ITU-T is responsible for the development of Recommendations in the area of “Transceivers for customer access and in-premises phone line networking systems on metallic pairs”. For more detailed information, see also Recommendation G.995.1, “Overview of digital subscriber line (DSL) Recommendations.”

**TU-R, Transceiver Unit,** Remote end

**TU-C, Transceiver Unit,** Central Office end

**TU-R to TU-C**

**Splitter**

**UNI/XNI**

User Network Interface

**Voice**

ADSL/ADSL2/ADSL2+

Asymmetric digital subscriber line

- B-ISDN Services
- Video Services, e.g. Video on Demand
- IP-Based Services
- Leased Lines
- N-ISDN Services
- PSTN

**SHDSL**

G.991.2, Single-pair high-speed digital subscriber line (SHDSL) transceivers

Duplex operation over one copper pair. Optional multi-pair operation for extended reach or higher net data rates. Net data rates of 1.92 kbit/s to 2.312 Mbit/s. Optional extensions allow net data rates up to 5.696 Mbit/s.

Line code: Trellis Coded Pulse Amplitude Modulation (TC-PAM).

**ADSL**

G.992.1, Asymmetric digital subscriber line (ADSL) transceivers

One copper pair. Net data rate ranging up to a minimum of 6 Mbit/s downstream and 640 kbit/s upstream. Optional support of higher net data rates.

Line code: Discrete Multi Tone (DMT).

G.992.3, Asymmetric digital subscriber line transceivers D (ADSL2)

One copper pair. Net data rate ranging up to a minimum of 8 Mbit/s downstream and 864 kbit/s upstream. Optional support of higher net data rates.

Line code: Discrete Multi Tone (DMT).

G.992.5, Asymmetric Digital Subscriber Line (ADSL) transceivers – Extended bandwidth ADSL2 (ADSL2+)

One copper pair. Net data rate ranging up to a minimum of 115 kbit/s downstream and 580 kbit/s upstream. Optional support of higher net data rates.

Line code: Discrete Multi Tone (DMT).

**VDSL**

G.993.1, Very high speed digital subscriber line foundation

One copper pair. Permits the transmission of asymmetric and symmetric aggregate data rates up to tens of Mbit/s on twisted pairs. It includes worldwide frequency plans that allow asymmetric and symmetric services in the same group of twisted pairs.

Line code: Discrete Multi Tone (DMT) or, alternatively, Quadrature Amplitude Modulation (QAM).

**Handshake**

G.994.1, Handshake procedures for digital subscriber line (DSL) transceivers

Provides a flexible mechanism for DSL transceivers to exchange capabilities and to select a common mode of operation. It includes parameters relating to service and application requirements as well as parameters pertinent to various DSL transceivers.

**Related Recommendations**

G.991.1 – High-bit rate digital subscriber line (HDSL) transceivers

G.995.1 – Overview of digital subscriber line (DSL) Recommendations

G.996.1 – Test procedures for digital subscriber line (DSL) transceivers

G.997.1 – Physical layer management for digital subscriber line (DSL) transceivers

G.999.x – Phoneline networking transceivers

**For more information on ongoing GPON Recommendation activities, please check the ITU-T Study Groups website at:** http://www.itu.int/ITU-T
ITU-T is responsible for the development of Recommendations in the area of “Transceivers for customer access and in-premises phone line networking systems on metallic pairs.” For more detailed information, see also Recommendation G.995.1, “Overview of digital subscriber line (DSL) Recommendations.”

**Central Office Customer Premises**

**ITU-R, Transceiver Unit, Remote end**
- Video
- Audio
- Data

**Customer Premises**

- Video
- Audio
- Data
- Voice

**Central Office**

- B-ISDN Services: Video Services, e.g. Video on Demand
- IPTV-Based Services: Leased Lines
- N-ISDN Services: PSTN

**Splitter**

- SHDSL: Single-pair high-speed digital subscriber line
- VDSL: Very high speed digital subscriber line

**UNI/XNI**

**Handshake procedures for DSL transceivers**

**Related Recommendations**

- G.991.1: High bit rate digital subscriber line (HDSL) transceivers
- G.995.1: Overview of digital subscriber line (DSL) Recommendations
- G.996.1: Test procedures for digital subscriber line (DSL) transceivers
- G.997.1: Physical layer management for digital subscriber line (DSL) transceivers
- G.998.x: Phoneline networking transceivers

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**Standards**

- SHDSL
- ADSL
- ADSL2/ADSL2+

**ITU-T Standards**

- The leader on DSL Standards
  - Support for wide range of services
  - IP-based services
  - Audio/video services
  - ATM-based services
  - Frame relay services
  - N-ISDN and B-ISDN
  - 64 kbit/s-based voice and data services
  - Exploiting existing infrastructure

Provides cost-effective transport of high-speed digital signals over existing copper wire infrastructure

**Advanced technology**

- Modulation techniques such as:
  - DMT (Discrete MultiTone)
  - QAM (Quadrature Amplitude Modulation)
  - TC-PAM (Trellis Coded Pulse Amplitude Modulation)
  - Handshake procedures

**G.994.1, Handshake procedures for digital subscriber line (DSL) transceivers**

Provides a flexible mechanism for DSL transceivers to exchange capabilities and to select a common mode of operation. It includes parameters relating to service and application requirements as well as parameters pertinent to various DSL transceivers.

**Related Recommendations**

- G.991.1: High bit rate digital subscriber line (HDSL) transceivers
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For more detailed information, see also Recommendation G.995.1, “Overview of digital subscriber line (DSL) Recommendations.”