

threshold de

To configure the threshold at which discard eligible (DE)-marked packets will be discarded from switched permanent virtual circuits (PVCs) on the output interface, use the **threshold de** command in Frame Relay congestion management configuration mode. To remove the threshold configuration, use the **no** form of this command.

threshold de *percentage*

no threshold de *percentage*

Syntax Description	<i>percentage</i>	Threshold at which DE-marked packets will be discarded, specified as a percentage of maximum queue size.
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Defaults	100%
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Command Modes	Frame Relay congestion management configuration
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Command History	Release	Modification
	12.1(2)T	This command was introduced.

Usage Guidelines

You must enable Frame Relay congestion management on the interface before congestion management parameters will be effective. To enable Frame Relay congestion management and to enter Frame Relay congestion management configuration mode, use the **frame-relay congestion-management** interface command.

You must enable Frame Relay switching, using the **frame-relay switching** global command, before the **threshold de** command will be effective on switched PVCs.

Examples

The following example shows how to configure a DE threshold of 40% on serial interface 1.

```
interface serial1
 encapsulation frame-relay
 frame-relay congestion-management
 threshold de 40
```

Related Commands	Command	Description
	frame-relay congestion-management	Enables Frame Relay congestion management functions on all switched PVCs on an interface, and enters congestion management configuration mode.
	frame-relay congestion threshold de	Configures the threshold at which DE-marked packets will be discarded from the traffic-shaping queue of a switched PVC.

Command	Description
frame-relay congestion threshold ecn	Configures the threshold at which ECN bits will be set on packets in the traffic-shaping queue of a switched PVC.
frame-relay switching	Enables PVC switching on a Frame Relay DCE or NNI.
threshold ecn	Configures the threshold at which ECN bits will be set on packets in switched PVCs on the output interface.

threshold ecn

To configure the threshold at which ECN bits will be set on packets in switched PVCs on the output interface, use the **threshold ecn** Frame Relay congestion management configuration command. To remove the threshold configuration, use the **no** form of this command.

threshold ecn {bc | be} *percentage*

no threshold ecn {bc | be} *percentage*

Syntax Description	Parameter	Description
	bc	Specifies threshold for committed traffic.
	be	Specifies threshold for excess traffic.
	<i>percentage</i>	Threshold at which ECN bits will be set on packets, specified as a percentage of maximum queue size.

Defaults 100%

Command Modes Frame Relay congestion management

Command History	Release	Modification
	12.1(2)T	This command was introduced.

Usage Guidelines You must enable Frame Relay congestion management on the interface before congestion management parameters will be effective. To enable Frame Relay congestion management and to enter Frame Relay congestion management configuration mode, use the **frame-relay congestion-management** interface command.

You must enable Frame Relay switching, using the **frame-relay switching** global command, before the **threshold ecn** command will be effective on switched PVCs.

You can configure separate queue thresholds for committed and excess traffic.

Configure the Be ECN threshold so that it is greater than or equal to zero and less than or equal to the Bc ECN threshold. Configure the Bc ECN threshold so that it is less than or equal to 100.

Examples The following example shows how to configure a Be threshold of 0 and a Bc threshold of 20% on serial interface 1.

```
interface serial1
 encapsulation frame-relay
 frame-relay congestion-management
  threshold ecn be 0
  threshold ecn bc 20
```

Related Commands	Command	Description
	frame-relay congestion-management	Enables Frame Relay congestion management functions on all switched PVCs on an interface, and enters congestion management configuration mode.
	frame-relay congestion threshold de	Configures the threshold at which DE-marked packets will be discarded from the traffic-shaping queue of a switched PVC.
	frame-relay congestion threshold ecn	Configures the threshold at which ECN bits will be set on packets in the traffic-shaping queue of a switched PVC.
	frame-relay switching	Enables PVC switching on a Frame Relay DCE or NNI.
	threshold de	Configures the threshold at which DE-marked packets will be discarded from switched PVCs on the output interface.

timeout setup

To configure the amount of time allowed to set up a control channel with a remote provider edge (PE) router at the other end of a Layer 2 pseudowire, use the **timeout setup** command in L2TP class configuration mode. To disable the configured value, use the **no** form of this command.

timeout setup *seconds*

no timeout setup *seconds*

Syntax Description	<i>seconds</i>	The number of seconds allowed to set up a Layer 2 control channel. The valid values range from 60 to 6000. The default value is 300 seconds.
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Defaults	<i>seconds</i> : 300
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Command Modes	L2TP class configuration
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Command History	Release	Modification
	12.0(23)S	This command was introduced.
12.3(2)T	This command was integrated into Cisco IOS Release 12.3(2)T.	

Usage Guidelines	Use this command to configure the amount of time that can be spent attempting to establish a control channel.
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Examples	The following example sets a timeout period of 200 seconds to establish a control channel with a remote peer in Layer 2 pseudowires that have been configured with the L2TP class named "l2tp-class1":
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```
Router(config)# l2tp-class l2tp-class1
Router(config-l2tp-class)# timeout setup 200
```

Related Commands	Command	Description
	l2tp-class	Creates a template of L2TP control plane configuration settings that can be inherited by different pseudowire classes and enters L2TP class configuration mode.

timeouts (SSG-radius-proxy)

To enter SSG-radius-proxy-timers configuration mode, use the **timeouts** command in SSG-radius-proxy configuration mode. To restore all timeouts, use the **no** form of this command.

timeouts

no timeouts

Syntax Description This command has no arguments or keywords.

Defaults No default behavior or values.

Command Modes SSG-radius-proxy configuration

Command History	Release	Modification
	12.2(15)B	This command was introduced.
	12.3(4)T	This command was integrated into Cisco IOS Release 12.3(4)T.

Usage Guidelines Use this command to enter SSG-radius-proxy-timeouts configuration mode to configure SSG RADIUS proxy handoff, idle, IP address, and Mobile Station ID (MSID) timeouts.

Examples The following example shows how to enter SSG-radius-proxy-timeouts mode:

```
ssg radius-proxy
 timeouts
```

ubr

To configure unspecified bit rate (UBR) quality of service (QoS) and specify the output peak cell rate (PCR) for an ATM permanent virtual circuit (PVC), PVC range, switched virtual circuit (SVC), virtual circuit (VC) class, or VC bundle member, use the **ubr** command in the appropriate command mode. To remove the UBR parameter, use the **no** form of this command.

```
ubr output-pcr [input-pcr]
```

```
no ubr output-pcr [input-pcr]
```

Syntax Description

<i>output-pcr</i>	The output PCR in kbps.
<i>input-pcr</i>	(Optional for SVCs only) The input peak cell rate (PCR) in kilobits per second. If this value is omitted, the <i>input-pcr</i> will equal the <i>output-pcr</i> .

Defaults

UBR QoS at the maximum line rate of the physical interface.

Command Modes

Interface-ATM-VC configuration (for an ATM PVC or SVC)
 VC-class configuration (for a VC class)
 Bundle-vc configuration (for ATM VC bundle members)
 PVC range configuration (for an ATM PVC range)
 PVC-in-range configuration (for an individual PVC within a PVC range)

Command History

Release	Modification
11.3 T	This command was introduced.
12.0(3)T	This command was enhanced to support selection of UBR QoS and configuration of output PCR for ATM VC bundles and ATM VC bundle members.
12.1(5)T	This command was made available in PVC range and PVC-in-range configuration modes.

Usage Guidelines

To configure ATM SVCs with an output PCR and an input PCR that differ from each other, you must expressly configure an output value and an input value using the *output-pcr* and *input-pcr* arguments, respectively.

Configure QoS parameters using the **ubr**, **ubr+**, or **vbr-nrt** command. The last command you enter will apply to the PVC or SVC you are configuring.

If the **ubr** command is not explicitly configured on an ATM PVC, SVC, or VC bundle member, the VC inherits the following default configuration (listed in order of next highest precedence):

- Configuration of any QoS command (**ubr**, **ubr+**, or **vbr-nrt**) in a VC class assigned to the PVC or SVC itself.
- Configuration of any QoS command (**ubr**, **ubr+**, or **vbr-nrt**) in a VC class assigned to the PVC's or SVC's ATM subinterface.

- Configuration of any QoS command (**ubr**, **ubr+**, or **vbr-nrt**) in a VC class assigned to the PVC's or SVC's ATM main interface.
- Global default: UBR QoS at the maximum line rate of the PVC or SVC.

To use this command in VC-class configuration mode, enter the **vc-class atm** global configuration command. This command has no effect if the VC class that contains the command is attached to a standalone VC, that is, if the VC is not a bundle member.

To use this command in bundle-vc configuration mode, first enter the **bundle** command to specify the bundle, then enter bundle configuration mode. Then enter the **pvc-bundle** configuration command to add the VC to the bundle as a member of it and enter bundle-vc configuration mode.

VCs in a VC bundle are subject to the following configuration inheritance rules (listed in order of next highest precedence):

- VC configuration in bundle-vc mode
- Bundle configuration in bundle mode (with effect of assigned VC-class configuration)
- Subinterface configuration in subinterface mode

Examples

The following example specifies the *output-pcr* argument for an ATM PVC to be 100,000 kbps:

```
pvc 1/32
ubr 100000
```

The following example specifies the *output-pcr* and *input-pcr* arguments for an ATM SVC to be 10,000 kbps and 9,000 kbps, respectively:

```
svc lion nsap 47.0091.81.000000.0040.0B0A.2501.ABC1.3333.3333.05
ubr 10000 9000
```

Related Commands

Command	Description
abr	Selects ABR QoS and configures output peak cell rate and output minimum guaranteed cell rate for an ATM PVC or virtual circuit class.
broadcast	Configures broadcast packet duplication and transmission for an ATM VC class, PVC, SVC, or VC bundle.
bump	Configures the bumping rules for a virtual circuit class that can be assigned to a virtual circuit bundle.
bundle	Creates a bundle or modifies an existing bundle to enter bundle configuration mode.
class-int	Assigns a VC class to an ATM main interface or subinterface.
class-vc	Assigns a VC class to an ATM PVC, SVC, or VC bundle member.
encapsulation	Sets the encapsulation method used by the interface.
inarp	Configures the Inverse ARP time period for an ATM PVC, VC class, or VC bundle.
oam-bundle	Enables end-to-end F5 OAM loopback cell generation and OAM management for a virtual circuit class that can be applied to a virtual circuit bundle.
oam retry	Configures parameters related to OAM management for an ATM PVC, SVC, VC class, or VC bundle.

Command	Description
precedence	Configures precedence levels for a virtual circuit class that can be assigned to a virtual circuit bundle and thus applied to all virtual circuit members of that bundle.
protect	Configures a virtual circuit class with protected group or protected virtual circuit status for application to a virtual circuit bundle member.
protocol (ATM)	Configures a static map for an ATM PVC, SVC, VC class, or VC bundle. Enables Inverse ARP or Inverse ARP broadcasts on an ATM PVC by either configuring Inverse ARP directly on the PVC, on the VC bundle, or in a VC class (applies to IP and IPX protocols only).
pvc-bundle	Adds a PVC to a bundle as a member of the bundle and enters bundle-vc configuration mode in order to configure that PVC bundle member.
ubr+	Configures UBR QoS and specifies the output peak cell rate and output minimum guaranteed cell rate for an ATM PVC, SVC, VC class, or VC bundle member.
vbr-nrt	Configures the VBR-NRT QoS and specifies output peak cell rate, output sustainable cell rate, and output maximum burst cell size for an ATM PVC, SVC, VC class, or VC bundle member.

ubr+

To configure unspecified bit rate (UBR) quality of service (QoS) and specify the output peak cell rate and output minimum guaranteed cell rate for an ATM permanent virtual circuit (PVC), PVC range, switched virtual circuit (SVC), virtual circuit (VC) class, or VC bundle member, use the **ubr+** command in the appropriate command mode. To remove the UBR+ parameters, use the **no** form of this command.

```
ubr+ output-pcr output-mcr [input-pcr] [input-mcr]
```

```
no ubr+ output-pcr output-mcr [input-pcr] [input-mcr]
```

Syntax Description

<i>output-pcr</i>	The output peak cell rate (PCR) in kbps.
<i>output-mcr</i>	The output minimum guaranteed cell rate in kbps.
<i>input-pcr</i>	(Optional for SVCs only) The input PCR in kbps. If this value is omitted, the <i>input-pcr</i> will equal the <i>output-pcr</i> .
<i>input-mcr</i>	(Optional for SVCs only) The input minimum guaranteed cell rate in kbps. If this value is omitted, the <i>input-mcr</i> will equal the <i>output-mcr</i> .

Defaults

UBR QoS at the maximum line rate of the physical interface.

Command Modes

Interface-ATM-VC configuration (for an ATM PVC or SVC)
 VC-class configuration (for a VC class)
 Bundle-vc configuration (for ATM VC bundle members)
 PVC range configuration (for an ATM PVC range)
 PVC-in-range configuration (for an individual PVC within a PVC range)

Command History

Release	Modification
11.3 T	This command was introduced.
12.0(3)T	This command was enhanced to support selection of UBR+ QoS and configuration of output PCR and output minimum guaranteed cell rate ATM VC bundles, and VC bundle members.
12.1(5)T	This command was made available in PVC range and PVC-in-range configuration modes.

Usage Guidelines

To configure ATM SVCs with an output PCR and an input PCR that differ from each other, you must expressly configure an output value and an input value using the *output-pcr*, *output-mcr*, *input-pcr*, and *input-mcr* arguments, respectively.

Configure QoS parameters using the **ubr**, **ubr+**, or **vbr-nrt** command. The last command you enter will apply to the PVC or SVC that you are configuring.

If the **ubr+** command is not explicitly configured on an ATM PVC or SVC, the VC inherits the following default configuration (listed in order of precedence):

- Configuration of any QoS command (**ubr**, **ubr+**, or **vbr-nrt**) in a VC class assigned to the PVC or SVC itself.
- Configuration of any QoS command (**ubr**, **ubr+**, or **vbr-nrt**) in a VC class assigned to the PVC's or SVC's ATM subinterface.
- Configuration of any QoS command (**ubr**, **ubr+**, or **vbr-nrt**) in a VC class assigned to the PVC's or SVC's ATM main interface.
- Global default: UBR QoS at the maximum line rate of the PVC or SVC.

To use this command in VC-class configuration mode, enter the **vc-class atm** global configuration command before you enter the **ubr+** command. This command has no effect if the VC class that contains the command is attached to a standalone VC, that is, if the VC is not a bundle member.

To use this command in bundle-vc configuration mode, first enter the **bundle** command to specify the bundle the VC member belongs to, then enter bundle configuration mode. Then enter the **pvc-bundle** bundle configuration command to add the VC to the bundle as a member of it.

VCS in a VC bundle are subject to the following configuration inheritance rules (listed in order of next highest precedence):

- VC configuration in bundle-vc mode
- Bundle configuration in bundle mode (with effect of assigned VC-class configuration)
- Subinterface configuration in subinterface mode

Examples

The following example specifies the *output-pcr* argument for an ATM PVC to be 100,000 kbps and the *output-mcr* to be 3000 kbps:

```
pvc 1/32
ubr+ 100000 3000
```

The following example specifies the *output-pcr*, *output-mcr*, *input-pcr*, and *input-mcr* arguments for an ATM SVC to be 10,000 kbps, 3000 kbps, 9000 kbps, and 1000 kbps, respectively:

```
svc lion nsap 47.0091.81.000000.0040.0B0A.2501.ABC1.3333.3333.05
ubr+ 10000 3000 9000 1000
```

Related Commands

Command	Description
abr	Selects ABR QoS and configures output peak cell rate and output minimum guaranteed cell rate for an ATM PVC or virtual circuit class.
broadcast	Configures broadcast packet duplication and transmission for an ATM VC class, PVC, SVC, or VC bundle.
bump	Configures the bumping rules for a virtual circuit class that can be assigned to a virtual circuit bundle.
bundle	Creates a bundle or modifies an existing bundle to enter bundle configuration mode.
class	Assigns a VC-class to an ATM main interface, subinterface, PVC, SVC, VC bundle, or VC bundle member.
encapsulation	Sets the encapsulation method used by the interface.
inarp	Configures the Inverse ARP time period for an ATM PVC, VC class, or VC bundle.

Command	Description
oam-bundle	Enables end-to-end F5 Operation, Administration, and Maintenance (OAM) loopback cell generation and OAM management for a virtual circuit class that can be applied to a virtual circuit bundle.
oam retry	Configures parameters related to OAM management for an ATM PVC, SVC, VC class, or VC bundle.
precedence	Configures precedence levels for a virtual circuit class that can be assigned to a virtual circuit bundle and thus applied to all virtual circuit members of that bundle.
protect	Configures a virtual circuit class with protected group or protected virtual circuit status for application to a virtual circuit bundle member.
protocol (ATM)	Configures a static map for an ATM PVC, SVC, VC class, or VC bundle. Enables Inverse ARP or Inverse ARP broadcasts on an ATM PVC by either configuring Inverse ARP directly on the PVC, on the VC bundle, or in a VC class (applies to IP and IPX protocols only).
pvc-bundle	Adds a PVC to a bundle as a member of the bundle and enters bundle-vc configuration mode in order to configure that PVC bundle member.
ubr	Configures UBR QoS and specifies the output peak cell rate for an ATM PVC, SVC, VC class, or VC bundle member.
vbr-nrt	Configures the VBR-NRT QoS and specifies output peak cell rate, output sustainable cell rate, and output maximum burst cell size for an ATM PVC, SVC, VC class, or VC bundle member.

user suspect maximum

To specify the maximum number of Service Selection Gateway (SSG) transparent autologon suspect (SP) users that can be added to the suspect user list, use the **user suspect maximum** command in transparent auto-logon configuration mode. To remove the specification, use the **no** form of this command.

user suspect maximum *value*

no user suspect maximum *value*

Syntax Description	<i>value</i>	Maximum number of suspect users that can be added to the SP list. Valid range is from 10 to 5000. The default is 5000.
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Defaults	The default maximum number of suspect users that can be added to the suspect user list is 5000.
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Command Modes	Transparent auto-logon configuration
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Command History	Release	Modification
	12.3(1a)BW	This command was introduced.
12.3(3)B	This command was integrated into Cisco IOS Release 12.3(3)B.	
12.3(7)T	This command was integrated into Cisco IOS Release 12.3(7)T.	

Usage Guidelines	An SSG transparent autologon suspect user is a user whose authentication, authorization, and accounting (AAA) authorization resulted in an access reject.
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If the number of suspect users exceeds the maximum value configured, SSG sends a syslog message and does not add any further users to the SP list.

Examples	The following example specifies that the maximum number of suspect users that can be added to the SP list is 200:
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```
Router(config-login-transparent)# user suspect maximum 200
```

Related Commands	Command	Description
	ssg login transparent	Enables the SSG Transparent Autologon feature.

user suspect timeout

To specify the maximum length of time for which a Service Selection Gateway (SSG) transparent autologon suspect (SP) user remains in the suspect user list, use the **user suspect timeout** command in transparent auto-logon configuration mode. To return to the default length of time, use the **no** form of this command.

user suspect timeout *timeout*

no user suspect timeout *timeout*

Syntax Description	<i>timeout</i>	Maximum length of time (in minutes) that a suspect user remains in the suspect user list. Range is from 1 to 34560. Default is 60 minutes.
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Defaults	60 minutes
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Command Modes	Transparent auto-logon configuration
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Command History	Release	Modification
	12.3(1a)BW	This command was introduced.
12.3(3)B	This command was integrated into Cisco IOS Release 12.3(3)B.	
12.3(7)T	This command was integrated into Cisco IOS Release 12.3(7)T.	

Usage Guidelines	If a packet is received for a user who is marked as an SP user, packets to or from this user are dropped or TCP-redirected until the <i>timeout</i> value is reached. When the <i>timeout</i> value is reached, any new traffic received by SSG from the user triggers the transparent logon procedure.
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Examples	The following example specifies that a suspect user will remain in the suspect user list for 30 minutes:
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```
Router(config-login-transparent)# user suspect timeout 30
```

Related Commands	Command	Description
	ssg login transparent	Enables the SSG Transparent Auto-Logon feature.

user unidentified timeout

To specify the maximum length of time for which a Service Selection Gateway (SSG) transparent autologon unidentified user remains marked as no response (NR), use the **user unidentified timeout** command in transparent auto-logon configuration mode. To return to the default timeout value (10 minutes), use the **no** form of this command.

user unidentified timeout *timeout*

no user unidentified timeout *timeout*

Syntax Description	<i>timeout</i>	Length of time (in minutes) that a user remains marked as NR. Range is from 1 to 34560.
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Defaults	10 minutes
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Command Modes	Transparent auto-logon
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Command History	Release	Modification
	12.3(1a)BW	This command was introduced.
12.3(3)B	This command was integrated into Cisco IOS Release 12.3(3)B.	
12.3(7)T	This command was integrated into Cisco IOS Release 12.3(7)T.	

Usage Guidelines	<p>An unidentified user is marked NR if there is no response from the authentication, authorization, and accounting (AAA) server to an authorization request and the authorization request times out.</p> <p>If a packet is received for a user who is marked as an NR user, packets to or from this user are dropped or TCP-redirection until the <i>timeout</i> value is reached. When the <i>timeout</i> value is reached, any new traffic received by SSG from the user triggers the transparent logon procedure.</p>
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Examples	<p>The following example sets the user unidentified timeout to 5 minutes:</p> <pre>Router(config-login-transparent)# user unidentified timeout 5</pre>
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Related Commands	Command	Description
	ssg login transparent	Enables the SSG Transparent Auto-Logon feature.

user unidentified traffic permit

To specify that packets received from a Service Selection Gateway (SSG) transparent autologon user whose authorization request has timed out will be forwarded or received, use the **user unidentified traffic permit** command in transparent auto-logon configuration mode. To return to the default (packets dropped if user authorization has timed out), use the **no** form of this command.

user unidentified traffic permit

no user unidentified traffic permit

Syntax Description This command has no arguments or keywords.

Defaults Packets received from a user whose authorization request has timed out are dropped.

Command Modes Transparent auto-logon configuration

Command History

Release	Modification
12.3(1a)BW	This command was introduced.
12.3(3)B	This command was integrated into Cisco IOS Release 12.3(3)B.
12.3(7)T	This command was integrated into Cisco IOS Release 12.3(7)T.

Usage Guidelines Configuring this command allows traffic flow for NR users toward the service network.

Examples

The following example specifies that packets received from a user whose authorization request has timed out will be forwarded or received:

```
Router(config-login-transparent)# user unidentified traffic permit
```

Related Commands

Command	Description
ssg login transparent	Enables the SSG Transparent Auto-Logon feature.

vbr-nrt

To configure the variable bit rate-nonreal time (VBR-NRT) quality of service (QoS) and specify output peak cell rate (PCR), output sustainable cell rate, and output maximum burst cell size for an ATM permanent virtual circuit (PVC), PVC range, switched virtual circuit (SVC), VC class, or VC bundle member, use the **vbr-nrt** command in the appropriate command mode. To remove the VBR-NRT parameters, use the **no** form of this command.

```
vbr-nrt output-pcr output-scr output-mbs [input-pcr] [input-scr] [input-mbs]
```

```
no vbr-nrt output-pcr output-scr output-mbs [input-pcr] [input-scr] [input-mbs]
```

Syntax Description

<i>output-pcr</i>	The output PCR, in kbps.
<i>output-scr</i>	The output SCR, in kbps.
<i>output-mbs</i>	The output maximum burst cell size, expressed in number of cells.
<i>input-pcr</i>	(Optional for SVCs only) The input PCR, in kbps.
<i>input-scr</i>	(Optional for SVCs only) The input SCR, in kbps.
<i>input-mbs</i>	(Optional for SVCs only) The input maximum burst cell size, expressed in number of cells.

Defaults

UBR QoS at the maximum line rate of the physical interface.

Command Modes

Interface-ATM-VC configuration (for an ATM PVC or SVC)
 VC-class configuration (for a VC class)
 Bundle-vc configuration (for ATM VC bundle members)
 PVC range configuration (for an ATM PVC range)
 PVC-in-range configuration (for an individual PVC within a PVC range)

Command History

Release	Modification
11.3 T	This command was introduced.
12.0(3)T	This command was enhanced to support configuration of VBR-NRT QoS and specification of output PCR, output SCR, and output maximum burst cell size for ATM bundles and VC bundle members.
12.1(5)T	This command was made available in PVC range and PVC-in-range configuration modes.

Usage Guidelines

Configure QoS parameters using the **ubr**, **ubr+**, or **vbr-nrt** command. The last command you enter will apply to the PVC or SVC you are configuring.

If the **vbr-nrt** command is not explicitly configured on an ATM PVC or SVC, the VC inherits the following default configuration (listed in order of precedence):

- Configuration of any QoS command (**ubr**, **ubr+**, or **vbr-nrt**) in a VC class assigned to the PVC or SVC itself.
- Configuration of any QoS command (**ubr**, **ubr+**, or **vbr-nrt**) in a VC class assigned to the PVC's or SVC's ATM subinterface.
- Configuration of any QoS command (**ubr**, **ubr+**, or **vbr-nrt**) in a VC class assigned to the PVC's or SVC's ATM main interface.
- Global default: UBR QoS at the maximum line rate of the PVC or SVC.

To use this command in VC-class configuration mode, enter the **vc-class atm** global configuration command before you enter the **vbr-nrt** command. This command has no effect if the VC class that contains the command is attached to a standalone VC, that is, if the VC is not a bundle member.

To use this command in bundle-vc configuration mode, first enter the **pvc-bundle** configuration command to add the VC to the bundle as a member of it, then and enter bundle-vc configuration mode.

VCs in a VC bundle are subject to the following configuration inheritance rules (listed in order of precedence):

- VC configuration in bundle-vc mode
- Bundle configuration in bundle mode (with effect of assigned VC-class configuration)
- Subinterface configuration in subinterface mode

Examples

The following example specifies the *output-pcr* argument for an ATM PVC to be 100,000 kbps, the *output-scr* argument to be 50,000 kbps, and the *output-mbs* to be 64:

```
pvc 1/32
 vbr-nrt 100000 50000 64
```

The following example specifies the VBR-NRT output and input parameters for an ATM SVC:

```
svc lion nsap 47.0091.81.000000.0040.0B0A.2501.ABC1.3333.3333.05
 vbr-nrt 10000 5000 32 20000 10000 64
```

Related Commands

Command	Description
abr	Selects ABR QoS and configures output peak cell rate and output minimum guaranteed cell rate for an ATM PVC or virtual circuit class.
broadcast	Configures broadcast packet duplication and transmission for an ATM VC class, PVC, SVC, or VC bundle.
bump	Configures the bumping rules for a virtual circuit class that can be assigned to a virtual circuit bundle.
bundle	Creates a bundle or modifies an existing bundle to enter bundle configuration mode.
class-int	Assigns a VC class to an ATM main interface or subinterface.
class-vc	Assigns a VC class to an ATM PVC, SVC, or VC bundle member.
encapsulation	Sets the encapsulation method used by the interface.
inarp	Configures the Inverse ARP time period for an ATM PVC, VC class, or VC bundle.
oam-bundle	Enables end-to-end F5 OAM loopback cell generation and OAM management for a virtual circuit class that can be applied to a virtual circuit bundle.

Command	Description
oam retry	Configures parameters related to OAM management for an ATM PVC, SVC, VC class, or VC bundle.
precedence	Configures precedence levels for a virtual circuit class that can be assigned to a virtual circuit bundle and thus applied to all virtual circuit members of that bundle.
protect	Configures a virtual circuit class with protected group or protected virtual circuit status for application to a virtual circuit bundle member.
protocol (ATM)	Configures a static map for an ATM PVC, SVC, VC class, or VC bundle. Enables Inverse ARP or Inverse ARP broadcasts on an ATM PVC by either configuring Inverse ARP directly on the PVC, on the VC bundle, or in a VC class (applies to IP and IPX protocols only).
pvc-bundle	Adds a PVC to a bundle as a member of the bundle and enters bundle-vc configuration mode in order to configure that PVC bundle member.
ubr	Configures UBR QoS and specifies the output peak cell rate for an ATM PVC, SVC, VC class, or VC bundle member.
ubr+	Configures UBR QoS and specifies the output peak cell rate and output minimum guaranteed cell rate for an ATM PVC, SVC, VC class, or VC bundle member.

vc-class atm

To create a virtual circuit (VC) class for an ATM permanent virtual circuit (PVC), switched virtual circuit (SVC), or ATM interface and enter `vc-class` configuration mode, use the **vc-class atm** global configuration command. To remove a VC class, use the **no** form of this command.

vc-class atm *name*

no vc-class atm *name*

Syntax Description

<i>name</i>	Name of your VC class.
-------------	------------------------

Defaults

No VC class is defined.

Command Modes

Global configuration

Command History

Release	Modification
11.3 T	This command was introduced.

Usage Guidelines

If an SVC command (for example, the **idle-timeout** or **oam-svc** command) is applied on a PVC, the command is ignored. This is also true if a PVC command is applied to an SVC.

Examples

The following example creates a VC class named “pvc-qos”:

```
vc-class atm pvc-qos
```

vc-group

To assign multiple Frame Relay data-link connection identifiers (DLCIs) to a virtual circuit (VC) group for Frame Relay-to-ATM Network Interworking (FRF.5), use the **vc-group** command in global configuration mode. To disable the VC group assignments, use the **no** form of this command.

```
vc-group group-name
```

```
no vc-group group-name
```

The **vc-group** command requires the use of the following command in VC-group configuration mode to provide a map between Frame Relay DLCIs and Frame Relay-SSCS DLCIs:

```
FR-interface-name FR-DLCI [FR-SSCS-DLCI]
```

Syntax Description

<i>group-name</i>	A VC group name entered as an 11-character maximum string.
-------------------	--

The following syntax description applies to the VC-group entries:

<i>FR-interface-name</i>	Frame Relay interface; for example, serial0/0.
<i>FR-DLCI</i>	Frame Relay DLCI number, in the range 16 to 1007.
<i>FR-SSCS-DLCI</i>	(Optional) Frame Relay SSSC DLCI number, in the range of 16 to 991. Default is 1022.

Defaults

No default behavior or values

Command Modes

Global configuration

Command History

Release	Modification
12.1(2)T	This command was introduced.

Usage Guidelines

This command specifies the Frame Relay DLCIs in the VC group and maps them to the Frame Relay-SSCS DLCIs. If the optional FR-SSCS DLCI value is not specified, its value is the same as the Frame Relay DLCI.

Examples

The following example shows how to configure an FRF.5 many-to-one connection. The **vc-group** command maps Frame Relay DLCI 16, 17, 18, and 19 to a VC group named “friends”:

```
Router(config)# vc-group friends
Router(config-vc-group)# serial0 16 16
Router(config-vc-group)# serial0 17 17
Router(config-vc-group)# serial0 18 18
Router(config-vc-group)# serial0 19 19
```

Related Commands

Command	Description
show vc-group	Displays the names of all VC groups.

virtual-template (BBA group)

To configure a PPPoE profile with a virtual template to be used for cloning virtual access interfaces, use the **virtual-template** command in BBA group configuration mode. To remove the virtual template from a PPPoE profile, use the **no** form of this command.

virtual-template *template-number*

no virtual-template *template-number*

Syntax Description	<i>template-number</i>	Identifying number of the virtual template that will be used to clone virtual-access interfaces.
---------------------------	------------------------	--

Defaults	A virtual template is not specified.
-----------------	--------------------------------------

Command Modes	BBA group configuration
----------------------	-------------------------

Command History	Release	Modification
	12.2(15)T	This command was introduced.

Usage Guidelines Each PPPoE profile can clone virtual-access interfaces using only one virtual template. If you enter a second **virtual-template** command in a PPPoE profile, it will replace the first **virtual-template** command.

You can configure different PPPoE profiles to use different virtual templates. You can also configure multiple PPPoE profiles to use the same virtual template.

Examples The following example shows the configuration of two PPPoE profiles:

```
bba-group pppoe vpn1
 virtual-template 1
 sessions per-vc limit 2
 sessions per-mac limit 1
!
bba-group pppoe vpn2
 virtual-template 2
 sessions per-vc limit 2
 sessions per-mac limit 1
!
```

Related Commands	Command	Description
	bba-group pppoe	Creates a PPPoE profile.

virtual-template pre-clone

To specify the number of virtual-access interfaces to be created and cloned from a specific virtual template, use the **virtual-template pre-clone** command in global configuration mode. To disable precloning, use the **no** form of this command.

virtual-template *template-number* **pre-clone** *number*

no virtual-template *template-number* **pre-clone** *number*

Syntax Description

<i>template-number</i>	The number of the virtual template interfaces from which the new virtual-access interfaces are created.
<i>number</i>	The number of virtual-access interfaces to be created.

Defaults

Precloning is disabled.

Command Modes

Global configuration

Command History

Release	Modification
12.0(3)DC	This command was introduced on the Cisco 6400 node route processor.
12.2(4)T	This command was integrated into Cisco IOS Release 12.2(4)T.

Usage Guidelines

The number of precloned virtual-access interfaces should be set to the number of expected PPPoA and PPPoE sessions.

The precloned virtual-access interfaces will be attached to the PVC upon receipt of the first PPP packet from the client on the PVC. The virtual-access interface will be detached from the PVC upon termination of the PPP session.

When a PPP session is terminated, the virtual-access interface will remain in the router and will be reused. When precloning is disabled, any virtual-access interfaces that were already precloned but have not yet been used will remain in the router for future use.

Examples

The following example shows how to create 1200 precloned virtual-access interfaces on virtual template 1:

```
virtual-template 1 pre-clone 1200
```

Related Commands	Command	Description
	encapsulation (ATM)	Configures the ATM adaptation layer (AAL) and encapsulation type for an ATM virtual circuit (VC), VC class, VC, bundle, or PVC range.
	show vtemplate	Displays a list of all configured virtual templates.

vlan-id dot1q

To enable IEEE 802.1Q VLAN encapsulation for a specific VLAN on an Ethernet interface, use the **vlan-id dot1q** command in interface configuration mode. To disable 802.1Q encapsulation for a specific VLAN, use the **no** form of this command.

```
vlan-id dot1q vlan-id
```

```
no vlan-id dot1q vlan-id
```

Syntax Description

<i>vlan-id</i>	VLAN identifier. Valid values range from 1 to 4095.
----------------	---

Defaults

IEEE 802.1Q VLAN encapsulation is not enabled.

Command Modes

Interface configuration

Command History

Release	Modification
12.3(2)T	This command was introduced.

Usage Guidelines

This command allows you to enable IEEE 802.1Q VLAN encapsulation for a specific VLAN on an Ethernet interface without associating the VLAN with a subinterface. Configuring 802.1Q VLANs on the main interface without using up subinterfaces increases the number of VLANs that can be configured on a router to 4000 VLANs per interface.

You can configure a VLAN on a main interface and at the same time configure VLANs on subinterfaces of the same interface. However, you cannot configure a specific VLAN on the main interface and on a subinterface at the same time. To configure PPPoE over 802.1Q VLAN support on a subinterface, use the **encapsulation dot1q** and **pppoe enable** commands in subinterface configuration mode.

It is not possible to shut down traffic for individual VLANs that are configured on the main interface.

Examples

The following example shows how to configure PPPoE over an 802.1Q VLAN on Fast Ethernet interface 0/0.

```
interface fastethernet 0/0
no ip address
no ip mroute-cache
duplex half
vlan-id dot1q 20
pppoe enable group PPPOE
exit-vlan-config
```

The following example configures Ethernet interface 0 to bridge packets using VLAN ID 100 and assigns the interface to bridge group 1:

```
interface ethernet 0
vlan-id dot1q 100
```

```
description bridged vlan 100
bridge-group 1
bridge-group 1
```

Related Commands

Command	Description
debug pppoe	Displays debugging information for PPPoE sessions.
pppoe enable	Enables PPPoE sessions on an Ethernet interface or subinterface.
vlan-range dot1q	Enables IEEE 802.1Q VLAN encapsulation for a range of VLANs on an Ethernet interface.

vlan-range dot1q

To enable IEEE 802.1Q VLAN encapsulation for a range of VLANs on an Ethernet interface, use the **vlan-range dot1q** command in interface configuration mode. To disable 802.1Q encapsulation for a range of VLANs, use the **no** form of this command.

```
vlan-range dot1q start-vlan-id end-vlan-id [native]
```

```
no vlan-range dot1q start-vlan-id end-vlan-id
```

Syntax Description

<i>start-vlan-id</i>	VLAN identifier of the first VLAN in the range. Valid values range from 1 to 4095.
<i>end-vlan-id</i>	VLAN identifier of the last VLAN in the range. Valid values range from 1 to 4095.
native	(Optional) Instructs the interface to bridge untagged (native) packets.

Defaults

IEEE 802.1Q VLAN encapsulation is not enabled.

Command Modes

Interface configuration

Command History

Release	Modification
12.3(2)T	This command was introduced.

Usage Guidelines

This command allows you to enable IEEE 802.1Q VLAN encapsulation for a range of VLANs on an Ethernet interface without associating each VLAN with a subinterface. Configuring an 802.1Q VLAN range on the main interface without using up subinterfaces increases the number of VLANs that can be configured on a router to 4000 VLANs per interface.

You can configure a VLAN range on a main interface and at the same time configure VLANs outside the range on subinterfaces of the same interface. However, you cannot configure a specific VLAN on the main interface and on a subinterface at the same time. To configure PPPoE over 802.1Q VLAN support on a subinterface, use the **encapsulation dot1q** and **pppoe enable** commands in subinterface configuration mode.

It is not possible to shut down traffic for individual VLANs that are configured on the main interface.

To bridge both tagged and untagged packets, regardless of their VLAN ID, you do not need to create a VLAN ID range.

Examples

The following example shows how to configure PPPoE over a range of 802.1Q VLANs on Fast Ethernet interface 0/0.

```
interface fastethernet 0/0
no ip address
no ip mroute-cache
```

```
duplex half
vlan-range dot1q 20 30
  pppoe enable group PPPOE
exit-vlan-config
```

The following example configures Ethernet interface 0 to bridge untagged (native) packets using a range of VLAN IDs from 1 to 500 and assigns the interface to bridge group 1:

```
interface ethernet 0
vlan-range dot1q 1 500 native
  description 1 to 500
  bridge-group 1
bridge-group 1
```

Related Commands

Command	Description
debug pppoe	Displays debugging information for PPPoE sessions.
pppoe enable	Enables PPPoE sessions on an Ethernet interface or subinterface.
vlan-id dot1q	Enables IEEE 802.1Q VLAN encapsulation for a specific VLAN on an Ethernet interface.

vpn service

To configure a static domain name, use the **vpn service** command in ATM VC or VC class configuration mode. To remove a static domain name, use the **no** form of this command.

vpn service *domain-name*

no vpn service *domain-name*

Syntax Description

<i>domain-name</i>	Static domain name.
--------------------	---------------------

Defaults

No default behavior or values

Command Modes

ATM VC configuration
ATM VC class configuration

Command History

Release	Modification
12.1(1)DC1	This command was introduced on the Cisco 6400 NRP.
12.2(13)T	This command was integrated into Cisco IOS Release 12.2(13)T.

Usage Guidelines

Use the **vpn service** command in a permanent virtual circuit (PVC) or a PVC range configuration so that PPP over ATM (PPPoA) sessions in those PVCs will be forwarded according to the domain name supplied, without starting PPP.

Examples

In the following partial example, virtual private dialup network (VPDN) group 1 is selected for PPPoA session forwarding based on the domain name domain.com:

```
vpdn-group 1
 request-dialin
  protocol l2tp
  domain abc.com
 initiate-to ip 10.1.1.1 priority 1
.
.
.
interface ATM1/0.1 multipoint
 pvc 101
  protocol ppp virtual-template 1
  vpn service domain.com
```

x25 accept-reverse

To configure the Cisco IOS software to accept all reverse-charge calls, use the **x25 accept-reverse** command in interface or X.25 profile configuration mode. To disable this facility, use the **no** form of this command.

x25 accept-reverse

no x25 accept-reverse

Syntax Description This command has no arguments or keywords.

Defaults Disabled

Command Modes Interface configuration
X.25 profile configuration

Command History	Release	Modification
	10.0	This command was introduced.

Usage Guidelines This command causes the interface to accept reverse-charge calls by default. You can also configure this behavior for each peer with the **x25 map** interface configuration command.

Examples The following example sets acceptance of reverse-charge calls:

```
interface serial 0
 x25 accept-reverse
```

Related Commands	Command	Description
	x25 map	Sets up the LAN protocols-to-remote host mapping.

x25 address

To set the X.121 address of a particular network interface, use the **x25 address** command in interface or X.25 profile configuration mode.

x25 address *x121-address*

Syntax Description

<i>x121-address</i>	Variable-length X.121 address. It is assigned by the X.25 network service provider.
---------------------	---

Defaults

Defense Data Network (DDN) and Blacker Front End (BFE) encapsulations have a default interface address generated from the interface IP address. For proper DDN or BFE operation, this generated X.121 address must not be changed. Standard X.25 encapsulations do not have a default.

Command Modes

Interface configuration
X.25 profile configuration

Command History

Release	Modification
10.0	This command was introduced.

Usage Guidelines

When you are connecting to a public data network (PDN), the PDN administrator will assign the X.121 address to be used. Other applications (for example, a private X.25 service), may assign arbitrary X.121 addresses as required by the network and service design. X.25 interfaces that engage in X.25 switching only do not need to assign an X.121 address.

Examples

The following example sets the X.121 address for the interface:

```
interface serial 0
 encapsulation x25
 x25 address 00000123005
```

The address must match that assigned by the X.25 network service provider.

x25 alias

To configure an interface alias address that will allow this interface to accept calls with other destination addresses, use the **x25 alias** command in interface or X.25 profile configuration mode.

```
x25 alias {destination-pattern | x121-address-pattern} [cud cud-pattern]
```

Syntax Description

<i>destination-pattern</i>	Regular expression used to match against the destination address of a received call.
<i>x121-address-pattern</i>	Alias X.121 address for the interface, allowing it to act as destination host for calls having different destination address.
cud <i>cud-pattern</i>	(Optional) Call user data (CUD) pattern, a regular expression of ASCII text. The CUD field might be present in a call packet. The first few bytes (commonly 4 bytes long) identify a protocol; the specified pattern is applied to any user data after the protocol identification.

Defaults

No alias is configured.

Command Modes

Interface configuration
X.25 profile configuration

Command History

Release	Modification
11.2	This command was introduced. It replaces the functionality that was provided by the alias keyword of the x25 route command.

Usage Guidelines

Encapsulation, packet assembler/disassembler (PAD), and Qualified Logical Link Control (QLLC) calls are normally accepted when the destination address is that of the interface (or the zero-length address). Those calls will also be accepted when the destination address matches a configured alias.

Examples

An X.25 call may be addressed to the receiving interface; calls addressed to the receiving interface are eligible for acceptance as a datagram encapsulation, PAD or QLLC connection, and may not be routed. In the following example, serial interface 0 is configured with a native address of 0000123 and a destination alias for any address that starts with 1111123. That is, serial interface 0 can accept its own calls and calls for any destination that starts with 1111123.

```
interface serial 0
 encapsulation x25
 x25 address 0000123
 x25 alias ^1111123.*
```

x25 bfe-decision

This command is no longer supported.

x25 bfe-emergency

This command is no longer supported.

x25 default

To set a default protocol that Cisco IOS software will assume applies to incoming calls with unknown or missing protocol identifier in the call user data (CUD), use the **x25 default** interface configuration command. To remove the default protocol specified, use the **no** form of this command.

x25 default *protocol*

no x25 default *protocol*

Syntax Description	<i>protocol</i>	Specifies the protocol to assume; may be ip or pad .
---------------------------	-----------------	--

Defaults	No default protocol is specified.
-----------------	-----------------------------------

Command Modes	Interface configuration X.25 profile configuration
----------------------	---

Command History	Release	Modification
	10.0	This command was introduced.

Usage Guidelines	This command specifies the protocol assumed by the Cisco IOS software for incoming calls with unknown or missing protocol identifier in the call user data (CUD). If you do not use the x25 default interface configuration command, the software clears any incoming calls with unrecognized CUD.
-------------------------	---

Examples	The following example establishes IP as the default protocol for X.25 calls:
-----------------	--

```
interface serial 0
  x25 default ip
```

Related Commands	Command	Description
	x25 map	Sets up the LAN protocols-to-remote host mapping.

x25 facility

To force facilities on a per-call basis for calls originated by the router (switched calls are not affected), use the **x25 facility** command in interface or X.25 profile configuration mode. To disable a facility, use the **no** form of this command.

x25 facility *option*

no x25 facility *option*

Syntax Description

option Set of user facilities options. See [Table 68](#) for a list of supported facilities and their values.

Defaults

No facility is sent.

Command Modes

Interface configuration
X.25 profile configuration

Command History

Release	Modification
10.0	This command was introduced.

Usage Guidelines

[Table 68](#) lists the set of **x25 facility** command user facilities options.

Table 68 x25 facility User Facilities Options

User Facilities Option	Description
cug <i>number</i>	Specifies a closed user group (CUG) number; CUGs numbered from 1 to 9999 are allowed. CUGs can be used by a public data network (PDN) to create a virtual private network within the larger network and to restrict access.
packetsize <i>in-size out-size</i>	Proposes input maximum packet size (<i>in-size</i>) and output maximum packet size (<i>out-size</i>) for flow control parameter negotiation. Both values must be one of the following values: 16, 32, 64, 128, 256, 512, 1024, 2048, or 4096.
window size <i>in-size out-size</i>	Proposes the packet count for input windows (<i>in-size</i>) and output windows (<i>out-size</i>) for flow control parameter negotiation. Both values must be in the range 1 to 127 and must not be greater than or equal to the value set for the x25 modulo command.
reverse	Specifies reverses charging on all calls originated by the interface.
throughput <i>in out</i>	Sets the requested throughput class negotiation values for input (<i>in</i>) and output (<i>out</i>) throughput across the network. Values for <i>in</i> and <i>out</i> are in bits per second (bps) and range from 75 to 64000 bps.

Table 68 x25 facility User Facilities Options (continued)

User Facilities Option	Description
transit-delay <i>value</i>	Specifies a network transit delay to request for the duration of outgoing calls for networks that support transit delay. The transit delay value can be between 0 and 65534 milliseconds.
roa <i>name</i>	Specifies the name defined by the x25 roa command for a list of transit Recognized Operation Agencies (ROAs) to use in outgoing Call Request packets.

Examples

The following example specifies a transit delay value in an X.25 configuration:

```
interface serial 0
  x25 facility transit-delay 24000
```

The following example sets an ROA name and then sends the list via the X.25 user facilities:

```
x25 roa green_list 23 35 36
interface serial 0
  x25 facility roa green_list
```

Related Commands

Command	Description
x25 suppress-called-address	Omits the destination address in outgoing calls.

x25 fail-over

To configure a secondary interface and set the number of seconds for which a primary interface must be up before the secondary interface resets, use the **x25 fail-over** command in the appropriate configuration mode. To prevent the secondary interface from resetting, use the **no** form of this command.

x25 fail-over *seconds* **interface** *type number* [*dldci* | *mac-address*]

no x25 fail-over *seconds* **interface** *type number* [*dldci* | *mac-address*]

Syntax Description		
<i>seconds</i>	Number of seconds for which the primary interface must be up before the secondary interface resets.	
interface	Secondary interface.	
<i>type</i>	Interface type.	
<i>number</i>	Interface number.	
<i>dldci</i>	(Optional) DLCI number.	
<i>mac-address</i>	(Optional) MAC address.	

Defaults No default behavior or values

Command Modes Interface configuration
X.25 profile configuration

Command History	Release	Modification
	Release 12.1(1)T	This command was introduced.

Usage Guidelines The **x25 fail-over** command can be configured on a primary X.25 interface or an X.25 profile only.

Examples In the following example, X.25 failover is configured on a network that is also configured for Annex G. If data-link connection identifier (DLCI) 13 or DLCI 14 on serial interface 1/0 goes down, dialer interface 1 will serve as the secondary interface. After DLCI 13 or 14 comes back up and remains up for 20 seconds, dialer interface 1 will reset, sending all calls back to the primary interface.

```
interface serial1/0
 encapsulation frame-relay
 frame-relay interface-dlci 13
 x25-profile frame1
 exit
 frame-relay interface-dlci 14
 x25-profile frame1 dte
 exit
!
interface dialer1
 encapsulation x25
```

```
exit

x25 route ^1234 interface serial1/0 dlci 13
x25 route ^1234 interface serial1/0 dlci 14
x25 route ^1234 interface dialer1
!
x25 profile frame1
x25 fail-over 20 interface dialer1
exit
!
```

Related Commands

Command	Description
show x25 context	Displays information about X.25 links.
x25 profile	Configures an X.25 profile without specifying any hardware-specific information.

x25 hic

To set the highest incoming-only virtual circuit (VC) number, use the **x25 hic** interface configuration command.

x25 hic *circuit-number*

Syntax Description	<i>circuit-number</i> VC number from 1 to 4095, or 0 if there is no incoming-only VC range.
---------------------------	---

Defaults	0
-----------------	---

Command Modes	Interface configuration X.25 profile configuration
----------------------	---

Command History	Release	Modification
	10.0	This command was introduced.

Usage Guidelines	This command is applicable only if you have the X.25 switch configured for an incoming-only VC range. <i>Incoming</i> is from the perspective of the X.25 data terminal equipment (DTE). If you do not want any outgoing calls from your DTE, configure both ends to disable the two-way range (set the values of x25 ltc and x25 htc to 0) and configure an incoming-only range. Any incoming-only range must come before (that is, must be numerically less than) any two-way range. Any two-way range must come before any outgoing-only range.
-------------------------	--

Examples	The following example sets a valid incoming-only VC range of 1 to 5:
-----------------	--

```
interface serial 0
  x25 lic 1
  x25 hic 5
```

Related Commands	Command	Description
	x25 lic	Sets the lowest incoming-only VC number.

x25 hoc

To set the highest outgoing-only virtual circuit (VC) number, use the **x25 hoc** interface configuration command.

x25 hoc *circuit-number*

Syntax Description	<i>circuit-number</i>	VC number from 1 to 4095, or 0 if there is no incoming-only VC range.
--------------------	-----------------------	---

Defaults	0
----------	---

Command Modes	Interface configuration
---------------	-------------------------

Command History	Release	Modification
	10.0	This command was introduced.

Usage Guidelines	This command is applicable only if you have the X.25 switch configured for an outgoing-only VC range. <i>Outgoing</i> is from the perspective of the X.25 data terminal equipment (DTE). If you do not want any incoming calls on your DTE, disable the two-way range (set the values of x25 ltc and x25 htc to 0) and configure an outgoing-only range. Any outgoing-only range must come after (that is, be numerically greater than) any other range.
------------------	--

Examples	The following example sets a valid outgoing-only VC range of 2000 to 2005:
----------	--

```
interface serial 0
  x25 loc 2000
  x25 hoc 2005
```

Related Commands	Command	Description
	x25 loc	Sets the lowest outgoing-only VC number.

x25 hold-queue

To set the maximum number of packets to hold until a virtual circuit (VC) is able to send, use the **x25 hold-queue** interface configuration command. To remove this command from the configuration file and restore the default value, use the **no** form of this command without an argument.

x25 hold-queue *packets*

no x25 hold-queue [*packets*]

Syntax Description	<i>packets</i>	Number of packets. A hold queue value of 0 allows an unlimited number of packets in the hold queue.
---------------------------	----------------	---

Defaults	10 packets
-----------------	------------

Command Modes	Interface configuration X.25 profile configuration
----------------------	---

Command History	Release	Modification
	10.0	This command was introduced.

Usage Guidelines	If you set the <i>queue-size</i> argument to 0 when using the no x25 hold-queue command, there will be no hold queue limit. While this setting will prevent drops until the router runs out of memory, it is only rarely appropriate. A VC hold queue value is determined when it is created; changing this parameter will not affect the hold queue limits of the existing virtual circuits.
-------------------------	--

Examples	The following example sets the X.25 hold queue to hold 25 packets:
-----------------	--

```
interface serial 0
 x25 hold-queue 25
```

Related Commands	Command	Description
	ip mtu	Sets the MTU size of IP packets sent on an interface.
	x25 ips	Sets the interface default maximum input packet size to match that of the network.
	x25 ops	Sets the interface default maximum output packet size to match that of the network.

x25 hold-vc-timer

To start the timer that prevents additional calls to a destination for a given period of time (thus preventing overruns on some X.25 switches caused by Call Request packets), use the **x25 hold-vc-timer** interface configuration command. To restore the default value for the timer, use the **no** form of this command.

x25 hold-vc-timer *minutes*

no x25 hold-vc-timer

Syntax Description

<i>minutes</i>	Number of minutes that calls to a previously failed destination will be prevented. Incoming calls are still accepted.
----------------	---

Defaults

0 minutes

Command Modes

Interface configuration
X.25 profile configuration

Command History

Release	Modification
10.0	This command was introduced.

Usage Guidelines

Only Call Requests that the router originates are held down; routed X.25 Call Requests are not affected by this parameter.

Upon receiving a Clear Request for an outstanding Call Request, the X.25 support code immediately tries another Call Request if it has more traffic to send, and this action might cause overrun problems.

Examples

The following example sets this timer to 3 minutes:

```
interface serial 0
 x25 hold-vc-timer 3
```

x25 host

To define a static host name-to-address mapping, use the **x25 host** global configuration command. To remove the host name, use the **no** form of the command.

```
x25 host name x121-address [cud call-user-data]
```

```
no x25 host name
```

Syntax Description

<i>name</i>	Host name.
<i>x121-address</i>	The X.121 address.
cu d <i>call-user-data</i>	(Optional) Sets the Call User Data (CUD) field in the X.25 Call Request packet.

Defaults

No static host name-to-address mapping is defined.

Command Modes

Global configuration

Command History

Release	Modification
10.0	This command was introduced.

Usage Guidelines

This command permits you to map an X.121 address to an easily recognizable name. You can later use this host name instead of the X.121 address when you issue the **translate** command for X.25.

Examples

The following example specifies a static address mapping:

```
x25 host Willard 4085551212
```

The following example removes a static address mapping:

```
no x25 host Willard
```

The following example specifies static address mapping from the X.121 address 12345678 to the host name "ocean". It then uses the name "ocean" in the **translate** command in place of the X.121 address when translating from the X.25 host to the PPP host with address 10.0.0.2.

```
x25 host ocean 12345678
translate x25 ocean ppp 10.0.0.2 routing
```

Related Commands

Command	Description
translate x25	When an X.25 connection request to a particular destination address is received, the Cisco router can automatically translate the request to another outgoing protocol connection type.

x25 htc

To set the highest two-way virtual circuit (VC) number, use the **x25 htc** interface configuration command.

x25 htc *circuit-number*

Syntax Description	<i>circuit-number</i>	VC number from 1 to 4095, or 0 if there is no two-way VC range.
--------------------	-----------------------	---

Defaults	1024 for X.25 network service interfaces; 4095 for CMNS network service interfaces.
----------	---

Command Modes	Interface configuration X.25 profile configuration
---------------	---

Command History	Release	Modification
	10.0	This command was introduced.

Usage Guidelines	This command is applicable if the X.25 switch is configured for a two-way VC range. Any two-way VC range must come after (that is, be numerically larger than) any incoming-only range, and must come before any outgoing-only range.
------------------	---

Examples	The following example sets a valid two-way VC range of 5 to 25:
----------	---

```
interface serial 0
  x25 ltc 5
  x25 htc 25
```

Related Commands	Command	Description
	cmns enable	Enables the CMNS on a nonserial interface.
	x25 ltc	Sets the lowest two-way VC number.

x25 hunt-group

To create and maintain a hunt group, use the **x25 hunt-group** global configuration command. To delete this hunt group, use the **no** form of this command.

```
x25 hunt-group name { rotary | vc-count }
```

```
no x25 hunt-group name
```

Syntax Description

<i>name</i>	Name you assign to the particular hunt group.
rotary	Each call steps to the next interface.
vc-count	Each call is placed on the interface with most available logical channels.

Command Modes

Global configuration

Command History

Release	Modification
12.0(3)T	This command was introduced.

Usage Guidelines

Only one load-balancing distribution method can be selected for a hunt group, although one interface can participate in one or more hunt groups.

The rotary distribution method sends every call to the next available interface regardless of line speed and the number of available VCs on that interface.

The vc-count distribution method sends calls to the interface with the largest number of available logical channels. This method ensures a good load balance when you have lines of equal speed. If the line speeds are unequal, the vc-count method will favor the line with the higher speed. In cases where interfaces have the same line speed, the call is sent to the interface that is defined earliest in the hunt group.

To distribute calls equally among interfaces regardless of line speed, configure each interface with the same number of VCs.

With the vc-count distribution method, if a hunt group does not contain an operational interface, the call will be forwarded to the next route if one was specified. If a session is terminated on an interface within the hunt group, that interface now has more available VCs and it will be chosen next.

Examples

X.25 Load Balancing Using VC-Count Distribution Method Example

In the following example, the vc-count distribution method is used on a hunt group that contains two serial interfaces that have different numbers of VCs. Assuming no sessions are being terminated at this time, the first 450 calls will be sent to Serial1, and subsequent calls will alternate between Serial0 and Serial1 until the interfaces are full.

```
interface serial0
  description 56k link supporting 50 virtual circuits
  x25 htc 50
!
```

```

interface serial1
  description T1 line supporting 500 virtual circuits
  x25 htc 500
!
x25 hunt-group hg-vc vc-count
  interface serial0
  interface serial1
!

```

Hunt Group Configuration Example

The following example shows the creation of hunt group "HG1" with serial interfaces 1 and 2 and two specific XOT target IP addresses (172.17.125.54 and 172.17.125.34). Hunt group "HG1" is configured to use rotary distribution method. The example also shows the creation of hunt group "HG2" with serial interfaces 0 and 3. Hunt group "HG2" will use vc-count distribution method.

```

x25 hunt-group HG1 rotary
  interface serial 1
  interface serial 2
  xot 172.17.125.54
  xot 172.17.125.34
  exit
x25 hunt-group HG2 vc-count
  interface serial 0
  interface serial 3

```

Related Commands

Command	Description
show x25 hunt-group	Displays X.25 hunt groups, detailed interface statistics, and distribution methods.

x25 idle

To define the period of inactivity after which the router can clear a switched virtual circuit (SVC), use the **x25 idle** interface configuration command.

x25 idle *minutes*

Syntax Description	<i>minutes</i>	Idle period in minutes.
---------------------------	----------------	-------------------------

Defaults	0 (the SVC is kept open indefinitely)
-----------------	---------------------------------------

Command Modes	Interface configuration X.25 profile configuration
----------------------	---

Command History	Release	Modification
	10.0	This command was introduced.

Usage Guidelines	Calls originated and terminated by the router are cleared; packet assembler/disassembler (PAD) and switched virtual circuits are not affected. To clear one or all virtual circuits at once, use the clear x25 privileged EXEC command.
-------------------------	--

Examples	The following example sets a 5-minute wait period before an idle circuit is cleared:
-----------------	--

```
interface serial 2
x25 idle 5
```

Related Commands	Command	Description
	clear x25	Restarts an X.25 or CMNS service, to clear an SVC, or to reset a PVC.

x25 ip-precedence

To enable the Cisco IOS software to use the IP precedence value when it opens a new virtual circuit (VC), use the **x25 ip-precedence** interface configuration command. To cause the Cisco IOS software to ignore the precedence value when opening VCs, use the **no** form of this command.

x25 ip-precedence

no x25 ip-precedence

Syntax Description This command has no arguments or keywords.

Defaults The router opens one VC for all types of service.

Command Modes Interface configuration

Command History	Release	Modification
	10.0	This command was introduced.

Usage Guidelines This feature is useful only for Defense Data Network (DDN) or Blacker Front End (BFE) encapsulations because only these methods have an IP precedence facility defined to allow the source and destination devices to both use the VC for traffic of the given IP priority.

Verify that your host does not send nonstandard data in the IP type of service (TOS) field because it can cause multiple wasteful virtual circuits to be created.

Four VCs may be opened based on IP precedence to encapsulate routine, priority, immediate, and all higher precedences.

The **x25 map nvc** limit or the default **x25 nvc** limit still applies.

Examples The following example allows new IP encapsulation VCs based on the IP precedence:

```
interface serial 3
 x25 ip-precedence
```

x25 ips

To set the interface default maximum input packet size to match that of the network, use the **x25 ips** interface configuration command.

x25 ips *bytes*

Syntax Description	<i>bytes</i>	Byte count. It can be one of the following values: 16, 32, 64, 128, 256, 512, 1024, 2048, or 4096.
---------------------------	--------------	--

Defaults	128 bytes
-----------------	-----------

Command Modes	Interface configuration
----------------------	-------------------------

Command History	Release	Modification
	10.0	This command was introduced.

Usage Guidelines X.25 network connections have a default maximum input packet size set by the network administrator. Larger packet sizes require less overhead processing. To send a packet larger than the X.25 packet size over an X.25 virtual circuit, the Cisco IOS software must break the packet into two or more X.25 packets with the more data bit (M-bit) set. The receiving device collects all packets with the M-bit set and reassembles the original packet.



Note

Set the **x25 ips** and **x25 ops** commands to the same value unless your network supports asymmetric input and output packet sizes.

Examples The following example sets the default maximum packet sizes to 512:

```
interface serial 1
  x25 ips 512
  x25 ops 512
```

Related Commands	Command	Description
	x25 facility	Forces facilities on a per-call basis for calls originated by the router (switched calls are not affected).
	x25 ops	Sets the interface default maximum output packet size to match that of the network.

x25 lic

To set the lowest incoming-only virtual circuit (VC) number, use the **x25 lic** interface configuration command.

x25 lic *circuit-number*

Syntax Description	<i>circuit-number</i>	VC number from 1 to 4095, or 0 if there is no incoming-only VC range.
--------------------	-----------------------	---

Defaults	0
----------	---

Command Modes	Interface configuration X.25 profile configuration
---------------	---

Command History	Release	Modification
	10.0	This command was introduced.

Usage Guidelines This command is applicable only if you have the X.25 switch configured for an incoming-only VC range. *Incoming* is from the perspective of the X.25 DTE device. If you do not want any outgoing calls on your DTE device, disable the two-way range (set the values of **x25 ltc** and **x25 htc** to 0).

The following example sets a valid incoming-only VC range of 1 to 5, and sets the lowest two-way VC number:

```
interface serial 0
  x25 lic 1
  x25 hic 5
  x25 ltc 6
```

Related Commands	Command	Description
	x25 hic	Sets the highest incoming-only VC number.

x25 linkrestart

To force X.25 Level 3 (packet level) to restart when Level 2 (Link Access Procedure, Balanced [LAPB], the link level) resets, use the **x25 linkrestart** interface configuration command. To disable this function, use the **no** form of this command.

x25 linkrestart

no x25 linkrestart

Syntax Description

This command has no arguments or keywords.

Defaults

Forcing packet-level restarts is the default and is necessary for networks that expect this behavior.

Command Modes

Interface configuration
X.25 profile configuration

Command History

Release	Modification
10.0	This command was introduced.

Examples

The following example disables the link-level restart:

```
interface serial 3
 no x25 linkrestart
```

x25 loc

To set the lowest outgoing-only virtual circuit (VC) number, use the **x25 loc** interface configuration command.

x25 loc *circuit-number*

Syntax Description	<i>circuit-number</i>	VC number from 1 to 4095, or 0 if there is no outgoing-only VC range.
--------------------	-----------------------	---

Defaults	0
----------	---

Command Modes	Interface configuration X.25 profile configuration
---------------	---

Command History	Release	Modification
	10.0	This command was introduced.

Usage Guidelines	This command is applicable only if you have the X.25 switch configured for an outgoing-only VC range. <i>Outgoing</i> is from the perspective of the X.25 DTE device. If you do not want any incoming calls from your DTE device, configure the values of x25 loc and x25 hoc and set the values of x25 ltc and x25 htc to 0.
------------------	---

Examples	The following example sets a valid outgoing-only virtual circuit range of 2000 to 2005:
----------	---

```
interface serial 0
x25 loc 2000
x25 hoc 2005
```

Related Commands	Command	Description
	x25 hoc	Sets the highest outgoing-only VC number.

x25 ltc

To set the lowest two-way virtual circuit (VC) number, use the **x25 ltc** interface configuration command.

x25 ltc *circuit-number*

Syntax Description	<i>circuit-number</i>	VC number from 1 to 4095, or 0 if there is no two-way VC range.
---------------------------	-----------------------	---

Defaults	1
-----------------	---

Command Modes	Interface configuration X.25 profile configuration
----------------------	---

Command History	Release	Modification
	10.0	This command was introduced.

Usage Guidelines	This command is applicable if you have the X.25 switch configured for a two-way virtual circuit range. Any two-way virtual circuit range must come after (that is, be numerically larger than) any incoming-only range, and must come before any outgoing-only range.
-------------------------	---

Examples	The following example sets a valid two-way virtual circuit range of 5 to 25:
-----------------	--

```
interface serial 0
  x25 ltc 5
  x25 htc 25
```

Related Commands	Command	Description
	x25 htc	Sets the highest two-way VC number.

x25 map

To set up the LAN protocols-to-remote host mapping, use the **x25 map** command in interface configuration or X.25 profile configuration mode. To retract a prior mapping, use the **no** form of this command.

```
x25 map protocol address [protocol2 address2 [...[protocol9 address9]]] x121-address [option]
```

```
no x25 map protocol address x121-address
```

Syntax Description

<i>protocol</i>	Protocol type, entered by keyword. Supported protocols are entered by keyword, as listed in Table 68 . As many as nine protocol and address pairs can be specified in one command line.
<i>address</i>	Protocol address.
<i>x121-address</i>	X.121 address of the remote host.
<i>option</i>	(Optional) Additional functionality that can be specified for originated calls. Can be any of the options listed in Table 69 .

Defaults

No LAN protocol-to-remote host mapping is set up.

Command Modes

Interface configuration
X.25 profile configuration

Command History

Release	Modification
10.0	This command was introduced.
12.2(13)T	The apollo , vines , and xns arguments were removed because Apollo Domain, Banyan VINES, and Xerox Network Systems are no longer available in the Cisco IOS software.

Usage Guidelines

Because no defined protocol can dynamically determine LAN protocol-to-remote host mappings, you must enter all the information for each host with which the router may exchange X.25 encapsulation traffic.

Two methods are available to encapsulate traffic: Cisco's long-available encapsulation method and the Internet Engineering Task Force (IETF) standard method (defined in RFC 1356); the latter allows hosts to exchange several protocols over a single virtual circuit. Cisco's encapsulation method is the default (for backward compatibility) unless the interface configuration command specifies the **ietf** keyword.

When you configure multiprotocol maps, you can specify a maximum of nine protocol and address pairs in an **x25 map** command. However, you can specify a protocol only once. For example, you can specify the IP protocol and an IP address, but you cannot specify another IP address. If the **compressedtcp** and **ip** keywords are both specified, the same IP address must be used.

Bridging is supported only if you are using Cisco's traditional encapsulation method. For correct operation, bridging maps must specify the **broadcast** option.

Since most datagram routing protocols rely on broadcasts or multicasts to send routing information to their neighbors, the **broadcast** keyword is needed to run such routing protocols over X.25.

Encapsulation maps might also specify that traffic between the two hosts should be compressed, thus increasing the effective bandwidth between them at the expense of memory and computation time. Because each compression virtual circuit requires memory and computation resources, compression must be used with care and monitored to maintain acceptable resource usage and overall performance.

Open Shortest Path First (OSPF) Protocol treats a nonbroadcast, multiaccess network such as X.25 in much the same way as it treats a broadcast network by requiring the selection of a designated router. In previous releases, this required manual assignment in the OSPF configuration using the **neighbor** router configuration command. When the **x25 map** command is included in the configuration with the **broadcast**, and the **ip ospf network** command (with the **broadcast** keyword) is configured, there is no need to configure any neighbors manually. OSPF will now run over the X.25 network as a broadcast network. (Refer to the **ip ospf network** interface configuration command for more detail.)

**Note**

The OSPF broadcast mechanism assumes that IP class D addresses are never used for regular traffic over X.25.

You can modify the options of an **x25 map** command by restating the complete set of protocols and addresses specified for the map, followed by the desired options. To delete a map command, you must also specify the complete set of protocols and addresses; the options can be omitted when deleting a map.

Once defined, a map's protocols and addresses cannot be changed. This requirement exists because the Cisco IOS software cannot determine whether you want to add to, delete from, or modify an existing map's protocol and address specification, or simply mistyped the command. To change a map's protocol and address specification, you must delete it and create a new map.

A given protocol-address pair cannot be used in more than one map on the same interface.

[Table 69](#) lists the protocols supported by X.25.

Table 69 *Protocols Supported by X.25*

Keyword	Protocol
appletalk	AppleTalk
bridge	Bridging ¹
clns	ISO Connectionless Network Service
compressedtcp	TCP/IP header compression
decnet	DECnet
ip	IP
ipx	Novell IPX
pad	PAD links ²
qllc	System Network Architecture (SNA) encapsulation in X.25 ³

1. Bridging traffic is supported only for Cisco's traditional encapsulation method, so a bridge map cannot specify other protocols.
2. Packet assembler/disassembler (PAD) maps are used to configure session and protocol translation access, therefore, this protocol is not available for multiprotocol encapsulation.
3. Qualified Logical Link Control (QLLC) is not available for multiprotocol encapsulation.

**Note**

The Connection-Mode Network Service (CMNS) map form is obsolete; its function is replaced by the enhanced **x25 route** command.

Table 70 lists the map options supported by X.25 using the **x25 map** command.

Table 70 x25 map Options

Option	Description
accept-reverse	Causes the Cisco IOS software to accept incoming reverse-charged calls. If this option is not present, the Cisco IOS software clears reverse-charged calls unless the interface accepts all reverse-charged calls.
broadcast	Causes the Cisco IOS software to direct any broadcasts sent through this interface to the specified X.121 address. This option also simplifies the configuration of OSPF; see “Usage Guidelines” for more detail.
cug <i>group-number</i>	Specifies a closed user group (CUG) number (from 1 to 9999) for the mapping in an outgoing call.
compress	Specifies that X.25 payload compression be used for mapping the traffic to this host. Each virtual circuit established for compressed traffic uses a significant amount of memory (for a table of learned data patterns) and for computation (for compression and decompression of all data). Cisco recommends that compression be used with careful consideration of its impact on overall performance.
idle <i>minutes</i>	Specifies an idle timeout for calls other than the interface default; 0 minutes disables the idle timeout.
method { cisco ietf snap multi }	Specifies the encapsulation method. The choices are as follows: <ul style="list-style-type: none"> • cisco—Cisco’s proprietary encapsulation; not available if more than one protocol is to be carried. • ietf—Default RFC 1356 operation: protocol identification of single-protocol virtual circuits and protocol identification within multiprotocol virtual circuits use the standard encoding, which is compatible with RFC 877. Multiprotocol virtual circuits are used only if needed. • snap—RFC 1356 operation where IP is identified with SNAP rather than the standard IETF method (the standard method is compatible with RFC 877). • multi—Forces a map that specifies a single protocol to set up a multiprotocol virtual circuit when a call is originated; also forces a single-protocol PVC to use multiprotocol data identification methods for all datagrams sent and received.
no-incoming	Use the map only to originate calls.
no-outgoing	Do not originate calls when using the map.

Table 70 x25 map Options (continued)

Option	Description
nudata <i>string</i>	Specifies the network user identification in a format determined by the network administrator (as allowed by the standards). This option is provided for connecting to non-Cisco equipment that requires a NUID facility. The string should not exceed 130 characters and must be enclosed in quotation marks (“ ”) if there are any spaces present. This option only works if the router is configured as an X.25 DTE.
nuid <i>username password</i>	Specifies that a network user ID (NUID) facility be sent in the outgoing call with the specified TACACS username and password (in a format defined by Cisco). This option should be used only when connecting to another Cisco router. The combined length of the username and password should not exceed 127 characters. This option only works if the router is configured as an X.25 data terminal equipment (DTE).
nvc <i>count</i>	Sets the maximum number of virtual circuits for this map or host. The default <i>count</i> is the x25 nvc setting of the interface. A maximum number of eight virtual circuits can be configured for each map. Compressed TCP may use only 1 virtual circuit.
packetsize <i>in-size out-size</i>	Proposes maximum input packet size (<i>in-size</i>) and maximum output packet size (<i>out-size</i>) for an outgoing call. Both values typically are the same and must be one of the following values: 16, 32, 64, 128, 256, 512, 1024, 2048, or 4096.
passive	Specifies that the X.25 interface should send compressed outgoing TCP datagrams only if they were already compressed when they were received. This option is available only for compressed TCP maps.
reverse	Specifies reverse charging for outgoing calls.
roa <i>name</i>	Specifies the name defined by the x25 roa command for a list of transit Recognized Operating Agencies (ROAs, formerly called Recognized Private Operating Agencies, or RPOAs) to use in outgoing Call Request packets.
throughput <i>in out</i>	Sets the requested throughput class values for input (<i>in</i>) and output (<i>out</i>) throughput across the network for an outgoing call. Values for <i>in</i> and <i>out</i> are in bits per second (bps) and range from 75 to 48000 bps.
transit-delay <i>milliseconds</i>	Specifies the transit delay value in milliseconds (0 to 65534) for an outgoing call, for networks that support transit delay.
window-size <i>in-size out-size</i>	Proposes the packet count for input window (<i>in-size</i>) and output window (<i>out-size</i>) for an outgoing call. Both values typically are the same, must be in the range 1 to 127, and must be less than the value set by the x25 modulo command.

Examples

The following example maps IP address 172.20.2.5 to X.121 address 000000010300. The **broadcast** keyword directs any broadcasts sent through this interface to the specified X.121 address.

```
interface serial 0
 x25 map ip 171.20.2.5 000000010300 broadcast
```

The following example specifies an ROA name to be used for originating connections:

```
x25 roa green_list 23 35 36
interface serial 0
 x25 map ip 172.20.170.26 10 roa green_list
```

The following example specifies an NUID facility to send on calls originated for the address map:

```
interface serial 0
 x25 map ip 172.20.174.32 2 nudata "Network User ID 35"
```

Strings can be quoted, but quotation marks are not required unless embedded blanks are present.

Related Commands

Command	Description
ip ospf network	Configures the OSPF network type to a type other than the default for a given medium.
show x25 map	Displays information about configured address maps.
x25 facility	Forces facilities on a per-call basis for calls originated by the router.
x25 map bridge	Configures an Internet-to-X.121 address mapping for bridging over X.25.
x25 map compressedtcp	Maps compressed TCP traffic to an X.121 address.
x25 map pad	Configures an X.121 address mapping for PAD access over X.25.
x25 route	Creates an entry in the X.25 routing table.
x25 suppress-called-address	Omits the destination address in outgoing calls.

x25 map bridge

To configure an Internet-to-X.121 address mapping for bridging of packets in X.25 frames, use the **x25 map bridge** command in interface configuration mode. To disable the Internet-to-X.121 address mapping, use the **no** form of this command.

```
x25 map bridge x121-address broadcast [option]
```

Syntax Description		
	<i>x121-address</i>	The X.121 address.
	broadcast	Required keyword for bridging over X.25.
	<i>option</i>	(Optional) Services that can be added to this map (same options as the x25 map command). See Table 6 for more details.

Defaults No bridging over X.25 is configured.

Command Modes Interface configuration

Command History	Release	Modification
	10.0	This command was introduced.

Usage Guidelines The X.25 bridging software uses the same spanning-tree algorithm as the other bridging functions, but allows packets to be encapsulated in X.25 frames and transmitted across X.25 media. This command specifies IP-to-X.121 address mapping and maintains a table of both the Ethernet and X.121 addresses.

[Table 71](#) lists **x25 map bridge** options.

Table 71 x25 map bridge Options

Option	Description
accept-reverse	Causes the Cisco IOS software to accept incoming reverse-charged calls. If this option is not present, the Cisco IOS software clears reverse-charged calls unless the interface accepts all reverse-charged calls.
broadcast	Causes the Cisco IOS software to direct any broadcasts sent through this interface to the specified X.121 address. This option also simplifies the configuration of Open Shortest Path First (OSPF) Protocol; see “Usage Guidelines” for more detail.

Table 71 x25 map bridge Options (continued)

Option	Description
compress	Specifies that X.25 payload compression be used for mapping the traffic to this host. Each virtual circuit established for compressed traffic uses a significant amount of memory (for a table of learned data patterns) and for computation (for compression and decompression of all data). Cisco recommends that compression be used with careful consideration of its impact on overall performance.
cug group-number	Specifies a closed user group (CUG) number (from 1 to 9999) for the mapping in an outgoing call.
idle minutes	Specifies an idle timeout for calls other than the interface default; 0 minutes disables the idle timeout.
method { cisco ietf snap multi }	Specifies the encapsulation method. The choices are as follows: <ul style="list-style-type: none"> • cisco—Cisco’s proprietary encapsulation; not available if more than one protocol is to be carried. • ietf—Default RFC 1356 operation: protocol identification of single-protocol virtual circuits and protocol identification within multiprotocol virtual circuits use the standard encoding, which is compatible with RFC 877. Multiprotocol virtual circuits are used only if needed. • snap—RFC 1356 operation where IP is identified with SNAP rather than the standard Internet Engineering Task Force (IETF) method (the standard method is compatible with RFC 877). • multi—Forces a map that specifies a single protocol to set up a multiprotocol virtual circuit when a call is originated; also forces a single-protocol permanent virtual circuit (PVC) to use multiprotocol data identification methods for all datagrams sent and received.
no-incoming	Uses the map only to originate calls.
no-outgoing	Does not originate calls when using the map.
nudata string	Specifies the network user identification in a format determined by the network administrator (as allowed by the standards). This option is provided for connecting to non-Cisco equipment that requires an NUID facility. The string should not exceed 130 characters and must be enclosed in quotation marks (“ ”) if there are any spaces present. This option only works if the router is configured as an X.25 DTE device.
nuid username password	Specifies that a network user ID (NUID) facility be sent in the outgoing call with the specified Terminal Access Controller Access Control System (TACACS) username and password (in a format defined by Cisco). This option should be used only when connecting to another Cisco router. The combined length of the username and password should not exceed 127 characters. This option only works if the router is configured as an X.25 DTE.

Table 71 x25 map bridge Options (continued)

Option	Description
nvc <i>count</i>	Sets the maximum number of virtual circuits for this map or host. The default <i>count</i> is the x25 nvc setting of the interface. A maximum number of eight virtual circuits can be configured for each map. Compressed TCP may use only 1 virtual circuit.
packetsize <i>in-size out-size</i>	Proposes maximum input packet size (<i>in-size</i>) and maximum output packet size (<i>out-size</i>) for an outgoing call. Both values typically are the same and must be one of the following values: 16, 32, 64, 128, 256, 512, 1024, 2048, or 4096.
passive	Specifies that the X.25 interface should send compressed outgoing TCP datagrams only if they were already compressed when they were received. This option is available only for compressed TCP maps.
reverse	Specifies reverse charging for outgoing calls.
roa <i>name</i>	Specifies the name defined by the x25 roa command for a list of transit Recognized Operating Agencies (ROAs, formerly called Recognized Private Operating Agencies, or RPOAs) to use in outgoing Call Request packets.
throughput <i>in out</i>	Sets the requested throughput class values for input (<i>in</i>) and output (<i>out</i>) throughput across the network for an outgoing call. Values for <i>in</i> and <i>out</i> are in bits per second (bps) and range from 75 to 48000 bps.
transit-delay <i>milliseconds</i>	Specifies the transit delay value in milliseconds (0 to 65534) for an outgoing call, for networks that support transit delay.
window size <i>in-size out-size</i>	Proposes the packet count for input window (<i>in-size</i>) and output window (<i>out-size</i>) for an outgoing call. Both values typically are the same, must be in the range 1 to 127, and must be less than the value set by the x25 modulo command.

Examples

The following example configures transparent bridging over X.25 between two Cisco routers using a maximum of six virtual circuits:

```
interface serial 1
  x25 map bridge 000000010300 broadcast nvc 6
```

Related Commands

Command	Description
x25 map	Sets up the LAN protocols-to-remote host mapping.
x25 address	Sets the X.121 address of a particular network interface.

x25 map cmns

The **x25 map cmns** command is replaced by the enhanced **x25 route** command. See the description of the **x25 route** command in this chapter for more information.

x25 map compressedtcp

To map compressed TCP traffic to an X.121 address, use the **x25 map compressedtcp** interface configuration command. To delete a TCP/IP header compression map for the link, use the **no** form of this command.

```
x25 map compressedtcp ip-address [protocol2 address2 [...[protocol9 address9]]]
    x121-address [option]
```

```
no x25 map compressedtcp address [protocol2 address2 [...[protocol9 address9]]]
    x121-address
```

Syntax Description		
<i>ip-address</i>		IP address.
<i>protocol</i>		(Optional) Protocol type, entered by keyword. Supported protocols are entered by keyword, as listed in Table 68 earlier in this chapter. As many as nine protocol and address pairs can be specified in one command line.
<i>address</i>		(Optional) Protocol address.
<i>x121-address</i>		X.121 address.
<i>option</i>		(Optional) The same options as those for the x25 map command; see Table 69 earlier in this chapter.

Defaults No mapping is configured.

Command Modes Interface configuration

Command History	Release	Modification
	10.0	This command was introduced.

Usage Guidelines Cisco supports RFC 1144 TCP/IP header compression (THC) on serial lines using HDLC and X.25 encapsulation. THC encapsulation is only slightly different from other encapsulation traffic, but these differences are worth noting. The implementation of compressed TCP over X.25 uses one virtual circuit to pass the compressed packets. Any IP traffic (including standard TCP) is separate from TCH traffic; it is carried over separate IP encapsulation virtual circuits or identified separately in a multiprotocol virtual circuit.



Note If you specify both **ip** and **compressedtcp** in the same **x25 map compressedtcp** command, they must both specify the same IP address.

The **nvc** map option cannot be used for TCP/IP header compression, because only one virtual circuit can carry compressed TCP/IP header traffic to a given host.

Examples

The following example establishes a map for TCP/IP header compression on serial interface 4:

```
interface serial 4
 ip tcp header-compression
 x25 map compressedtcp 172.20.2.5 000000010300
```

Related Commands

Command	Description
x25 map	Sets up the LAN protocols-to-remote host mapping.

x25 map pad

To configure an X.121 address mapping for packet assembler/disassembler (PAD) access over X.25, use the **x25 map pad** interface configuration command.

```
x25 map pad x121-address [option]
```

Syntax Description	<i>x121-address</i>	X.121 address of the interface.
	<i>option</i>	(Optional) Services that can be added to this map—the same options as the x25 map command; see Table 69 earlier in this chapter.

Defaults No specific options are used for PAD access.

Command Modes Interface configuration

Command History	Release	Modification
	10.2	This command was introduced.

Usage Guidelines Use a PAD map to configure optional X.25 facility use for PAD access. When used with the **x25 pad-access** interface configuration command, the **x25 map pad** command restricts incoming PAD access to those statically mapped hosts.

Examples The following example configures an X.25 interface to restrict incoming PAD access to the single mapped host. This example requires that both incoming and outgoing PAD access use the network user identification (NUI) user authentication.

```
interface serial 1
  x25 pad-access
  x25 map pad 000000010300 nuid johndoe secret
```

Related Commands	Command	Description
	x25 map	Sets up the LAN protocols-to-remote host mapping.
	x25 pad-access	Causes the PAD software to accept PAD connections only from statically mapped X.25 hosts.

x25 map rbp local

To configure a router to establish X.25 circuits in response to incoming TCP connections on a specified TCP port, and to use record boundary preservation (RBP) to transfer data between the TCP session and the corresponding X.25 circuit, use the **x25 map rbp local** command in interface configuration mode. To delete the map, use the **no** form of this command.

```
x25 map rbp x121-address [cud string] local port port [cug group-number] [packet  
size in-size out-size] [record  
size size] [reverse] [roa name] [throughput in out] [transit-delay  
milliseconds] [window  
size in-size out-size]
```

```
no x25 map rbp x121-address [cud string] local port port
```

Syntax Description	
<i>x121-address</i>	X.121 address of the remote host.
cud <i>string</i>	(Optional) Call user data (CUD) to be included in the X.25 call request, as a hexadecimal string.
port <i>port</i>	TCP port number on which the router should listen.
cug <i>group-number</i>	(Optional) Closed user group (CUG) number (from 1 to 9999) used for the mapping in an outgoing call.
packet <i>size in-size out-size</i>	(Optional) Proposes maximum input packet size (<i>in-size</i>) and maximum output packet size (<i>out-size</i>). Both values typically are the same and must be one of the following values: 16, 32, 64, 128, 256, 512, 1024, 2048, or 4096.
record <i>size size</i>	(Optional) Maximum length of a record.
reverse	(Optional) Specifies reverse charging for outgoing calls.
roa <i>name</i>	(Optional) Specifies the name defined by the x25 roa command for a list of transit Recognized Operating Agencies (ROAs, formerly called Recognized Private Operating Agencies, or RPOAs) to use in outgoing Call Request packets.
throughput <i>in out</i>	(Optional) Sets the requested throughput class values for input (<i>in</i>) and output (<i>out</i>) throughput across the network. Values for <i>in</i> and <i>out</i> are in bits per second (bps) and range from 75 to 48000 bps.
transit-delay <i>milliseconds</i>	(Optional) Transit delay value in milliseconds (0 to 65534) for an outgoing call, for networks that support transit delay.
window <i>size in-size out-size</i>	(Optional) Inbound and outbound window sizes (the number of packets permitted in each direction before an acknowledgment is required). Both values typically are the same, must be in the range from 1 to 127, and must be less than the value set by the x25 modulo command.

Defaults No SVC is configured.

Command Modes Interface configuration

Command History

Release	Modification
12.2(8)T	This command was introduced.

Usage Guidelines

RBP enables X.25 hosts to exchange data with TCP/IP hosts via TCP sessions while maintaining X.25 packet boundaries.

When the **x25 map rbp local** command is configured, the router will listen for a request for a TCP connection to the specified TCP port. When the connection request is accepted, the router will then attempt to place an X.25 call on the interface on which the command was configured, using the X.25 address of the interface as the calling address, the X.121 address specified in the command as the destination address, and the call user data specified in the command. If the call is not successfully completed, the TCP connection will be closed.

The number of connections that may be established to the TCP port is limited only by router resources (such as memory, processor utilization, and available X.25 circuits).

When connections that will be established by the TCP/IP host are configured, the local TCP port number must be unique, with the exception that the same TCP port number may be configured once on each of multiple X.25 interfaces that will not be active simultaneously; this includes the case in which one X.25 interface is configured as a backup interface for another X.25 interface.

No information from the TCP connection is included in the X.25 Call packet sent to the X.25 host.

Examples

In the following example, when the router receives a TCP connection request on port 9999, the host will make an X.25 call to X.121 address 12131 with no call user data.

```
interface Serial1/0
 encapsulation x25 dce
 x25 address 13133
 x25 map rbp 12131 local port 9999
```

Related Commands

Command	Description
show x25 map	Displays information about configured address maps.
show x25 vc	Displays information about active SVCs and PVCs.
x25 map rbp remote	Establishes TCP sessions in response to incoming X.25 calls and uses RBP to transfer data between the X.25 circuit and the corresponding TCP session.
x25 modulo	Sets the window modulus.
x25 pvc rbp local	Accepts an incoming TCP connection and uses RBP to transfer data between the TCP host and an X.25 PVC.
x25 pvc rbp remote	Establishes a TCP session and uses RBP to transfer data between the X.25 host and the TCP session.
x25 roa	Specifies a sequence of packet network carriers.

x25 map rbp remote

To configure a router to establish TCP sessions in response to incoming X.25 calls, and to use record boundary preservation (RBP) to transfer data between the X.25 circuit and the corresponding TCP session, use the **x25 map rbp remote** command in interface configuration mode. To delete the map, use the **no** form of this command.

```
x25 map rbp x121-address [ cud string] remote host ip-address port port [accept-reverse]
recordsize size [source-interface interface]
```

```
no x25 map rbp x121-address [ cud string] remote host port port
```

Syntax Description

<i>x121-address</i>	X.121 address of the remote host.
 cud string	(Optional) Call user data (CUD) to be included in the X.25 call request, as a hexadecimal string.
 host ip-address	Remote IP address for the TCP connection request.
 port port	Remote TCP port number for the TCP connection request.
 accept-reverse	(Optional) Causes the Cisco IOS software to accept incoming reverse-charged calls. If this option is not present, the Cisco IOS software clears reverse-charged calls unless the interface accepts all reverse-charged calls.
 recordsize size	(Optional) Maximum length of a record.
 source-interface interface	(Optional) Name of an interface whose IP address will be used as the local IP address for the TCP connection.

Defaults

No SVC is configured.

Command Modes

Interface configuration

Command History

Release	Modification
12.2(8)T	This command was introduced.

Usage Guidelines

RBP enables X.25 hosts to exchange data with TCP/IP hosts via TCP sessions while maintaining X.25 packet boundaries.

The router will accept an incoming X.25 call if the source address and call user data in the call request match the values configured in the **x25 map rbp remote** command. If the **cud** parameter is specified in the command, the call user data in the incoming call must match the configured value exactly. If the **cud** parameter is not specified in the command, the call user data must not conflict with any protocol ID recognized by the router, but it is otherwise ignored.

If an incoming call requests reverse charging, and the **accept-reverse** option is not specified in the matching map, the call will be refused.

If the incoming call is accepted, the router will attempt to open a TCP connection to a configured IP address and TCP port using a dynamically assigned local TCP port number. If the TCP connection cannot be opened, the X.25 call will be cleared.

The number of X.25 calls that may be accepted is limited only by router resources.

No information from the X.25 call packet is provided to the TCP/IP host.

Examples

In the following example, when serial interface 1/0 receives a call from a remote host that has the X.121 address 12132, the router will open a TCP connection to port number 9999 on the TCP/IP host that has the IP address 10.0.0.1.

```
interface Serial1/0
  encapsulation x25 dce
  x25 address 12030
  x25 map rbp 12132 remote host 10.0.0.1 port 9999
```

Related Commands

Command	Description
show x25 map	Displays information about configured address maps.
show x25 vc	Displays information about active SVCs and PVCs.
x25 map	Establishes X.25 circuits in response to incoming TCP connections and uses RBP to transfer data between the TCP session and the corresponding X.25 circuit.
x25 pvc rbp local	Accepts incoming TCP connections uses RBP to transfer data between the TCP host and an X.25 PVC.
x25 pvc rbp remote	Establishes TCP sessions and uses RBP to transfer data between the X.25 host and the TCP session.

x25 modulo

To set the window modulus, use the **x25 modulo** interface configuration command.

x25 modulo *modulus*

Syntax Description	<i>modulus</i>	Either 8 or 128. The value of the modulo parameter must agree with that of the device on the other end of the X.25 link.
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Defaults	8
-----------------	---

Command Modes	Interface configuration
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Command History	Release	Modification
	10.0	This command was introduced.

Usage Guidelines	X.25 supports flow control with a sliding window sequence count. The window counter restarts at zero upon reaching the upper limit, which is called the <i>window modulus</i> . Modulo 128 operation is also referred to as <i>extended packet sequence numbering</i> , which allows larger packet windows.
-------------------------	---

Examples	The following example sets the window modulus to 128:
-----------------	---

```
interface serial 0
  x25 modulo 128
```

Related Commands	Command	Description
	x25 facility	Forces facilities on a per-call basis for calls originated by the router (switched calls are not affected).
	x25 win	Changes the default incoming window size to match that of the network.
	x25 wout	Changes the default outgoing window size to match that of the network.

x25 nvc

To specify the maximum number of virtual circuits (VCs) that a protocol can have open simultaneously to one host, use the **x25 nvc** interface configuration command. To increase throughput across networks, you can establish up to eight virtual circuits to a host and protocol.

x25 nvc *count*

Syntax Description	<i>count</i>	Circuit count from 1 to 8. A maximum of eight virtual circuits can be configured for each protocol-host pair. Protocols that do not tolerate out-of-sequence delivery, such as encapsulated TCP/IP header compression, will use only one virtual circuit despite this value. Permitting more than one VC may help throughput on slow networks.
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Defaults	1
-----------------	---

Command Modes	Interface configuration X.25 profile configuration
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Command History	Release	Modification
	10.0	This command was introduced.

Usage Guidelines	When the windows and output queues of all existing connections to a host are full, a new virtual circuit will be opened to the designated circuit count. If a new connection cannot be opened, the data is dropped.
-------------------------	---



Note

The *count* value specified for the **x25 nvc** command affects the default value for the number of VCs. It does not affect the **nvc** option for any **x25 map** commands that are configured.

Examples	The following example sets the default maximum number of VCs that each map can have open simultaneously to 4:
-----------------	---

```
interface serial 0
  x25 nvc 4
```


