X.25 Throughput Negotiation

This feature enables a router to negotiate X.25 throughput parameters on behalf of end devices, thereby making it possible for X.25 calls to reach devices that may not themselves be able to negotiate throughput.

History for the X.25 Throughput Negotiation Feature

Release	Modification
12.3(11)YN	This feature was introduced.
12.4(4)T	This feature was integrated into Cisco IOS 12.4(4)T.

Finding Support Information for Platforms and Cisco IOS Software Images

Use Cisco Feature Navigator to find information about platform support and Cisco IOS software image support. Access Cisco Feature Navigator at http://www.cisco.com/go/fn. You must have an account on Cisco.com. If you do not have an account or have forgotten your username or password, click **Cancel** when presented with the login screen and then follow the instructions that subsequently appear.

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Restrictions for X.25 Throughput Negotiation

This feature currently supports only basic throughput classes; extended throughput classes are not supported.

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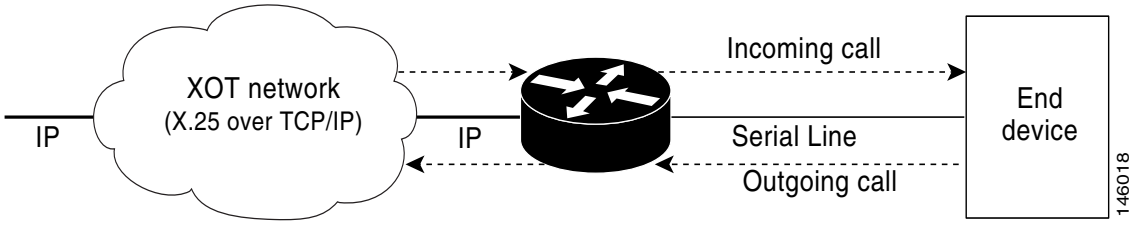
Information about X.25 Throughput Negotiation

In order for end devices in a network to support X.25 calls, they need to be able to negotiate X.25 throughput parameters. This feature enables a router to handle that negotiation on behalf of end devices that cannot do it themselves.

Figure 1 Router Negotiating Throughput Between a Network and an End Device



The router does this by stripping out or inserting values, as appropriate for each case, in the "throughput facility field" of the X.25 calls' setup and confirmed messages (specifically, in the Call Request, Incoming Call, Call Accepted, and Call Confirmed packets).

In order to insert values appropriately, the router interface connected to the end device must earlier have been configured with the input and output bit rates that are intended to be used by the eventual X.25 call.

The rules according to which the router removes or inserts those bit rates are set by the command **x25 subscribe throughput**, which can have three distinct states: **no**, **basic** or **never**. These forms of the command work as follows when the router receives a call from the network and forwards that call onward to the end device:

a. If the router has been configured by the command "**no** x25 subscribe throughput", it will make *no change* to the values it receives in the call's facility field. The router merely forwards the message, and those values, onward.

b. If the router has been configured by the "x25 subscribe throughput **basic**" form of this command, the router will *insert* the bit rate values previously configured on its interface into the call's facility field. (The only exception is when those values are larger than the call's values, in which case the router will leave the call's *smaller* values in place when it forwards the message.)

In cases when the router has substituted its own configured values for the values it detected in the incoming call, the router also reports those new values in a Call Confirmed packet back out through the network to the source device.

c. If the "x25 subscribe throughput **never**" form of the command has been entered, the router will *remove* the values it receives in the call's facility field. (And if the values previously configured on the router's interface are *smaller* than those contained in the call, the router will also replace the call's values with those smaller ones when it forwards the end device's Call Confirmed packet back out to the network.)

How these behavior rules apply to each possible case is presented in Table 1.

When calls originate not in the network but in the end device, this command's three states can have somewhat different results, which are detailed in Table 2.

*Table 1 Router Treatment of Throughput Facility Field in Incoming Call**

Incoming call's 'Call Request' packet	Cisco IOS commands applied		Results	
	Is interface configured with throughput values?	How is Serial Line's throughput subscription configured?	Within 'Incoming Call' packet	Within 'Call Confirmed' packet
Contains throughput facility field	**YES**: "x25 facility throughput *xxx yyy*"	**no** x25 sub throughput	Facility field in message from network is sent to end device unmodified.	End device includes no facility field in its Call Accepted packet to the router. And the router includes no facility field in the Call Confirmed packet it sends out to the network.
		x25 sub throughput **never**	Router strips out facility field, then forwards message to end device.	Router sends values out to network only if the values configured on its interface are *smaller* than those received in network call.
		x25 sub throughput **basic**	Router compares values in message with those configured on its interface, and sends to end device the lower set.	Router sends that lower set out to the network.
Has no throughput facility field		**no** x25 sub throughput	No facility field sent to end device.	No facility field sent out to network.
		x25 sub throughput **never**	No facility field sent to end device.	No facility field sent back out to network.
		x25 sub throughput **basic**	Router inserts facility field into message, and forwards that to the end device.	No facility field sent back out to network.

Incoming call's 'Call Request' packet	Cisco IOS commands applied		Results	
	Is interface configured with throughput values?	How is Serial Line's throughput subscription configured?	Within 'Incoming Call' packet	Within 'Call Confirmed' packet
Contains throughput facility field	**NO**: "no x25 facility throughput"	**no** x25 sub throughput	Facility field sent to end device.	End device includes no facility field in its Call Accepted packet to the router. And the router includes no facility field in the Call Confirmed packet it sends out to the network.
		x25 sub throughput **never**	Router strips out facility field, then forwards message to end device.	No facility field sent back out to network.
		x25 sub throughput **basic**	Facility field sent on to end device.	No facility field sent back out to network.
Has no throughput facility field		**no** x25 sub throughput	No facility field sent to end device.	No facility field sent out to network.
		x25 sub throughput **never**	No facility field sent to end device.	No facility field sent back out to network.
		x25 sub throughput **basic**	No facility field sent to end device.	No facility field sent out to network.

*Shaded rows (in PDF version) describe calls that contain no throughput facility field before they reach the router.

*Table 2 Router Treatment of Throughput Facility Field in Outgoing Call**

Outgoing call's 'Call Request' packet	Cisco IOS commands applied		Results	
	Is interface configured with throughput values?	How is Serial Line's throughput subscription configured?	Within outgoing 'Call Request' packet	Within received 'Call Confirmed' packet
Contains throughput facility field	**YES**: "x25 facility throughput *xxx yyy*"	**no** x25 sub throughput	Router forwards facility field it receives in the end device's Call Request packet out to the network unmodified.	Router forwards facility field it receives in the Call Confirmed packet from the network on to the end device unmodified.
		x25 sub throughput **never**	Router refuses to forward call on to the network, and cancels it, sending back to the end device a Clear Request packet with the Cause Code field set to 3 ('3' stands for "Invalid Facility Request"). Router also sends to the end device a Diagnostic Code field set to 65 (which stands for "Facility Code Not Allowed").	
		x25 sub throughput **basic**	Router compares values in message with those configured on its interface, and sends to network the lower set.	Router sends that lower set to the end device, unless still different values are received in *the Call Confirmed message* from the network. In that case, the router forwards that network set to the end device.
Has no throughput facility field		**no** x25 sub throughput	No facility field sent to network.	No facility field sent to end device.
		x25 sub throughput **never**	Router sends values configured on its interface out to the network.	No facility field sent to end device.
		x25 sub throughput **basic**	Router inserts facility field into message, and forwards that to the network.	Router sends the inserted facility field to the end device.

Outgoing call's 'Call Request' packet	Cisco IOS commands applied		Results	
	Is interface configured with throughput values?	How is Serial Line's throughput subscription configured?	Within outgoing 'Call Request' packet	Within received 'Call Confirmed' packet
Contains throughput facility field	**NO**: "no x25 facility throughput"	**no** x25 sub throughput	Router forwards facility field it receives in the end device's Call Request packet out to the network unmodified.	Router forwards facility field it receives in the Call Confirmed packet from the network on to the end device unmodified.
		x25 sub throughput **never**	Router refuses to forward call on to the network, and cancels it, sending back to the end device a Clear Request packet with the Cause Code field set to 3 ('3' stands for "Invalid Facility Request"). Router also sends to the end device a Diagnostic Code field set to 65 (which stands for "Facility Code Not Allowed").	
		x25 sub throughput **basic**	Facility field sent on to network.	Facility field sent back to end device.
Has no throughput facility field		**no** x25 sub throughput	No facility field sent to network.	No facility field sent to end device.
		x25 sub throughput **never**	No facility field sent to network.	No facility field sent to end device.
		x25 sub throughput **basic**	No facility field sent to network.	No facility field sent to end device.

*Shaded rows (in PDF version) describe calls that contain no throughput facility field before they reach the router.

How to Configure X.25 Throughput Negotiation

Prerequisites

If you will be choosing the "basic" option in Step 4 below, the interface should already have been configured with the appropriate throughput values by use of the command **x25 facility throughput** *in out* . [That command is documented in the *Cisco IOS Release 12.0 Wide-Area Networking Command Reference,* viewable online at

http://www.cisco.com/en/US/docs/ios/wan/command/reference/wan_book.html

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **interface** *interface-id*
4. **x25 subscribe throughput { never | basic }**

5. **exit**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Router> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Router# configure terminal`	Enters global configuration mode.
Step 3	**interface** *interface-id* **Example:** `Router(config)# interface serial2/0`	Specifies the interface which is connected to the end device, and enters interface configuration mode.
Step 4	**x25 subscribe throughput { never | basic }** **Example:** `Router(config-if)# x25 subscribe throughput basic`	Enables the router to negotiate X.25 throughput for the end device. (In this example, the end device always expects the throughput facility field to be present in incoming call setup packets).
Step 5	**exit** **Example:** `Router(config-if)# exit`	Exits interface configuration mode.

Examples

In this example, the end device *never* expects the throughput facility field to be present in incoming call setup packets:

```
Router> enable
Router# configure terminal
Router(config)# interface serial2/0
Router(config-if)# x25 subscribe throughput never
Router(config-if)# exit
```

In this example, the end device *always* expects the throughput facility field to be present in incoming call setup packets:

```
Router> enable
Router# configure terminal
Router(config)# interface serial0/0
Router(config-if)# x25 subscribe throughput basic
Router(config-if)# exit
```

In this example, the *active* throughput negotiation capability on the just-illustrated interface (Serial 0/0) gets turned off:

```
Router(config)# interface serial0/0
Router(config-if)# no x25 subscribe throughput
Router(config-if)# exit
```

Configuration Examples for X.25 Throughput Negotiation

'Basic' example

In this example, the end device always expects the throughput facility field to be present in Incoming Call packets. The router inserts its configured bit rate values—unless they are larger than the values in the incoming call.

```
Router# configure terminal
Router(config)# interface serial2/0
Router(config-if)# x25 facility throughput 300 300
Router(config-if)# x25 subscribe throughput basic
Router(config-if)# end
Router#
```

'Never' example

In this example, the end device never expects the throughput facility field to be present in Incoming Call packets. The router removes the facility field from incoming calls.

```
Router# configure terminal
Router(config)# interface serial2/0
Router(config-if)# x25 facility throughput 300 300
Router(config-if)# x25 subscribe throughput never
Router(config-if)# end
Router#
```

Additional References

The following provides a reference related to X.25 Throughput Negotiation.

Related Documents

Related Topic	Document Title
Configuring X.25 throughput facilities.	*Cisco IOS Release 12.0 Wide-Area Networking Command Reference,* especially its chapter entitled, "X.25 and LAPB Commands".

Technical Assistance

Description	Link
The Cisco Technical Support website contains thousands of pages of searchable technical content, including links to products, technologies, solutions, technical tips, and tools. Registered Cisco.com users can log in from this page to access even more content.	http://www.cisco.com/techsupport

Command Reference

This section documents a new command:

- **x25 subscribe throughput**

x25 subscribe throughput

To enable a router to negotiate X.25 throughput for end devices, use the **x25 subscribe throughput** command in interface configuration mode. To disable this feature, use the **no** form of this command.

x25 subscribe throughput {**never** | **basic**}

no x25 subscribe throughput

Syntax Description

never	Use this keyword for devices connected to the router that never expect the throughput facility field to be in the incoming call setup packets.
basic	Use this keyword for devices connected to the router that always expect the throughput facility field to be present in the incoming call setup packets.

Command Default

No X.25 throughput negotiation is performed by the router for end devices.

Command Modes

Interface configuration

Command History

Release	Modification
12.3(11)YN	This command was introduced.
12.4(4)T	This command was integrated into Cisco IOS Release 12.4(4)T.

Examples

In this example, the end device never expects the throughput facility field to be present in incoming call setup packets:

```
Router> enable
Router# configure terminal
Router(config)# interface serial2/0
Router(config-if)# x25 subscribe throughput never
Router(config-if)# exit
```

In this example, the end device always expects the throughput facility field to be present in incoming call setup packets:

```
Router> enable
Router# configure terminal
Router(config)# interface serial0/0
Router(config-if)# x25 subscribe throughput basic
Router(config-if)# exit
```

In this example, the active throughput negotiation capability on the just-illustrated interface (Serial 0/0) is disabled:

```
Router(config)# interface serial0/0
Router(config-if)# no x25 subscribe throughput
Router(config-if)# exit
```

Related Commands

Command	Description
x25 facility throughput	Specifies the input and output bit rate values that the router should insert into the call setup packets' throughput-facility field.
x25 subscribe flow-control	Configures inclusion of X.25 flow-control parameter negotiation facilities in call setup packets.