Higher speeds

xDSL

xDSL is a collective name for a family of technologies where digital modems are used on a standard telephone or fixed line. The type of digital system sent over the line is described by the letter that replaces the x. Examples of designations are: ADSL, SDSL, SHDSL and VDSL. These technologies suit different applications. For example, VDSL can reach transfer rates up to 52 Mbit yet only over about 300 m (984 ft), SHDSL supports a maximum of 2.3 Mbit up to 3 km (1.86 mi) and 192 kbit/s up to approximately 6 km (3.72 mi).

HDSL

HDSL, High speed Digital Subscriber Line. Duplex communication at speeds of 2.3 Mbit/s in each direction.

ADSL

ADSL, Asymmetric Digital Subscriber Line. Duplex communication up to speeds of 8 Mbit/s to the subscriber (downstream) and 640 kbit/s from the subscriber (upstream). The communication simultaneously uses the same line as standard telephony traffic. The user installs a filter on the first jack in order to improve voice quality on the line; this filter is called a splitter and is usually supplied with the ADSL product. ADSL is a popular option for home users, as the technology offers a higher downstream transfer rate than upstream. Download times are usually more important to the home user as upload is normally limited to e-mails.

VDSL

VDSL, Very high speed Digital Subscriber Line. Duplex communication at speeds up to 52 Mbit/s to the subscriber (downstream) and 6.4 Mbit/s from the subscriber (upstream). The communication uses 1 pair.

VDSL is the fastest technology available to transfer data over the standard telephone network. It is an alternative to ADSL when high transfer rates are required for applications such as:

- Streaming video.
- Video conferencing.
- Combination of video and data over the same connection.
- High data access requirements.

SDSL

SDSL (Symmetric Digital Subscriber Loop) and G.SHDSL are symmetrical xDSL technologies.

A distinguishing feature of these is that they have similar uploading and downloading rates, thus the name symmetrical. Using SDSL the user attains a maximum of 2.3 Mbit/s in both directions. Symmetrical SDSL can be used in Back to Back mode, which involves interconnecting two modems using copper cable. SDSL is a proprietary technology mainly installed in North America. Industrial applications are starting to switch to the international standard SHDSL, see below.

SHDSL

SHDSL stands for Symmetric High-Bitrate Digital Subscriber Loop, which is the first international standard for Multi-Rate symmetrical DSL. SHDSL has been developed for communication over one or more twisted wire pairs. Using a single wire pair produces transfer rates between 192 kbit/s and 2.3 Mbit/s, while two pairs produce rates between 384 kbit/s and 4.6 Mbit/s. SHDSL utilises an advanced coding algorithm, TC-PAM, which results in improved transfer rates and/or transmission distances compared with other DSL technologies.

Indication of transmission distances using SHDSL

	Speed	Distance
Communication over a single pair		
AWG 26	192 kbit/s	6 km (3.72 mi)
Communication over a single pair		
AWG 26	2.3 Mbit/s	3 km (1.86 mi)
Communication over two pairs		
AWG 26	2.3 Mbit/s	5 km (3.10 mi)

When greater transmission distances are required, there is the possibility of deploying a repeater between the devices.

Detailed information can be found in the standards:

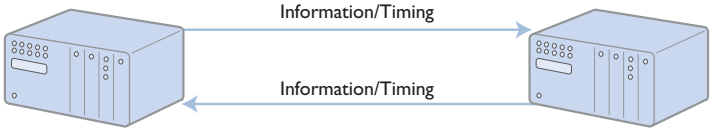
- ANSI (T1E1.4/2001-174) for North America.
- ETSI (TS 101524) for Europe.
- ITU-T (G.991.2) worldwide.

G.703

The ITU standard G.703, describes the electrical and physical properties and a number of transfer rates.
There are three basic physical types of the interface, codirectional, contradirectional and centralised interfaces.
The standard specifies speeds from 64 kbit/s to 155 520 kbit/s. The standard was originally created to carry speech over a PCM-link.
The transmission medium can either be a 120 ohm balanced pair or an unbalanced 75 ohm coaxial cable.

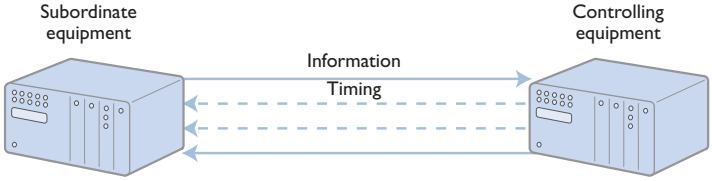
Codirectional interface

Transmission takes place over a wire pair in each direction. Data and timing information are superimposed. Data and timing information run in the same direction and it falls upon the receiver to synchronize the data and timing information.



Contradirectional interface

This type of transfer uses a 4 wire pair, timing information is provided by the governing device.



Centralised clock interface

This variant of the interface uses 3 or 4 wiring pairs, timing information is provided by the central unit. In the 3-pair instance, timing is provided common to both transmitting and receiving.
In the 4-pair instance individual timing is used for the transmission and for the reception.