Cisco VDSL2 High-Speed WAN Interface Card

Cisco® integrated services routers offer a wide variety of WAN connectivity modules to accommodate the range of application needs in customer networks. The Cisco® VDSL2 High-Speed WAN Interface Card (part number HWIC-1VDSL) is designed to support the wide deployment of services such as voice, video, data, high-definition television (HDTV), and interactive gaming. This 1-port high-speed WAN interface card (HWIC) has one very-high-data-rate (VDSL) port and supports VDSL2 over basic telephone service(Plain Old Telephony System).

Overview

The VDSL HWIC provides 1-port VDSL2 (Figure 1) connectivity to a WAN. Combined with the Cisco® 1941 Integrated Services Router (ISR G2) or the Cisco® 2900 or 3900 Series Integrated Services Routers (ISR G2), this HWIC provides high-speed digital data transmission between customer premises equipment (CPE) and a central office (DSL access multiplexer [DSLAM]). Thus service providers and resellers can offer additional services by supporting features for business-class security, voice , video, and data integration, differentiated classes of service (CoS), and managed network access with Cisco IOS® Software. These value-added features, along with the manageability and reliability of Cisco IOS Software technology, provide the mission-critical networking that businesses require.

The 1-port VDSL2 HWIC is supported on the Cisco 1941, 2901, 2911, 2921, 2951, 3925, and 3945 ISR G2 starting with Cisco IOS Software 15.0.1M1.

Figure 1.   Single-Port HWIC Provides VDSL2 Port for WAN Connectivity

VDSL2 is an enhancement to G.993.1 (VDSL), and in February 2006 it was standardized as ITU G.993.2. It permits the transmission of asymmetric and symmetric aggregate data rates of up to 200 Mbps on twisted pairs using a frequency bandwidth of up to 30 MHz. The exact data rates vary, depending on the VDSL profiles and band plans supported, as well as the distance from the DSLAM; DSLAM type; line card and chipset; and firmware, noise profile, quality of copper, etc.

The newest and most advanced standard of DSL broadband wireline communications, VDSL2 is designed to support a wide deployment of triple-play services such as voice, video, data, high definition television (HDTV) and interactive gaming. VDSL2 is purported to enable operators and carriers to gradually, flexibly, and cost-efficiently upgrade existing DSL infrastructures.

VDSL over Basic Telephone Service (HWIC-1VDSL)

Key Features

Supports VDSL2 over basic telephone service with G.993.2 (up to 17 MHz)

- Supports VDSL2 over basic telephone service band plans (997 and 998).
- Supports VDSL2 profiles: 8a, 8b, 8c, 8d, 12a, 12b, and 17a
- Supports downstream speeds up to 100 Mbps in Ethernet Packet Transport Mode (PTM) mode and up to 50 Mbps upstream
- Supports long-reach VDSL2
- Supports PTM (Ethernet over DSL – 802.3ah)
- Supports IEEE802.1q; VLAN tagged frames will be supported in Ethernet mode of VDSL2
- Supports Double Ended Line Testing (DELT) capabilities
- Supports IP quality of service (QoS)
- Supports Dying Gasp function to send a message to the DSLAM to report power failure
- Has one RJ-11 VDSL2 interface
- Interoperates with third-party DSLAMs (refer to Table 1)

Applications

Business-Class DSL with WAN Backup

The Cisco 1900, 2900, and 3900 Series ISR G2 offer multiple WAN slots. These routers are configured with VDLS2 HWICs for primary WAN access, providing redundancy for mission-critical applications (Figure 2). In addition, the WAN flexibility in these platforms enables you to swap out the VDLS2 HWIC with any other WIC or HWIC, depending on your business need.

Figure 2. VDSL2 WAN Access with ISDN Backup

Branch Office
- Cisco 1941 with HWIC-1VDSL and ISDN BRI WIC
- If the VDSL fails, the router recognizes that the line is down and starts the backup with ISDN

Banking Application
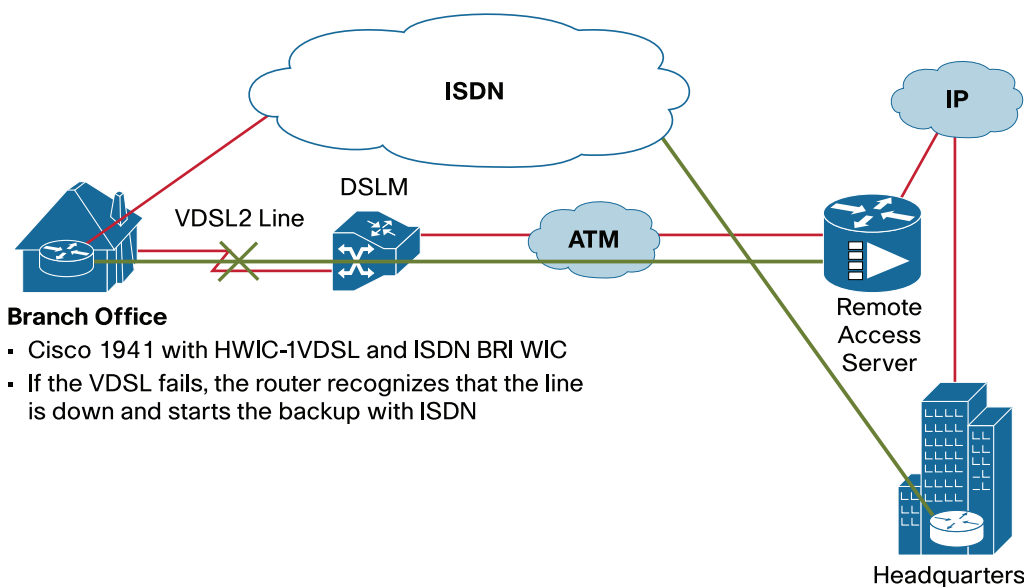
In this scenario (refer to Figure 3), a bank branch office uses the Cisco 2911 ISR G2 with an ADSL2 + HWIC and ISDN Basic Rate Interface (BRI) WIC to provide primary and backup WAN access. In addition, the 8-port asynchronous/synchronous HWIC (HWIC-8A/S) is used as an interface to ATM machines. This scenario further highlights the versatility of the Cisco 2911 because it enables the banking databases to update any ATM transactions that take place while continuing to provide WAN access and redundancy for mission-critical applications.

Figure 3.   Banking Application

ATM Machines

ISDN

IP

DSLM

VDSL2 Line

ATM

Bank Branch Office
- Cisco 2911 with HWIC-1VDSL, ISDN BRI WIC, and HWIC-8A/S
- VDSL2 access, WAN backup through ISDB BRI WIC; high-density asynchronous/synchronous interface to ATM terminals

Remote Access Server

Bank Headquarters

Business-Class Security

The Cisco 1900, 2900, and 3900 Series ISR G2 with the VDSL2 HWICs can be optimized for Internet security with the Cisco IOS Firewall supporting stateful-inspection-firewall and intrusion-prevention-system features. With an always-on DSL connection, Internet security is vital to protect corporate resources from malicious network attacks. You can enable these features on the modular routers by purchasing the optional Cisco IOS Software with the Advanced Security or higher feature set.

You can also optimize these platforms for VPNs, which allow secure use of the Internet for communications with the same policies and levels of security and performance as a private network. VPNs provide security through encryption tunneling, and the Cisco routers support hardware-based Triple Data Encryption Standard (3DES), IP Security (IPSec), and Advanced Encryption Standard (AES) .You can enable encryption features on the routers by purchasing the optional Cisco IOS Software Advanced Security feature set.

Application-Aware Networking with IP QoS

Using Cisco QoS features, including Class-Based Weighted Fair Queuing (CBWFQ), Low-Latency Queuing (LLQ), Weighted Random Early Detection (WRED), etc., Cisco 1900, 2900, and 3900 Series ISR G2 with VDSL2 HWICs can help service providers and resellers offer services that can differentiate bandwidth based on a specific

application or a specific user. For example, administrators can give traffic of an order entry department priority over that of a marketing department.

DSLAM Interoperability

Table 1 lists the DSLAMs supported by the new VDSL2 HWIC at first customer shipment (FCS) of Cisco IOS Software Release 15.0.1M1 with CPE VDSL2 firmware AvC011b. The DSLAMs listed in Table 1 provide interoperability for the VDSL2 standard (G.993.2) .This table will be updated as more DSLAMs are tested and supported.

Table 1.   DSLAM Interoperability for VDSL2 HWIC

Product Number and Standard	HWIC-1VDSL Firmware	DSLAM Model	DSLAM Line Car/Chipset	DSLAM Firmware
HWIC-1VDSL	15.0.1M1 IOS with AvC011b VDSL2 firmware	ZTE 9806	VSTDC/Broadcom	V1.2.0P4T2
		Huawei 5603	H565VDEA/Broadcom	320(2007-12-7)
		ECI M41	VTUC_EC 48NGxDSL	VTUCP48_APP_2.00.45

Performance

VDSL2 performance varies according to a variety of factors, including the DSLAM line-card type, DSLAM software version, VDSL profile and band plan, line noise, and loop length.

Software Support

The 1-port VDSL2 HWICs are supported starting with Cisco IOS Software Release 15.0.1M1 on Cisco 1941, 2901, 2911, 2921, 2951, 3925, and 3945 ISR G2.

The VDSL2 features are supported with the IP Base technology package license for the Cisco 1941 and Cisco 2900 and 3900 Series ISR G2.

Platform Support

VDLS2 HWICs are supported only in the onboard HWIC slots of the modular ISR G2. Table 2 provides platform support details.

Table 2.   Platform Support Details and Maximum Number of HWICs per Platform

HWIC-1VDSL	Maximum Number of HWICs
Cisco 1941 and 2901	2
Cisco 2911, 2921, 2951, 3925, and 3945	4

Product Number and Ordering Information

Table 3 lists the part numbers for the VDSL2 over basic telephone service.

Table 3.   VDSL2 over Basic Telephone Service Product Numbers

Product Number	Description
HWIC-1VDSL	1-port VDSL2 over basic telephone service HWIC (system)
HWIC-1VDSL=	1-port VDSL2 over basic telephone service HWIC (spare)

Cable Information

The straight-through cable is the default cable; it is included in the HWIC packaging. If you have an external splitter, you may need a crossover cable; you can order one as a spare (part number CAB-ADSL-RJ11X=).

Cisco 1900, 2900, and 3900 Series Regulatory Approvals

When installed in the Cisco 1900, 2900, and 3900 Series Integrated Services Routers G2, the VDSL2 HWIC does not change the router standards (regulatory compliance, safety, EMC, and telecom).

Refer to the platform-specific links for their regulatory compliance, safety, EMC, and telecom standards:

- For Cisco 1941 Series Integrated Services Routers: http://www.cisco.com/go/1900
- For Cisco 2900 Series Integrated Services Routers: http://www.cisco.com/go/2900
- For Cisco 3900 Series Integrated Services Routers: http://www.cisco.com/go/3900

VDSL2 Chipset Specifications

- HWIC-1VDSL (VDSL2 over POTS)) uses a Broadcom BCM6368 chipset.

Table 4.   VDSL2 HWIC Dimensions and Weight

	HWIC-1VDSL
Width	3.08 in. (7.82 cm)
Height	0.75 in. (1.91 cm)
Depth	4.36 in. (11.08 cm)
Weight	0.20 lb (91g)