SHDSL FAQ

1. What is SHDSL?

SHDSL stands for Symmetric High-Bitrate Digital Subscriber Loop. SHDSL is the first standardized multi-rate symmetric DSL and is a product of the International Telecommunications Union - Telecommunications (ITU-T). SHDSL 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 HDSL, SDSL, T1, E1, and services beyond E1. SHDSL adheres to the following recommendations: ITU G.991.2 G.SHDSL, ETSI TS 101-524 SDSL and the ANSI T1E1.4/2001-174 G.SHDSL.

2. What variable transmission speeds does SHDSL offer?

With single-pair operation, SHDSL offers 192 kbps to 2.3 Mbps. Data rates are defined in increments of 8 kbps. With dual-pair operation (4-wire mode), SHDSL offers 384 kbps to 4.6 Mbps. Data rates are defined in increments of 16kbps. The line rate on both pairs must be the same.

3. What's the difference between SDSL and SHDSL?

Symmetric DSL has typically been deployed in North America using a proprietary technology called Symmetric Digital Subscriber Loop (SDSL) utilizing 2B1Q line coding. The industry is now moving to an internationally standardized (ITU 991.2) symmetric technology - SHDSL, that uses a more advanced coding technology called TC-PAM (see "What is TC-PAM?"). This leads to higher loop reach together with better spectral compatibility with other DSL technologies. Some regions such as Europe use the generic term "Symmetric" DSL (SDSL) to describe the ITU 991.2 SHDSL standard.

4. What's the status of the standards?

So far, SHDSL has been standardized by three different standardization bodies: ANSI (T1E1.4/2001-174) for North America, ETSI (TS 101524) for Europe and ITU-T (G.991.2) worldwide. All these standards have been published and are stable. ETSI as well as ITU are currently working on upgrades.

5. What are the differences between North American and European Standards?

First of all SHDSL is an international standard. So the region specific Annexes focus on things like special loop conditions and regional specific optional services (e.g. T1). However most equipment will support all worldwide requirements.

6. What is TC-PAM?

TC-PAM stands for Trellis Coded Pulse Amplitude Modulation. It is the modulation format that is used in both HDSL2 and SHDSL, and provides robust performance over a variety of loop conditions. SHDSL uses TC-PAM to provide a rate/reach adaptive capability, offering enhanced performance (increased rate or reach) and improved spectral compatibility with ADSL when compared to today's 2B1Q SDSL offerings. Compared to HDSL2, SHDSL offers lower power consumption through the use of lower-power, intelligently shaped transmit waveforms.

7. What is the typical loop reach of SHDSL?

SHDSL provides excellent reach capabilities. Symmetric rates of 2.3 Mbps can be achieved out to >10kft (3 km) scaling down to 192 kbps at >20 kft (6 km) on a single AWG26 cable pair. The optional 4-wire mode can be used to extend the reach for specific target rates such as 2.3 Mbps at >16kft (5 km). Individual carriers will establish specific rate and reach profiles based on the SHDSL standards for deployment in their networks.

8. Does the SHDSL standard provide for the use of repeaters?

Yes. Optional repeaters are defined for both single-pair and dual-pair operation. The ITU standard supports up to eight repeaters per pair allowing for extremely long reach scenarios.

9. What is meant by "4-wire mode"?

The SHDSL standard provides an option to increase loop reach or data rate by using a second wire pair. The payload is equally split to the two pairs but for the application both links operate as one simultaneous, large pipe.

10. Can SHDSL be deployed alongside other DSLs, such as ADSL?

Absolutely. SHDSL is designed to be spectrally compatible with other DSLs. That means that it can be deployed in the same binder group with other DSLs with minimal interference to its own signal and signals being transmitted using other technologies.

11. What type of network protocols does SHDSL support?

SHDSL is a physical layer standard that has the versatility to support TDM, ATM, Frame Relay and other network protocols. SHDSL's flexibility allows carriers to utilize whichever network protocol they currently have deployed while enabling higher bandwidth and greater reach.

12. Will SHDSL platforms from multiple vendors be interoperable?

Yes. From the very beginning this was a major goal of the standardization. Like for other DSL technologies the DSL-Forum drives interoperability by providing a test plan. In SuperComm 2001, different vendors demonstrated the interoperability of

their respective systems. It is expected that SHDSL will show the same level of interoperability like ISDN has today.

13. Can SHDSL be transported on top of POTS (Plain Old Telephone Service)?

In order to get a maximum loop reach, SHDSL uses the base band of the frequency spectrum on the line. Thus, line sharing is not possible. However, SHDSL supports POTS transport in-band with means of either VoDSL or Channelized VoDSL.

14. What services can be addressed with SHDSL?

Due its symmetric nature, SHDSL is perfectly suited for any kind of multiple voice or video services. Also symmetric data services as typically found in more business-oriented applications like remote LAN access can be addressed by SHDSL. The flexibility of this technology allows also for a tailor-made combination of services for a special customer.

15. Does SHDSL provide a lifeline service?

An analog lifeline, like with ADSL, is not possible with deployments using SHDSL. However, the standards define a remote feeding mode to the remote terminal and supplied by the central office in case of a power-loss.

16. Where can I get more information on SHDSL?

Detailed technical information can be found in the following standards:

- ANSI (T1E1.4/2001-174) for North America.

- ETSI (TS 101524) for Europe.

- ITU-T (G.991.2) worldwide.