X.25 Facility Handling

This appendix provides reference material describing how X.25 facilities are handled by the Cisco IOS software.

X.25 Facility Handling in Datagram Transport Virtual Circuits

A router either originates or accepts datagram transport (encapsulation) switched virtual circuits (SVCs) to transport LAN traffic through an X.25 network.

When the router originates a call for LAN traffic encapsulation, the facilities in the call are controlled by the facilities configured for the interface and the map statement that specifies the LAN and X.25 encapsulation. Because a router can be attached to a public data network (PDN), the interface and map configurations allow a number of facilities to be specified in outgoing calls. These facilities are specified in all originated calls relating to the given interface and map, with one exception: the incoming and outgoing maximum packet sizes proposed are lowered if the LAPB cannot support the specified data packet size.

When the router accepts an encapsulation call, many facilities are simply ignored. The maximum packet sizes are lowered if the LAPB cannot support the sizes proposed. A reverse-charge call is cleared if neither the interface nor the map allows it. A call that specifies a network user identification (NUID) is cleared if the user authentication fails.

If an interface is configured as a DCE that is subscribed to closed user group (CUG) services, datagram encapsulation calls that originate and terminate on the interface will be subject to the requirements of CUG security.

X.25 Facility Handling in Switching Virtual Circuits

As a general rule, the X.25 switch services will forward facilities encoded in Call, Call Confirm, Clear, and Clear Confirm packets. This handling, however, is subject to the following restrictions:

- The facilities must be valid for the X.25-class service on which they were received and must be consistent with the other information presented in the packet and any prior signaling for the SVC.

- The facilities must be valid for the X.25-class service to which they are forwarded and must be consistent with the other information being encoded in the packet and any prior signaling for the SVC. Some limited amount of modification of facility values may be performed to meet various standard requirements; for example, some facility values have restrictions based on the station identity of the DTE/DCE sending the packet.
- Some facilities are subject to modification, insertion, or deletion by specific features configured for the incoming or outgoing X.25-class service, or by the X.25 switch service itself.

X.25 Standard Facilities

The table below describes how X.25 standard facilities are treated when a switched virtual circuit (SVC) is routed. If the facility was introduced in a recommendation later than the 1980 X.25 recommendation, the recommendation in which the facility was introduced is listed in parentheses after the facility name. By default, Cisco IOS software supports the 1984 recommendation.

Table 1: Treatment of Standard X.25 Facilities by Cisco IOS Software

Facility	Treatment When Switched by Cisco IOS Software
Flow Control Negotiation • Packet size • Window size • Extended window size (1996) **Note** The 1980 recommendation defines maximum Data packet sizes from 32 to 1024 bytes. The 1984 recommendation extends the upper limit to 4096 bytes.	Adds, removes, or changes flow control parameter values, depending on the requirements of the X.25-class services supporting the connection and the X.25 switch service. For information about flow control parameters, see the "Enabling Flow Control Parameter Negotiation" section of the "Configuring X.25 and LAPB" chapter.
Throughput Negotiation • Throughput facility, basic encoding • Throughput facility, extended encoding (1993)	Forwards incoming Throughput facilities.
Closed User Group Selection • CUG facility, basic encoding • CUG facility, extended encoding (1984) • CUG with Outgoing Access facility, basic encoding (1984) • CUG with Outgoing Access facility, extended encoding (1984) • Bilateral CUG facility	Forwards Closed User Group (CUG) selection facilities. If an interface is configured as a DCE that is subscribed to CUG services, all calls that originated and terminated on the interface will be subject to the requirements of CUG security.
Reverse Charging	Forwards the incoming Reverse Charging facility.

Facility	Treatment When Switched by Cisco IOS Software
Fast Select	Forwards the incoming Fast Select facility.
Internetwork Call Redirection and Deflection (ICRD) Status Selection (1993)	Forwards the ICRD Status Selection facility.
Network User Identification (NUID) (1984)	Forwards the incoming NUID facility.
Charging • Charging request (1984) • Monetary report (1984) • Segment report (1984) • Duration report (1984)	Forwards Charging facilities.
ROA • ROA facility, basic encoding • ROA facility, extended encoding (1984)	Forwards ROA facilities.
Called Line Address Modified Notification (CLAMN) (1984)	Forwards the CLAMN facility. A router will insert a CLAMN facility in the call confirm if the call was routed through a hunt group.
Call Deflection Selection (1988)	Forwards the Call Deflection Selection facility.
Call Redirection or Call Deflection Notification (CRCDN) (1984)	Forwards the CRCDN facility. A router will insert a CRCDN facility in a call that is routed through a hunt group.
Transit Delay (1984)	Forwards the Transit Delay facility.
Marker Facilities, including the following:	
• Local and remote network marker	Forwards a block of private network facilities preceded by either a local network marker or a remote network maker, presuming that the information following the network marker can be parsed according to the X.25 rules that define encoding for Class A, B, C, and D facilities. An X.25 interface configured for DDN or BFE can encode facilities behind a local network marker. The X.25 switching service will forward these facilities.

Facility	Treatment When Switched by Cisco IOS Software
• ITU-T Specified DTE facilities marker	An ITU-T Specified DTE facilities marker will be validated according to the facilities defined for the X.25-class service handling the packet.

ITU-T-Specified Marker Facilities

The table below describes how CCITT/ITU-T-specified marker facilities are treated when an SVC is routed.

Table 2: Default Treatment of ITU-T-Specified Marker Facilities

Facility	Treatment When Switched by Cisco IOS Software
Calling Address Extension (1984)	Forwards the incoming Calling Address Extension facility.
Called Address Extension (1984)	Forwards the incoming Called Address Extension facility.
Quality of Service (QoS) Negotiation • Minimum Throughput Class QoS facility, basic encoding (1984) • Minimum Throughput Class QoS facility, extended encoding (1993) • End-to-End Transit Delay QoS facility (1984) • Priority QoS (1988) • Protection QoS (1988)	Forwards the QoS facilities and their associated values.
Expedited Data Negotiation (1984)	Forwards the Expedited Data Negotiation facility.

CMNS hosts commonly use the Called Address Extension facility, which can be used to make X.25 routing decisions.

The encoding of any CCITT/ITU-T facilities is preceded by a marker, as displayed in the output of the **debug x25** command.