



## Preface

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This preface explains the objectives, intended audience, and organization of the Cisco Gigabit-Ethernet Optimized IPTV/Video over Broadband (GOVoBB) Solution, Release 1.0. The solution supports both broadcast video and video on demand (VoD) for the IPTV/video over broadband/telco (IPTV/VoBB) market, enabling operators that use digital subscriber lines (DSL) and fiber (FTTx) to offer not only video but also voice over IP (VoIP) and data (Internet access)—collectively referred to as “triple play”—over their existing infrastructure, now intelligently optimized for video service.

The preface also defines the conventions used to convey instructions and information, available related documentation, and the process for obtaining Cisco documentation and technical assistance.

This preface presents the following major topics:

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## Document Version and Solution Release

This is the second version of this document, which covers Release 1.0 of the Cisco Gigabit-Ethernet Optimized IPTV/Video over Broadband (GOVoBB) Solution.

### Document History

Document Version	Date	Notes
1	08/25/2005	This document was first released.
2	12/01/2005	<a href="#">Multicast Admission Control</a> , page 17, documents a condition on the <b>ip igmp limit</b> command.
3	09/19/2006	Clarifies distinction between “Express forwarding” and Expedited Forwarding (EF) in Appendix C.

## Document Objectives and Scope

This guide describes the architecture, the components, and the processes necessary for the design and implementation of the Cisco Gigabit-Ethernet Optimized IPTV/Video over Broadband (GOVoBB) Solution, Release 1.0. The primary focus of this release is on video over broadband functionality.



#### Note

This document is primarily for Cisco products. To establish and maintain the third-party products and applications that may be a part of the Cisco GOVoBB Solution, refer to the documentation provided by the vendors of those products.

## Audience

The target audience for this document is assumed to have basic knowledge of and experience with the installation and acceptance of the products covered by this solution. See [Chapter 1, “Solution Overview.”](#)

In addition, it is assumed that the user understands the procedures required to upgrade and troubleshoot optical transport systems and Ethernet switches, with emphasis on Cisco Catalyst series switches).



#### Note

This document addresses Cisco components only. It does not discuss how to implement third-party components typically required for a video service, such as VoD servers, encoders, headends, program guides, or DSLAMs.

## Document Organization

The major sections of this document are as follows:

Section	Title	Major Topics
<a href="#">Chapter 1</a>	<a href="#">Solution Overview</a>	Introduces solution architecture and scope, components, and miscellaneous support topics.
<a href="#">Chapter 2</a>	<a href="#">Video Application Components and Architecture</a>	Discusses the segmentation of the video application architecture into logical components that are required for broadcast video and VoD services.

Chapter 3	<a href="#">Solution Transport Architecture</a>	Discusses architectures for distribution, aggregation, edge transport, and quality of service. Introduces 10-GE ring and 1-GE asymmetric configurations.
Chapter 4	<a href="#">Implementing and Configuring the Solution</a>	Describes the configuration and implementation of the solution, and provides example implementations.
Chapter 5	<a href="#">Monitoring and Troubleshooting</a>	Provides an introduction to monitoring and troubleshooting the Cisco switches used in the solution.
Appendix A	<a href="#">Sample DER and AR Switch Configurations for the 10-GE Symmetric Topology</a>	Provides example configurations for distribution edge routers and aggregation routers for this topology.
Appendix B	<a href="#">Sample DER and AR Switch Configurations for the 1-GE Asymmetric Topology</a>	Provides example configurations for distribution edge routers and aggregation routers for this topology.
Appendix C	<a href="#">Understanding QoS as Implemented in the Solution</a>	Presents a more detailed understanding of Quality of Service (QoS) specific to this solution. Discusses queueing structures on specific line cards and ports.
Appendix D	<a href="#">Configuring DSL Equipment</a>	Provides details related to the configuration of Ericsson DSL equipment, if it is used.

## Related Documentation

### Solution Documentation

This document, and *Release Notes for Cisco Gigabit-Ethernet Optimized IPTV/Video over Broadband Solution, Release 1.0*, are available under the following URLs:

<http://www.cisco.com/univercd/cc/td/doc/solution/vobbsols>

[http://www.cisco.com/en/US/netsol/ns524/networking\\_solutions\\_market\\_segment\\_solutions\\_home.html](http://www.cisco.com/en/US/netsol/ns524/networking_solutions_market_segment_solutions_home.html)

### Switch Documentation

Documentation resources for the Cisco Catalyst switches and the Cisco 7609 router are available at the following URLs:



Note

The Cisco 7609 router used in this solution functions as a switch, and is considered to be a switch in this documentation.

## Cisco Catalyst 4500 Series Switches



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The following includes the Cisco Catalyst 4948-10GE.

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For all hardware and software documentation for this series, go to the following URL:

<http://www.cisco.com/univercd/cc/td/doc/product/lan/cat4000/index.htm>

## Cisco Catalyst 6500 Series Switches

For all hardware and software documentation for this series, go to the following URL:

<http://www.cisco.com/univercd/cc/td/doc/product/lan/cat6000/index.htm>

## Cisco 7600 Series Routers

For all hardware and software documentation for this series, go to the following URL:

<http://www.cisco.com/univercd/cc/td/doc/product/core/cis7600/index.htm>

## Optical Component Documentation

### Cisco DWDM GBICs

- *Cisco DWDM Gigabit Interface Converter Installation Guide*  
[www.cisco.com/univercd/cc/td/doc/product/gbic\\_sfp/gbic\\_doc/78\\_15574.htm](http://www.cisco.com/univercd/cc/td/doc/product/gbic_sfp/gbic_doc/78_15574.htm)
- *Cisco Dense Wavelength Division Multiplexing GBICs Compatibility Matrix*  
[www.cisco.com/univercd/cc/td/doc/product/gbic\\_sfp/gbic\\_doc/ol\\_4604.htm](http://www.cisco.com/univercd/cc/td/doc/product/gbic_sfp/gbic_doc/ol_4604.htm)



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Other references are provided as appropriate throughout this document.

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## Document Conventions

Command descriptions use the following conventions:

<b>boldface font</b>	Commands and keywords are in <b>boldface</b> .
<i>italic font</i>	Arguments for which you supply values are in <i>italics</i> .
[ ]	Elements in square brackets are optional.
{ x   y   z }	Alternate keywords are grouped in braces and separated by vertical bars.
[ x   y   z ]	Optional alternative keywords are grouped in brackets and separated by vertical bars.
string	A nonquoted set of characters. Do not use quotation marks around the string or the string will include the quotation marks.

Screen examples use the following conventions:

<code>screen font</code>	Terminal sessions and information the system displays are in <code>screen font</code> .
<b>boldface screen font</b>	Information you must enter is in <b>boldface screen font</b> . <sup>1</sup>
<i>italic screen font</i>	Arguments for which you supply values are in <i>italic screen font</i> .
→	This pointer highlights an important line of text in an example.
^	The symbol ^ represents the key labeled Control. For example, the key combination ^D in a screen display means hold down the Control key while you press the D key.
< >	Nonprinting characters, such as passwords, are in angle brackets in contexts where italic font is not available.
[ ]	Default responses to system prompts are in square brackets.
!, #	An exclamation point (!) or a pound sign (#) at the beginning of a line of code indicates a comment line.

1. As this document makes use of annotated configurations, the rigorous use of boldface type to indicate what the user must enter is relaxed.

Notes use the following conventions:



Note

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

Timesavers use the following conventions:



Timesaver

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

Cautions use the following conventions:



Caution

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

Tips use the following conventions:



Tip

Means the following information *will help you solve a problem*. The tips information might not be troubleshooting or even an action, but could be useful information, similar to a Timesaver.

# 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](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](mailto: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](mailto: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](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](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](mailto: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](mailto:psirt@cisco.com)

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

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

**Tip**

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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](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.

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## 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**

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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.

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## 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>