ADSL2 and ADSL2+ High-Speed WAN Interface Cards for the 1841 Integrated Services Router and Cisco 2800 and 3800 Series Integrated Services Routers

Q. **What are the part numbers for the Cisco ADSL2 and ADSL2+ High-Speed WAN Interface Cards?**

A. The part numbers for the Cisco ADSL2 and ADSL2+ High-Speed WAN Interface Cards (HWICs) are as indicated in Table 1.

Table 1.   ADSL2/ADSL2+ HWIC Part Numbers

Product Name/Part Number	Description
HWIC-1ADSL	Cisco 1-Port ADSL2+ HWIC – Annex A, L
HWIC-1ADSLI	Cisco 1-Port ADSL2+ HWIC – Annex B
HWIC-1ADSL-B/ST	Cisco 1-Port ADSL2+ HWIC – Annex A, L, 1 ISDN BRI port for backup
HWIC-1ADSLI-B/ST	Cisco 1-Port ADSL2+ HWIC – Annex B, 1 ISDN BRI port for back
HWIC-1ADSL-M	Cisco 1-Port ADSL2+ HWIC – Annex A, L, M

Q. **What are some of the key features of the ADSL2 and ADSL2+ HWICs?**

A. The HWICs support for different ADSL standards follows:

HWIC-1ADSL/HWIC-1ADSL-B/ST:

- Supports ADSL2+ standard (G.992.5) Annex A
- Supports ADSL2 standard (G.992.3) Annex A
- Supports reach-extended ADSL2 standard (G.992.3) Annex L
- Supports asymmetric DSL (ADSL) standard (G.992.1) Annex A
- Supports ANSI T1.413 issue 2

HWIC-1ADSLI/HWIC-1ADSLI-B/ST

- Supports ADSL2+ standard (G.992.5) Annex B
- Supports ADSL2 standard (G.992.3) Annex B
- Supports ADSL standard (G.992.1) Annex B
- Supports ETSI TS 101 388

HWIC-1ADSL-M

- Supports ADSL2+ standard (G.992.5) Annex A and M
- Supports ADSL2 standard (G.992.3) Annex A and M
- Supports reach-extended ADSL2 standard (G.992.3) Annex L
- Supports ADSL standard (G.992.1) Annex A
- Supports with ANSI T1.413 issue 2

In addition, the following features are common to all the ADSL, ADSL2, and ADSL2+ HWICs:

- Supports ATM Adaptation Layer 5 (AAL5) services
- Supports ATM class-of-service (CoS) features constant bit rate (CBR), non-real-time variable bit rate (VBR-nrt), real-time variable bit rate (VBR-rt), and unspecified bit rate (UBR)
- Supports up to 23 virtual circuits per HWIC
- Supports IP quality of service (QoS)
- Supports Dying Gasp function

Q. **Which platforms support the HWICs?**

A. Cisco 1841, 2801, 2811, 2821, 2851, 3825, and 3845 Integrated Services Routers support the HWICs. The Cisco 1700 and 3700 Series Modular Access Routers and Cisco 2600 and 3600 Series Multiservice Platforms do not support the HWICs. Table 2 gives the number of ADSL HWICs supported on each platform. The ADSL HWICs function in built-in HWIC slots of the integrated services routers only.

Table 2.   Number of ADSL HWICs Supported by Cisco Integrated Services Routers

Platform	Maximum ADSL HWICs per Platform
Cisco 1841 and 2801	2
Cisco 2811 through Cisco 2851, and Cisco 3825 through Cisco 3845	4

Q. **Which Cisco IOS® Software release and firmware are required?**

A. Cisco IOS Software Release-to-ADSL Firmware Mapping for ADSL2 and ADSL2+ HWICs at first customer shipment (FCS) and later is shown Table 3.

Table 3.   Cisco IOS Software Release and Firmware Mapping

HWIC-1ADSL/HWIC-1ADSL-B/ST		HWIC-1ADSLI/HWIC-1ADSLI-B/ST		HWIC-1ADSL-M	
Default Firmware Version	Cisco IOS Software Releases Supported	Default Firmware Version	Cisco IOS Software Releases Supported	Default Firmware Version	Cisco IOS Software Releases Supported
2.5.27	12.4(4)T	2.5.27	12.4(4)T		
2.5.42	12.4(6)T	2.5.42	12.4(6)T		
2.5.42	12.4(9)T	2.5.42	12.4(9)T		
3.0.14	12.4(11)XJ, 12.4(15)T	3.0.14	12.4(11)XJ, 12.4(15)T	3.0.14	12.4(11)XJ, 12.4(15)T

The firmware version is subject to change. For more detail and future updates on Cisco IOS Software release-to-DSL firmware version mapping, please go to:

http://www.cisco.com/en/US/partner/prod/collateral/routers/ps221/prod_bulletin0900aecd801d5c4c.html

Q. **Is it possible to configure the HWIC in the WIC mode?**

A. No, it is not possible to configure the HWIC in WIC mode. The HWICs are compatible with the HWIC slots only on the Cisco 1841, 2800, and 3800 Integrated Services Routers.

Q. **Why is the DSL access multiplexer (DSLAM) firmware version listed in the Interoperability table in the data sheet?**

A. The DSLAM firmware version is listed in the data sheet because it is the firmware against which Layer one interoperability testing has been performed within Cisco. DSLAM vendors sometimes release new firmware versions for existing DSLAM line cards to add support for new software and hardware features. When the firmware upgrade is done only on the DSLAM side, it can result in interoperability problems between customer premises equipment (CPE) and the DSLAM.

Q. **What are the differences in data rates for the ADSL, ADSL2, and ADSL2+ standards?**

A. ADSL, the G.992.1 standard, enables communications of up to 0.8 Mbps upstream and up to 8 Mbps downstream.

ADSL2, the G.992.3 standard, increases downstream data rates of up to 12 Mbps, and upstream data rates of up to 1 Mbps.

ADSL2+, the G.992.5 standard, doubles the maximum frequency used for downstream data transmission from 1.1 to 2.2 MHz, effectively providing downstream data rates of up to 24 Mbps at a distance of up to 5000 feet from the central office, and upstream data rates of up to 1.5 Mbps.

The exact data rates vary, depending on the distance from the DSLAM, DSLAM type, line card and chipset, and firmware, noise profile, quality of copper, etc.

A plot of downstream data for the different ADSL standards shows approximate reaches in Figure 1.

Figure 1. Approximate Reaches Achieved for Different ADSL Standards
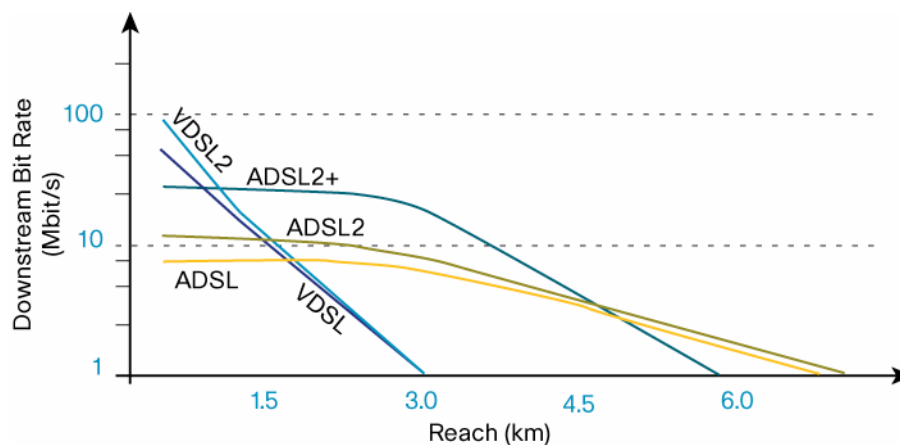
Q. **What do the different annexes specify?**

A. The scope of the different annexes in G.992.5 is defined as follows:

- **Annex-A:** This annex defines those parameters of the ADSL system that are unique to an ADSL service that is frequency division multiplexed with basic telephone service.
- **Annex-B:** This annex defines those parameters of the ADSL system that are unique to an ADSL service that is frequency division multiplexed with ISDN BA on the same digital subscriber line.
- **Annex-M:** This annex defines those parameters of the ADSL with an extended upstream bandwidth system that are unique to an ADSL service that is frequency division multiplexed with basic telephone service.
- **Annex-L:** This annex defines those parameters of the ADSL system that are unique to a reach-extended ADSL2 service that is frequency division multiplexed with basic telephone service.

Q. **What is Annex-M?**

A. This annex-M is an annex of the G.992.3 standard that extends the upstream bandwidth. This extension is achieved by doubling the upstream frequency range. With this feature, service providers can provision symmetric data rates for ADSL2 and ADSL2+ services with data rates up to 2 Mbps.

Q. **The exact data rates vary, depending on the distance from the DSLAM, DSLAM type, line card and chipset, and firmware, noise profile, quality of copper, etc.What does the term "mask" imply in Annex-M?**

A. The mask refers to the submode power spectral density (PSD) mask applicable for Annex-M. Service providers use the mask to minimize the cross-talk between adjacent pairs to an acceptable level. G.992.3 specifies the masks, as shown in Table 4.

Table 4. Annex-M Masks

Upstream Mask Number	Designator	Cutoff Frequency f1 (kHz)	Upstream Tones	Downstream Tones
1	EU-32	138.00	6–32	58–255
2	EU-36	155.25	6–36	58–255
3	EU-40	172.50	6–40	58–255
4	EU-44	189.75	6–44	58–255
5	EU-48	207.00	6–48	58–255
6	EU-52	224.25	6–52	58–255
7	EU-56	241.50	6–56	58–255
8	EU-60	258.75	6–60	61–255
9	EU-64	276.00	6–64	65–255

Q. **Do the Fixed Annex M in HWIC-1ADSL-M products support the power spectral density (PSD) Mask required to comply with the Annex M standards in the United Kingdom?**

A. No. Currently, there are no plans to support this standard.

Q. **What mask does the HWIC-1ADSL-M support?**

A. HWIC-1ADSL-M hardware is optimized for Mask M-9. HWIC-1ADSL-M can operate in other masks, but the performance may be lower than a CPE that is optimized for that mask.

Q. **What is INP?**

A. INP stands for Impulse Noise Protection. Support for INP allows the CPE to provide error-correction capability for impulse noise. The unit for this parameter is in number of symbols. Support for up to 16 symbols is provided by an amendment to the original G.992.5 standard and is referred to as extended INP function (G992.5-addemdum II edited on May 2005). Support for optional INP capability of at least 16 DMT symbols (INP = 16) protects against impulse noise of up to 4 milliseconds. Increasing the INP also increases the latency.

Q. **Do the ADSL, ADSL2, and ADSL2+ HWICs support extended INP functions?**

A. Only the HWIC-1ADSL-M supports the extended INP functions.

Q. **What ADSL chipset is used in the HWICs?**

A. The HWICs use the STMicroelectronics ST20190 chipset.

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