CISCO SYSTEMS

Cisco 7600 Series/Catalyst 6500 Series Enhanced **FlexWAN** Module

The Cisco® 7600 Series/Catalyst® 6500 Series Enhanced FlexWAN module (Enhanced FlexWAN) enables high-performance, intelligent metropolitan-area network (MAN) and WAN services. Enterprises and service providers can take advantage of the many types of the Cisco 7000 Series common port adapters for their WAN aggregation and connectivity options, as well as the increased scalability, performance, and rich quality of service (QoS) featur offered by the Cisco Enhanced FlexWAN module.

high-performance, intelligent WAN and MAN service scalability for both enterprises and service providers. The Cisco Enhanced FlexWAN module supports a variety of clear-channel and channelized WAN interfaces, including T1/E1, T3/E3, High-Speed Serial Interface (HSSI), T3/E3 ATM, OC-3 ATM, and OC-3 packet over SONET (POS), with the ability to directly interface with high-speed SONET equipment for MANs and WANs.

The Cisco Enhanced FlexWAN module accepts up to two WAN port adapters commonly used with the Cisco 7200 and 7500 Series Routers, providing an easy migration path for Cisco customers from the Cisco 7500 Series to the Cisco 7600 Series. In addition, the Cisco Enhanced FlexWAN module adds switch

fabric connectivity, offers increased performance and memory compared to the existing FlexWAN module, and supports advanced features targeted at Metropolitan (Metro) Ethernet markets. This new innova architecture is designed to deliver numerou media options and enable scalable, distribu intelligent network services for the next generation of applications.

Applications

WAN, MAN, and LAN Service Convergence

A hallmark of the Cisco 7600 Series and the Cisco Catalyst 6500 Series is the flexib to support multiple applications on the sam platform, delivering "no-compromise" convergence for a range of applications, including data center, MAN, and WAN edg The Cisco Enhanced FlexWAN module simplifies network design and deployment allowing consolidation of LAN, WAN, and MAN interfaces into a single, highly scala platform. The Cisco 7600 Series and Cisco Catalyst 6500 Series deliver advanced flexibility, supporting any mix of media or traffic within a common system, software, chassis, thereby easing and simplifying

Figure 1
The Cisco 7600 Series/
Catalyst 6500 Series
Enhanced FlexWAN
module

Product Overview

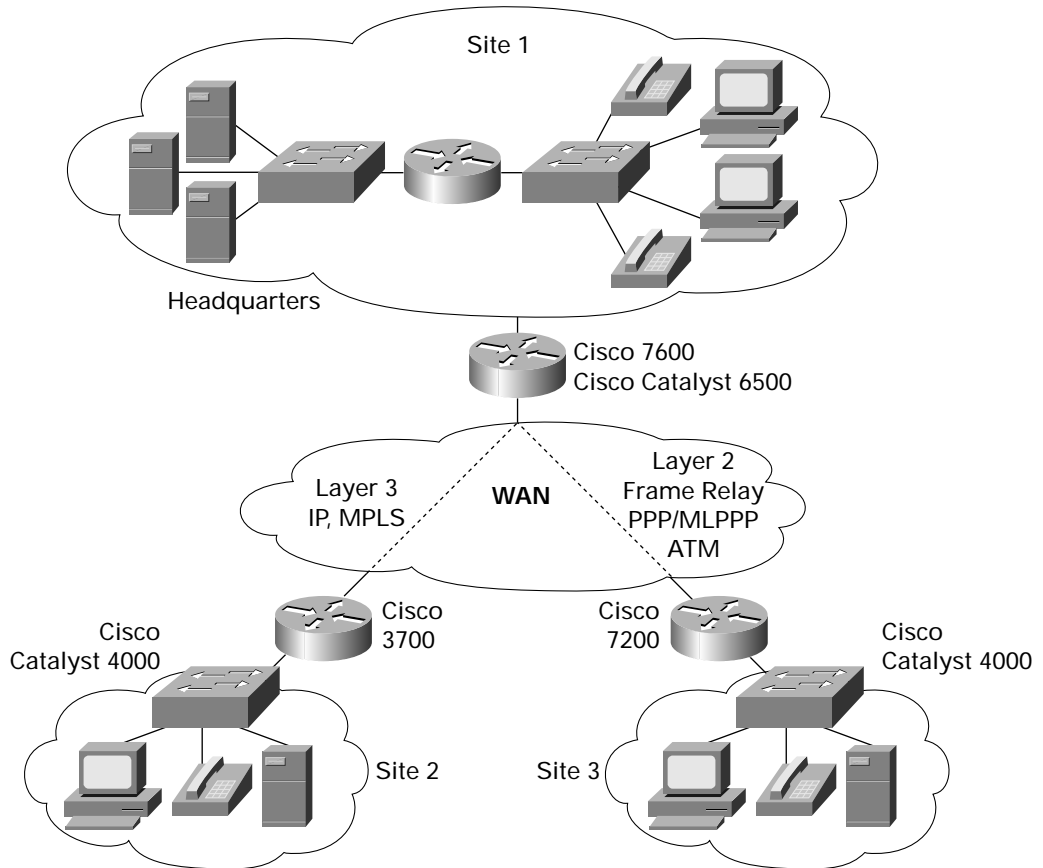The Cisco Enhanced FlexWAN module (Figure 1) enables

network configuration and installation tasks, and speeding service delivery. Converged data, voice, and video traffic can be transported transparently from end to end across an interconnected LAN, WAN, or MAN, with the ability to manage thousands of simultaneous traffic flows at wire speed with granular QoS and security control.

WAN Aggregation

The Cisco Enhanced FlexWAN module enables the Cisco 7600 Series Router and Cisco Catalyst 6500 Series Switch to do high-end WAN aggregation, including that based on point-to-point circuits, Frame Relay, Point-to-Point Protocol (PPP), High-Level Data Link Control (HDLC), ATM, or POS. The rich QoS features and distributed processing attributes of the Cisco Enhanced FlexWAN module make it a cornerstone of a highly scalable WAN aggregation solution. Higher-layer applications can easily be supported on this end-to-end network to allow intelligent data, voice, video, and security services—all on the same platform to provide integrated easy-to-use application delivery and control. Figure 2 illustrates a Cisco 7600 or a Cisco Catalyst 6500 deployed as a head-end router for WAN aggregation.

Figure 2
WAN Aggregation

Key Features and Benefits

The Cisco Enhanced FlexWAN module offers the ability to consolidate LAN, WAN, and MAN services into a single platform and lowers the total cost of ownership of the network through simplified design and ease of network management and maintenance.

Scalable Bandwidth with Intelligent Network Services for Next-Generation Applications

The unique value proposition of the Cisco 7600 Series and the Cisco Catalyst 6500 Series is the convergence supported from the physical layer to a highly scalable application layer. These two platforms can scale from 10 Megabit Ethernet to 10 Gigabit Ethernet in the LAN and DS-0 to OC-48/STM-16 in the WAN. Differentiated Services (DiffServ) and IP Precedence priority packet marking along with QoS classification, policing, queuing, intelligent packet discard, and security access control on every port ensure that the platform will meet the demands of any network environment.

Included in the rich QoS features is the capability to guarantee bandwidth to business-critical applications; limit bandwidth to non-critical applications; drop selective, low-priority packets to avoid congestion; and mark packets to control QoS for any type of traffic flows. In addition, the Cisco Enhanced FlexWAN module supports several key features required for low-speed WAN aggregation, such as compressed Real-Time Protocol (cRTP) and distributed link fragmentation and interleaving (LFI).

Lower Cost of Ownership

A major benefit of LAN, WAN, and MAN consolidation on the Cisco 7600 Series and Cisco Catalyst 6500 Series is the reduction in the number of platforms to deploy and manage in any given network. This service convergence not only simplifies network design and configuration, it also decreases rack space and power requirements as well as the training and administrative burden associated with managing many different platforms. Additionally, such integration eases the support burden placed on a maintenance staff because spare parts for multiple platforms do not need to be stocked or managed.

The Cisco Enhanced FlexWAN module also provides considerable investment protection for the large installed base of Cisco 7200 and 7500 Series Routers. These same WAN port adapters can be deployed on the Cisco 7600 Series and Cisco Catalyst 6500 Series for immediate service delivery and scaling to much higher levels of system performance and bandwidth.

These benefits directly translate to reduced costs of ownership—reduced capital costs of procurement and reduced ongoing operational costs of network management, such as training, element management, and inventory and configuration management. In addition to requiring fewer platforms to manage, a converged solution from Cisco Systems® provides management of all LAN, WAN, and MAN functions with the same network management tool set, easing the number of management platforms required.

Table 1 Features and Benefits of Cisco Enhanced FlexWAN Module

	FlexWAN	Enhanced FlexWAN	Benefit
CPU	Medium performance	High performance	Targets the granular DS-0 to the high-end OC-3 market
Number of CPUs	2 CPUs, one per bay	2 CPUs, one per bay	Offers a high-performance, independently scalable solution across the 2-port adapter bays
Memory default	64 MB per bay	256 MB per bay	Enables support of large routing tables, rich QoS features, and increased scalability
Memory upgrade option	Total 128 MB per FlexWAN module 128 MB maximum per bay	Total 512 MB per Enhanced FlexWAN module 512 MB maximum per bay	
Switch fabric connectivity	No	Yes	Enables the use of 256- or 720-Gbps switch fabric modules for data forwarding
Online insertion and removal (OIR) of module	Yes	Yes	Increases high availability, and provides operational ease of use

Product Specifications

Table 2 Product Specifications

Compatibility	Cisco Catalyst Supervisor Engine 2 and Supervisor Engine 720 systems
Minimum software compatibility	Cisco IOS® Software Release 12.2(17a)SXA or later releases for Supervisor Engine 720; Cisco IOS Software Release 12.2(17a)SXB or later releases for Supervisor Engine 2-based systems
Protocols	TCP, IPv4, IPv6, Multiprotocol Label Switching (MPLS), Ethernet over MPLS (EoMPLS), Frame Relay over MPLS (FRoMPLS), ATM over MPLS (ATMoMPLS)
Encapsulation	Frame Relay, Multilink Frame Relay—FRF.16, Multilink Point-to-Point Protocol (MLPPP), HDLC, ATM, HSSI, generic routing encapsulation (GRE) (supported on HSSI and Frame Relay interfaces)
Cards, ports, and slots	2-port adapter bays per Cisco Enhanced FlexWAN module
Features and benefits	• Higher performance—Doubles the packet forwarding performance over the previous-generation FlexWAN module • Switch fabric connectivity—Allows system scalability up to 720 Gbps by offering switch fabric connectivity • Increased packet memory—Increases the memory to 512 MB per bay, from 128 MB per bay supported in the previous-generation FlexWAN; this enables support of large routing tables, rich QoS features, and increased scalability • OIR of the Cisco Enhanced FlexWAN module

Table 2 Product Specifications (Continued)

	QoS, ACLs, and Low-Speed Aggregation Features
	Security
	– Standard, extended, dynamic, reflexive, and time-based access control lists (ACLs)
	QoS
	– IP Precedence
	– Differentiated services code point (DSCP) (IPv6 and IPv4)
	– MPLS experimental values (MPLS EXP)
	Congestion avoidance
	– Weighted Random Early Detection (WRED)
	Congestion management
	– Per-virtual circuit queuing
	– Low-latency queuing (LLQ)
	– Weighted Fair Queuing (WFQ)
	– Class-Based Weighted Fair Queuing (CBWFQ)
	Traffic classification, shaping, and bandwidth policing
	– Marking
	– Policing
	– Distributed traffic shaping (DTS)
	– Hierarchical traffic shaping
	– Network-based application recognition (NBAR)
	Bandwidth efficiency
	– cRTP
	Fragmentation
	– Distributed LFI (dLFI)
	– Frame Relay Forum FRF.12
	Voice over Frame Relay
	– Frame Relay Forum FRF.11
	Bridging
	– RFCs 1483 and 2684 ATM Bridging
	ATM permanent-virtual-circuit (PVC) bundles
Unsupported features	• Frame Relay traffic shaping (FRTS), ISDN, Frame Relay switching, Layer 2 Tunneling Protocol (L2TP), Layer 2 Forwarding (L2F), Point-to-Point Tunneling Protocol (PPTP)
	• Frame Relay switched virtual circuits (SVCs)
	• Multi-chassis Multilink PPP
	• Systems Network Architecture (SNA) serial protocols (Synchronous Data Link Control [SDLC], Frame Relay Access Support [FRAS], binary network node [BNN], and boundary access node [BAN])
	• FRF.5, FRF.8, FRF. 9, and FRF.15
	• POS channel bonding
	• QoS groups
Memory	• 256-MB default Double Data Rate (DDR) synchronous dynamic RAM (SDRAM) memory per bay
	• Optionally upgradable to 512 MB DDR SDRAM memory per bay

Table 2 Product Specifications (Continued)

Supported port adapters	**T1/E1** PA-4T+ PA-8T-V35 PA-8T-232 PA-8T-X21 PA-MC-2T1 PA-MC-4T1 PA-MC-8T1 PA-MC-8TE1+ PA-MC-8E1/120 PA-MC-2E1/120 PA-4E1G/120 PA-4E1G/75
	T3/E3 and STM-1 PA-T3+ PA-E3 PA-2T3 PA-2T3+ PA-2E3 PA-MC-T3 PA-MC-2T3+ PA-MC-E3 PA-MC-STM-1MM PA-MC-STM-1SMI
	ATM PA-A3-T3 PA-A3-E3 PA-A3-OC3MM PA-A3-OC3SMI PA-A3-OC3SML PA-A3-8T1IMA PA-A3-8E1IMA PA-A6-OC3MM PA-A6-OC3SMI PA-A6-OC3SML PA-A6-T3 PA-A6-E3

Table 2 Product Specifications (Continued)

	POS and HSSI PA-POS-OC3MM PA-POS-OC3SMI PA-POS-OC3SML PA-POS-2OC3MM PA-POS-2OC3SMI PA-POS-2OC3SML PA-POS-1OC3 **HSSI** PA-H PA-2H **Fast Ethernet** PA-1FE-TX PA-1FE-FX PA-2FE-TX PA-2FE-FX
Unsupported port adapters	Dual-wide adapters, voice, Token Ring, Fiber Distributed Data Interface (FDDI), encryption, compression, Fibre Channel
Environmental conditions	• Operating temperature: 32 to 104 F (0 to 40 C) • Storage temperature: –40 to 167 F (–40 to 75 C) • Relative humidity: 10 to 90%, noncondensing • Operating altitude: –60 to 2000m
Reliability and availability	• Mean time between failures: 7 years for system configuration
MIBs	• Cisco Entity MIB (CISCO-ENTITY-MIB) • Cisco Entity Asset MIB • Cisco Entity Field-Replaceable Unit (FRU) Control MIB • Cisco Entity Alarm MIB • Interface IF MIB (RFC 2233) • DS-3 MIB (RFC 1407) • DS-1 MIB (RFC 1406) • Frame Relay MIB (RFC 1315) • Cisco Frame Relay MIB • ATM MIB (RFC 1695) • Definitions of Managed Objects for Bridges (RFC 1493) • Evolution of Interfaces Group of MIB-II (RFC 1573) • Simple Network Management Protocol (SNMP) MIB II (RFC 1213) • Remote Monitoring (RMON) MIB (RFC 1757) • Switch Monitoring (SMON) MIB
Network management	Supported with CiscoWorks—CiscoView, CiscoWorks Resource Manager Essentials (RME) Cisco VPN Solution Center (VPNSC)

Table 2 Product Specifications (Continued)

Physical specifications	• Occupies one slot in a Cisco 7600 Series Router or Cisco Catalyst 6500 Series Switch • Supports up to 12 Enhanced FlexWAN modules in a 13-slot chassis • Requires Supervisor Engine 2 with Multilayer Switch Feature Card 2 (MSFC2) and Policy Feature Card 2 (PFC2) or Supervisor Engine 720 • Dimensions (H x W x D): 1.75 x 15.375 x 16 in. • Weight: 8.4 lb
Power	135 watts power consumption per Enhanced FlexWAN module, 170 watts maximum power consumption with two port adapters
Indicators	Enhanced FlexWAN module status: green (operational); orange (faulty)
Regulatory compliance	**CE marking** *Safety* • UL 60950 • CSA C22.2 No. 60950 • EN60950 • TS001 • IEC 60950 • AS/NZS3260 *EMC* • FCC Part 15 Class A • ICES-003 Class A • VCCI Class A • EN55022 Class A • EN55024 • EN50082-1 • EN61000-3-2 • EN61000-3-3 • EN61000-3-1 • CISPR22 Class A • AS/NZS3548 Class A • ETS-300 386

Table 2 Product Specifications (Continued)

Standards	Telecommunications
	• ITU-T G.610
	• ITU-T G.703
	• ITU-T G.707
	• ITU-T G.783 Sections 9-10
	• ITU-T G.784
	• ITU-T G.803
	• ITU-T G.813
	• ITU-T G.825
	• ITU-T G.826
	• ITU-T G.841
	• ITU-T G.957 Table 3
	• ITU-T G.958
	• ITU-T I.361
	• ITU-T I.363
	• ITU I.432
	• ITU-T Q.2110
	• ITU-T Q.2130
	• ITU-T Q.2140
	• ITU-T Q.2931
	• ITU-T O.151
	• ITU-T O.171
	• ETSI ETS 300 417-1-1
	• ACA TS 026 (1997)
	• BABT /TC/139 (Draft 1e)

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Availability and Ordering

Table 3 Ordering Information

Description	Part Number
Cisco 7600 Series/Catalyst 6500 Series Enhanced FlexWAN module	WS-X6582-2PA
Cisco 7600 Series/Catalyst 6500 Series Enhanced FlexWAN module, spare	WS-X6582-2PA=
Cisco 7600 Series/Catalyst 6500 Series Enhanced FlexWAN module 256-MB memory	MEM-CC-WAN-256M
Cisco 7600 Series/Catalyst 6500 Series Enhanced FlexWAN module 256-MB memory, spare	MEM-CC-WAN-256M=
Cisco 7600 Series/Catalyst 6500 Series Enhanced FlexWAN module 512-MB memory	MEM-CC-WAN-512M
Cisco 7600 Series/Catalyst 6500 Series Enhanced FlexWAN module 512-MB memory, spare	MEM-CC-WAN-512M=

Service and Support

Cisco offers numerous service and support offerings for both service provider and enterprise customers. Cisco has earned the highest customer satisfaction ratings in the industry by providing the world-class service and support necessary to deploy, operate, and optimize networks. Whether the goal is speed to market, maximizing network availability, or enhancing customer satisfaction and retention, Cisco is committed to the success of its customers.

For More Information

For more information about Cisco service and support programs and benefits, visit:

http://www.cisco.com/en/US/support/index.html

For more information about Cisco 7600 Series Routers visit:

http://www.cisco.com/go/7600

For ordering information, visit:

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