command defines an individual PVC within a PVC range and enables PVC-in-range configuration mode.

Examples

In the following example, a PVC called “pppoa” is deactivated. The PVC “pppoa” is an individual PVC within a configured PVC range.

```
pvc-in-range pppoa 0/130
shutdown
```

Related Commands

Command	Description
range pvc	Defines a range of ATM PVCs.

range pvc

To define a range of ATM permanent virtual circuits (PVCs), use the **range pvc** command in subinterface configuration mode. To delete the range of ATM PVCs, use the **no** form of this command.

range [*range-name*] **pvc** *start-vpi/start-vci end-vpi/end-vci*

no range [*range-name*] **pvc**

Syntax Description

<i>range-name</i>	(Optional) Name of the range. The range name can be a maximum of 15 characters.
<i>start-vpi/</i>	Beginning value for a range of virtual path identifiers (VPIs). In the absence of the “/” and a <i>vpi</i> value, the <i>vpi</i> value defaults to 0. The <i>vpi</i> value ranges from 0 to 255.
<i>start-vci/</i>	Beginning value for a range of virtual channel identifiers (VCIs). The <i>vci</i> value ranges from 32 to 65535.
<i>end-vpi/</i>	End value for a range of virtual path identifiers (VPIs). In the absence of an <i>end-vpi</i> value, the <i>end-vpi</i> value defaults to the <i>start-vpi</i> value. The <i>vpi</i> value ranges from 0 to 255.
<i>end-vci</i>	End value for a range of virtual channel identifiers (VCIs). The <i>vci</i> value ranges from 32 to 65535.

Defaults

An ATM PVC range is not configured.

Command Modes

Subinterface configuration

Command History

Release	Modification
12.1(5)T	This command was introduced.

Usage Guidelines

The **range pvc** command defines a range of PVCs and enables PVC range configuration mode.

The number of PVCs in a range can be calculated using the following formula:

$$\text{number of PVCs} = (\text{end-vpi} - \text{start-vpi} + 1) \times (\text{end-vci} - \text{start-vci} + 1).$$

The *start-vpi* argument may be omitted if it is zero. The *end-vpi* argument may be omitted, but if it is omitted, it is assigned the value of *start-vpi*. The *end-vpi* and *end-vci* arguments are always greater than or equal to *start-vpi* and *start-vci* respectively.

When applied to multipoint subinterfaces, the **range pvc** command creates a range of ATM PVCs. When applied to point-to-point subinterfaces, the **range pvc** command creates range of PVCs and a corresponding range of point-to-point subinterfaces.

For point-to-point subinterfaces, subinterface numbering begins with the subinterface on which the PVC range is configured and increases sequentially through the range.

Examples

ATM PVC Range Example

In the following example, 100 PVCs with VCI values from 100 to 199 for each VPI value from 0 to 4 are created for a PVC range called “range-pppoa-1”. This configuration creates a total of 500 PVCs in the range. PVC parameters are then configured for the range.

```
interface atm 6/0.110 multipoint
range range-pppoa-1 pvc 100 4/199
  class-range class-pppoa-1
  ubr 1000
  encapsulation aal5snap
  protocol ppp virtual-Template 2
```

Subinterface Grouping by PVC Range for Routed Bridge Encapsulation Example

In the following example, a PVC range called “range1” is created with a total of 100 PVCs in the range. A point-to-point subinterface will be created for each PVC in the range. ATM routed bridge encapsulation is also configured.

```
interface atm 6/0.200 point-to-point
ip unnumbered loopback 1
atm route-bridged ip
range range1 pvc 1/200 1/299
# end
```

Related Commands

Command	Description
pvc-in-range	Configures an individual PVC within a PVC range.

rbe nasip

To specify the IP address of an interface on the Dynamic Host Configuration Protocol (DHCP) relay agent that will be sent to the DHCP server via the agent remote ID option, use the **rbe nasip** command in global configuration mode. To remove this specification, use the **no** form of this command.

rbe nasip *source-interface*

no rbe nasip *source-interface*

Syntax Description

<i>source-interface</i>	The type and number of one of the interfaces on the router. The IP address for this interface will be forwarded in the agent remote ID option and can be used by the DHCP server to uniquely identify the DHCP relay agent.
-------------------------	---

Defaults

No IP address is specified.

Command Modes

Global configuration

Command History

Release	Modification
12.2(2)T	This command was introduced.

Usage Guidelines

The **rbe nasip** command is used to configure support for the DHCP relay agent information option (option 82) for ATM routed bridge encapsulation (RBE).

Support for the DHCP relay agent information option must be configured on the DHCP relay agent using the **ip dhcp relay information option** command in order for the **rbe nasip** command to be effective.

Examples

In the following example, support for DHCP option 82 is enabled on the DHCP relay agent by the use of the **ip dhcp relay agent information option** command. The **rbe nasip** command configures the router to forward the IP address for Loopback0 to the DHCP server. ATM routed bridge encapsulation is configured on ATM subinterface 4/0.1.

```
ip dhcp-server 10.1.1.1
!
ip dhcp relay information option
!
interface Loopback0
 ip address 10.5.1.1 255.255.255.0
!
interface ATM4/0
 no ip address
!
interface ATM4/0.1 point-to-point
 ip unnumbered Loopback0
 ip helper-address 10.1.1.1
 atm route-bridged ip
 pvc 88/800
```

```
    encapsulation aal5snap
!
router eigrp 100
  network 10.0.0.0
!
rbe nasip loopback0
```

Related Commands

Command	Description
ip dhcp relay information option	Enables the system to insert the DHCP relay agent information option in forwarded BOOT REQUEST messages to a Cisco IOS DHCP server.

relay pppoe bba-group

To configure the PPP over Ethernet (PPPoE) broadband access (BBA) group that responds to PPPoE Active Discovery (PAD) messages, use the **relay pppoe bba-group** command in VPDN group configuration mode. To unconfigure the group, use the **no** form of this command.

relay pppoe bba-group *pppoe-bba-group-name*

no relay pppoe bba-group *pppoe-bba-group-name*

Syntax Description

pppoe-bba-group-name Name of the PPPoE BBA group.

Defaults

This command is disabled by default.

Command Modes

VPDN group configuration

Command History

Release	Modification
12.3(4)T	This command was introduced.

Usage Guidelines

On the router that responds to relayed PAD messages, this command configures a PPPoE group and attaches it to a virtual private dial-up network (VPDN) group that accepts dial-in calls for Layer 2 Tunnel Protocol (L2TP). The relayed PAD messages will be passed from the VPDN L2TP tunnel or session to the PPPoE broadband group for receiving the PAD response.

Examples

The following partial example shows how to configure a tunnel switch (or L2TP network server) to respond to PAD messages. The **relay pppoe bba-group** command configures PPPoE “group-1”, which is attached to accept dial-in VPDN group “Group-A”.

```
.
.
.
vpdn-group Group-A
! Configure an L2TP tunnel for PPPoE Relay
accept-dialin
protocol l2tp
.
.
.
terminate-from hostname LAC-1
relay pppoe bba-group group-1
.
.
! Configure the PPPoE group to respond to the relayed PAD messages
bba-group pppoe group-1
service profile profile-1
```

■ relay pppoe bba-group

Related Commands	Command	Description
	bba-group pppoe	Creates a PPPoE profile.
	vpdn-group	Associates a VPDN group with a customer or VPDN profile.

rx-speed

To configure the required speed on the ATM virtual circuit (VC) carrying the PPPoX session, and to transfer this information into attribute-value pair 38 (AVP 38) from the Layer 2 Tunnel Protocol (L2TP) Access Concentrator (LAC) to the L2TP network server (LNS) for asymmetric digital subscriber line (DSL) sessions, use the **rx-speed** command in PVC, PVC-in-range, or range configuration mode. To reset the variable to have the same value as that passed in AVP 24, use the **no** form of this command.

rx-speed *incoming-cell-rate*

no rx-speed

Syntax Description

<i>incoming-cell-rate</i>	Incoming cell rate for L2TP AVP 38, in Kbps.
---------------------------	--

Defaults

The same value as that passed in AVP 24.

Command Modes

PVC
PVC-in-range
Range

Command History

Release	Modification
12.3(11)T	This command was introduced.

Usage Guidelines

To allow L2TP to send AVP 38 with the required value from LAC to LNS for DSL services, use the **rx-speed** command in PVC, PVC-in-range, or range configuration mode.

The configured speed is transported to the LNS, which validates the session within AVP 24 and AVP 38.

Examples

The following examples show how L2TP sends AVP38 with the required value to LNS in the PVC, range PVC and PVC-in-range modes.

PVC

```
Router(config)# interface atm 6/0.110 multipoint
Router(config-if)# pvc 0/600
Router(config-if-atm-vc)# rx-speed 128
Router(config-if-atm-vc)# encapsulation aal5snap
Router(config-if-atm-vc)# exit
```

Range PVC

```
Router(config)# interface atm 6/0.110 multipoint
Router(config-subif)# range range-pppoa-1 pvc 100 4/199
Router(config-if-atm-range-pvc)# rx-speed 400
Router(config-if-atm-range-pvc)# exit
```

PVC-in-Range

```
Router(config)# interface atm 6/0.110 multipoint  
Router(config-subif)# range range1 pvc 100 4/199  
Router(config-if-atm-range)# pvc-in-range 0/300  
Router(config-if-atm-range-pvc)# rx-speed 200  
Router(config-if-atm-range-pvc)# shutdown
```


service profile

To assign a subscriber profile to a PPP over Ethernet (PPPoE) profile, use the **service profile** command in BBA group configuration mode. To remove a subscriber profile assignment from a PPPoE profile, use the **no** form of this command.

service profile *subscriber-profile-name* [**refresh** *minutes*]

no service profile *subscriber-profile-name* [**refresh** *minutes*]

Syntax Description

<i>subscriber-profile-name</i>	Name of the subscriber profile to be assigned to a PPPoE profile.
refresh	(Optional) Causes the cached PPPoE configuration to be timed out and reread from the subscriber profile.
<i>minutes</i>	(Optional) Number of minutes after which the cached PPPoE configuration will be timed out. The range is from 2 to 44640 minutes. There is no default.

Defaults

A subscriber profile is not assigned to a PPPoE profile.

Command Modes

BBA group configuration

Command History

Release	Modification
12.3(4)T	This command was introduced.
12.2(27)SB	This command was integrated into Cisco IOS Release 12.2(27)SB.

Usage Guidelines

A subscriber profile contains a list of PPPoE service names. Use the **service profile** command to assign a subscriber profile to a PPPoE profile. The PPPoE server will advertise the service names that are listed in the subscriber profile to each PPPoE client connection that uses the configured PPPoE profile.

A subscriber profile can be configured locally on the router or remotely on a AAA server. The PPPoE configuration that is derived from a subscriber profile is cached locally under the PPPoE profile. Use the **service profile** command with the **refresh** keyword and the *minutes* argument to cause the cached PPPoE configuration to be timed out after a specified number of minutes. When the cached PPPoE configuration is timed out, the PPPoE profile rereads the configuration in the subscriber profile.

Examples

The following example shows how to assign a subscriber profile called “customer_tunnels” to a PPPoE profile called “group_A”:

```
!  
! Configure the AAA default authorization method  
aaa new-model  
aaa authorization network default group radius  
!  
! Configure the PPPoE profile  
bba-group pppoe group_A
```

```

virtual-template 1
sessions per-vc 5
service profile customer_tunnels
!
! Attach the PPPoE profile to PVCs
interface atm1/0.1
pvc 2/200
    protocol PPPoE group pppoe_group_A
!
interface atm1/0.2
pvc 3/300
    protocol PPPoE group pppoe_group_A

```

Related Commands

Command	Description
bba-group pppoe	Creates a PPPoE profile.
clear pppoe derived	Clears the cached PPPoE configuration of a PPPoE profile and forces the PPPoE profile to reread the configuration from the assigned subscriber profile.
service profile	Assigns a subscriber profile to a PPPoE profile.
show pppoe derived	Displays the cached PPPoE configuration that is derived from the subscriber profile for a specified PPPoE profile.
subscriber profile	Defines Subscriber Service Switch policy for searches of a subscriber profile database.

sessions max limit

To configure the PPP over Ethernet (PPPoE) global profile with the maximum number of PPPoE sessions that will be permitted on a router and to set the PPPoE session-count threshold at which a Simple Network Management Protocol (SNMP) trap will be generated, use the **sessions max limit** command in BBA group configuration mode. To remove these settings, use the **no** form of this command.

sessions max limit *number-of-sessions* [**threshold** *threshold-value*]

no sessions max limit *number-of-sessions* [**threshold** *threshold-value*]

Syntax Description

<i>number-of-sessions</i>	Maximum number of PPPoE sessions that will be permitted on the router. The range is from 0 to the total number of interfaces on the router.
threshold	(Optional) Sets the PPPoE session-count threshold at which an SNMP trap will be generated.
<i>threshold-value</i>	(Optional) Number of PPPoE sessions that will cause an SNMP trap to be generated. The range is from 0 to the total number of interfaces on the router.

Defaults

There is no default *number-of-sessions*.
The default *threshold-value* is the configured *number-of-sessions*.

Command Modes

BBA group configuration

Command History

Release	Modification
12.2(15)T	This command was introduced.
12.3(7)X13	This command was integrated into Cisco IOS Release 12.3(7)X13.

Usage Guidelines

This command can be used only in a global PPPoE profile.

The **snmp-server enable traps pppoe** command must be configured in order for SNMP traps to be generated when the PPPoE session-count threshold is reached.

Examples

The following example shows the global PPPoE profile configured with a maximum PPPoE session limit of 8000 sessions. The PPPoE session-count threshold is set at 7000 sessions, so when the number of PPPoE sessions on the router reaches 7000, an SNMP trap will be generated.

```
bba-group pppoe global
 virtual-template 1
  sessions max limit 8000 threshold 7000
  sessions per-vc limit 8
  sessions per-mac limit 2
```

Related Commands	Command	Description
	bba-group pppoe	Creates a PPPoE profile.
	sessions per-mac limit	Sets the maximum number of PPPoE sessions allowed per MAC address in a PPPoE profile.
	sessions per-vc limit	Sets the maximum number of PPPoE sessions permitted over a VC and sets the PPPoE session-count threshold.
	sessions per-vlan limit	Sets the maximum number of PPPoE sessions per VLAN in a PPPoE profile.
	snmp-server enable traps pppoe	Enables PPPoE session-count SNMP notifications.

sessions per-mac limit

To set the maximum number of PPP over Ethernet (PPPoE) sessions allowed per MAC address in a PPPoE profile, use the **sessions per-mac limit** command in BBA group configuration mode. To remove this setting, use the **no** form of this command.

sessions per-mac limit *per-mac-limit*

no sessions per-mac limit *per-mac-limit*

Syntax Description	<i>per-mac-limit</i>	Maximum number of PPPoE sessions that can be sourced from a MAC address. The default is 100 sessions.
---------------------------	----------------------	---

Defaults	100 sessions
-----------------	--------------

Command Modes	BBA group configuration
----------------------	-------------------------

Command History	Release	Modification
	12.2(15)T	This command was introduced.
	12.3(7)XI3	This command was integrated into Cisco IOS Release 12.3(7)XI3.

Usage Guidelines	Use the sessions per-mac limit command to configure a PPPoE profile with the maximum number of PPPoE sessions that will be allowed per MAC address.
	You cannot configure PPPoE session limits in PPPoE profiles and in VPDN groups simultaneously. You also cannot configure session limits in PPPoE profiles and directly on PPPoE ports (Ethernet interface, VLAN, or permanent virtual circuit (PVC)) simultaneously.

Examples	The following example show a limit of two PPPoE sessions per MAC address configured in the global PPPoE profile:
	<pre>bba-group pppoe global virtual-template 1 sessions max limit 8000 threshold-sessions 7000 sessions per-vc limit 8 sessions per-mac limit 2</pre>

Related Commands	Command	Description
	bba-group pppoe	Creates a PPPoE profile.
	sessions max limit	Configures a PPPoE global profile with the maximum number of PPPoE sessions that will be permitted on a router and sets the PPPoE session-count threshold.

Command	Description
sessions per-vc limit	Sets the maximum number of PPPoE sessions to be established over a VC in a PPPoE profile and sets the PPPoE session-count threshold.
sessions per-vlan limit	Sets the maximum number of PPPoE sessions per VLAN in a PPPoE profile.

sessions per-vc limit

To set the maximum number of PPP over Ethernet (PPPoE) sessions to be established over a virtual circuit (VC) in a PPPoE profile and to set the PPPoE session-count threshold at which a Simple Network Management Protocol (SNMP) trap will be generated, use the **sessions per-vc limit** command in BBA group configuration mode. To remove this specification, use the **no** form of this command.

sessions per-vc limit *per-vc-limit* [**threshold** *threshold-value*]

no sessions per-vc limit *per-vc-limit* [**threshold** *threshold-value*]

Syntax Description	<i>per-vc-limit</i>	Maximum number of PPPoE sessions that can be established over an ATM PVC. The default is 100.
	threshold	(Optional) Sets the PPPoE session-count threshold at which an SNMP trap will be generated.
	<i>threshold-value</i>	(Optional) Number of PPPoE sessions that will cause an SNMP trap to be generated.

Defaults

Sessions: 100
The default *threshold-value* is the *per-vc-limit*.

Command Modes

BBA group configuration

Command History

Release	Modification
12.2(15)T	This command was introduced.
12.3(7)X13	This command was integrated into Cisco IOS Release 12.3(7)X13.

Usage Guidelines

Use the **sessions per-vc limit** command to configure a PPPoE profile with the maximum number of PPPoE sessions that will be allowed per VC.

You cannot configure session limits in PPPoE profiles and directly on permanent virtual circuits (PVCs) simultaneously.

The **snmp-server enable traps pppoe** command must be configured in order for SNMP traps to be generated when the PPPoE session-count threshold is reached.

Examples

The following example shows a limit of eight PPPoE sessions per VC configured in the PPPoE profile “vpn1”:

```
bba-group pppoe vpn1
 virtual-template 1
  sessions per-vc limit 8
  sessions per-mac limit 2
```

Related Commands	Command	Description
	bba-group pppoe	Creates a PPPoE profile.
	sessions max limit	Configures a PPPoE global profile with the maximum number of PPPoE sessions that will be permitted on a router and sets the PPPoE session-count threshold.
	sessions per-mac limit	Sets the maximum number of PPPoE sessions allowed per MAC address in a PPPoE profile.
	sessions per-vlan limit	Sets the maximum number of PPPoE sessions per VLAN in a PPPoE profile.
	snmp-server enable traps pppoe	Enables PPPoE session-count SNMP notifications.

sessions per-vlan limit

To specify the maximum number of PPP over Ethernet (PPPoE) sessions permitted per VLAN in a PPPoE profile, use the **sessions per-vlan limit** command in BBA group configuration mode. To remove this specification, use the **no** form of this command.

sessions per-vlan limit *per-vlan-limit*

no sessions per-vlan limit *per-vlan-limit*

Syntax Description

<i>per-vlan-limit</i>	Maximum number of PPPoE sessions permitted under each VLAN. The default is 100.
-----------------------	---

Defaults

Sessions: 100

Command Modes

BBA group configuration

Command History

Release	Modification
12.2(15)T	This command was introduced.
12.3(7)XI3	This command was integrated into Cisco IOS Release 12.3(7)XI3.

Usage Guidelines

Use the **sessions per-vlan limit** command to configure a PPPoE profile with the maximum number of PPPoE sessions that will be allowed per VLAN.

You cannot configure session limits in PPPoE profiles and directly on VLANs simultaneously.

Examples

The following example shows a limit of 200 PPPoE sessions per VLAN configured in the PPPoE profile “vpn1”:

```
bba-group pppoe vpn1
 virtual-template 1
 sessions per-vlan limit 200
```

Related Commands

Command	Description
bba-group pppoe	Creates a PPPoE profile.
sessions max limit	Configures a PPPoE global profile with the maximum number of PPPoE sessions that will be permitted on a router and sets the PPPoE session-count threshold.
sessions per-mac limit	Sets the maximum number of PPPoE sessions allowed per MAC address in a PPPoE profile.
sessions per-vc limit	Sets the maximum number of PPPoE sessions to be established over a VC in a PPPoE profile and sets the PPPoE session-count threshold.

sessions throttle

To configure PPP over Ethernet (PPPoE) connection throttling, which limits the number of PPPoE session requests that can be made from a virtual circuit (VC) or a MAC address within a specified period of time, use the **sessions throttle** command in BBA group configuration mode. To remove this limit, use the **no** version of this command.

sessions {**per-mac** | **per-vc**} **throttle** *session-requests session-request-period blocking-period*

no sessions {**per-mac** | **per-vc**} **throttle** *session-requests session-request-period blocking-period*

Syntax Description

per-mac	Limits the number of PPPoE session requests that can be made from a single MAC address.
per-vc	Limits the number of PPPoE session requests that can be made from a single VC.
<i>session-requests</i>	Number of PPPoE session requests that will be allowed within a specified period of time. Range is from 1 to 100000.
<i>session-request-period</i>	Period of time, in seconds, during which a specified number of PPPoE session requests will be allowed. Range is from 1 to 3600.
<i>blocking-period</i>	Period of time, in seconds, during which PPPoE session requests will be blocked. This period begins when the number of PPPoE session requests from a VC or MAC address exceeds the configured <i>session-requests</i> value within the configured <i>session-request-period</i> . Range is from 0 to 3600.

Defaults

The number of PPPoE session requests that can be made within a specific period of time is not limited. There are no default values for the *session-requests*, *session-request-period*, and *blocking-period* arguments.

Command Modes

BBA group configuration

Command History

Release	Modification
12.2(15)T	This command was introduced.
12.2(107)S	This command was integrated into Cisco IOS Release 12.2(107)S.

Usage Guidelines

Continuous repeated requests to initiate PPPoE sessions can seriously affect the performance of a router and RADIUS server. Use the **sessions throttle** command to configure the PPPoE server to limit the number of requests for PPPoE sessions that can be made from a MAC address or VC during a configured period of time.

If a client exceeds the configured number of allowable session requests (*session-requests*) within the configured time limit (*session-request-period*), the PPPoE server accepts only the allowable number of session requests and blocks the MAC address or VC from making any more requests for a configured period of time (*blocking-period*).

After the *blocking-period* expires, the PPPoE server will again accept the configured number of session requests from the MAC address or VC within the configured *session-request-period*.

Examples

The following example shows the configuration of per-VC and per-MAC PPPoE connection throttling in PPPoE profile “grp1”:

```
bba-group pppoe grp1
virtual-template 1
sessions per-mac throttle 10 60 300
sessions per-vc throttle 100 30 300

interface ATM2/0.1 multipoint
pvc 2/100
encapsulation aal5snap
protocol pppoe group grp1

interface virtual-template1
ip address negotiated
no peer default ip address
ppp authentication chap
```

Related Commands

Command	Description
bba-group pppoe	Creates a PPPoE profile.
sessions per-mac limit	Sets the maximum number of PPPoE sessions allowed per MAC address in a PPPoE profile.
sessions per-vc limit	Sets the maximum number of PPPoE sessions to be established over a VC in a PPPoE profile and sets the PPPoE session-count threshold.

show atm svc ppp

To display information about each switched virtual circuit (SVC) configured for PPP over ATM, use the **show atm svc ppp** command in privileged EXEC mode.

show atm svc ppp

Syntax Description

This command has no arguments or keywords.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.1(3)T	This command was introduced.

Examples

The following is sample output for the **show atm svc ppp** command:

```
Router# show atm svc ppp
```

ATM Int.	VCD/Name	VPI	VCI	Type	VCSt	VA	VASt
2/0.1	10	0	60	SVC	UP	1	UP

[Table 3](#) describes the fields shown in the display.

Table 3 *show atm svc ppp Field Descriptions*

Field	Description
ATM Int.	Interface on which the SVC is configured.
VCD/Name	Virtual circuit descriptor (VCD) or name associated with the SVC.
VPI	Virtual path identifier.
VCI	Virtual channel identifier.
Type	Type of virtual circuit.
VCSt	Virtual circuit state.
VA	Virtual access interface number.
VASt	Virtual access interface state.

show controller shdsl

To display the status of the controller configured for single-pair high-bit-rate digital subscriber line (SHDSL) mode, use the **show controller shdsl** command in privileged EXEC mode.

show controller shdsl *number*

Syntax Description	<i>number</i>	SHDSL controller number. The valid controller number for SHDSL mode is 0.
--------------------	---------------	---

Defaults	Controller number: 0
----------	----------------------

Command Modes	Privileged EXEC
---------------	-----------------

Command History	Release	Modification
	12.2(8)T	This command was introduced on Cisco IAD2420 series.

Usage Guidelines	This command is used to display the controller mode, the controller number, and associated statistics.
------------------	--

Examples	The following example displays the status of the controller configured for SHDSL mode:
----------	--

```
Router# show controller shdsl 0
```

```
SHDSL 0 controller UP
SLOT 3: Globespan xDSL controller chipset
Frame mode: Serial ATM
Configured Line rate: 1160Kbps
Line Re-activated 0 times after system bootup
LOS Defect alarm: None
CRC per second alarm: None
Line termination: CPE
FPGA Revision: 9
```

Related Commands	Command	Description
	controller shdsl 0	Configures the controller status and the controller number.

show dsl interface atm

To display information specific to the asymmetric digital subscriber line (ADSL) for a specified ATM interface, use the **show dsl interface atm** command in EXEC mode.

show dsl interface atm *number*

Syntax Description

number ATM interface number.

Command Modes

EXEC

Command History

Release	Modification
12.1(3)XJ	The command was introduced on Cisco 1700 series routers.
12.2(2)T	This command was integrated into Cisco IOS Release 12.2(2)T.
12.1(5)YB	Support for this command was added to Cisco 2600 series and Cisco 3600 series routers.
12.1(5)XR1	Support for this command was added to the Cisco IAD2420 series.
12.2(4)T	This command was integrated into Cisco IOS Release 12.2(4)T.

Usage Guidelines

Use this command to display the status or results of a line test and to get information on port status, alarms, configured and actual transmission rates, and transmission errors.

The output from this command appears the same as the output from the **show controller atm** command on Cisco 1400 series routers.

Examples

ADSL: Example

The following example shows sample output for the **show dsl interface atm** command for a CPE device that is configured for ADSL:

```
Router# show dsl interface atm0

Alcatel 20150 chipset information
                        ATU-R (DS)                ATU-C (US)
Modem Status:         Showtime (DMTDSL_SHOWTIME)
DSL Mode:              ITU G.992.1 (G.DMT)
ITU STD NUM:          0x01                        0x1
Vendor ID:             'ALCB'                     'ALCB'
Vendor Specific:       0x0000                      0x0000
Vendor Country:        0x00                        0x0F
Capacity Used:         85%                         98%
Noise Margin:          13.5 dB                      7.0 dB
Output Power:           9.5 dBm                     12.0 dBm
Attenuation:            1.5 dB                       3.5 dB
Defect Status:         None                         None
Last Fail Code:        None
Selftest Result:       0x00
Subfunction:           0x15
```

```

Interrupts:      5940 (0 spurious)
PHY Access Err:  0
Activations:     1
SW Version:      3.670
FW Version:      0x1A04

```

	Interleave	Fast	Interleave	Fast
Speed (kbps):	0	8128	0	864
Reed-Solomon EC:	0	0	0	0
CRC Errors:	0	0	0	7
Header Errors:	0	0	0	2
Bit Errors:	0	0		
BER Valid sec:	0	0		
BER Invalid sec:	0	0		

```

DMT Bits Per Bin
00: 0 0 0 0 0 0 0 7 6 7 9 A B C C C
10: C C C C C C B B B B A 9 A 9 0 0
20: 0 0 0 0 0 0 2 2 3 4 4 5 6 6 7 7
30: 7 8 8 8 9 9 9 A A A A A B B B
40: B B B B B B B B B B A B B B B
50: B B B B B B B B B B B B 2 B B B
60: B B B B B B B B B B B B B B B
70: B B B B B B B B B B B B B B B
80: B B B B B B B B B B B B B B B
90: B B B B B B B B B B B B B B B
A0: B B B B B B B B B B B B B B B
B0: B B B B B B B B B B B A B A A
C0: A A A A A A A A A A A A A A A
D0: A A A A A A A A A A 9 9 9 9 9
E0: 9 9 9 9 9 9 9 9 9 9 8 8 8 8
F0: 8 8 8 8 8 8 7 7 7 7 6 6 5 4 4

```

[Table 4](#) describes the significant fields shown in the display.

Table 4 *show dsl interface atm Field Descriptions*

Field	Description
Modem Status	Status of the modem. Possible states include the following: DMTDSL_INVALID—Error state. DMTDSL_STOP—Administrative down state. DMTDSL_INIT—Restarting line. DMTDSL_CHK_HW—Confirming that required HW exists. DMTDSL_DLOAD_1—Downloading the init.bin file. DMTDSL_DLOAD_2—Downloading operational firmware. DMTDSL_MODE_CHK—Verifying that download was successful. DMTDSL_DO_OPEN—Issue ADSL_OPEN command. DMTDSL_RE_OPEN—Cycle the link. Retry open. DMTDSL_ACTIVATING—Waiting for activation to succeed. DMTDSL_LOOPBACK—Activation done. DMTDSL_SHOWTIME—Activation succeeded.
DSL Mode	DSL operating mode.
ITU STD NUM	ITU standard number for the operating mode.
Vendor ID	Vendor identification code.
Vendor Specific	Indicates if this router is specified for a vendor.
Vendor Country	Code for the country where the vendor is located.
Capacity Used	Percentage of the capacity that is being used.
Noise Margin	Noise margin, in decibels.
Output Power	Power output, in decibels.
Attenuation	Attenuation of the signal, in decibels.
Defect Status	Status of defects.
Last Fail Code	Last failure code that was logged.
Selftest Result	Results of the self-test.
Subfunction	Code for the subfunction running.
Interrupts	Code for interrupts used.
PHY Access Err	Number of physical access errors.
Activations	Number of activations of the router.
SW Version	Software version number.
FW Version	Firmware version number.
Speed	The train speed for upstream and downstream. It shows both the interleave and the fast mode.
Reed-Solomon EC	Reed-Solomon error-correction statistics.
CRC Errors	Cyclic redundancy check statistics.

Table 4 *show dsl interface atm Field Descriptions (continued)*

Field	Description
Header Errors	ATM header error reports.
Bit Errors	Total number of bit errors.
BER Valid sec	Bit error rate valid seconds.
BER Invalid sec	Bit error rate invalid seconds.

G.SHDSL: Example

The following example shows sample output for the **show dsl interface atm** command for a CPE device that is configured for G.SHDSL:

```
Router# show dsl interface atm 0/0

Globespan G.SHDSL Chipset Information
Equipment Type: Customer Premise
Operating Mode: G.SHDSL
Clock Rate Mode: Auto rate selection Mode
Reset Count: 1
Actual rate: 2320 Kbps
Modem Status: Data
Noise Margin: 42 dB
Loop Attenuation: 0.0 dB
Transmit Power: 13.5 dB
Receiver Gain: 204.8000 dB
Last Activation Status:No Failure
CRC Errors: 0
Chipset Version: 1
Firmware Version: R1.0
```

Table 5 describes the significant fields shown in the display.

Table 5 *show dsl interface atm Field Descriptions*

Field	Description
Equipment Type	Terminal type, which can be one of the following: - Customer Premise (CPE)—This value indicates that the device is connected to a DSLAM. This is the default. - Central Office (CO)—If the devices are connected back-to-back, one of the routers can act as a CO.
Operating Mode	G.SHDSL annex configuration, which can be one of the following values: - A—Operating parameters for North America. This value is the default. - B—Operating parameters for Europe.
Clock Rate Mode	Upstream and downstream bit rate configuration, in kbps. If the upstream and downstream rates have different values, the device will train to lowest of the rates. If the value indicates “Auto rate selection mode”, the CO and CPE devices will negotiate the speed and train.

Table 5 *show dsl interface atm Field Descriptions (continued)*

Field	Description
Reset Count	Number of times the G.SHDSL chip has been reset since powering up.
Actual rate	The actual bit rate that the transceiver is using. This rate could be different from the requested (configured) rate.
Modem Status	One of the following values: - Handshake—local transceiver is trying to reach the far-end transceiver. - Training—startup training is in progress. - Data—training was successful.
Received SNR	The received signal-to-noise ratio (SNR), in decibels (dB).
SNR Threshold	SNR threshold below which the router will retrain. The default is 23 dB.
Loop Attenuation	The difference in decibels between the power received at the near-end device and the power transmitted from the far-end device.
Transmit Power	Local STU transmit power, in decibels per milliwatt (dBm).
Receiver Gain	Total receiver gain.
Last Activation Status	Defines the last failure state of the G.SHDSL chip.
CRC Errors	Number of cyclic redundancy check (CRC) errors observed after bootup or resetting of the interface.
Chipset Version	Vendor's chipset version.
Firmware Version	Version of the vendor's chipset firmware.

Related Commands

Command	Description
dsl operating-mode	Modifies the operating mode of the digital subscriber line for an ATM interface.

show pppatm summary

To display PPP over ATM (PPPoA) session counts, use the **show pppatm summary** command in EXEC mode.

show pppatm summary [**interface atm** *interface-number* [*.subinterface-number*]]

Syntax Description

interface atm <i>interface-number.subinterface-number</i>	(Optional) Specifies a particular ATM interface by interface number and possibly a subinterface number. A period (.) must precede the optional subinterface number.
---	---

Command Modes

EXEC

Command History

Release	Modification
12.2(13)T	This command was introduced.

Usage Guidelines

This command is useful for obtaining session counts, the state of the PPPoA sessions, and the interfaces on which they are running.

This command gives a summary of the number of PPPoA sessions in each state and the session information of each individual session. If a subinterface number is given in the command, the output is a summary report of the PPPoA sessions in the subinterface. If a main interface number is given, the output will have the summary reports for each individual subinterface of that main interface as shown in the example that follows. If no interface is given, the output will contain the summary reports for each ATM interface on the router.

Examples

The following example displays PPPoA session counts and states for ATM interface 5/0:

```
Router# show pppatm summary interface atm 5/0
```

```
ATM5/0.3:
```

```
    0 sessions total
```

```
ATM5/0.6:
```

```
    1 in PTA (PTA) State
```

```
    1 sessions total
```

VPI	VCI	Conn ID	PPPoA ID	SSS ID	PPP ID	AAA ID	VT	VA/SID	State
6	101	11	DA000009	BB000013	E5000017	C	1	1.1	PTA

Most of the messages displayed by the **show pppatm summary** command are self-explanatory. [Table 6](#) describes the significant fields shown in the displays. Any data not described in [Table 6](#) is used for internal debugging purposes.

Table 6 *show pppatm summary Field Descriptions*

Field	Description
VPI	Virtual path identifier of the permanent virtual circuit (PVC).
VCI	Virtual channel identifier of the PVC.
Conn ID	Unique connection identifier for the PPPoA session. This ID can be correlated with the unique ID in the show vpdn session command output for the forwarded sessions.
PPPoA ID	Internal identifier for the PPPoA session.
SSS ID	Internal identifier in the Subscriber Service Switch.
PPP ID	Internal identifier in PPP.
AAA ID	Authentication, authorization, and accounting (AAA) unique identifier for accounting records.
VT	Virtual template number used by the session.
VA/SID	PPPoA virtual access number for PPP Termination Aggregation (PTA) sessions, and switch identifier for forwarded sessions.
State	PPPoA state of the session.

Related Commands

Command	Description
clear pppatm interface atm	Clears PPP ATM sessions on an ATM interface.
debug pppatm	Enables reports for PPPoA events, errors, and states either globally or conditionally on an interface or VC.
show pppatm trace	Displays a sequence of PPPoA events, errors, and state changes when the debug pppatm command is enabled.

show pppatm trace

To display a sequence of PPP over ATM (PPPoA) events, errors, and state changes when the **debug pppatm** command is enabled, use the **show pppatm trace** command in privileged EXEC mode.

```
show pppatm trace [error | event | state] interface atm interface-number [subinterface-number]
vc {[vpi]/vci | virtual-circuit-name}
```

Syntax Description	error	(Optional) PPPoA events.
	event	(Optional) PPPoA errors.
	state	(Optional) PPPoA state.
	interface atm <i>interface-number</i>	Specifies a particular ATM interface by interface number.
	<i>.subinterface-number</i>	(Optional) Specifies a subinterface number preceded by a period.
	vc [<i>vpi</i>]/ <i>vci</i>	Virtual circuit (VC) keyword followed by a virtual path identifier (VPI), virtual channel identifier (VCI). The absence of the "/" and a <i>vpi</i> value causes the <i>vpi</i> value to default to 0.
	<i>virtual-circuit-name</i>	Name of the VC.

Command Modes Privileged EXEC

Command History	Release	Modification
	12.2(13)T	This command was introduced.

Usage Guidelines When the **debug pppatm** command has been enabled, this command displays messages from the specified permanent virtual circuit (PVC). If only one **debug pppatm** command keyword is supplied in the command, the report will display only the sequence of events for that particular debug type.

Examples The following example traces the debugging messages supplied by the **debug pppatm** command on PVC 101. The report is used by Cisco technical personnel for diagnosing system problems.

```
Router# debug pppatm trace interface atm 1/0.10 vc 101
Router# debug pppatm state interface atm 1/0.10 vc 101
Router# debug pppatm event interface atm 1/0.10 vc 101
Router# show pppatm trace interface atm 1/0.10 vc 101
```

```
Event = Disconnecting
Event = AAA gets dynamic attrs
Event = AAA gets dynamic attrs
Event = SSS Cleanup
State = DOWN
Event = Up Pending
Event = Up Dequeued
Event = Processing Up
```

■ show pppatm trace

```

Event = Access IE allocated
Event = Set Pkts to SSS
Event = AAA gets retrieved attrs
Event = AAA gets nas port details
Event = AAA gets dynamic attrs
Event = AAA gets dynamic attrs
Event = AAA unique id allocated
Event = No AAA method list set
Event = SSS Request
State = NAS_PORT_POLICY_INQUIRY
Event = SSS Msg
State = PPP_START
Event = PPP Msg
State = LCP_NEGOTIATION
Event = PPP Msg
Event = Access IE get nas port
Event = AAA gets dynamic attrs
Event = AAA gets dynamic attrs
Event = PPP Msg
Event = Set Pkts to SSS
State = FORWARDED

```

Related Commands

Command	Description
clear pppatm interface atm	Clears PPP ATM sessions on an ATM interface.
debug pppatm	Enables reports for PPPoA events, errors, and states either globally or conditionally on an interface or VC.
show pppatm summary	Displays PPPoA session counts.

show pppoe derived

To display the cached PPP over Ethernet (PPPoE) configuration that is derived from the subscriber profile for a specified PPPoE profile, use the **show pppoe derived** command in privileged EXEC mode.

show pppoe derived group *group-name*

Syntax Description	group <i>group-name</i> PPPoE profile for which the cached PPPoE configuration will be displayed.
--------------------	--

Command Modes	Privileged EXEC
---------------	-----------------

Command History	Release	Modification
	12.3(4)T	This command was introduced.
	12.2(27)SB	This command was integrated into Cisco IOS Release 12.2(27)SB.

Usage Guidelines	A subscriber profile can be configured locally on the router or remotely on a AAA server. The PPPoE configuration that is derived from a subscriber profile is cached locally under the PPPoE profile. Use the show pppoe derived command to display the cached PPPoE configuration that is derived from the subscriber profile for a specified PPPoE profile. A subscriber profile contains a list of PPPoE service names. The PPPoE server will advertise the service names that are listed in the subscriber profile to each PPPoE client connection that uses the configured PPPoE profile. A subscriber profile is assigned to a PPPoE profile by using the service profile command in BBA group configuration mode.
------------------	---

Examples	The following example shows the PPPoE configuration for PPPoE profile “sp_group_a” that is derived from subscriber profile “abc”. The services “isp_xyz”, “gold_isp_A”, and “silver_isp_A” will be advertised to each PPPoE client connection that uses PPPoE profile “sp_group_a”.
----------	--

```
Router# show pppoe derived group sp_group_a
```

```
Derived configuration from subscriber profile 'abc':
```

```
Service names:
```

```
    isp_xyz, gold_isp_A, silver_isp_A
```

Related Commands	Command	Description
	clear pppoe derived	Clears the cached PPPoE configuration of a PPPoE profile and forces the PPPoE profile to reread the configuration from the assigned subscriber profile.
	pppoe service	Adds a PPPoE service name to a local subscriber profile.
	service profile	Assigns a subscriber profile to a PPPoE profile.
	subscriber profile	Defines Subscriber Service Switch policy for searches of a subscriber profile database.

show pppoe relay context all

To display PPPoE relay contexts created for relaying PPPoE Active Discovery (PAD) messages, use the **show pppoe relay context all** command in privileged EXEC mode.

show pppoe relay context all

Syntax Description

This command has no arguments or keywords.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.3(4)T	This command was introduced.
12.2(27)SB	This command was integrated into Cisco IOS Release 12.2(27)SB.

Usage Guidelines

Use this command to display relay contexts created for relaying PAD messages.

Examples

The following is sample output from the **show pppoe relay context all** command:

```
Router# show pppoe relay context all
```

```
Total PPPoE relay contexts 1
UID      ID      Subscriber-profile  State
25       18      Profile-1          RELAYED
```

[Table 7](#) describes the significant fields shown in the **show pppoe relay context all** command output.

Table 7 *show pppoe relay context all Field Descriptions*

Field	Description
Total PPPoE relay contexts	PPPoE relay contexts created for relaying PAD messages.
UID	Unique identifier for the relay context.
ID	PPPoE session identifier for the relay context.
Subscriber-profile	Name of the subscriber profile that is used by the PPPoE group associated with the relay context.
State	Shows the state of the relay context, which will be one of the following: - INVALID—Not valid. - RELFWD—PPPoE relay context was forwarded. - REQ_RELAY—Relay has been requested.

Related Commands

Command	Description
clear pppoe relay context	Clears PPPoE relay contexts created by PAD messages.
show pppoe session	Displays information about currently active PPPoE sessions.

show pppoe session

To display **information about currently active PPPoE sessions**, use the **show pppoe session command** in privileged EXEC mode.

```
show pppoe session [{all | packets}]
```

Syntax Description	all	(Optional) Displays detailed information about the PPP over Ethernet (PPPoE) session.
	packets	(Optional) Displays packet statistics for the PPPoE session.

Command Modes	Privileged EXEC
---------------	-----------------

Command History	Release	Modification
	12.2(4)YG	This command was introduced on the Cisco SOHO 76, 77, and 77H routers.
	12.3(4)T	This command was integrated into Cisco IOS Release 12.3(4)T and was enhanced to display information about relayed PPPoE Active Discovery (PAD) messages.

Examples The following is sample output for the **show pppoe session** command:

```
Router# show pppoe session

  1 session  in FORWARDED (FWDED) State
  1 session  total

Uniq ID  PPPoE  RemMAC          Port          VT  VA          State
      SID  LocMAC
    26    19  0001.96da.a2c0  Et0/0.1      5  N/A  RELFWD
           000c.8670.1006  VLAN:3434
```

[Table 8](#) describes the significant fields shown in the **show pppoe session** command output.

Table 8 *show pppoe session Field Descriptions*

Field	Description
State	Displays the state of the session, which will be one of the following: • FORWARDED • FORWARDING • LCP_NEGOTIATION • LOCALLY_TERMINATED • PPP_START • PTA_BINDING • RELFWD (a PPPoE session was forwarded for which the Active discovery messages were relayed) • SHUTTING_DOWN • VACCESS_REQUESTED
Uniq ID	Unique identifier for the PPPoE session.
PPPoE SID	PPPoE session identifier.
RemMAC	Remote MAC address.
LocMAC	Local MAC address.
Port	Port type and number.
VT	Virtual template interface.
VA	Virtual access interface.

Related Commands

Command	Description
clear pppoe relay context	Clears PPPoE relay contexts created for relaying PAD messages.
show pppoe relay context all	Displays PPPoE relay contexts created for relaying PAD messages.

shutdown (PVC range)

To deactivate a permanent virtual circuit (PVC) range, use the **shutdown** command in PVC range configuration mode. To reactivate a PVC range, use the **no** form of this command.

shutdown

no shutdown

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

Defaults	PVC range is active.
-----------------	----------------------

Command Modes	PVC range configuration
----------------------	-------------------------

Command History	Release	Modification
	12.1(5)T	This command was introduced.

Examples	In the following example, a PVC range called “range1” is deactivated:
-----------------	---

```
interface atm 6/0.110 multipoint
 range range1 pvc 100 4/199
 shutdown
```

Related Commands	Command	Description
	range pvc	Defines a range of ATM PVCs.
	show pppatm summary	Deactivates an individual PVC within a PVC range.

shutdown (PVC-in-range)

To deactivate an individual permanent virtual circuit (PVC) within a PVC range, use the **shutdown** command in PVC-in-range configuration mode. To reactivate an individual PVC within PVC range, use the **no** form of this command.

shutdown

no shutdown

Syntax Description

This command has no arguments or keywords.

Defaults

The PVC is active.

Command Modes

PVC-in-range configuration

Command History

Release	Modification
12.1(5)T	This command was introduced.

Examples

In the following example, “pvc1” within the PVC range called “range1” is deactivated:

```
interface atm 6/0.110 multipoint
 range range1 pvc 100 4/199
  pvc-in-range pvc1 7/104
   shutdown
```

Related Commands

Command	Description
pvc-in-range	Configures an individual PVC within a PVC range.
shutdown (PVC range)	Deactivates a PVC range.

virtual-template (BBA group)

To configure a PPPoE profile with a virtual template to be used for cloning virtual access interfaces, use the **virtual-template** command in BBA group configuration mode. To remove the virtual template from a PPPoE profile, use the **no** form of this command.

virtual-template *template-number*

no virtual-template *template-number*

Syntax Description	<i>template-number</i>	Identifying number of the virtual template that will be used to clone virtual-access interfaces.
---------------------------	------------------------	--

Defaults	A virtual template is not specified.
-----------------	--------------------------------------

Command Modes	BBA group configuration
----------------------	-------------------------

Command History	Release	Modification
	12.2(15)T	This command was introduced.
	12.3(7)XI3	This command was integrated into Cisco IOS Release 12.3(7)XI3.

Usage Guidelines	Each PPPoE profile can clone virtual-access interfaces using only one virtual template. If you enter a second virtual-template command in a PPPoE profile, it will replace the first virtual-template command.
	You can configure different PPPoE profiles to use different virtual templates. You can also configure multiple PPPoE profiles to use the same virtual template.

Examples	The following example shows the configuration of two PPPoE profiles:
-----------------	--

```
bba-group pppoe vpn1
 virtual-template 1
 sessions per-vc limit 2
 sessions per-mac limit 1
!
bba-group pppoe vpn2
 virtual-template 2
 sessions per-vc limit 2
 sessions per-mac limit 1
!
```

Related Commands	Command	Description
	bba-group pppoe	Creates a PPPoE profile.

virtual-template pre-clone

To specify the number of virtual-access interfaces to be created and cloned from a specific virtual template, use the **virtual-template pre-clone** command in global configuration mode. To disable precloning, use the **no** form of this command.

virtual-template *template-number* **pre-clone** *number*

no virtual-template *template-number* **pre-clone** *number*

Syntax Description

<i>template-number</i>	The number of the virtual template interfaces from which the new virtual-access interfaces are created.
<i>number</i>	The number of virtual-access interfaces to be created.

Defaults

Precloning is disabled.

Command Modes

Global configuration

Command History

Release	Modification
12.0(3)DC	This command was introduced on the Cisco 6400 node route processor.
12.2(4)T	This command was integrated into Cisco IOS Release 12.2(4)T.

Usage Guidelines

The number of precloned virtual-access interfaces should be set to the number of expected PPPoA and PPPoE sessions.

The precloned virtual-access interfaces will be attached to the PVC upon receipt of the first PPP packet from the client on the PVC. The virtual-access interface will be detached from the PVC upon termination of the PPP session.

When a PPP session is terminated, the virtual-access interface will remain in the router and will be reused. When precloning is disabled, any virtual-access interfaces that were already precloned but have not yet been used will remain in the router for future use.

Examples

The following example shows how to create 1200 precloned virtual-access interfaces on virtual template 1:

```
virtual-template 1 pre-clone 1200
```

Related Commands	Command	Description
	encapsulation (ATM)	Configures the ATM adaptation layer (AAL) and encapsulation type for an ATM virtual circuit (VC), VC class, VC, bundle, or PVC range.
	show vtemplate	Displays a list of all configured virtual templates.

vlan-id dot1q

To enable IEEE 802.1Q VLAN encapsulation for a specific VLAN on an Ethernet interface, use the **vlan-id dot1q** command in interface configuration mode. To disable 802.1Q encapsulation for a specific VLAN, use the **no** form of this command.

vlan-id dot1q *vlan-id*

no vlan-id dot1q *vlan-id*

Syntax Description

<i>vlan-id</i>	VLAN identifier. Valid values range from 1 to 4095.
----------------	---

Defaults

IEEE 802.1Q VLAN encapsulation is not enabled.

Command Modes

Interface configuration

Command History

Release	Modification
12.3(2)T	This command was introduced.

Usage Guidelines

This command allows you to enable IEEE 802.1Q VLAN encapsulation for a specific VLAN on an Ethernet interface without associating the VLAN with a subinterface. Configuring 802.1Q VLANs on the main interface without using up subinterfaces increases the number of VLANs that can be configured on a router to 4000 VLANs per interface.

You can configure a VLAN on a main interface and at the same time configure VLANs on subinterfaces of the same interface. However, you cannot configure a specific VLAN on the main interface and on a subinterface at the same time. To configure PPPoE over 802.1Q VLAN support on a subinterface, use the **encapsulation dot1q** and **pppoe enable** commands in subinterface configuration mode.

It is not possible to shut down traffic for individual VLANs that are configured on the main interface.

Examples

The following example shows how to configure PPPoE over an 802.1Q VLAN on Fast Ethernet interface 0/0.

```
interface fastethernet 0/0
no ip address
no ip mroute-cache
duplex half
vlan-id dot1q 20
pppoe enable group PPPOE
exit-vlan-config
```

The following example configures Ethernet interface 0 to bridge packets using VLAN ID 100 and assigns the interface to bridge group 1:

```
interface ethernet 0
vlan-id dot1q 100
```

```
description bridged vlan 100
bridge-group 1
bridge-group 1
```

Related Commands

Command	Description
debug pppoe	Displays debugging information for PPPoE sessions.
pppoe enable	Enables PPPoE sessions on an Ethernet interface or subinterface.
vlan-range dot1q	Enables IEEE 802.1Q VLAN encapsulation for a range of VLANs on an Ethernet interface.

vlan-range dot1q

To enable IEEE 802.1Q VLAN encapsulation for a range of VLANs on an Ethernet interface, use the **vlan-range dot1q** command in interface configuration mode. To disable 802.1Q encapsulation for a range of VLANs, use the **no** form of this command.

vlan-range dot1q *start-vlan-id end-vlan-id* [**native**]

no vlan-range dot1q *start-vlan-id end-vlan-id*

Syntax Description

<i>start-vlan-id</i>	VLAN identifier of the first VLAN in the range. Valid values range from 1 to 4095.
<i>end-vlan-id</i>	VLAN identifier of the last VLAN in the range. Valid values range from 1 to 4095.
native	(Optional) Instructs the interface to bridge untagged (native) packets.

Defaults

IEEE 802.1Q VLAN encapsulation is not enabled.

Command Modes

Interface configuration

Command History

Release	Modification
12.3(2)T	This command was introduced.

Usage Guidelines

This command allows you to enable IEEE 802.1Q VLAN encapsulation for a range of VLANs on an Ethernet interface without associating each VLAN with a subinterface. Configuring an 802.1Q VLAN range on the main interface without using up subinterfaces increases the number of VLANs that can be configured on a router to 4000 VLANs per interface.

You can configure a VLAN range on a main interface and at the same time configure VLANs outside the range on subinterfaces of the same interface. However, you cannot configure a specific VLAN on the main interface and on a subinterface at the same time. To configure PPPoE over 802.1Q VLAN support on a subinterface, use the **encapsulation dot1q** and **pppoe enable** commands in subinterface configuration mode.

It is not possible to shut down traffic for individual VLANs that are configured on the main interface.

To bridge both tagged and untagged packets, regardless of their VLAN ID, you do not need to create a VLAN ID range.

Examples

The following example shows how to configure PPPoE over a range of 802.1Q VLANs on Fast Ethernet interface 0/0.

```
interface fastethernet 0/0
no ip address
no ip mroute-cache
```

```
duplex half
vlan-range dot1q 20 30
  pppoe enable group PPPOE
exit-vlan-config
```

The following example configures Ethernet interface 0 to bridge untagged (native) packets using a range of VLAN IDs from 1 to 500 and assigns the interface to bridge group 1:

```
interface ethernet 0
vlan-range dot1q 1 500 native
  description 1 to 500
  bridge-group 1
bridge-group 1
```

Related Commands

Command	Description
debug pppoe	Displays debugging information for PPPoE sessions.
pppoe enable	Enables PPPoE sessions on an Ethernet interface or subinterface.
vlan-id dot1q	Enables IEEE 802.1Q VLAN encapsulation for a specific VLAN on an Ethernet interface.

vpn service

To configure a static domain name, use the **vpn service** command in ATM VC or VC class configuration mode. To remove a static domain name, use the **no** form of this command.

vpn service *domain-name*

no vpn service *domain-name*

Syntax Description

<i>domain-name</i>	Static domain name.
--------------------	---------------------

Defaults

No default behavior or values

Command Modes

ATM VC configuration
ATM VC class configuration

Command History

Release	Modification
12.1(1)DC1	This command was introduced on the Cisco 6400 NRP.
12.2(13)T	This command was integrated into Cisco IOS Release 12.2(13)T.

Usage Guidelines

Use the **vpn service** command in a permanent virtual circuit (PVC) or a PVC range configuration so that PPP over ATM (PPPoA) sessions in those PVCs will be forwarded according to the domain name supplied, without starting PPP.

Examples

In the following partial example, virtual private dialup network (VPDN) group 1 is selected for PPPoA session forwarding based on the domain name domain.com:

```
vpdn-group 1
 request-dialin
  protocol l2tp
  domain abc.com
 initiate-to ip 10.1.1.1 priority 1
.
.
.
interface ATM1/0.1 multipoint
 pvc 101
  protocol ppp virtual-template 1
  vpn service domain.com
```

