CISCO SYSTEMS

DATA SHEET

SYMMETRIC HIGH-BIT-RATE DSL INTERFACE CARD FOR CISCO 1800, 2800, AND 3800 SERIES INTEGRATED SERVICES ROUTERS AND CISCO 1700, 2600XM, 2691, AND 3700 MULTISERVICE ACCESS ROUTERS

Cisco® multiservice access routers and integrated services routers offer a wide variety of WAN connectivity modules to accommodate the range of application needs in customer networks. The new Cisco 1-Port G.SHDSL WAN Interface Card (part number WIC-1SHDSL-V3) offers G.SHDSL-based WAN connectivity for modular routers deployed in small to medium-sized branch offices (Figure 1).

OVERVIEW

The new G.SHDSL WAN interface card (WIC) provides 1-port symmetric high-bit-rate DSL (SHDSL) connectivity to a WAN. The modular routers that support the new card are the Cisco 1841, 2801, 2811, 2821, 2851, 3825, and 3845 series integrated services routers; the Cisco 1721, 1751, 1760, 2600XM, 3725, and 3745 series multiservice access routers; and the Cisco 2691 Multiservice Platform. The interface card is available on Cisco access routers, starting with Cisco IOS® Software Release 12.4(3) Mainline and special Cisco IOS Software Release 12.4(2)XA. The first T-train image that will support the new interface card will be 12.4(3rd)T.

The new interface card is the latest G.SHDSL-based WIC for Cisco modular routers. It supersedes existing interfaces (part numbers WIC-1SHDSL and WIC-1SHDSL-V2) while maintaining feature parity with WIC-1SHDSL-V2. (Table 4 later in this document compares the three interface cards.)

G.SHDSL technology offers customers high-speed, symmetrical WAN connectivity at a lower monthly cost than most traditional WAN circuits. Using single or dual-pair copper wires, Cisco access routers with SHDSL interface card (part number WIC-1SHDSL-V3), can provide businesses the necessary bandwidth for critical traffic such as voice and videoconferencing, and can allow customers to save money by integrating voice and data traffic on the same WAN link. Service providers can increase subscriber revenue by bundling services and offering differentiated service levels through service-level agreements (SLAs).

A product of the ITU-T, SHDSL is the first standardized multirate symmetric DSL technology. It is designed to transport rate-adaptive symmetrical data across a single copper pair at data rates from 192 kbps to 2.3 Mbps, or 384 kbps to 4.6 Mbps over two pairs. This covers applications traditionally served by high-bit-rate DSL (HDSL), symmetric DSL (SDSL), T1, E1, and services beyond E1. G.SHDSL represents the worldwide-accepted DSL standard for symmetrical DSL, based on ITU recommendation G.991.2.

Figure 1. Cisco 1-Port G.SHDSL WAN Interface Card (part number WIC-1SHDSL-V3)

FEATURE SUMMARY

- Offers symmetrical WAN speeds up to 2.3 Mbps over a single copper pair and up to 4.6 Mbps over two copper pairs
- Based on ITU Recommendation G.991.2 (accepted worldwide)
- Supports Dying Gasp; uses power status bit (section 7.1.2.5.3 of G.991.2) for signaling
- Supports Wetting Current (Section A.5.3.3 of G.991.2)
- Supports G.SHDSL Annex A (U.S. signaling) and Annex B (European signaling)
- Multiple G.SHDSL WICs configurable per Cisco 1800, 2800, and 3800 and Cisco 1700, 2600XM, and 3700 router chassis
- Offers toll-quality voice over data with ATM Adaptation Layer 2 (AAL2) on Cisco 2800, 3800, 2600, and 3700 series routers; and AAL5 and voice over IP (VoIP) on the Cisco 1800, 2800, 3800, 1700, 2600, and 3700 series routers
- Supports extensive ATM classes of service (CoS) and IP quality of service (QoS)
- Operates back to back or with DSL access multiplexer (DSLAM)
- Sustains up to 23 virtual circuits per WIC

SYSTEM REQUIREMENTS

- The WIC is supported on all modular Cisco integrated services routers—the Cisco 1841, 2801, 2811, 2821, 2851, 3825, and 3845. It is also supported on the older multiservice routers—the Cisco 1721, 1751, 1760, 2600XM, 2691, 3725, and 3745 routers.
- The new WIC is supported on these access routers using the Cisco IOS IP Base feature set and up. For the Cisco 1700 Series, the minimum Cisco IOS Software feature set required to support the card is IP/ADSL or IP Base.
- The routers listed previously need to run Cisco IOS Software Release 12.4(3) Mainline and above or 12.4(2)XA to support the new WIC. The interface is also supported in Cisco IOS Software Release 12.4(3rd)T and above.
- The system requires no additional flash or DRAM memory other than the specified minimum memory for the Cisco IOS Software releases listed.
- No slot placement restrictions are placed for the new interface card on any of the platforms.

FEATURES AND BENEFITS SUMMARY

Table 1 summarizes the features and benefits of the new WIC.

Table 1.   G.SHDSL WICs with Cisco Access Routers Features and Benefits

Feature	Benefits
Flexibility	
Cisco IOS Software Support	• Provides the industry's most robust, scalable, and feature-rich internetworking software support using the accepted standard networking software for the Internet and private WANs • Constitutes part of the Cisco Systems® end-to-end network solution, including multiprotocol routing (IP, Internetwork Packet Exchange [IPX, AppleTalk, and IBM/Systems Network Architecture [SNA]) and bridging
Integrated Voice and Data Networking	
Voice and Data Integration	• Reduces long-distance toll charges by allowing the data network to carry interoffice voice and fax traffic • Works with existing handsets, key units, and private branch exchanges (PBXs), eliminating the need for a costly phone-equipment upgrade • Supports critical IP QoS features in Cisco IOS Software • Provides traffic management with ATM CoS
Digital Voice Interfaces	• Provides toll-quality, award-winning derived VoIP; software-support VoIP/AAL5 and voice over ATM (VoATM)/AAL2 (Cisco 2800, 3800, 2600, and 3700 only); and AAL5

Feature	Benefits
Analog Voice Interfaces	• Supports analog voice for VoATM/VoIP over AAL5
Standards-Based H.323 Signaling	• Allows an ecosystem of third-party vendors to develop applications for a complete solution; allows rapid low-cost deployment of VoIP
Digital Signal Processors (DSPs) and Voice-Compression Codecs G.711, G.729a, G.723.1, and G.726	• Provide hardware-based compressed voice to fit significantly more voice lines over a single copper pair without breaking the end-to-end delay budget
Sub-Cell Multiplexing (AAL2) (Cisco 2800, 3800, 2600, and 3700 only)	• Helps enable multiple voice channels to share an ATM cell, leading to efficient bandwidth utilization
Modular Architecture	
Variety of WICs, Voice Interface Cards (VICs), and Network Modules	• Offers added flexibility and investment protection • Provides easy migration from Frame Relay or asymmetric DSL (ADSL) to SHDSL
Multiple Platform Support	• Supports G.SHDSL WICs across a variety of Cisco platforms, including the Cisco 1841, 2800, 3800, 1700, 2600, 2600XM, 2691, and 3700 series routers • Reduces cost of maintaining inventory, and allows reuse of modules
Security with VPN and Integrated Firewall	
Hardware-Based Encryption	• Helps enable creation of VPNs by providing industry-standard data privacy, integrity, and authenticity as data traverses the Internet or a shared public network • Offers hardware-based VPN encryption through onboard processor or Advanced Integration Module (AIM) VPN card
Triple Digital Encryption Standard (3DES) IP Security (IPSec), Advanced Encryption Standard (AES), Generic Routing Encapsulation (GRE), Layer 2 Tunneling Protocol (L2TP), and Layer 2 Forwarding (L2F)	• Offers choice of standards-based tunneling methods to create VPNs for IP and non-IP traffic • Offers full interoperability with public certificate authorities and IPSec standards-based products • Constitutes part of the scalable Cisco end-to-end VPN solution portfolio
Cisco IOS Firewall	• Cisco IOS Firewall includes context-based access control for dynamic firewall filtering, denial-of-service (DoS) detection and prevention, Java blocking, and real-time alerts • Allows internal users to access the Internet with secure, per-application-based, dynamic access control while preventing unauthorized Internet users from accessing the internal LAN
Network Address Translation and Port Address Translation (NAT/PAT)	• Hides internal IP addresses from external networks • Prevents certain DoS attacks from outside networks • Allows multiple users access with a single IP address
Password Authentication Protocol/Challenge Handshake Authentication Protocol (PAP/CHAP), Microsoft CHAP (MS-CHAP), RADIUS, and TACACS+	• Supports all leading user identity verification schemes
Route and Router Authentication	• Accepts routing table updates from only known routers, helping ensure that no corrupt information from unknown sources is received
Internet Key Exchange (IKE) and X.509v3 Digital Certification	• Helps ensure proper identity and authenticity of devices and data • Supports Certificate Enrollment Protocol (CEP) with certification authorities (CAs) such as Verisign and Entrust

Feature	Benefits
ATM Features	
ATM Traffic Unspecified Bit Rate (UBR), Non-Real-Time Variable Bit Rate (VBR-nrt), Real-Time Variable Bit Rate (VBR-rt), and Constant Bit Rate (CBR) with Traffic Shaping	• Helps ensure QoS guarantees for real-time traffic, with ability to send traffic over the appropriate virtual circuit to provide ATM-level shaping and ensure that no head-of-line blocking occurs between circuits of different or equal traffic classes
Up to 23 Virtual Circuits per WIC	• Helps enable more sessions at a time; is relevant for small and medium-sized businesses and small branch offices with 50 to 200 employees • Supports per-virtual circuit queuing in Cisco IOS Software releases 12.2(2)XK, 12.2(4)XL, 12.2(13)T, 12.2(8)YN, and subsequent releases (per-virtual circuit queuing not supported in Cisco IOS Software releases 12.2(4)T, 12.2(8)T1, or 12.2(11)T)
Point-to-Point Protocol (PPP) over ATM	• Helps ensure compatibility with existing network
F5 OAM Continuity Check (F5OAMCC) and Loopback	• Supported in Cisco IOS Software releases 12.2(4)XL, 12.2(11)T2, 12.2(8)YN, and subsequent releases
Interim Local Management Interface (ILMI)	• Supported in Cisco IOS Software releases 12.2(4)XL, 12.2(13)T, 12.2(8)YN, and subsequent releases
PPP over Ethernet Client	• Meets service provider requirements and eliminates the need for additional network software on LAN-connected client PCs
RFC 2684 Routing	• Supports RFC 2684 Routing
ATM Oversubscription for DSL	• Allows bandwidth oversubscription to be configured for VBR and UBR+ service classes • Supported in Cisco IOS Software releases starting with 12.4(2)XA; also available in Release 12.4(3rd)T and above
Multiqueue	• Multiqueue for DSL lines helps enable a priority and a regular (nonpriority) queue for traffic streams • Supported in Cisco IOS Software releases starting with 12.4(2)XA; also available in Release 12.4(3rd)T and above
Device Integration	
Integrated Router, Voice Gateway, Firewall, and VPN in a Single Device	• Reduces costs and simplifies management

IP QUALITY OF SERVICE

The Cisco 1800, 2800, 3800, 1700, 2600XM, 2691, and 3700 series with a G.SHDSL WIC support the integration of voice and data over the same G.SHDSL circuit using VoIP. The Cisco 2800, 3800, 2600XM, 2691, and 3700 support VoATM, thus allowing for further reduction of recurring monthly WAN charges. Table 2 describes all the IP QoS features that are supported on the new WIC. For more information about IP QoS, refer to the following URL: http://www.cisco.com/univercd/cc/td/doc/product/software/ios122/122newft/122limit/122y/122yn8/ft_ipqos.htm

Table 2. Supported IP QoS Features

Feature	Description
Classification and Marking	• Class-based marking with differentiated services code point (DSCP) (data only) • Committed access rate (CAR) with DSCP (Ingress-Ethernet/Fast Ethernet; Egress—G.SHDSL) • Dial-peer DSCP/IP Precedence marking
Queuing and Scheduling	• Class-Based Weighted Fair Queuing (CBWFQ) • Low Latency Queuing (LLQ) • Driver per-virtual circuit queuing
Congestion Avoidance	• Class-Based Weighted Random Early Detection (WRED) with DSCP (egress)
Policing and Traffic Shaping	• Class-based policing • Per-ATM virtual circuit shaping for VBR-nrt • ATM cell loss priority (CLP) bit marking*
Link Efficiency	• Tunable Tx ring buffer for values 2 through 601 • Multilink PPP (MLPPP) link fragmentation and interleaving (LFI) • MLPPP with LLQ, CBWFQ, and other QoS features* • Compressed Real-Time Transport Protocol (cRTP)*
Other (IP QoS)	• Local policy routing (LPR) • Policy-based routing (PBR) • IP QoS map to ATM CoS

* Supported in Cisco IOS Software Release 12.3(2)T or later

The G.SHDSL WICs for the Cisco 2800, 3800, 2600XM, 2691, and 3700 provide support for ATM CoS (CBR, VBR-nrt, VBR-rt, and UBR) features that help service providers manage their core ATM network infrastructures to deliver scalable, cost-effective services with CoS guarantees to their customers. Permanent-virtual-circuit (PVC) traffic shaping and queuing allow further optimization of the existing bandwidth between customers and various services.

INTEROPERABILITY

The new interface cards are based on the Conexant chipset (Firmware 3.0.1), and they operate when connected back to back or when connected to a DSLAM.

Customers can deploy G.SHDSL WICs in a back-to-back configuration to take advantage of existing copper wiring in a building, campus, or neighborhood where DSLAM aggregation equipment is neither needed nor financially justified. In back-to-back mode, one side of the connection is configured in central-office mode and provides functions similar those of a DSLAM (Table 3).

Table 3. DSLAM Interoperability

	WIC-1SHDSL-V3 (2-wire ATM mode)	WIC-1SHDSL-V3 (4-wire ATM mode)
Alcatel ASAM 7300 (12- and 24-Port Line Cards)	X	X
ECI HiFocus SAM 240 (16-Port Metalink-Based Line Cards)	X	X
Lucent Stinger FS (32- and 48-Port Line Cards)	X	X

Table 4 lists the primary differences among the new line cards, and Table 5 gives details about platform support.

Table 4. Primary Differences Among 1-Port G.SHDSL WAN Interface Cards

Features, Parts, or Firmware	WIC-1SHDSL	WIC-1SHDSL-V2	WIC-1SHDSL-V3
Dying Gasp	No	Yes	Yes
4-Wire Support	No	Yes	Yes
Wetting Current	No	Yes	Yes
Conexant Firmware Version**	1.5	A29733 (based on 2.3.1)	3.0.1
Annex A-B and ANFPB Support	No	Yes	Yes

** Firmware versions current as of 8/20/2005

PLATFORM SUPPORT

Table 5. Platform Support Details

	WIC-1SHDSL-V3	
Platforms Supported	Cisco 1721, 1751, 1721, 1751, 1760, 1841, 2801, 2811, 2821, and 2851 routers	Cisco 1721, 1751, and 1760; Cisco 2610XM through Cisco 2650XM; and Cisco 2691, 3725, 3745, 3825, and 3845 routers
Onboard High-Speed WIC (HWIC) or WIC Slots	Yes	Yes
NM-2W Support	No	Yes
NM-1FE2W, NM2FE2W, NM-1FE1R2W Support	No	Yes (except for 2600XM)***
NM-1FE2W-V2, NM2FE2W-V2, NM-1FE1R2W-V2 Support	No	Yes (except for 2600XM)***

*** NM-1FE2W, NM2FE2W, NM-1FE1R2W, NM-1FE2W-V2, NM2FE2W-V2, NM-1FE1R2W-V2 are not supported on 2600 XM routers

Table 6 gives the maximum number of G.SHDSL WICs per platform.

Table 6. Maximum Number of G.SHDSL WICs per Platform

Platform	Maximum Number of G.SHDSL WICs
Cisco 1721, 1751, and 1760	2
Cisco 1841	2
Cisco 2600XM	4
Cisco 2801	3
Cisco 2811 through Cisco 2851	4
Cisco 2691	5
Cisco 3725	7
Cisco 3745	11
Cisco 3825	8
Cisco 3845	12

SOFTWARE REQUIREMENTS

Table 7 gives software requirements, Table 8 gives ordering information, and Table 9 gives hardware specifications for the new interface cards.

Table 7. Minimum Cisco IOS Software Release Required for New WICs

Platform	Minimum Cisco IOS Software Release for WIC-1SHDSL-V3 Support	Minimum Cisco IOS Software 'T' train support	Recommended Cisco IOS Software Release	Cisco IOS Feature Set
Cisco 1841 and 2801	12.4(2)XA	12.4(3rd)T or 12.4(6)T	12.4(5)M	IP Base and up
Cisco 2811 through Cisco 2851	12.4(2)XA	12.4(3rd)T or 12.4(6)T	12.4(5)M	IP Base and up
Cisco 3825 and 3845	12.4(2)XA	12.4(3rd)T or 12.4(6)T	12.4(5)M	IP Base and up
Cisco 1721, 1751, and 1760	12.4(2)XA	12.4(3rd)T or 12.4(6)T	12.4(5)M	IP/ADSL, IP Base, and up
Cisco 2610XM through Cisco 2651XM and Cisco 2691	12.4(2)XA	12.4(3rd)T or 12.4(6)T	12.4(5)M	IP Base and up
Cisco 3700 Series	12.4(2)XA	12.4(3rd)T or 12.4(6)T	12.4(5)M	IP Base and up

Table 8. Product Number and Ordering Information

Product Number	Description
WIC-1SHDSL-V3	1-port G.shdsl WIC with Four Wire Support (system)
WIC-1SHDSL-V3=	1-port G.shdsl WIC with Four Wire Support (spare)
CISCO1841-SHDSL-V3	1841 DSL bundle, WIC-1SHDSL-V3 (4-wire), IP Broadband, 32F/128D
C2801-SHDSL-V3/K9	2801 DSL bundle, WIC-1SHDSL-V3 (4-wire), SP Svcs, 64F/192D
C2811-SHDSL-V3/K9	2811 DSL bundle, WIC-1SHDSL-V3 (4-wire), SP Svcs, 64F/256D

Table 9. Hardware Specifications

G.SHDSL Chipset	Conexant Chipset
Dimensions (H x W x D)	0.75 x 3.08 x 4.38 in. ((1.91 x 6.93 x 9.86 cm)
Weight	2.4 oz (68g)
LEDs	CD (carrier detect)
	LP (loopback)
	OK (DSLSAR download complete)
Ports	Single RJ-11/RJ-14C connector
Cabling	RJ-11 line cord
Network Equipment Building Standards (NEBS) Compliance	Level 3 compliant (Type 2/4)

SAFETY, EMC, TELECOM, NETWORK HOMOLOGATION, POWER, ENVIRONMENTAL REQUIREMENTS, AND REGULATORY APPROVALS

When installed in a Cisco 1700, 1841, 2600, 2800, 3700, or 3800 series router, the new Cisco SHDSL WIC does not change the standards (safety, EMC, telecom, network homologation, power, environmental requirements, and regulatory approvals) of the router itself. Refer to the following data sheets for additional information about mechanical, environmental, and agency certifications:

- For Cisco 1721 and 1760:

http://www.cisco.com/en/US/products/hw/routers/ps221/products_data_sheet09186a00800920ec.html

http://www.cisco.com/en/US/products/hw/routers/ps221/products_data_sheet09186a0080088719.html

http://www.cisco.com/en/US/products/hw/routers/ps221/products_data_sheet09186a00800920f2.html

- For Cisco 1800 Series (modular):

http://www.cisco.com/en/US/prod/collateral/routers/ps5853/product_data_sheet0900aecd8016a59b.html

- For Cisco 2600XM and 2691:

http://www.cisco.com/en/US/prod/collateral/routers/ps259/product_data_sheet0900aecd800fa5be.html

- For Cisco 2800 Series:

http://www.cisco.com/en/US/products/ps5854/index.html

- For Cisco 3700 Series:

http://www.cisco.com/en/US/prod/collateral/routers/ps282/product_data_sheet09186a008009203f.html

- For Cisco 3800 Series:

http://www.cisco.com/en/US/prod/collateral/routers/ps5855/product_data_sheet0900aecd8016a8e8.html

COUNTRY SUPPORT

This technology is accepted worldwide based on ITU Recommendation 991.2.

Refer to the following URL or contact your local Cisco representative for country-specific approval status:
http://tools.cisco.com/cse/prdapp/jsp/externalsearch.do?action=externalsearch&page=EXTERNAL_SEARCH.

CISCO SYSTEMS

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

European Headquarters
Cisco Systems International BV
Haarlerbergpark
Haarlerbergweg 13-19
1101 CH Amsterdam
The Netherlands
www-europe.cisco.com
Tel: 31 0 20 357 1000
Fax: 31 0 20 357 1100

Americas Headquarters
Cisco Systems, Inc.
170 West Tasman Drive
San Jose, CA 95134-1706
USA
www.cisco.com
Tel: 408 526-7660
Fax: 408 527-0883

Asia Pacific Headquarters
Cisco Systems, Inc.
168 Robinson Road
#28-01 Capital Tower
Singapore 068912
www.cisco.com
Tel: +65 6317 7777
Fax: +65 6317 7799

Cisco Systems has more than 200 offices in the following countries and regions. Addresses, phone numbers, and fax numbers are listed on
the Cisco Website at www.cisco.com/go/offices.

Argentina • Australia • Austria • Belgium • Brazil • Bulgaria • Canada • Chile • China PRC • Colombia • Costa Rica • Croatia • Cyprus
Czech Republic • Denmark • Dubai, UAE • Finland • France • Germany • Greece • Hong Kong SAR • Hungary • India • Indonesia • Ireland • Israel
Italy • Japan • Korea • Luxembourg • Malaysia • Mexico • The Netherlands • New Zealand • Norway • Peru • Philippines • Poland • Portugal
Puerto Rico • Romania • Russia • Saudi Arabia • Scotland • Singapore • Slovakia • Slovenia • South Africa • Spain • Sweden • Switzerland • Taiwan
Thailand • Turkey • Ukraine • United Kingdom • United States • Venezuela • Vietnam • Zimbabwe