

# X.25 WAN Protocol - Cisco Implementation

X.25 is an International Telecommunication Union-Telecommunication Standardization Sector (ITU-T) protocol standard for WAN communications that defines how connections between user devices and network devices, packet switching network (PSN), are established and maintained.

X.25 packets using LAPD are restricted to 256 to 260 bytes per packet when implemented on the D channel, versus 1024 bytes per packet for X.25 over LAPB on the ISDN B channel.

<b>Network Layer (3)</b> (PLP) Packet Layer Protocol
<b>Data Link Layer (2)</b> (LAPB) Link Access Procedure Balanced
<b>Physical Layer (1)</b> (X.21, X.21-bis and V.24 )

X.25 OSI Protocol mapping

Primarily concerned with network routing functions and the multiplexing of simultaneous logical connections over a single physical connection. (Can operate in five different modes).

An implementation of the ISO HDLC standard called Link Access Procedure Balanced (LAPB) and provides an error free link between two connected devices.

LAPB Frame Formats - Control Field Values

**(I) Frames - Information**  
Carry frame sequencing, flowcontrol, error detection, and recovery.

**(S) Frames - Supervisor (RR, RNR, REJ)**  
Provide control information, such as transmission requests, suspensions, status reporting, and acknowledgment information.

**(U) Frames - Unnumbered (SAMBE, DM, UI, DISC, UA, FRMR, XID)**  
Provide control such as error reporting, link setup and link termination.

## Packet Assembler / Disassembler (PAD)

A Protocol standard converting device, defined for asynchronous terminals to use X.25 packets sent to or from a DTE device. This is done by adding a header.

X.3 defines the operation and function of a PAD based on a set of X.3 PAD parameters, which can be either the asynchronous terminal mode or the synchronous mode implemented in the X.28 mode.

### X.3 Parameters

- 1 PAD Recall Data
- 2 Local Echo
- 3 Data Field
- 4 Idle
- 5

**Call-setup mode** - Used to create a Switched Virtual Circuit (SVC) between two DTE devices.

PLP uses the X.121 addressing scheme to create the virtual circuit.

**Data-transfer mode** - Used for transferring the physical data between two DTE devices through a created virtual circuit. Data-transfer mode handles PLP segmentation and reassembly, and error and flow control.

**Idle mode** - Used when a virtual circuit has been established and data transfer is not occurring.

**Call-clearing mode** - Used to end communication sessions between two DTE devices connected through an SVC.

**Restarting mode** - Used to restart the transmission between a DTE device and a DCE device on the DTE devices with established virtual circuits.

## Types of PLP packet fields

**General Format Identifier (GFI)** - Identifies packet parameters, such as the type of packet, the type of control information, what kind of windowing is being used, and what kind of flow control is being used.

**Logical Channel Identifier (LCI)** - Identifies the virtual circuit of the packet.

**Packet Type Identifier (PTI)** - Identifies the packet as one of the following:

**User Data** - Contains encapsulated upper-layer information. Otherwise, additional fields containing control information.

## X.121 International Data Numbers

Used only with SVC at call setup time

Data Network Identification Code (DNIC)	
Country Code 3 bytes	PSN 1 byte

ITU-T Recommendation  
US = 310 - 316

DTE

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