

Configuring CBWFQ with IPsec VPN Using GRE Tunnel

Introduction

This document describes how to configure Quality of Service (QoS) for traffic encrypted and carried over a GRE tunnel between a Hub router (Cisco 7200 Series Router) and a spoke router (Cisco 3745 Series Router). QoS includes the tools for managing congestion and providing a guarantee for bandwidth to a specific site.

Prerequisites

The sample QoS configuration is based on the following assumptions:

- The IPsec peer destination address is static.
- QoS service policy is required only on the outbound.
- GRE Tunnel is used to encapsulate the IPsec traffic.
- There are defined network addresses or applications for CBWFQ classification.

Components Used

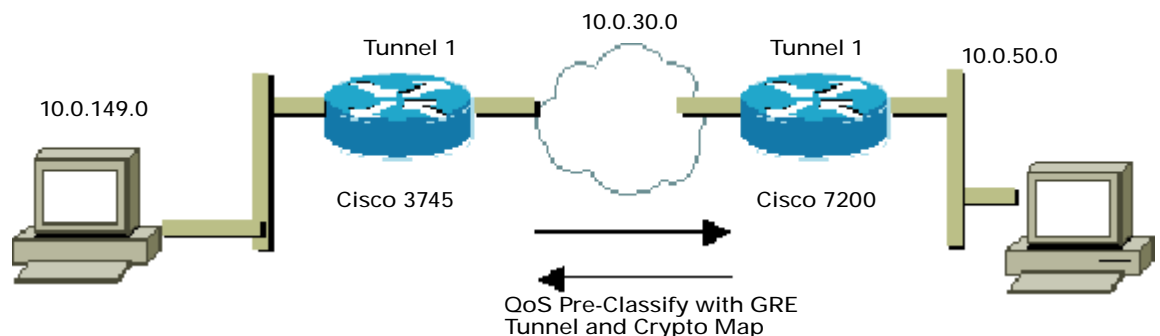
The sample configuration uses the following releases of the software and hardware:

- Cisco 7200 with Cisco IOS® Software Release 12.2(13)T (C7200-IK9O3S-M)
- Cisco 3745 with Cisco IOS® Software Release 12.2(8)T5 (C3745-JK9S-M)

Figure 1 illustrates the network for the sample configuration.

The information presented in this document was created from devices in a specific lab environment. All of the devices started with a cleared (default) configuration. If you are working in a live network, it is imperative to understand the potential impact of any command before implementing it.

Figure 1
 Network Diagram





QoS Configuration Options

The sample configuration minimizes bandwidth guarantees and maximizes bandwidth traffic shaping. Additional QoS features that can be used in the policy map include low latency queuing, policing, and random early detection.

In the sample configuration, the class-map matches the original unencrypted packets. To match the unencrypted packet, you use the qos-preclassify command as documented in the [QoS for Virtual Private Network](#). The matching for the traffic is made with the ACL. Any of the unencrypted packet information specified in the ACL can be used for matching a specific class and applying a different service policy to different classes for the outbound traffic.

The service policy can be applied on the input or on the output of the public or private interface of both routers. The sample configuration shows the service policy applied to output traffic on the hub and the spoke router.

For additional information about configuring QoS, refer to [Cisco IOS Quality of Service Solutions Configuration Guide](#).

Cisco 7200 VPN Router Configuration

```
version 12.2
service timestamps debug datetime
service timestamps log datetime
no service password-encryption
!
hostname "c7200-12"
!
!
ip subnet-zero
ip cef
!
class-map match-any sitel
  match access-group 120
! Additional Class-map for other sites can be added here
!
policy-map output
  class sitel
    bandwidth 200
    police cir 5000000
  !
  !
crypto isakmp policy 1
  authentication pre-share
  group 2
crypto isakmp key bigsecret address 10.0.30.245
!
!
crypto ipsec transform-set vpn-test esp-3des esp-sha-hmac
!
!
crypto map static-crypt 6 ipsec-isakmp
  set peer 10.0.30.245
  set transform-set vpn-test
  match address 101
  qos pre-classify
!
!
controller ISA 6/1
```



```
!  
!  
interface Tunnell  
  ip unnumbered FastEthernet0/0  
  ip mtu 1440  
  qos pre-classify  
  tunnel source FastEthernet0/0  
  tunnel destination 10.0.30.245  
  crypto map static-crypt  
!  
interface FastEthernet0/0  
  ip address 10.0.30.212 255.255.255.0  
  duplex full  
  service-policy output output  
  crypto map static-crypt  
!  
interface FastEthernet1/0  
  ip address 10.0.50.212 255.255.255.0  
  duplex full  
!  
ip classless  
ip route 10.0.149.0 255.255.255.0 Tunnell  
!  
!  
access-list 101 permit ip 10.0.50.0 0.0.0.255 10.0.149.0 0.0.0.255  
access-list 120 permit ip 10.0.50.0 0.0.0.255 10.0.149.0 0.0.0.255  
!  
!  
!  
line con 0  
  exec-timeout 0 0  
line aux 0  
line vty 0 4  
  login  
!  
!  
end
```

Configuring the Cisco 3745 VPN Router

```
!  
version 12.2  
service timestamps debug uptime  
service timestamps log uptime  
!  
hostname c3745-20  
!  
!  
ip subnet-zero  
!  
!  
!  
class-map match-any hub  
  match access-group 120  
!  
!
```



```
policy-map mqcp
  class hub
    bandwidth 200
    police cir 5000000
  !
  !
  crypto isakmp policy 1
    authentication pre-share
    group 2
  crypto isakmp key bigsecret address 10.0.30.212
  !
  crypto ipsec transform-set vpn-test esp-3des esp-sha-hmac
  !
  crypto map test 1 ipsec-isakmp
    set peer 10.0.30.212
    set transform-set vpn-test
    match address 101
    qos pre-classify
  !
  !
  !
  interface Tunnell
    ip unnumbered FastEthernet0/1
    ip mtu 1440
    qos pre-classify
    tunnel source FastEthernet0/1
    tunnel destination 10.0.30.212
    crypto map test
  !
  interface FastEthernet0/0
    ip address 10.0.149.220 255.255.255.0
    speed 100
    full-duplex
  !
  interface FastEthernet0/1
    ip address 10.0.30.245 255.255.255.0
    speed 100
    full-duplex
    service-policy output mqcp
    crypto map test
  !
  ip classless
  ip route 10.0.50.0 255.255.255.0 Tunnell
  !
  !
  access-list 101 permit ip 10.0.149.0 0.0.0.255 10.0.50.0 0.0.0.255
  access-list 120 permit ip 10.0.149.0 0.0.0.255 10.0.50.0 0.0.0.255
  !
  !
  line con 0
  line aux 0
  line vty 0 4
    login
  !
  end
```



Verifying the Results

This section provides information you can use to confirm that your configuration is working properly.

```
c3745-20#show policy-map
```

```
Policy Map mqcp
  Class hub
    Weighted Fair Queueing
      Bandwidth 200 (kbps) Max Threshold 64 (packets)
    police cir 5000000 bc 156250
      conform-action transmit
      exceed-action drop
```

```
c3745-20#show policy-map interface fastEthernet 0/1
FastEthernet0/1
```

Service-policy output: mqcp

```
Class-map: hub (match-any)
  4605058 packets, 2567115168 bytes
  30 second offered rate 9550000 bps, drop rate 0 bps
  Match: access-group 120
    3884074 packets, 2141735456 bytes
    30 second rate 9550000 bps
  Weighted Fair Queueing
    Output Queue: Conversation 265
    Bandwidth 200 (kbps) Max Threshold 64 (packets)
    (pkts matched/bytes matched) 2044996/1186842912
    (depth/total drops/no-buffer drops) 0/0/0
  police:
    cir 5000000 bps, bc 156250 bytes
    conformed 2230228 packets, 1237348128 bytes; actions:
      transmit
    exceeded 2374831 packets, 1329767552 bytes; actions:
      drop
    conformed 4999000 bps, exceed 4550000 bps,
```

```
Class-map: class-default (match-any)
  532380 packets, 313976237 bytes
  30 second offered rate 0 bps, drop rate 0 bps
  Match: any
```

```
c3745-20#show access-list
```

```
Extended IP access list 101
  permit ip 10.0.149.0 0.0.0.255 10.0.50.0 0.0.0.255 (4227393 matches)
Extended IP access list 120
  permit ip 10.0.149.0 0.0.0.255 10.0.50.0 0.0.0.255 (3887076 matches)
```



Troubleshooting the Configuration

Certain show commands are supported by the [Output Interpreter Tool \(registered customers only\)](#), which analyzes show command output.

Note: Before issuing debug commands, see [Important Information about Debug Commands](#).

- debug crypto isakmp—Displays errors during Phase 1.
- debug crypto ipsec—Displays errors during Phase 2.
- debug crypto engine—Displays information from the crypto engine.
- debug ip your routing protocol—Displays information about routing transactions of your routing protocol.
- clear crypto connection connection-id [slot | rsm | vip]—Terminates an encrypted session currently in progress. Encrypted sessions normally terminate when the session times out. Use the show crypto cisco connections command to see the connection-id value.
- clear crypto isakmp—Clears the Phase 1 security associations.
- clear crypto sa—Clears the Phase 2 security associations.

Related Information

[IPsec Support Page](#)

[An Introduction to IP Security \(IPsec\) Encryption](#)

[QoS for Virtual Private Networks](#)

[Configuring IPsec Network Security](#)

[Configuring Internet Key Exchange Security Protocol](#)

[Command Lookup Tool \(registered customers only\)](#)

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