NORTEL NETWORKS

Nortel Networks Multiservice Switch

7400/15000/20000

# Layer 3 Traffic Management Configuration

NN10600-591

Nortel Networks Multiservice Switch 7400/15000/20000

# Layer 3 Traffic Management Configuration

Publication: NN10600-591
Document status: Standard
Document version: 6.1S2
Document date: November 2004



Printed in Canada

# Publication history

## November 2004

6.1S2 Standard
General availability. Contains information on Nortel Networks Multiservice Switch 7400, 15000, and 20000 for the PCR6.1 release.

# Contents

## List of figures

# About this document

NN10600-591 *Nortel Networks Multiservice Switch 7400/15000/20000 Layer 3 Traffic Management Configuration* describes how to configure differentiated services (DiffServ) and IP class of service (CoS) in Nortel Networks Multiservice Switch systems.

This document is for anyone who performs the following Multiservice Switch layer 3 traffic management tasks: planning, installation, provisioning, operating, and maintenance.

This document assumes that you are familiar with the concepts of internetworking, particularly with the IP suite and its common uses, and layer 3 traffic management fundamentals.

## What's new in this document

This is a brand new Nortel Networks technical publication (NTP). Information in this document was extracted from the following NTPs:

- NN10600-582 *Nortel Networks Multiservice Switch 7400/15000/20000 VPN Configuration Management*
- NN10600-801 *Nortel Networks Multiservice Switch 7400/15000/20000 IP Configuration Management*

The following features were added to this document:

- "Differentiated services (DiffServ)" (page 18)
- "IP policing" (page 18)

### Differentiated services (DiffServ)

The following sections were added to this document:

- "Traffic management configuration" (page 23)
- "DiffServ traffic management configuration" (page 25)
- "VR DiffServ profiles configuration" (page 63)
- "VRF DiffServ profiles configuration" (page 143)
- "VR VPN DSCP map configuration" (page 55)
- "RTR MPLS service map configuration" (page 133)
- "IP CoS to IP DiffServ migration" (page 217)
- "Node IP CoS to IP DiffServ migration" (page 219)
- "Network IP CoS to IP DiffServ migration" (page 225)

The following sections were updated:

- "VR DiffServ domain configuration" (page 43)
- "RTR and VRF DiffServ domain configuration" (page 127)

### IP policing

The following sections were added to this document:

- "VR interface profiles configuration" (page 61)
- "VR policer profiles configuration" (page 77)
- "VR interface profiles activation" (page 101)
- "VRF interface profiles configuration" (page 141)
- "VRF policer profiles configuration" (page 159)
- "VRF interface profiles activation" (page 183)

## Procedure conventions

This document uses the following procedure conventions:

- You can enter commands using full component and attribute names, or you can abbreviate them. The commands used in the procedures contain the full component and attribute names in the first instance. In the second

instance, the component and attribute names are abbreviated. For more information on abbreviating component and attribute names, see NN10600-060 *Nortel Networks Multiservice Switch 7400/15000/20000 Component Reference*. All component and attribute names are formatted in italics.

- The introduction of every procedure states whether you must perform the procedure in operational mode or provisioning mode. For more information on these modes, see "Operational mode" (page 19) or "Provisioning mode" (page 20).
- When you complete a procedure, you can verify your changes and then activate them as the new node configuration. For more information on completing configuration changes and exiting provisioning mode, see "Activating configuration changes" (page 20).

## Operational mode

Procedures contained within this document can be performed in operational mode or provisioning mode. When you initially log into a Nortel Networks Multiservice Switch node, you are in operational mode. Multiservice Switch nodes use the following command prompt when you are in operational mode:

```
#>
```

where:
# is the current command number

In operational mode, you work with operational components and attributes. In operational mode, you can

- list operational components and display operational attributes to determine the current operating parameters for the node
- control the state of parts of the node by locking and unlocking components
- set certain operational attributes and enter commands to perform diagnostic tests

## Provisioning mode

To change from operational mode to provisioning mode, type the following command at the operator prompt:

```
start Prov
```

Only one user can be in provisioning mode at a time. Nortel Networks Multiservice Switch nodes use the following command prompt whenever you are in provisioning mode:

```
PROV #>
```

where:

# is the current command number

In provisioning mode, you work with the provisionable components and attributes that contain the current and future configurations of the node. You can add and delete components, and display and set provisionable attributes. For information on completing the configuration changes, exiting provisioning mode, and returning to operational mode see "Activating configuration changes" (page 20).

For information on operational and provisionable attributes, see NN10600-060 *Nortel Networks Multiservice Switch 7400/15000/20000 Component Reference*.

## Activating configuration changes

Several procedures in this document ask that you complete the configuration changes. When you complete the configuration changes, you are activating the configuration changes, confirming that you want to activate them, and saving the changes. You are instructed to complete the configuration changes only at the end of procedures that you perform in provisioning mode.

**CAUTION**

**Activating a provisioning view can affect service**

Activating a provisioning view can result in a CP reload or restart, causing all services on the node to fail. See NN10600-050 *Nortel Networks Multiservice Switch 7400/15000/20000 Command Reference*, for more information.

1 Verify that the provisioning changes you have made are acceptable:

```
check Prov
```

Correct any errors and then verify the provisioning changes again.

2 If you want to store the provisioning changes in a file, save the provisioning view:

```
save Prov
```

3 If you want these changes as well as other changes made in the edit view to take effect immediately, activate, confirm, and commit the provisioning changes:

```
activate Prov
```

```
confirm Prov
```

```
commit Prov
```

4 End the provisioning session:

```
end Prov
```

## How to get more help

For information on training, problem reporting, and technical support, see the "Nortel Networks support services" section in the *NN10600-030 Nortel Networks Multiservice Switch 7400/15000/20000 Overview*.

# Chapter 1
# Traffic management configuration

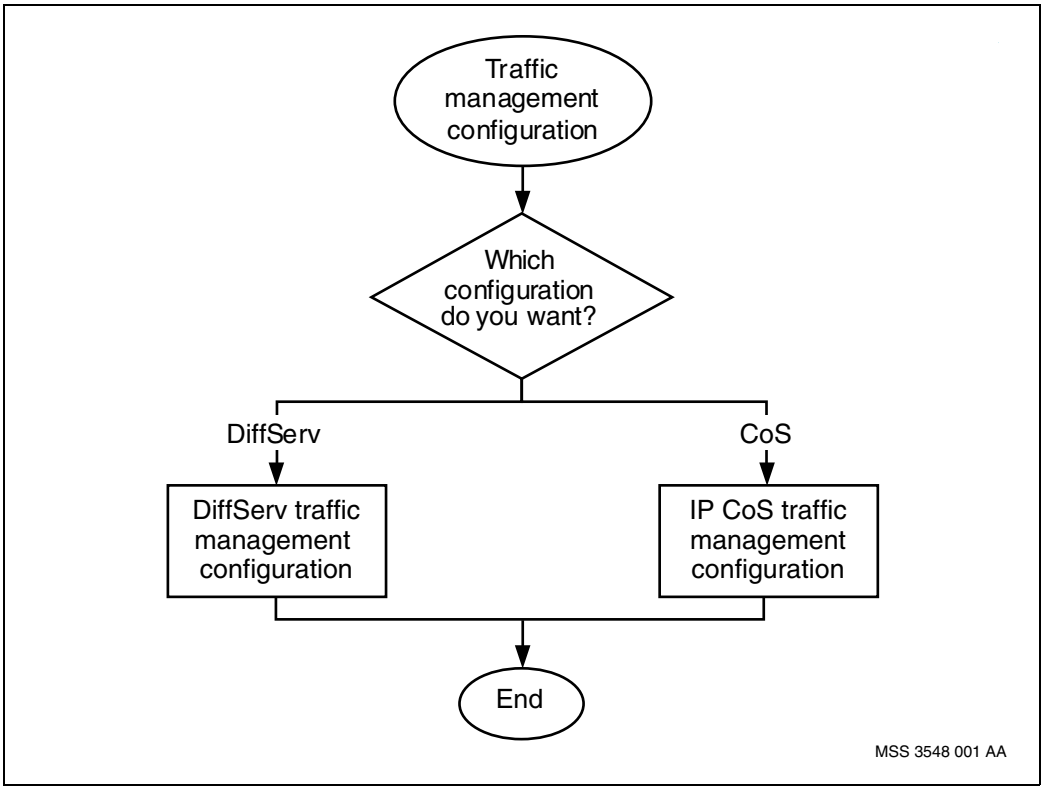
Configure layer 3 traffic management to enable the virtual routers (VRs), VPN route forwarders (VRFs) and routers (RTRs) of the Multiservice switch nodes to control network traffic. You can select the differentiated services (DiffServ) or the class of services (CoS) configuration.

For conceptual information about the DiffServ and CoS configurations, see NN10600-590 *Nortel Networks Multiservice Switch 7400/15000/20000 Layer 3 Traffic Management Fundamentals*.

## Traffic management configuration tasks

This work flow shows you the sequence of tasks you perform to configure traffic management with the DiffServ or the CoS configuration. To link to any task, go to "Traffic management configuration task navigation" (page 24).

**Figure 1**
**Traffic management configuration tasks**




## Traffic management configuration task navigation

- "DiffServ traffic management configuration" (page 25)
- "IP CoS traffic management configuration" (page 197)

# Chapter 2
# DiffServ traffic management configuration

Configure differentiated services (DiffServ) for traffic management and congestion control.

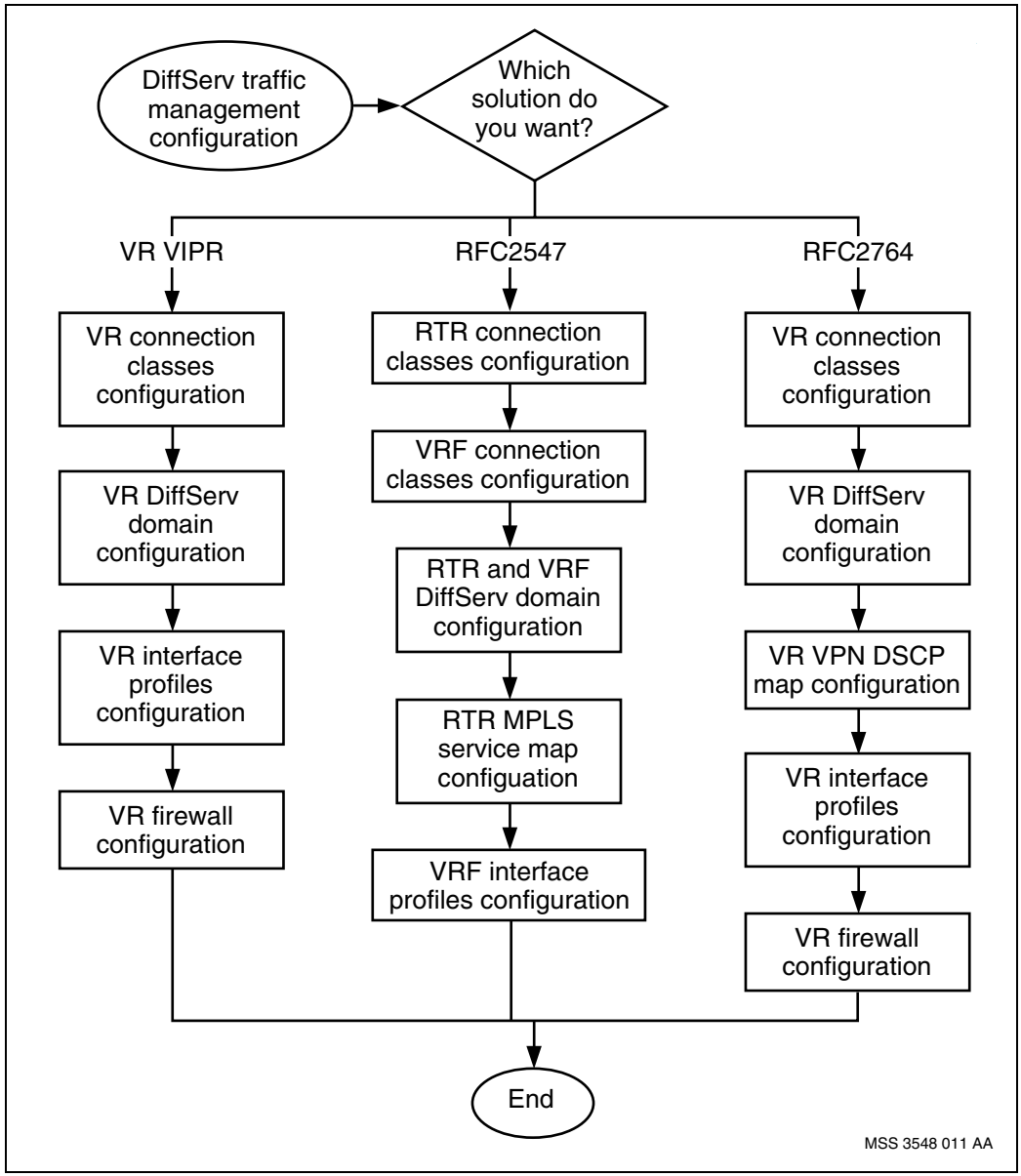
## Prerequisites to Diffserv traffic management configuration

- Evaluate the layer 2 to layer 3 traffic management interactions. For more information, see NN10600-590 *Nortel Networks Multiservice Switch 7400/15000/20000 Layer 3 Traffic Management Fundamentals*.

## DiffServ traffic management configuration tasks

This work flow shows you the sequence of tasks you perform to configure DiffServ traffic management. To link to any task, go to “DiffServ traffic management configuration task navigation” (page 27).

**Figure 2**
**DiffServ traffic management configuration tasks**



## DiffServ traffic management configuration task navigation

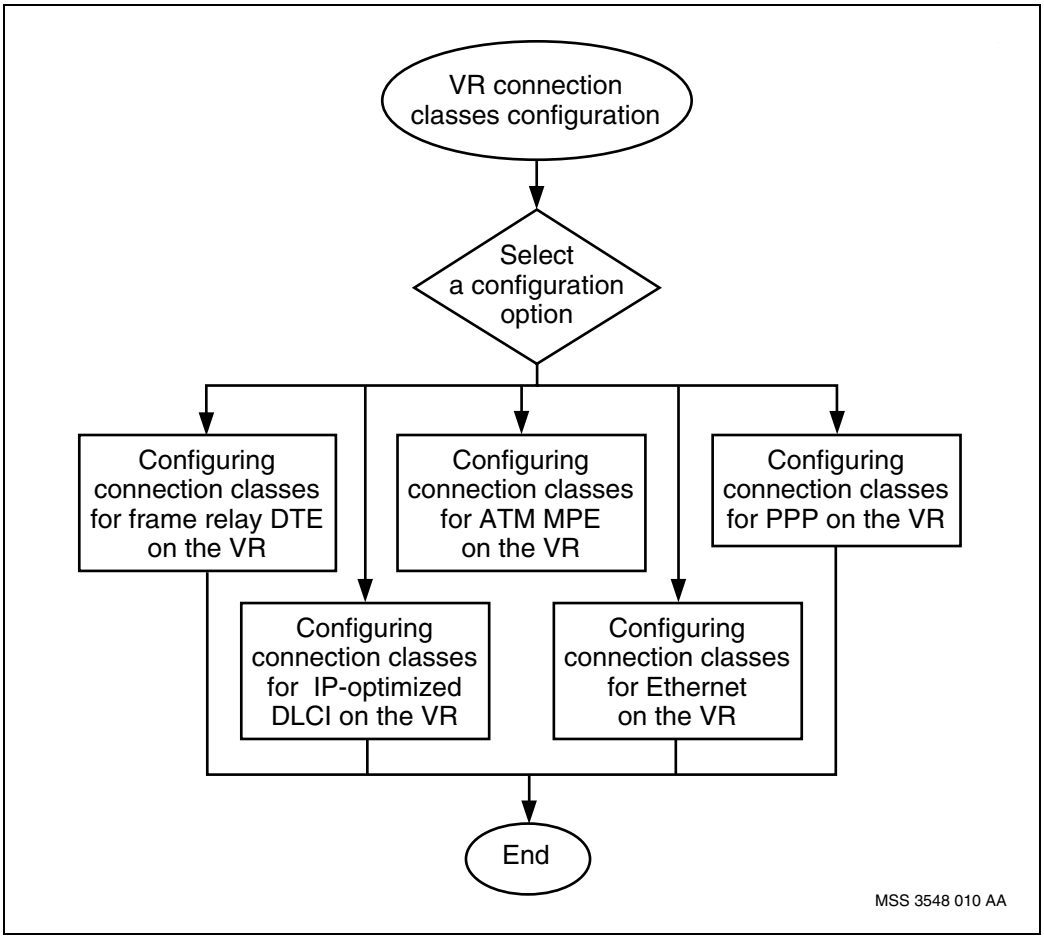
# Chapter 3
# VR connection classes configuration

Configure connection classes on the virtual router (VR) at layer 2 interfaces to support virtual circuit selection.

## VR connection classes configuration procedures

This task flow shows you the sequence of procedures you perform to configure connection classes on a VR. To link to any procedure, go to “VR connection classes configuration procedure navigation” (page 30).

**Figure 3**
**VR connection classes configuration procedures**




## VR connection classes configuration procedure navigation

- "Configuring connection classes for frame relay DTE on the VR" (page 32)
- "Configuring connection classes for IP-optimized DLCI on the VR" (page 34)
- "Configuring connection classes for ATM MPE on the VR" (page 36)

- “Configuring connection classes for Ethernet on the VR” (page 38)
- “Configuring connection classes for PPP on the VR” (page 39)

For an example procedure for the VR connection classes configuration, see:“Example procedure for VR connection classes configuration” (page 40).

# Configuring connection classes for frame relay DTE on the VR

Configure connection classes for frame relay DTE on the virtual router (VR) to control the multi-connection and single connection congestion.

***Note 1:*** If you add a static DLCI with a different connection class to a *FrDte Remote Group* component that has other DLCIs in operation, lock and unlock the *IpPort* component of the frame relay DTE interface's linked protocol port.

***Note 2:*** If there are multiple frame relay connections under a frame relay DTE interface with the same connection class value, only one registers with the IP ARP table.

## Prerequisites

- For details on configuring frame relay DTE static DLCIs, see the procedure on Frame relay DTE access media configuration in NN10600-801 *Nortel Networks Multiservice Switch 7400/15000/20000 IP Configuration Management*.

## Procedure steps

1. If one does not already exist, create a static DLCI to the next IP hop for a specific connection class.

   ```
   add FrDte/<fr> StDlci/<stdlci_no>
   ```

2. Assign a connection class value to the DLCI.

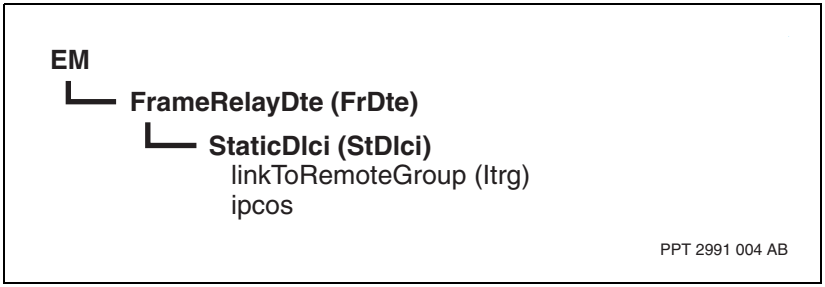
   ```
   set FrDte/<fr> StDlci/<stdlci_no> ipCos <cos>
   ```

## Variable definitions

| Variable | Value |
|---|---|
| <cos> | is the connection class value associated with the static DLCI. Nortel Networks Multiservice Switch systems use this value to select a DLCI for outgoing IP packets. |
| <fr> | is the instance number of the frame relay DTE interface. |
| <stdlci_no> | is the instance number of the static DLCI. |
| | |

## Procedure job aid

**Figure 4**
**VR connection classes for frame relay DTE component hierarchy**



# Configuring connection classes for IP-optimized DLCI on the VR

Configure connection classes for IP-optimized DLCI on the virtual router (VR) to control the multi-connection and single connection congestion.

***Note 1:*** If there are multiple frame relay connections under an IP-optimized DLCI with the same connection class value, only one registers with the IP ARP table.

***Note 2:*** If you add a static DLCI with a different connection class to a *Ip Dlci Group* component that has other DLCIs in operation, lock and unlock the *IpPort* component of the IP-optimized DLCI interface's linked protocol port.

## Prerequisites

- For details on configuring IP-optimized DLCIs, see the procedure on the VR IP-optimized DLCI access media configuration in NN10600-801 *Nortel Networks Multiservice Switch 7400/15000/20000 IP Configuration Management*.

## Procedure steps

1. If one does not already exist, create an IP-optimized DLCI to the next IP hop for a specific connection class.

   ```
   add IpDlciGroup/<dlci_grp>
   ```

   When you add the *IpDlciGroup* component, the *Frc/1* component and *ipCos 0* attribute are added automatically.

2. Assign a connection class value to the DLCI.

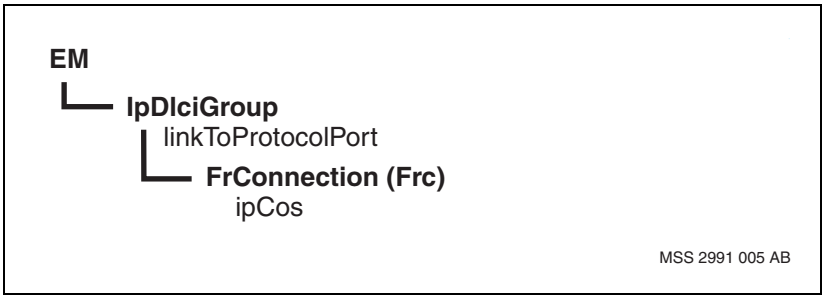
   ```
   set IpDlciGroup/<dlci_grp> Frc/<frc> ipCos <cos>
   ```

## Variable definitions

| Variable | Value |
|---|---|
| <cos> | is the connection class value associated with the static DLCI. Nortel Networks Multiservice Switch systems use this value to select a DLCI for outgoing IP packets. |
| <dlci_grp> | is the instance value of the interface between the virtual router protocol port and the IP-optimized DLCI. |
| <frc> | is the instance value of the frame relay connection. |
| | |

## Procedure job aid

**Figure 5**
**VR connection classes for IP-optimized DLCI component hierarchy**



# Configuring connection classes for ATM MPE on the VR

Configure connection classes for ATM MPE on the virtual router (VR) to control the multi-connection and single connection congestion.

***Note:*** If there are multiple ATM MPE AtmConnections under an ATM MPE interface with the same connection class value, only one registers with the IP ARP table. If that AtmConnection goes down, another *AtmMpe Ac* component with that connection class value will register with the IP ARP table.

## Prerequisites

- For details on configuring ATM MPE AtmConnections, see the procedure on Configuring an ATM PVC for an ATM MPE interface in NN10600-801 *Nortel Networks Multiservice Switch 7400/15000/20000 IP Configuration Management*.
- If the router has ATM backbone connections, it is advisable to provision the ATM media under the ATM interfaces for four emission priorities. For more information, see the procedure on Configuring ATM media for multi link congestion control in NN10600-582 *Nortel Networks Multiservice Switch 7400/15000/20000 VPN Configuration Management*. Otherwise, scheduling class differentiation will not occur.

## Procedure steps

1. If one does not already exist, create an ATM MPE AtmConnection to the next IP hop for a specific connection class.

   ```
   add AtmMpe/<mpe> Ac/<ac>
   ```

2. Assign a connection class value to the AtmConnection.

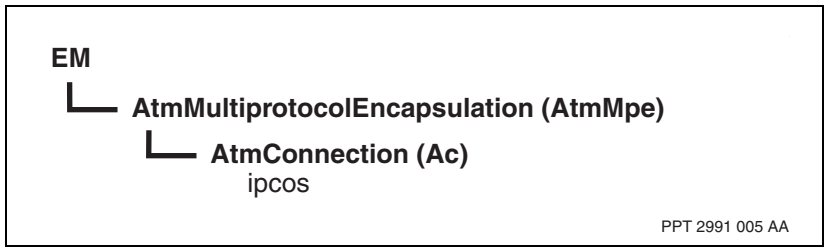
   ```
   set AtmMpe/<mpe> Ac/<ac> ipCos <cos>
   ```

## Variable definitions

| Variable | Value |
|---|---|
| <ac> | is the instance number of the AtmMpe AtmConnection (AC). |
| <cos> | is the connection class value associated with the AtmMpe AC. Nortel Networks Multiservice Switch systems use this value to select a AC for outgoing IP packets. |
| <mpe> | is the instance number of the ATM MPE interface. |
| | |

## Procedure job aid

**Figure 6**
**VR connection classes for ATM MPE component hierarchy**



# Configuring connection classes for Ethernet on the VR

Configure connection classes for Ethernet on the virtual router (VR) to classify packets arriving at an Ethernet interface on a VR that does not have a differentiated services (DiffServ) domain.

## Prerequisites

- For traffic management information on the FP that supports gigabit Ethernet, see NN10600-551 *Nortel Networks Multiservice Switch 7400/ 15000/20000 FP Configuration Reference*.

## Procedure steps

1 Assign a connection class value to the Ethernet protocol port. The system assigns this connection class value to all IP packets arriving on the Ethernet interface when the VR does not have a DiffServ domain.

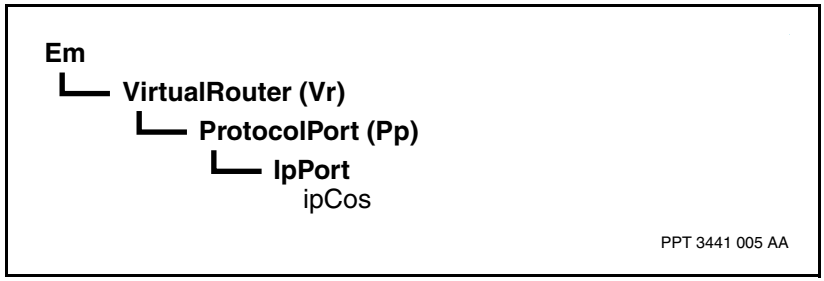
```
set Vr/<vr_name> Pp/<pp_name> IpPort ipCos <cos>
```

## Variable definitions

| Variable | Value |
|---|---|
| <cos> | is the connection class value to be assigned to incoming packets. |
| <pp_name> | is the name of the protocol port associated with the Ethernet interface. |
| <vr_name> | is the name of the virtual router. |
| | |

## Procedure job aid

**Figure 7**
**VR connection classes for Ethernet component hierarchy**



# Configuring connection classes for PPP on the VR

Configure connection classes for point-to-point protocol (PPP) on the virtual router (VR) to classify packets arriving at an Ethernet interface on a VR that does not have a differentiated services (DiffServ) domain.

## Procedure steps

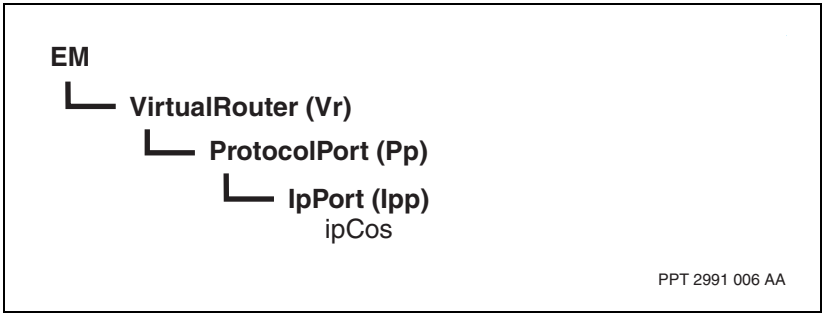
1 Assign a connection class value to the PPP protocol port. The system assigns this connection class value to all IP packets arriving on the PPP interface when the VR does not have a DiffServ domain.

```
set Vr/<vr_name> Pp/<pp_name> IpPort ipCos <cos>
```

## Variable definitions

| Variable | Value |
|---|---|
| <cos> | is the CoS value to be assigned to incoming packets. |
| <pp_name> | is the name of the protocol port associated with the PPP interface. |
| <vr_name> | is the name of the virtual router. |
| | |

**Figure 8**
**VR connection classes for PPP component hierarchy**



# Example procedure for VR connection classes configuration

This is an example procedure for configuring connection classes on the VR.

## Procedure steps

To configure connection classes for frame relay DTE:

1 If one does not already exist, create a static DLCI to the next IP hop for a specific connection class.

```
add FrDte/10 StDlci/100

add FrDte/10 StDlci/101

add FrDte/10 StDlci/102

add FrDte/10 StDlci/103
```

2 Assign a connection class value to the DLCI.

```
set FrDte/10 StDlci/100 ipCos 0

set FrDte/10 StDlci/101 ipCos 1

set FrDte/10 StDlci/102 ipCos 2

set FrDte/10 StDlci/103 ipCos 3
```

To configure connection classes for IP-optimized DLCI:

3 If one does not already exist, create an IP-optimized DLCI to the next IP hop for a specific connection class.

```
add IpDlciGroup/20
```

When you add *IpDlciGroup/20*, *Frc/1* and *ipCos 0* are added automatically.

4 Add the *FrConnection* component.

```
add IpDlciGroup/20 Frc/2

add IpDlciGroup/20 Frc/3

add IpDlciGroup/20 Frc/4
```

5 Assign a connection class value to the DLCI.

```
set IpDlciGroup/20 Frc/1 ipCos 0

set IpDlciGroup/20 Frc/2 ipCos 1
```

```
set IpDlciGroup/20 Frc/3 ipCos 2

set IpDlciGroup/20 Frc/4 ipCos 3
```

To configure connection classes for ATM MPE:

**6** If one does not already exist, create an ATM MPE AtmConnection to the next IP hop for a specific connection class.

```
add AtmMpe/30
```

When you add *AtmMpe/30*, *Ac/1* and *ipCos 0* are added automatically.

**7** Add the *AtmConnection* component.

```
add AtmMpe/30 Ac/2 ipCos 1

add AtmMpe/30 Ac/3 ipCos 2

add AtmMpe/30 Ac/4 ipCos 3
```

**8** Assign a connection class value to the *AtmConnection* component.

```
set AtmMpe/30 Ac/1 ipCos 0

set AtmMpe/30 Ac/2 ipCos 1

set AtmMpe/30 Ac/3 ipCos 2

set AtmMpe/30 Ac/4 ipCos 3
```

To configure connection classes for Ethernet:

**9** Assign a connection class value to the Ethernet protocol port. The system assigns this connection class value to all IP packets arriving on the Ethernet interface when the VR does not have a DiffServ domain.

```
set Vr/cvr1 Pp/eth1 IpPort ipCos 1
```

To configure connection classes for PPP:

**10** Assign a connection class value to the PPP protocol port. The system assigns this connection class value to all IP packets arriving on the PPP interface when the VR does not have a DiffServ domain.

```
set Vr/cvr1 Pp/ppp1 IpPort ipCos 1
```

# Chapter 4
# VR DiffServ domain configuration

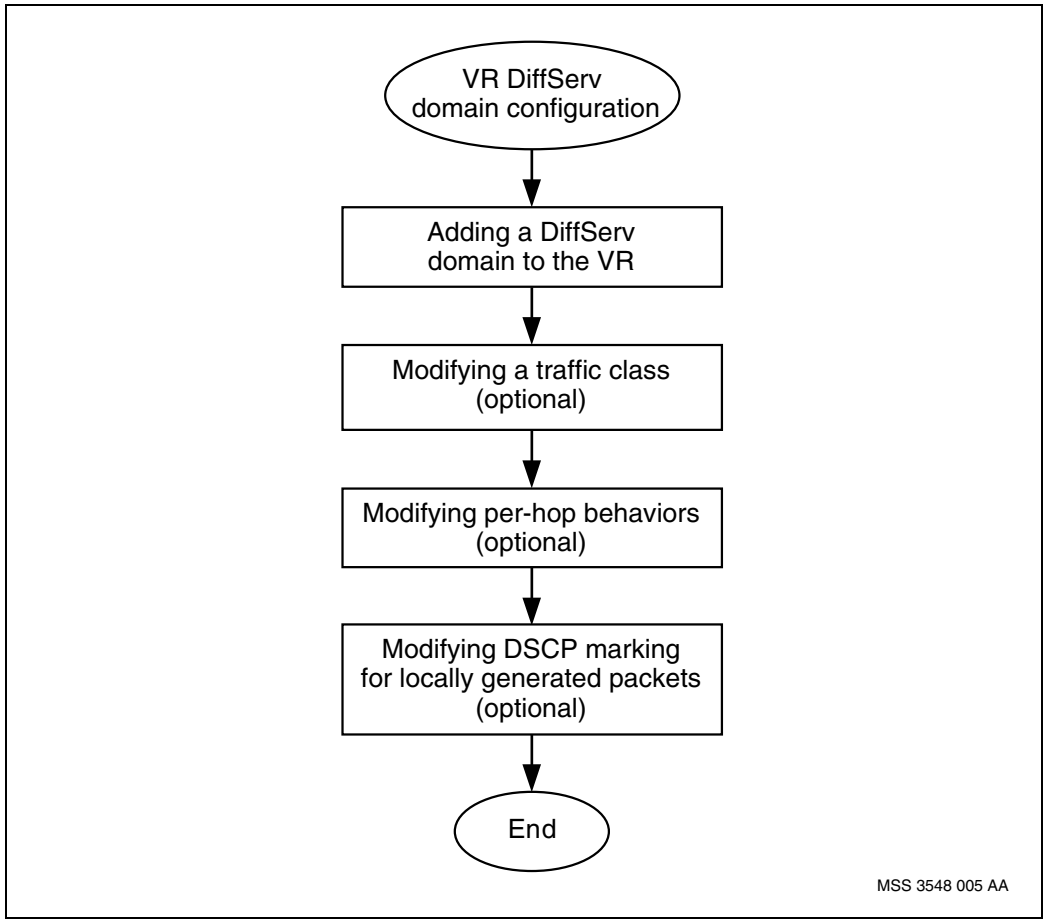
Configure the differentiated services (DiffServ) domain on the virtual router (VR) to support DiffServ and to include the VR in a group (domain) of routers that have the same per-hop behavior (PHB) definitions.

For RFC2764, you must complete all procedures for a virtual connection gateway (VCG) and a customer virtual router (cVR).

## VR DiffServ domain configuration procedures

This task flow shows you the sequence of procedures you perform to configure DiffServ domain on the VR. To link to any procedure, go to “VR DiffServ domain configuration procedure navigation” (page 44).

**Figure 9**
**VR DiffServ domain configuration procedures**




## VR DiffServ domain configuration procedure navigation

- "Adding a DiffServ domain to the VR" (page 46)
- "Modifying a traffic class" (page 48)
- "Modifying per-hop behaviors" (page 50)
- "Modifying DSCP marking for locally generated packets" (page 52)

For an example of the VR DiffServ domain configuration, see “Example procedure for a VR DiffServ domain configuration” (page 54).

# Adding a DiffServ domain to the VR

Add a differentiated services (DiffServ) domain to a virtual router (VR) to support DiffServ and to include the VR in a group (domain) of routers that have the same per-hop behavior (PHB) definitions.

## Procedure steps

1 Add the DiffServ domain to the virtual router to set the per-hop behaviors (PHBs) for DiffServ.

```
add Vr/<vr_name> Dsd/<domain_type>
```

When you add the *DifferentiatedServicesDomain (Dsd)* component to the VR, the following components are added automatically: *PerHopBehavior* (*Phb*) and *TrafficClass* (*Tc*). The automatic configuration of the *Phb* and *Tc* components varies depending on the *Dsd* component instance used. For more information, refer to the NN10600-590 *Nortel Networks Multiservice Switch 7400/15000/20000 Layer 3 Traffic Management Fundamentals*.

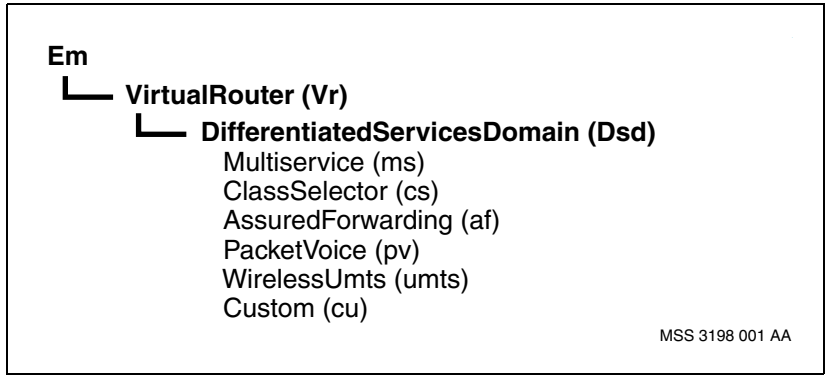
The selected default configuration of the DSD can be modified, but reconfiguration is generally not necessary. For information on each component and its attributes, see NN10600-060 *Nortel Networks Multiservice Switch 7400/15000/20000 Component Reference*.

## Variable definitions

| Variable | Value |
|---|---|
| <domain_type> | is the instance value of the DiffServ domain. |
| <vr_name> | is the name of the virtual router. |
| | |

## Procedure job aid

**Figure 10**
**VR DiffServ domain component hierarchy**



# Modifying a traffic class

Modify a traffic class to deliver specific differentiated services treatments for your network.

## Procedure steps

1 Set the *schedulingClass8Queues* (*sc8q*) attribute.

```
set Vr/<vr_name> Dsd/<domain_type> Tc/
<traffic_class_value> sc8q <sc8q_value>
```

2 Set the *schedulingClass4Queues* (*sc4q*) attribute.

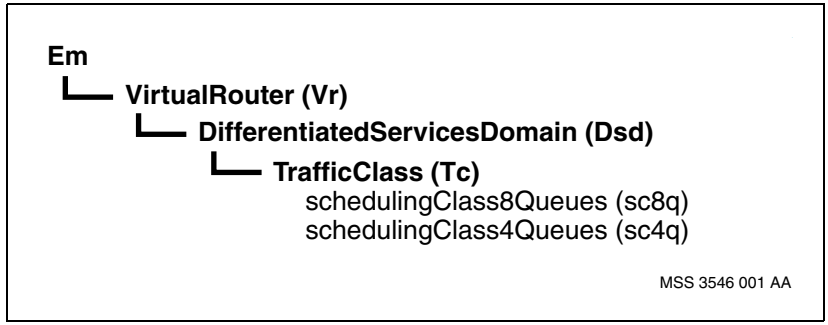
```
set Vr/<vr_name> Dsd/<domain_type> Tc/
<traffic_class_value> sc4q <sc4q_value>
```

## Variable definitions

| Variable | Value |
|---|---|
| <domain_type> | is the instance value of the DiffServ domain. |
| <sc4q_value> | specifies a logical scheduling class value given to a packet that uses the *TrafficClass* component instance. This value is used when the packet is transmitted at an interface on a PQC-based FP. |
| <sc8q_value> | specifies a logical scheduling class value given to a packet that uses the *TrafficClass* component instance. This value is used when the packet is transmitted at an interface on an FQM-based or GQM-based FP. |
| <traffic_class_value> | is the value of the traffic class which with its attributes control how individual packets are forwarded. |
| <vr_name> | is the name of the virtual router. |
| | |

## Procedure job aid

**Figure 11**
**Traffic class component hierarchy**



# Modifying per-hop behaviors

Modify per-hop behaviors (PHB) to deliver specific differentiated services treatments for your network.

***Note:*** Default PHBs are provided with default settings based on the DiffServ domain that is provisioned.

## Procedure steps

1. Add the *perHopBehavior* (*Phb*) component to the *DifferentiatedServicesDomain* (*Dsd*) component.

   ```
   add Vr/<vr_name> Dsd/<domain_type> Phb/<phb_value>
   ```

2. Set the *trafficClass* (*tc*) attribute for the *perHopBehavior* (*Phb*) component.

   ```
   set Vr/<vr_name> Dsd/<domain_type> Phb/<phb_value>
   trafficClass <traffic_value>
   ```

3. Set the *dropPrecedence* (*dp*) attribute for the *perHopBehavior* (*Phb*) component.

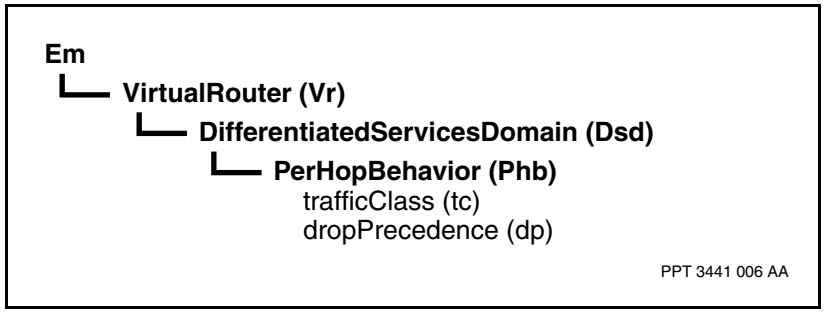
   ```
   set Vr/<vr_name> Dsd/<domain_type> Phb/<phb_value> dp
   <drop_value>
   ```

## Variable definitions

| Variable | Value |
|---|---|
| <domain_type> | is the instance value of the DiffServ domain. |
| <drop_value> | specifies the drop precedence of IP packets assigned with the traffic class of this PHB. |
| <phb_value> | is the DSCP or RFC representation of the value you are modifying. |
| <traffic_value> | is the value that specifies how this PHB is scheduled relative to other PHBs. |
| <vr_name> | is the name of the virtual router. |
| | |

## Procedure job aid

**Figure 12**
**Per-hop behaviors component hierarchy**



# Modifying DSCP marking for locally generated packets

Modify differentiated services code point (DCSP) marking for locally generated packets to change how packets generated at the virtual router are classified for differentiated services (DiffServ).

## Prerequisites

- Identify the per-hop behavior (PHB) you want to assign to the locally generated packets.

## Procedure steps

1. To configure the PHB value for locally generated BGP, RIP, and OSPF packets, set the *phbRoutingSource (phbr)* attribute.

   **`set Vr/<vr_name> Dsd/<domain_type> phbr <phb_value>`**

   This attribute should be left at its default value to be compliant with RFC791.

   To pass provisioning semantic checks, the PHB used for locally generated packets must match a PHB in your differentiated services domain.

2. To configure the PHB value for any locally generated packets other than BGP, RIP, or OSPF, set the *phbGeneralSource (phbg)* attribute.

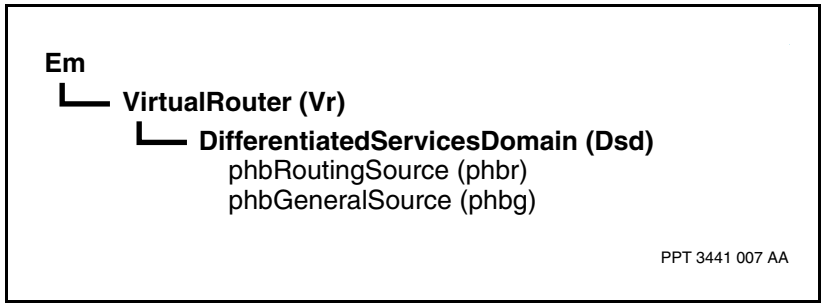
   **`set Vr/<vr_name> Dsd/<domain_type> phbg <phb_value>`**

## Variable definitions

| Variable | Value |
|---|---|
| <domain_type> | is the instance value of the DiffServ domain. |
| <phb_value> | is the specific DSCP value you want to assign for that packet type (Default = 0 (df) for *phbGeneralSource* and 48 (cs6) for *phbRoutingSource*). |
| <vr_name> | is the name of the virtual router. |
| | |

## Procedure job aid

**Figure 13**
**DCSP marking for locally generated packets component hierarchy**



# Example procedure for a VR DiffServ domain configuration

This is an example procedure for a VR DiffServ domain configuration.

## Procedure steps

1. Add the DiffServ domain to the virtual router to set the per-hop behaviors (PHBs) for DiffServ.

   ```
   add Vr/cvr1 Dsd/custom
   ```

2. Set the *schedulingClass8Queues* (*sc8q*) attribute.

   ```
   set Vr/cvr1 Dsd/custom Tc/gold sc8q 6
   ```

3. Set the *schedulingClass4Queues* (*sc4q*) attribute.

   ```
   set Vr/cvr1 Dsd/custom Tc/gold sc4q 3
   ```

4. Add the *perHopBehavior* (*Phb*) component to the *DifferentiatedServicesDomain* (*Dsd*) component.

   ```
   add Vr/cvr1 Dsd/custom Phb/ef
   ```

5. Set the *trafficClass* (*tc*) attribute for the *perHopBehavior* (*Phb*) component.

   ```
   set Vr/cvr1 Dsd/custom Phb/ef tc premium
   ```

6. Set the *dropPrecedence* (*dp*) attribute for the *perHopBehavior* (*Phb*) component.

   ```
   set Vr/cvr1 Dsd/custom Phb/ef dp low
   ```

7. To configure the PHB value for locally generated BGP, RIP, and OSPF packets, set the *phbRoutingSource (phbr)* attribute.

   ```
   set Vr/cvr1 Dsd/custom phbr ef
   ```

   This attribute should be left at its default value to be compliant with RFC791.

   To pass provisioning semantic checks, the PHB used for locally generated packets must match a PHB in your differentiated services domain.

8. To configure the PHB value for any locally generated packets other than BGP, RIP, or OSPF, set the *phbGeneralSource (phbg)* attribute.

   ```
   set Vr/cvr1 Dsd/custom phbg df
   ```

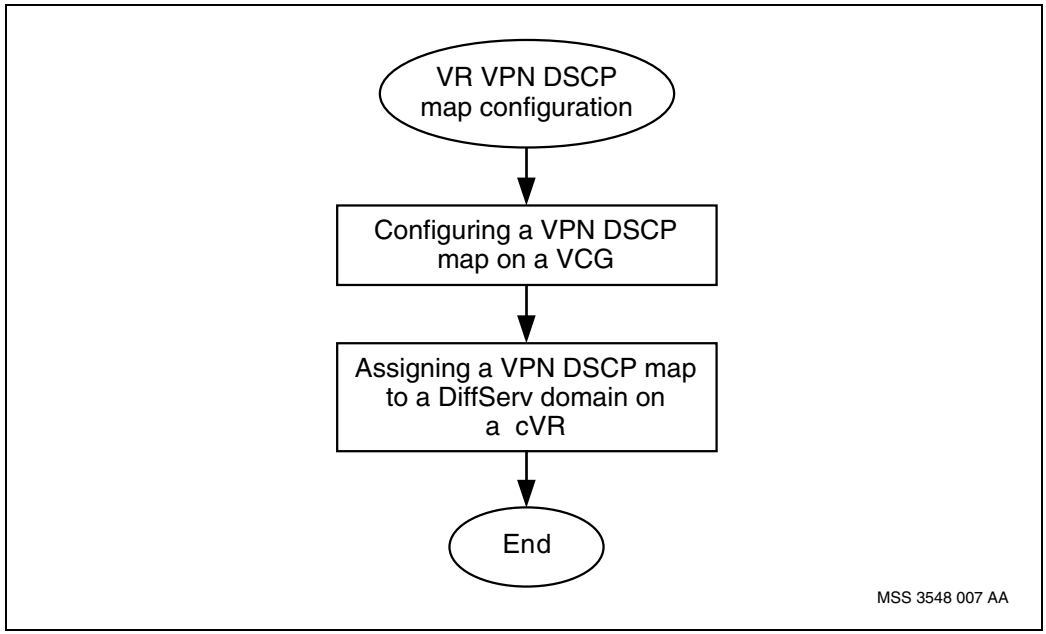
# Chapter 5
# VR VPN DSCP map configuration

This section includes the procedures required to configure and assign a map for the virtual private network (VPN) differentiated services code point (DCSP).

## VR VPN DSCP map configuration procedures

This task flow shows you the sequence of procedures you perform to configure a VPN DSCP map for a virtual connection gateway (VCG) and a customer virtual router (cVR). To link to any procedure, go to “VR VPN DSCP map configuration procedure navigation” (page 56).

**Figure 14**
**VR VPN DSCP map configuration procedures**




## VR VPN DSCP map configuration procedure navigation

- "Configuring a VPN DSCP map on a VCG" (page 57)
- "Assigning a VPN DCSP map to a DiffServ domain on a cVR" (page 59)

For an example procedure for the VR VPN DSCP map configuration, see"Example procedure for a VR VPN DSCP map configuration" (page 60).

# Configuring a VPN DSCP map on a VCG

Configure a map for the virtual private network (VPN) differentiated services code point (DCSP) to provide a translation mapping from a customer DSCP to a carrier per-hop behavior (PHB)/DSCP during VPN tunnel encapsulation This VPN DSCP map is on a virtual connection gateway (VCG).

## Procedure steps

1 Add the *VpnDscpMap* component.

```
add Vr/<vcg_name> Dsd/<domain_type> VpnDscpMap/
<map_name>
```

2 Set the *assignedPhb* attribute.

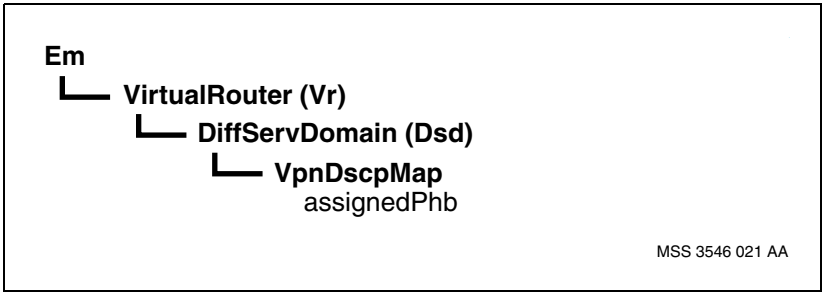
```
set Vr/<vcg_name> Dsd/<domain_type> VpnDscpMap/
<map_name> assignedPhb <dscp_value> <phb_value>
```

## Variable definitions

| Variable | Value |
|---|---|
| <domain_type> | is the instance value of the DiffServ domain. |
| <dscp_value> | is the value of the DSCP field in the customer IP header. |
| <map_name> | is the mnemonic. |
| <phb_value> | is the per-hop behavior (PHB) that determines the value of the DSCP field in the carrier IP header. |
| <vcg_name> | is the name of the virtual router at the VCG. |
| | |

## Procedure job aid

**Figure 15**
**VCG VPN DSCP map component hierarchy**



# Assigning a VPN DCSP map to a DiffServ domain on a cVR

Assign a map for the virtual private network (VPN) differentiated services code point (DCSP) to the customer differentiated services (DiffServ) domain.

## Procedure steps

1 Link the *VpnDscpMap* component to the customer *Dsd* component.

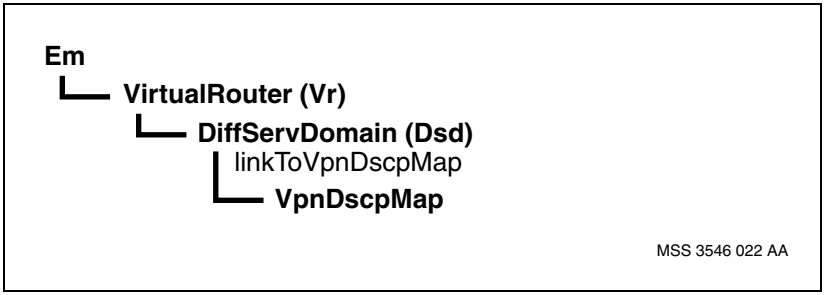
```
set Vr/<cvr_name> Dsd/<cvr_domain_type>
linkToVpnDscpMap Vr/<vcg_name> Dsd/<vcg_domain_type>
VpnDscpMap/<map_name>
```

## Variable definitions

| Variable | Value |
|---|---|
| <cvr_domain_type> | is the domain type used on the cVR. |
| <cvr_name> | is the name of the virtual router at the cVR. |
| <vcg_domain_type> | is the domain type used on the VCG. |
| <vcg_name> | is the name of the virtual router at the VCG. |
| | |

## Procedure job aid

**Figure 16**
**VPN DSCP map to DiffServ domain component hierarchy**



# Example procedure for a VR VPN DSCP map configuration

This is an example procedure for the VR VPN DSCP map configuration.

## Procedure steps

1. Add the *VpnDscpMap* component.

   ```
   add Vr/vcg Dsd/ms VpnDscpMap/0
   ```

2. Set the *assignedPhb* attribute.

   ```
   set Vr/vcg Dsd/ms VpnDscpMap/0 assignedPhb 34 46
   ```

3. Link the *VpnDscpMap* component to the customer *Dsd* component.

   ```
   set Vr/cvr1 Dsd/ms linkToVpnDscpMap Vr/vcg Dsd/ms
   VpnDscpMap/0
   ```

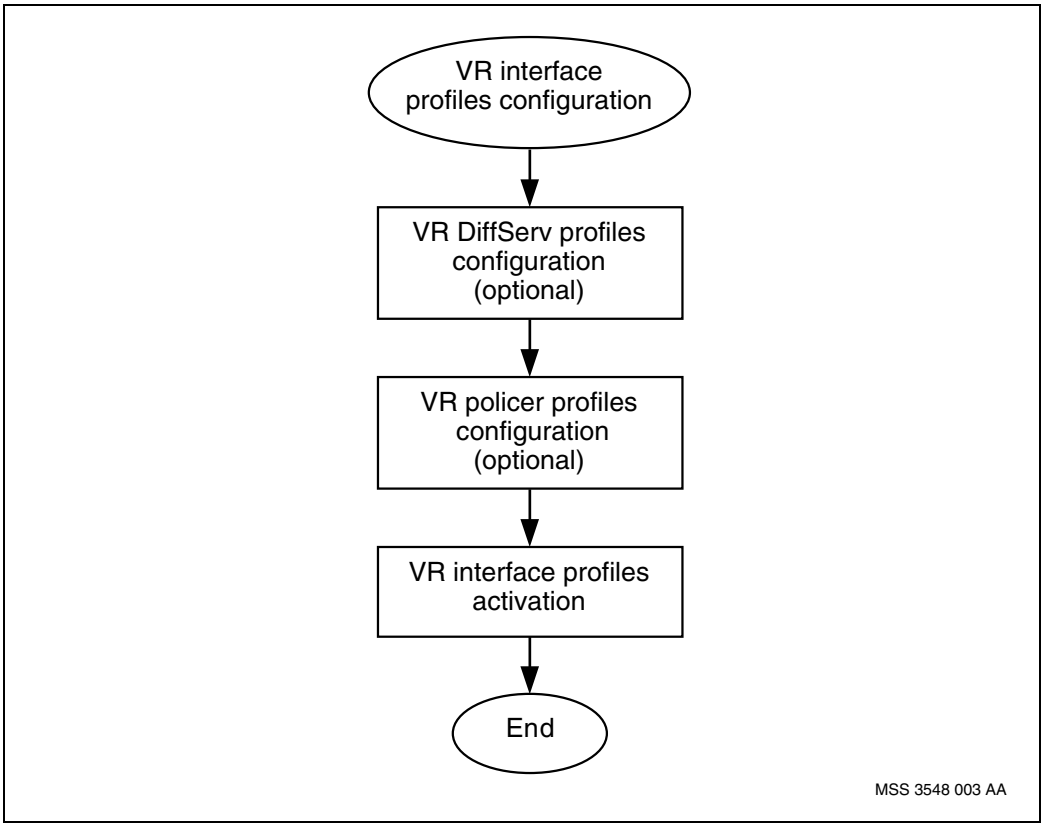
# Chapter 6
# VR interface profiles configuration

Configure interface profiles on the virtual router (VR) to manage IP traffic that is received and transmitted at an interface on a VR.

## VR interface profiles configuration tasks

This work flow shows you the sequence of tasks you perform to configure interface profiles on the VR. To link to any task, go to “VR interface profiles configuration task navigation” (page 62).

**Figure 17**
**VR interface profiles configuration tasks**




## VR interface profiles configuration task navigation

- “VR DiffServ profiles configuration” (page 63)
- “VR policer profiles configuration” (page 77)
- “VR interface profiles activation” (page 101)

# Chapter 7
# VR DiffServ profiles configuration

Configure differentiated services (DiffServ) profiles on the virtual router (VR) to classify and mark packets that are transmitted and received on the IP port interfaces.

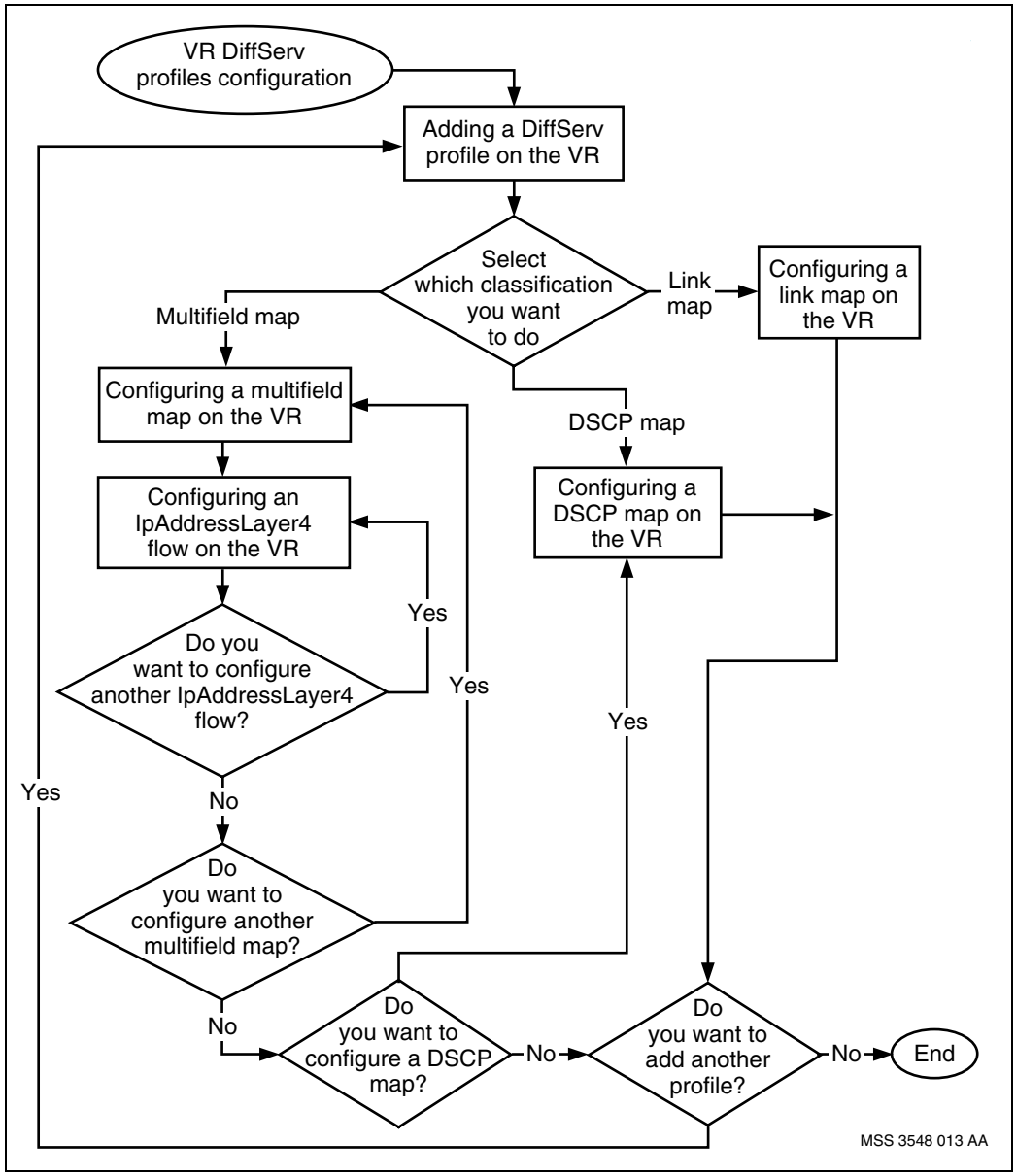
## Prerequisites for VR DiffServ profiles configuration

- Add the *ipDiffServ* feature to the feature list of each FP that requires that feature.
- Use the tasks and procedures in NN10600-550 *Nortel Networks Multiservice Switch 7400/15000/20000 Common Configuration Procedures* if you require supporting information or need to provision or reconfigure any node or nodal elements to support *DiffServProfile* components.

## VR DiffServ profile configuration procedures

This task flow shows you the sequence of procedures you perform to configure DiffServ profiles on the VR. To link to any procedure, go to "VR DiffServ profiles configuration procedure navigation" (page 65).

**Figure 18**
**VR DiffServ profiles configuration procedures**



## VR DiffServ profiles configuration procedure navigation



For example procedures for the VR DiffServ profiles configuration, see:

# Adding a DiffServ profile on the VR

Configure a differentiated services (DiffServ) profile to define traffic classification marking criteria for the packets transmitted and received on the IP port.

## Procedure steps

1 Add a *DiffServProfile* component.

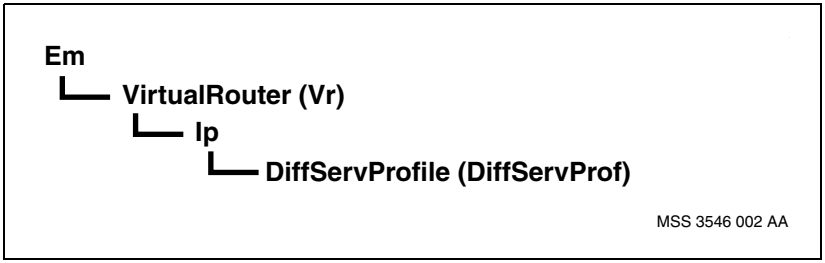
```
add Vr/<vr_name> Ip DiffServProf/<dsprof_name>
```

## Variable definitions

| Variable | Value |
|---|---|
| <dsprof_name> | is any mnemonic. |
| <vr_name> | is the name of the virtual router. |
| | |

## Procedure job aid

**Figure 19**
**VR DiffServ profile component hierarchy**



# Configuring a multifield map on the VR

Configure a multifield map to define the traffic conditioning rules for the traffic stream on the IP port interface.

## Procedure steps

1 Add *MultiFieldMap* component.

```
add Vr/<vr_name> Ip DiffServProf/<dsprof_name> MfMap/
<map_name>
```

2 Set the *assignedPhb* attribute.

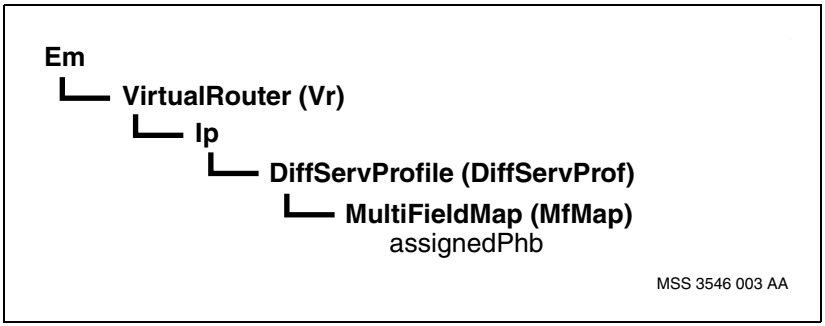
```
set Vr/<vr_name> Ip DiffServProf/<dsprof_name> MfMap/
<map_name> assignedPhb <phb_value>
```

## Variable definitions

| Variable | Value |
|---|---|
| <dsprof_name> | is any mnemonic. |
| <map_name> | is the mnemonic. |
| <phb_value> | is the PHB assigned to the packet which determines the value of the DSCP field after translation. |
| <vr_name> | is the name of the virtual router. |
| | |

## Procedure job aid

**Figure 20**
**VR multifield map component hierarchy**



# Configuring an IpAddressLayer4 flow on the VR

Configure an IpAddressLayer4 flow to identify the multifield criteria for the IP flow received on the IP port.

## Procedure steps

1. Add the *IpAddressLayer4Flow* component.

   ```
   add Vr/<vr_name> Ip DiffServProf/<dsprof_name> MfMap/
   <map_name> IpAddressLayer4Flow/<layer4flow_value>
   ```

2. Set the *prefix* attribute.

   ```
   set Vr/<vr_name> Ip DiffServProf/<dsprof_name> MfMap/
   <map_name> IpAddressLayer4Flow/<layer4flow_value>
   prefix <prefix_value>
   ```

3. Set the *prefixLength* attribute.

   ```
   set Vr/<vr_name> Ip DiffServProf/<dsprof_name> MfMap/
   <map_name> IpAddressLayer4Flow/<layer4flow_value>
   prefixLength <prefixLength_value>
   ```

4. Set the *protocol* attribute.

   ```
   set Vr/<vr_name> Ip DiffServProf/<dsprof_name> MfMap/
   <map_name> IpAddressLayer4Flow/<layer4flow_value>
   protocol <protocol_value>
   ```

5. Set the *portNumberRange* attribute.

   ```
   set Vr/<vr_name> Ip DiffServProf/<dsprof_name> MfMap/
   <map_name> IpAddressLayer4Flow/<layer4flow_value>
   port <port_value>
   ```

## Variable definitions

| Variable | Value |
|---|---|
| <dsprof_name> | is any mnemonic. |
| <layer4flow_value> | is a decimal value. |
| <map_name> | is any mnemonic. |
| <port_value> | specifies the TCP or UDP port number or range of port numbers to which the policy applies. |

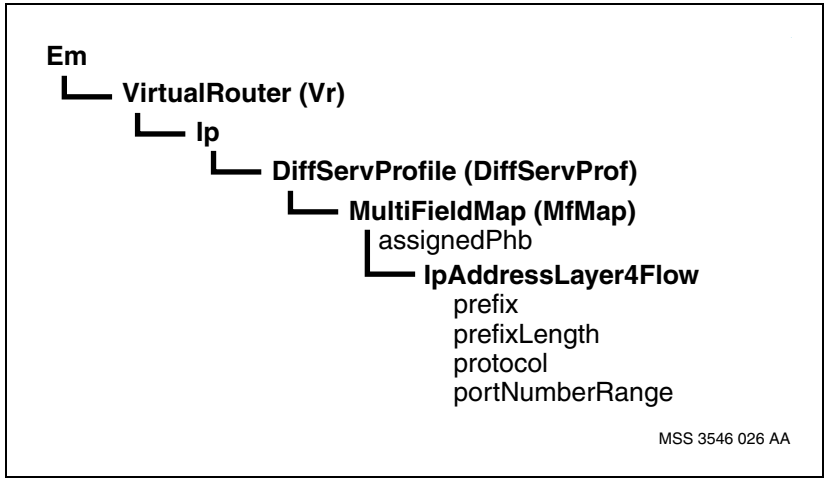
(Sheet 1 of 2)

| Variable | Value |
|---|---|
| <prefix_value> | specifies the IP address prefix. |
| <prefixLength_value> | specifies the number of the most significant bits of the IP address. Those numbers must match with the ones in the prefix. |
| <protocol_value> | specifies the layer 4 protocol. |
| <vr_name> | is the name of the virtual router. |

(Sheet 2 of 2)

## Procedure job aid

**Figure 21**
**VR IpAddressLayer4 flow component hierarchy**



# Configuring a DSCP map on the VR

Configure a differentiated services code point (DSCP) map for the differentiated services profile to translate the DSCP field of the packet to new values when the packet is transmitted and received on the IP port interfaces. The *DscpMap* component identifies the connection class and per-hop behavior (PHB) values of the IP packets associated with the IP traffic flow.

## Procedure steps

1. Add the *DscpMap* component.

   ```
   add Vr/<vr_name> Ip DiffServProf/<dsprof_name> DscpMap
   ```

2. Set the *assignedPhb* attribute.

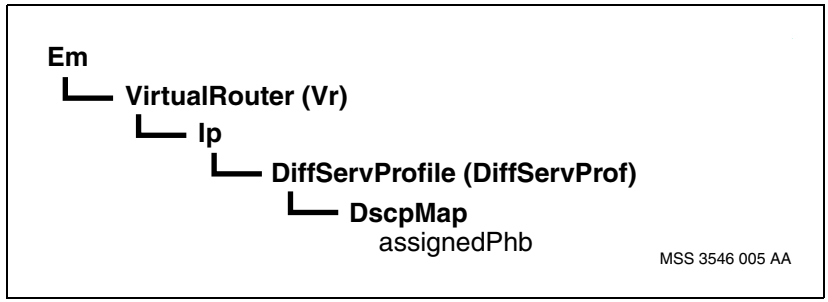
   ```
   set Vr/<vr_name> Ip DiffServProf/<dsprof_name> DscpMap
   assignedPhb <dscp_value> <phb_value>
   ```

## Variable definitions

| Variable | Value |
|---|---|
| <dscp_value> | is the value of the DSCP field in the IP packet header before translation. |
| <dsprof_name> | is any mnemonic. |
| <phb_value> | is the PHB assigned to the packet which determines the value of the DSCP field after translation. |
| <vr_name> | is the name of the virtual router. |
| | |

## Procedure job aid

**Figure 22**
**VR DSCP map for ingress traffic component hierarchy**



# Configuring a link map on the VR

Configure a link map on the virtual router (VR) for the differentiated services profile to translate the connection class values to DSCP values for packets received on the IP port interface.

## Procedure steps

1 Add the *LinkMap* component.

```
add Vr/<vr_name> Ip DiffServProf/<dsprof_name> LinkMap
```

2 Set the *assignedPhb* attribute.

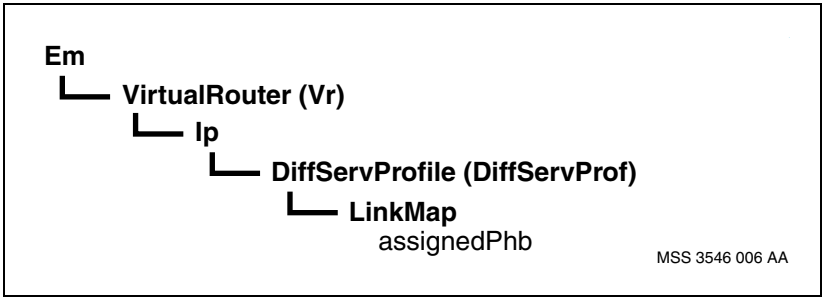
```
add Vr/<vr_name> Ip DiffServProf/<dsprof_name> LinkMap
assignedPhb <connection_class_value> <phb_value>
```

## Variable definitions

| Variable | Value |
|---|---|
| <connection_class_value> | is the value of the layer 2 interface where the packet is received. |
| <dsprof_name> | is any mnemonic. |
| <phb_value> | is the PHB assigned to the packet which determines the value of the DSCP field after translation. |
| <vr_name> | is the name of the virtual router. |
| | |

## Procedure job aid

**Figure 23**
**VR link map component hierarchy**



# Example procedure for configuring a multifield map on the VR

This is an example procedure for configuring a multifield map on the VR.

## Procedure steps

1 Add *MultiFieldMap* component.

```
add Vr/cvr1 Ip DiffServProf/mf_profile MfMap/1
```

2 Set the *assignedPhb* attribute.

```
set Vr/cvr1 Ip DiffServProf/mf_profile MfMap/1
assignedPhb ef
```

# Example procedure for configuring an IpAddressLayer4 flow on the VR

This is an example procedure for configuring an IpAddressLayer4 flow on the VR.

In this example procedure, an IP address in the network is identified as x.x.x.x.

## Procedure steps

1. Add the *IpAddressLayer4Flow* component.

   ```
   add Vr/cvr1 Ip DiffServProf/mf_profile MfMap/1
   IpAddressLayer4Flow/1
   ```

2. Set the *prefix* attribute.

   ```
   set Vr/cvr1 Ip DiffServProf/mf_profile MfMap/1
   IpAddressLayer4Flow/1 prefix x.x.x.x
   ```

3. Set the *prefixLength* attribute.

   ```
   set Vr/cvr1 Ip DiffServProf/mf_profile MfMap/1
   IpAddressLayer4Flow/1 prefixLength 24
   ```

4. Set the *protocol* attribute.

   ```
   set Vr/cvr1 Ip DiffServProf/mf_profile MfMap/1
   IpAddressLayer4Flow/1 protocol TCP
   ```

5. Set the *portNumberRange* attribute.

   ```
   set Vr/cvr1 Ip DiffServProf/mf_profile MfMap/1
   IpAddressLayer4Flow/1 port 20 23
   ```

# Example procedure for configuring a DSCP map on the VR

This is an example procedure for configuring a DSCP map on the VR.

## Procedure steps

1 Add the *DscpMap* component.

```
add Vr/cvr1 Ip DiffServProf/dscp_profile DscpMap
```

2 Set the *assignedPhb* attribute.

```
set Vr/cvr1 Ip DiffServProf/dscp_profile DscpMap
assignedPhb 34 46
```

# Example procedure for configuring a link map on the VR

This is an example procedure for configuring a link map on the VR.

## Procedure steps

1. Add the *LinkMap* component.

   ```
   add Vr/cvr1 Ip DiffServProf/link_profile LinkMap
   ```

2. Set the *assignedPhb* attribute.

   ```
   add Vr/cvr1 Ip DiffServProf/link_profile LinkMap
   assignedPhb 1 10
   ```

   ```
   add Vr/cvr1 Ip DiffServProf/link_profile LinkMap
   assignedPhb 2 48
   ```

   ```
   add Vr/cvr1 Ip DiffServProf/link_profile LinkMap
   assignedPhb 3 46
   ```

# Chapter 8
# VR policer profiles configuration

Configure the policer profiles on the virtual router (VR) to be able to control the maximum rate of traffic sent and received on an interface.

Traffic streams are differentiated by their per-hop behavior (PHB), not the source or destination IP address. All received packets on one protocol port sharing the same PHB are measured by the same meter configured with matching PHB value. A policer is assigned to a protocol port on the ingress or egress interface.

If you want to direct packets that have a different PHB to a meter that is already configured, you must complete the procedure, "Selecting a traffic stream for the meter on the VR" (page 84). Otherwise, you can configure another meter with a different PHB value or another policer with different meter and different PHB value.

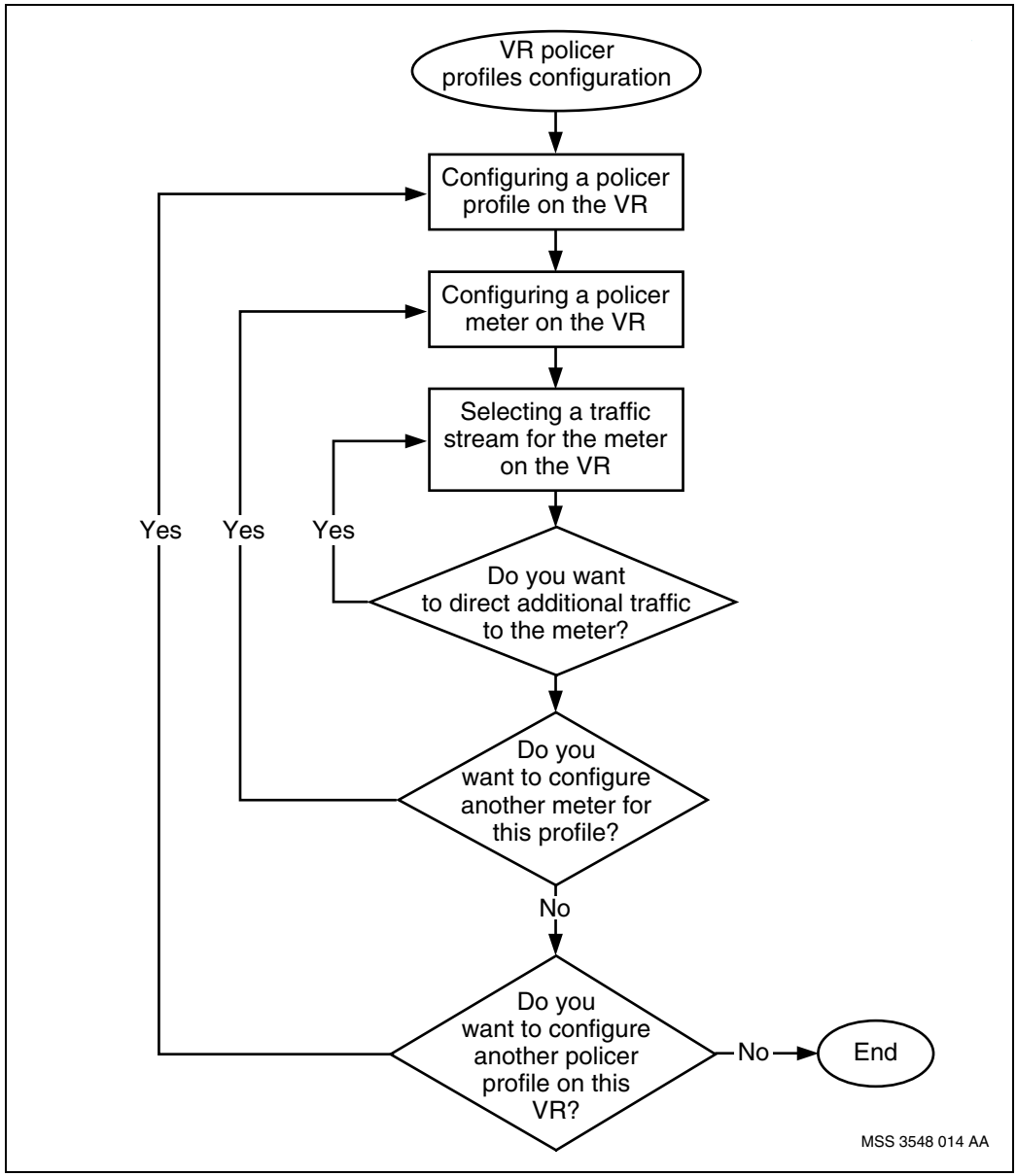
## Prerequisites for VR policer profiles configuration

- Add the *ipPolicing* feature to the feature list of each FP that requires that feature.
- Use the tasks and procedures in NN10600-550 *Nortel Networks Multiservice Switch 7400/15000/20000 Common Configuration Procedures* if you require supporting information or need to provision or reconfigure any node or nodal elements to support *PolicerProfile* components.

# VR policer profiles configuration procedures

This task flow shows you the sequence of procedures you perform to configure a policer profile on the VR. To link to any procedure, go to “VR policer profiles configuration procedure navigation” (page 80).

**Figure 24**
**VR policer profiles configuration procedures**



## VR policer profiles configuration procedure navigation

- "Configuring a policer profile on the VR" (page 81)
- "Configuring a policer meter on the VR" (page 82)
- "Selecting a traffic stream for the meter on the VR" (page 84)

For example procedures for different VR policer profiles configurations, see:

- "Example procedure for configuring single CIR policer with all excess packets forwarded" (page 86)
- "Example procedure for configuring single CIR policer with all excess packets dropped" (page 88)
- "Example procedure for configuring single EIR policer" (page 90)
- "Example procedure for configuring dual rate policer" (page 92)
- "Example procedure for configuring color blind policer" (page 94)
- "Example procedure for configuring combined traffic class policer" (page 96)
- "Example procedure for configuring IP firewall using DiffServ multifield map and single EIR policer on the VR" (page 98)

# Configuring a policer profile on the VR

Configure a policer profile on the virtual router (VR) to control the maximum rate of traffic sent and received on an interface.

## Procedure steps

1 Add a *PolicerProfile* component.

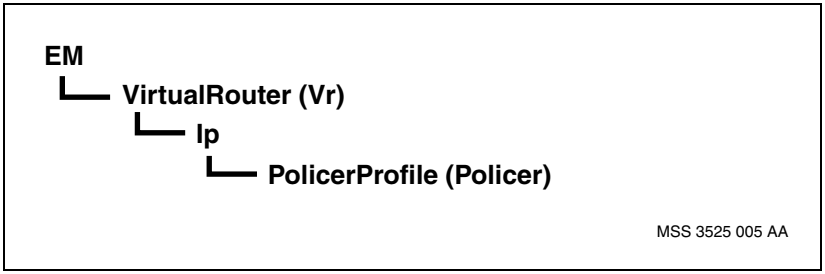
```
add Vr/<vr_name> Ip Policer/<profile_name>
```

## Variable definitions

| Variable | Value |
|---|---|
| <profile_name> | is an instance of a policer profile that can be associated with one or more interfaces. |
| <vr_name> | is the name of the virtual router. |
| | |

## Procedure job aid

**Figure 25**
**VR policer profile component hierarchy**



# Configuring a policer meter on the VR

Configure a policer meter on the virtual router (VR) for every traffic stream that requires policing. The policer meter provides traffic characteristics for the traffic stream.

## Procedure steps

1 Add a *Meter* component.

```
add Vr/<vr_name> Ip Policer/<profile_name> Meter/
<meter_name>
```

2 Set the *committedInformationRate* attribute.

```
set Vr/<vr_name> Ip Policer/<profile_name> Meter/
<meter_name> cir <cir_value>
```

3 Set the *committedBurstSize* attribute.

```
set Vr/<vr_name> Ip Policer/<profile_name> Meter/
<meter_name> bc <bc_value>
```

4 Set the *excessBurstSize* attribute.

```
set Vr/<vr_name> Ip Policer/<profile_name> Meter/
<meter_name> be <be_value>
```

5 Set the *measurementInterval* attribute.

```
set Vr/<vr_name> Ip Policer/<profile_name> Meter/
<meter_name> t <time_value>
```

## Variable definitions

| Variable | Value |
|---|---|
| <bc_value> | is the amount of data that the network transfers under normal conditions over a measurement interval. The measurement interval is determined by the *committedInformationRate* and *committedBurstSize* attributes. |
| <be_value> | is the amount of uncommitted data that the network attempts to deliver over a measurement interval. |

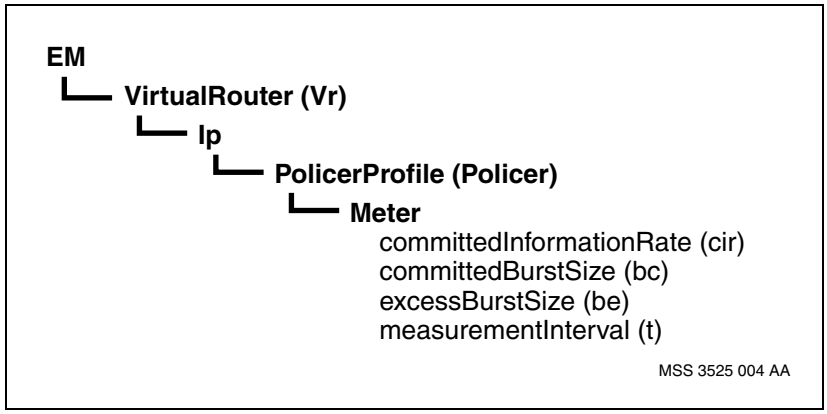
(Sheet 1 of 2)

| Variable | Value |
|---|---|
| <cir_value> | is the rate at which the network transfers information under normal conditions. |
| <meter_name> | is an instance of a traffic conditioner for an interface. |
| <profile_name> | is an instance of a policer profile that can be associated with one or more interfaces. |
| <time_value> | is a measurement of time (in milliseconds) over which rates and burst sizes are measured. |
| <vr_name> | is the name of the virtual router. |

(Sheet 2 of 2)

## Procedure job aid

**Figure 26**
**VR policer meter component hierarchy**



# Selecting a traffic stream for the meter on the VR

Select a traffic steam for the meter on the virtual router (VR). The traffic stream is controlled by this meter.

## Procedure steps

1. Add a *PolicedPhb* component.

   ```
   add Vr/<vr_name> Ip Policer/<profile_name> Meter/
   <meter_name> Phb/<phb_value>
   ```

2. Set the *initialBucket* attribute.

   ```
   set Vr/<vr_name> Ip Policer/<profile_name> Meter/
   <meter_name> Phb/<phb_value> initialBucket
   <bucket_value>
   ```

3. Set the *outOfProfilePhb* attribute.

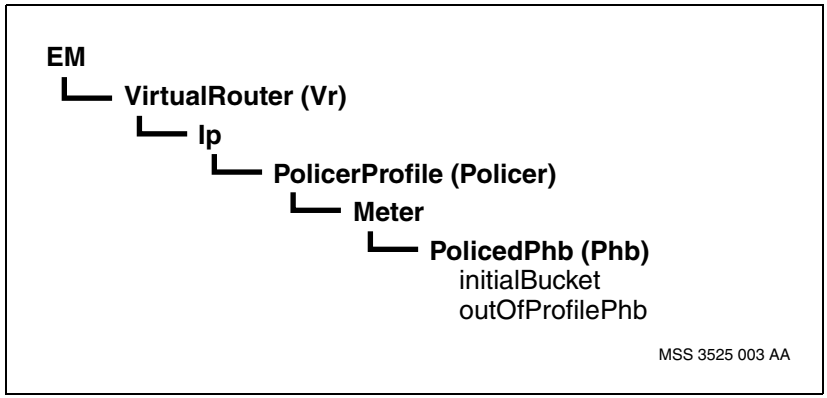
   ```
   set Vr/<vr_name> Ip Policer/<profile_name> Meter/
   <meter_name> Phb/<phb_value> outOfProfilePhb
   <out_value>
   ```

## Variable definitions

| Variable | Value |
|---|---|
| <bucket_value> | is the value that specifies whether the traffic with this PHB is forwarded to the CIR bucket or the EIR bucket of the meter. |
| <meter_name> | is an instance of a traffic conditioner. |
| <out_value> | is the value of the new PHB assigned to the packets that have exceeded the CIR. The *outOfProfilePhb* attribute is applicable only if the *initialBucket* attribute is set to committed. |
| <phb_value> | is a PHB of a stream directed to this meter. |
| <profile_name> | is an instance of a policer profile that can be associated with one or more interfaces. |
| <vr_name> | is the name of the virtual router. |
| | |

## Procedure job aid

**Figure 27**
**VR traffic stream for the meter component hierarchy**



# Example procedure for configuring single CIR policer with all excess packets forwarded

This example procedure illustrates the configuration for the single committed information rate (CIR) policer with all excess packets forwarded for the AF21 traffic. The packet with the AF21 differentiated services code point (DSCP) is directed to the CIR bucket. The conforming traffic is forwarded with the AF21 DSCP. All non-conforming traffic is re-marked to AF22 and sent to the excess information rate (EIR) bucket. Since the *excessBurstSize (be)* attribute is set to the maximum value, all excess packets are forwarded.

## Procedure steps

1 Configure the policer meter.

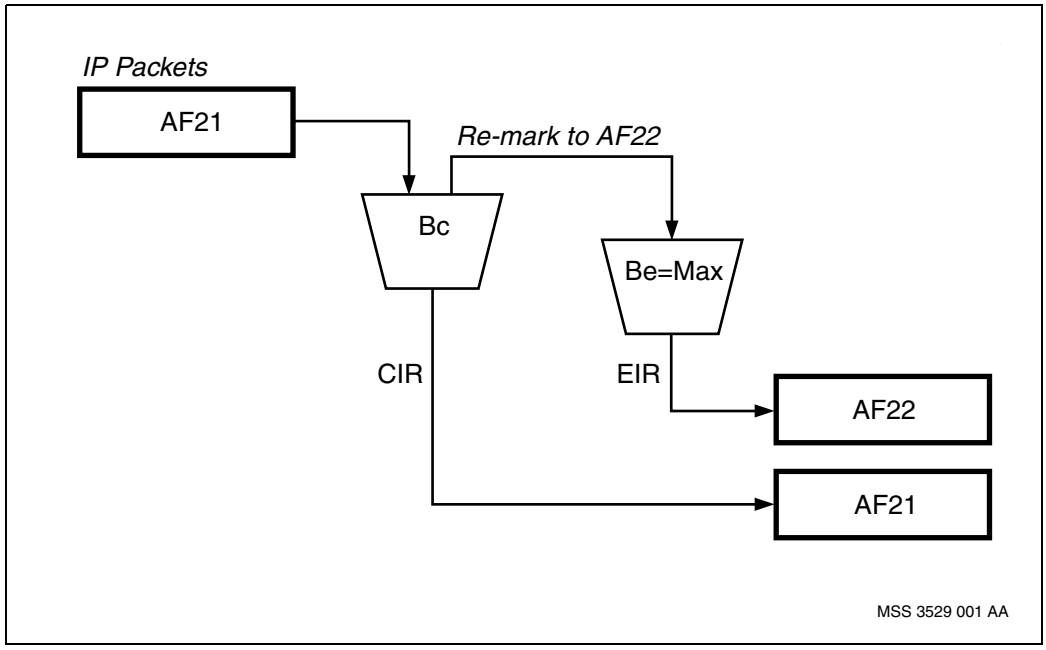
```
add -s Vr/1 Ip Policer/sla1 Meter/stream1

set Vr/1 Ip Policer/sla1 Meter/stream1 cir 256000

set Vr/1 Ip Policer/sla1 Meter/stream1 bc 256000

set Vr/1 Ip Policer/sla1 Meter/stream1 be 50000000
```

2 Configure the traffic stream for this meter.

```
add -s Vr/1 Ip Policer/sla1 Meter/stream1 Phb/AF21
initialBucket committed
```

## Procedure job aid

**Figure 28**
**Single CIR policer with all excess packets forwarded**



# Example procedure for configuring single CIR policer with all excess packets dropped

This example procedure illustrates the configuration for the single committed information rate (CIR) policer with all excess packets dropped for the EF traffic. The packet with the EF differentiated services code point (DSCP) is directed to the CIR bucket. The conforming traffic is forwarded with the EF DSCP. All non-conforming traffic is sent to the excess information rate (EIR) bucket. Since the *excessBurstSize (be)* attribute is set to 0, all excess packets are dropped.

## Procedure steps

1 Configure the policer meter.

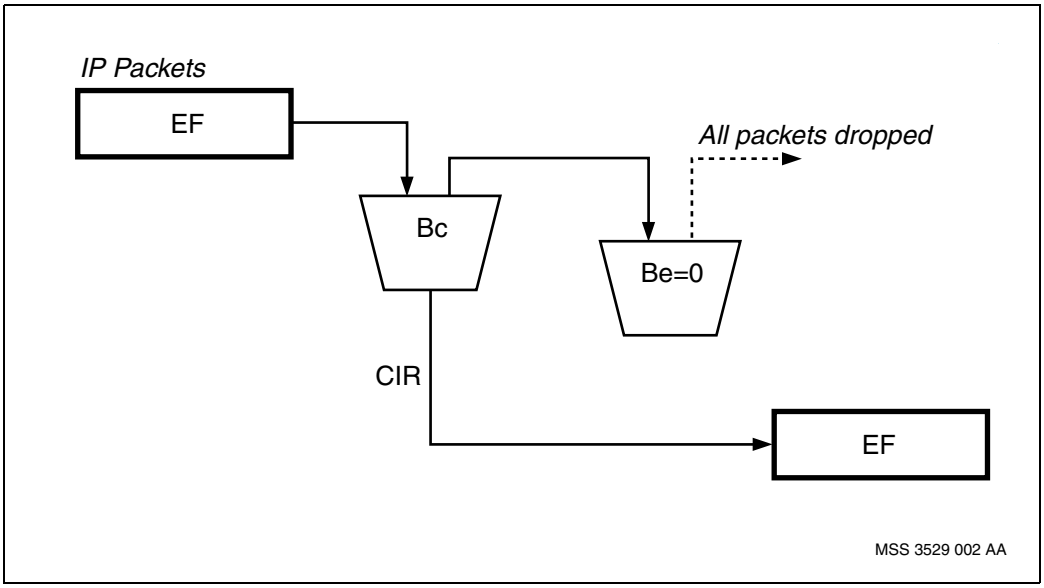
```
add -s Vr/1 Ip Policer/sla1 Meter/stream1

set Vr/1 Ip Policer/sla1 Meter/stream1 cir 256000

set Vr/1 Ip Policer/sla1 Meter/stream1 bc 256000

set Vr/1 Ip Policer/sla1 Meter/stream1 be 0
```

2 Configure the traffic stream for this meter.

```
add -s Vr/1 Ip Policer/sla1 Meter/stream1 Phb/EF
initialBucket committed
```

## Procedure job aid

**Figure 29**
**Single CIR policer with all excess packets dropped**



# Example procedure for configuring single EIR policer

This example procedure illustrates the configuration for the single excess information rate (EIR) policer for the DF traffic. All packets with the DF differentiated services code point (DSCP) are directed to the EIR bucket. All non-conforming traffic is dropped and conforming traffic is forwarded with the DF DSCP.

## Procedure steps

1 Configure the policer meter.

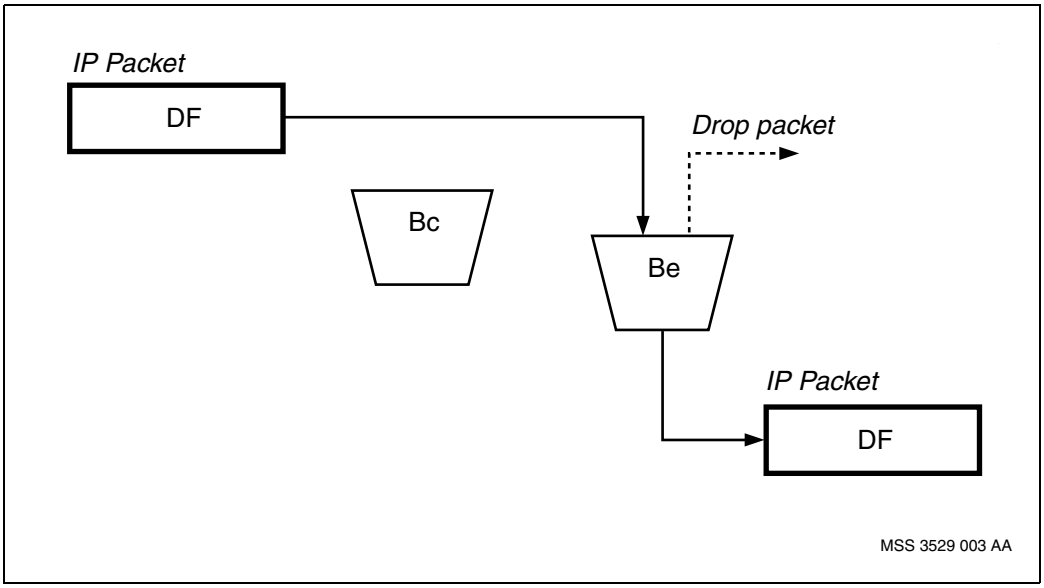
```
add -s Vr/1 Ip Policer/sla1 Meter/stream1

set Vr/1 Ip Policer/sla1 Meter/stream1 be 256000

set Vr/1 Ip Policer/sla1 Meter/stream1 t 1000
```

2 Configure the traffic stream for this meter.

```
add Vr/1 Ip Policer/sla1 Meter/stream1 Phb/DF
```

## Procedure job aid

**Figure 30**
**Single EIR policer**



# Example procedure for configuring dual rate policer

This example procedure illustrates the configuration for the dual rate policer for AF31, AF32, and AF33 traffic. The AF31 packet is directed to the committed information rate (CIR) bucket. If the traffic conforms, then the packet is forwarded. If the CIR is exceeded, then the packet is PHB AF32 and is directed to the excess information rate (EIR) bucket. If the traffic conforms to the EIR, then the packet is forwarded. If the EIR is exceeded then the packet is dropped. The AF32 and AF33 packets are directed to the EIR bucket. If the traffic conforms to the EIR, then the packet is forwarded. If the EIR is exceeded then the packet is dropped.

## Procedure steps

1 Configure the policer meter.

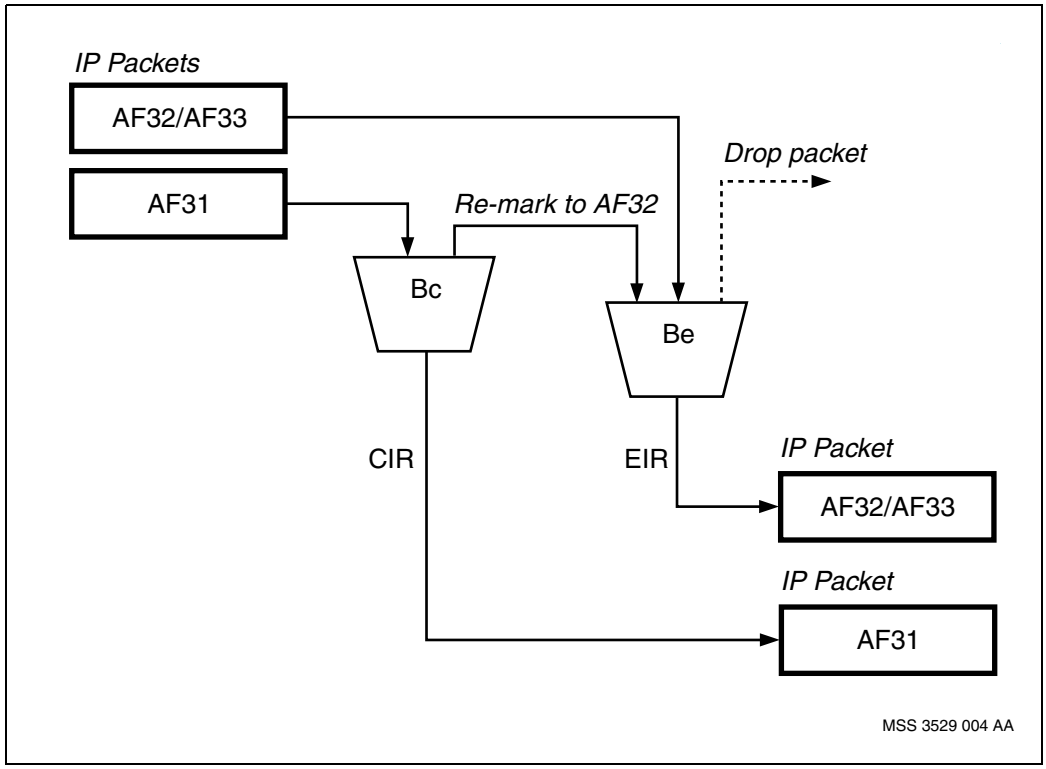
```
add -s Vr/1 Ip Policer/sla1 Meter/stream1

set Vr/1 Ip Policer/sla1 Meter/stream1 cir 256000

set Vr/1 Ip Policer/sla1 Meter/stream1 bc 256000

set Vr/1 Ip Policer/sla1 Meter/stream1 be 256000
```

2 Configure the traffic stream for this meter.

```
add Vr/1 Ip Policer/sla1 Meter/stream1 Phb/AF32

add Vr/1 Ip Policer/sla1 Meter/stream1 Phb/AF33

add -s Vr/1 Ip Policer/sla1 Meter/stream1 Phb/AF31
initialBucket committed
```

## Procedure job aid

**Figure 31**
**Dual rate policer**



# Example procedure for configuring color blind policer

This example procedure illustrates the configuration for the color blind policer for AF41 traffic. All packets entering an interface are assigned PHB AF41. All packets are forwarded to the committed information rate (CIR) bucket. If the traffic conforms, then the packet is forwarded. If the CIR is exceeded, then the packet is assigned PHB AF42 and is directed to the excess information rate (EIR) bucket. If the traffic conforms to the EIR, then the packet is forwarded. If the EIR is exceeded, then the packet is dropped.

***Note:*** AF41 is the decimal value of 34.

## Procedure steps

1 Configure the differentiated services (DiffServ) profile.

```
add -s Vr/1 Ip DiffServProf/stream1

add Vr/1 Ip DiffServProf/stream1 LinkMap

set Vr/1 Ip DiffServProf/stream1 LinkMap assignedPhb 0
34 1 34 2 34 3 34 3 34
```

2 Configuring the policer meter.

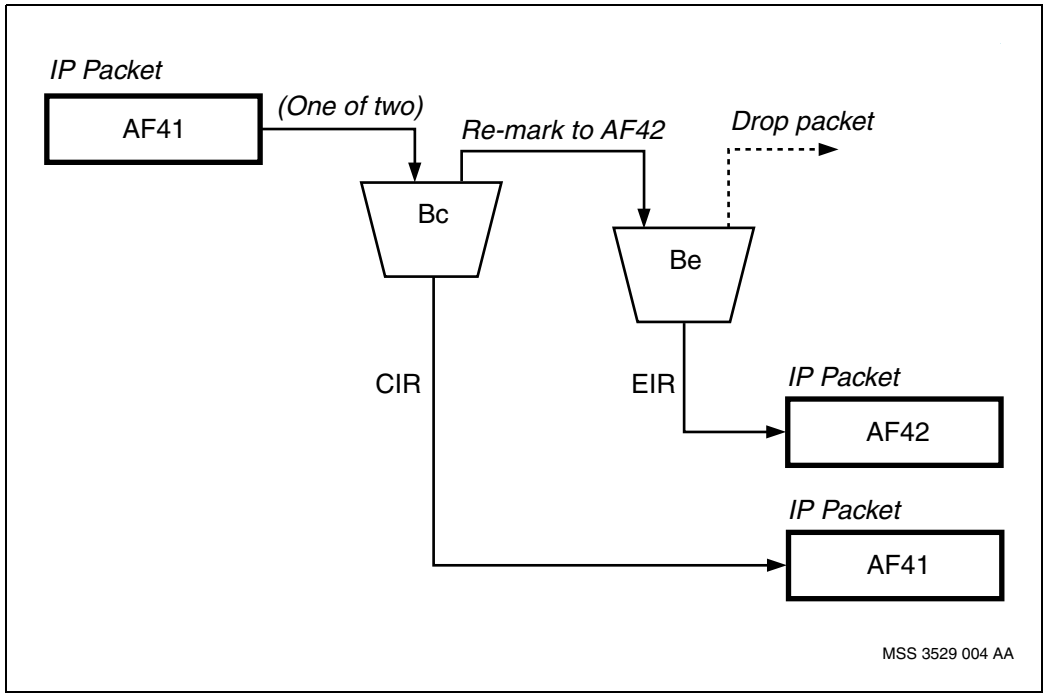
```
add -s Vr/1 Ip Policer/sla1 Meter/stream1

set Vr/1 Ip Policer/sla1 Meter/stream1 cir 256000

set Vr/1 Ip Policer/sla1 Meter/stream1 bc 256000

set Vr/1 Ip Policer/sla1 Meter/stream1 be 256000
```

3 Configure the traffic stream for this meter.

```
add -s Vr/1 Ip Policer/sla1 Meter/stream1 Phb/AF41
initialBucket committed
```

## Procedure job aid

**Figure 32**
**Color blind policer**



# Example procedure for configuring combined traffic class policer

This example procedure illustrates the configuration of a policer for packets belonging to different traffic classes. Packets with EF, AF41, AF31, AF21, AF11, and DF PHB are directed to the committed information rate (CIR) bucket of a single policer. Packets that do not conform are re-marked and directed to the excess information rate (EIR) bucket as follows: EF to EF, AF41 to AF42, AF31 to AF32, AF21 to AF22, AF11 to AF12, and DF to DF.

## Procedure steps

1 Configuring the policer meter.

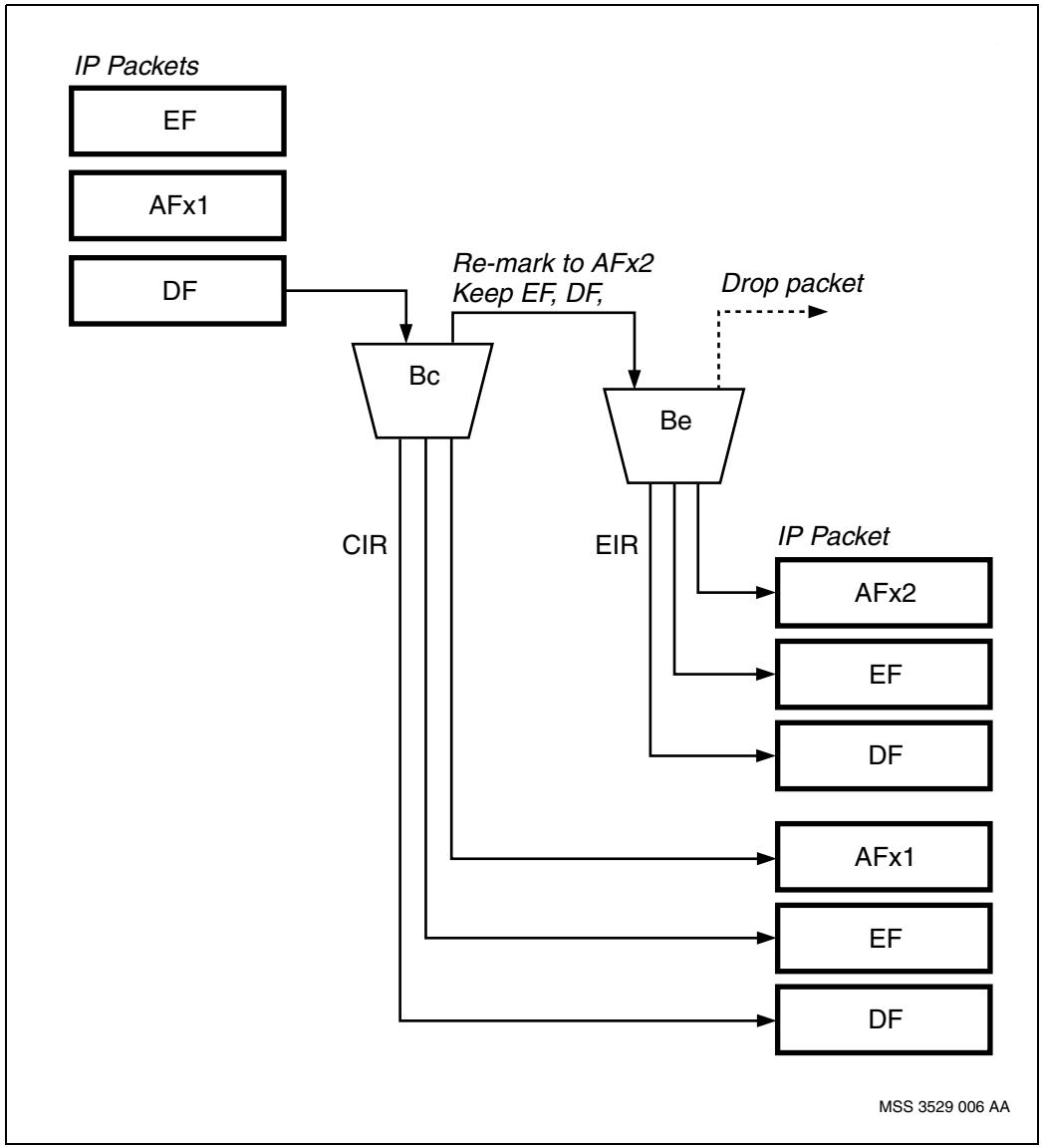
```
add -s Vr/1 Ip Policer/sla1 Meter/stream1

set Vr/1 Ip Policer/sla1 Meter/stream1 cir 256000

set Vr/1 Ip Policer/sla1 Meter/stream1 bc 256000

set Vr/1 Ip Policer/sla1 Meter/stream1 be 256000
```

2 Configure the traffic stream for this meter.

```
add -s Vr/1 Ip Policer/sla1 Meter/stream1 Phb/EF
initialBucket committed

add -s Vr/1 Ip Policer/sla1 Meter/stream1 Phb/AF41
initialBucket committed

add -s Vr/1 Ip Policer/sla1 Meter/stream1 Phb/AF31
initialBucket committed

add -s Vr/1 Ip Policer/sla1 Meter/stream1 Phb/AF21
initialBucket committed

add -s Vr/1 Ip Policer/sla1 Meter/stream1 Phb/AF11
initialBucket committed

add -s Vr/1 Ip Policer/sla1 Meter/stream1 Phb/DF
initialBucket committed
```

## Procedure job aid

**Figure 33**
**Combined traffic class policer**



# Example procedure for configuring IP firewall using DiffServ multifield map and single EIR policer on the VR

This example procedure illustrates the configuration of an IP firewall using the differentiated services (DiffServ) multifield map and the single excess information rate (EIR) policer in the virtual router (VR).

You can filter user datagram protocol (UDP) or transmission control protocol (TCP) packets with an IP address (source address or destination address) that you specify in the *prefix* attribute. This example procedure filters UDP packets with an IP address specified in the *prefix* attribute.

In this example procedure, an IP address in the network is identified as x.x.x.x.

To configure a firewall using the Ip and filter components, see "VR firewall configuration" (page 113).

## Procedure steps

1. Add a *DifferentiatedServicesDomain* (*Dsd*) component to the VRF.

   ```
   add Vr/1 Dsd/ms
   ```

   When you add the *DifferentiatedServicesDomain* (*Dsd*) component, the following components are added automatically: *PerHopBehavior (Phb)* and *TrafficClass (Tc)*.

   The selected default configuration of the DSD can be modified, but reconfiguration is generally not necessary. For information on each component and its attributes, see NN10600-060 *Nortel Networks Multiservice Switch 7400/15000/20000 Component Reference*.

2. Add the *perHopBehavior* component to the *DifferentiatedServicesDomain* (*Dsd*) component.

   ```
   add Vr/1 Dsd/ms phb/3
   ```

3. Add a *DiffServProfile* component.

   ```
   add Vr/1 Ip DiffServProf/firewall
   ```

4. Add *MultiFieldMap* component.

   ```
   add Vr/1 Ip DiffServProf/firewall MfMap/1
   ```

5 Set the *assignedPhb* attribute.

```
set Vr/1 Ip DiffServProf/firewall MfMap/1
assignedPhb 3
```

6 Add the *IpAddressLayer4Flow* component.

```
add Vr/1 Ip DiffServProf/firewall MfMap/1
IpAddressLayer4Flow/1
```

7 Set the *prefix* attribute.

```
set Vr/1 Ip DiffServProf/firewall MfMap/1
IpAddressLayer4Flow/1 prefix x.x.x.x
```

8 Set the *prefixLength* attribute.

```
set Vr/1 Ip DiffServProf/firewall MfMap/1
IpAddressLayer4Flow/1 prefixLength 16
```

9 Set the *protocol* attribute.

```
set Vr/1 Ip DiffServProf/firewall MfMap/1
IpAddressLayer4Flow/1 protocol udp
```

For details about multifield map, refer to NN10600-590 *Nortel Networks Multiservice Switch 7400/15000/20000 Layer 3 Traffic Management Fundamentals*.

10 Add the *DscpMap* component.

```
add Vr/1 Ip DiffServProf/firewall DscpMap
```

11 Set the *linkToDiffServProfile* attribute.

```
set Vr/1 Pp/1 Ip Is dsLink Vr/1 Ip DiffServProf/
firewall
```

12 Add a *PolicerProfile* component.

```
add Vr/1 Ip Policer/firewall
```

13 Add a *Meter* component.

```
add Vr/1 Ip Policer/firewall Meter/1
```

14 Set the *committedInformationRate* attribute.

```
set Vr/1 Ip Policer/firewall Meter/1 cir 0
```

15 Set the *committedBurstSize* attribute.

```
set Vr/1 Ip Policer/firewall Meter/1 bc 0
```

**16** Set the *excessBurstSize* attribute.

```
set Vr/1 Ip Policer/firewall Meter/1 be 0
```

**17** Set the *measurementInterval* attribute.

```
set Vr/1 Ip Policer/firewall Meter/1 t 1
```

**18** Add a *PolicedPhb* component.

```
add Vr/1 Ip Policer/firewall Meter/1 Phb/3
```

**19** Set the *IngressServices* attribute.

```
set Vr/1 Pp/1 Ip Is linkToPolicerProfile Vr/1 Ip
Policer/firewall
```

**20** Activate the configuration changes. For details, refer to “Activating configuration changes” (page 20).

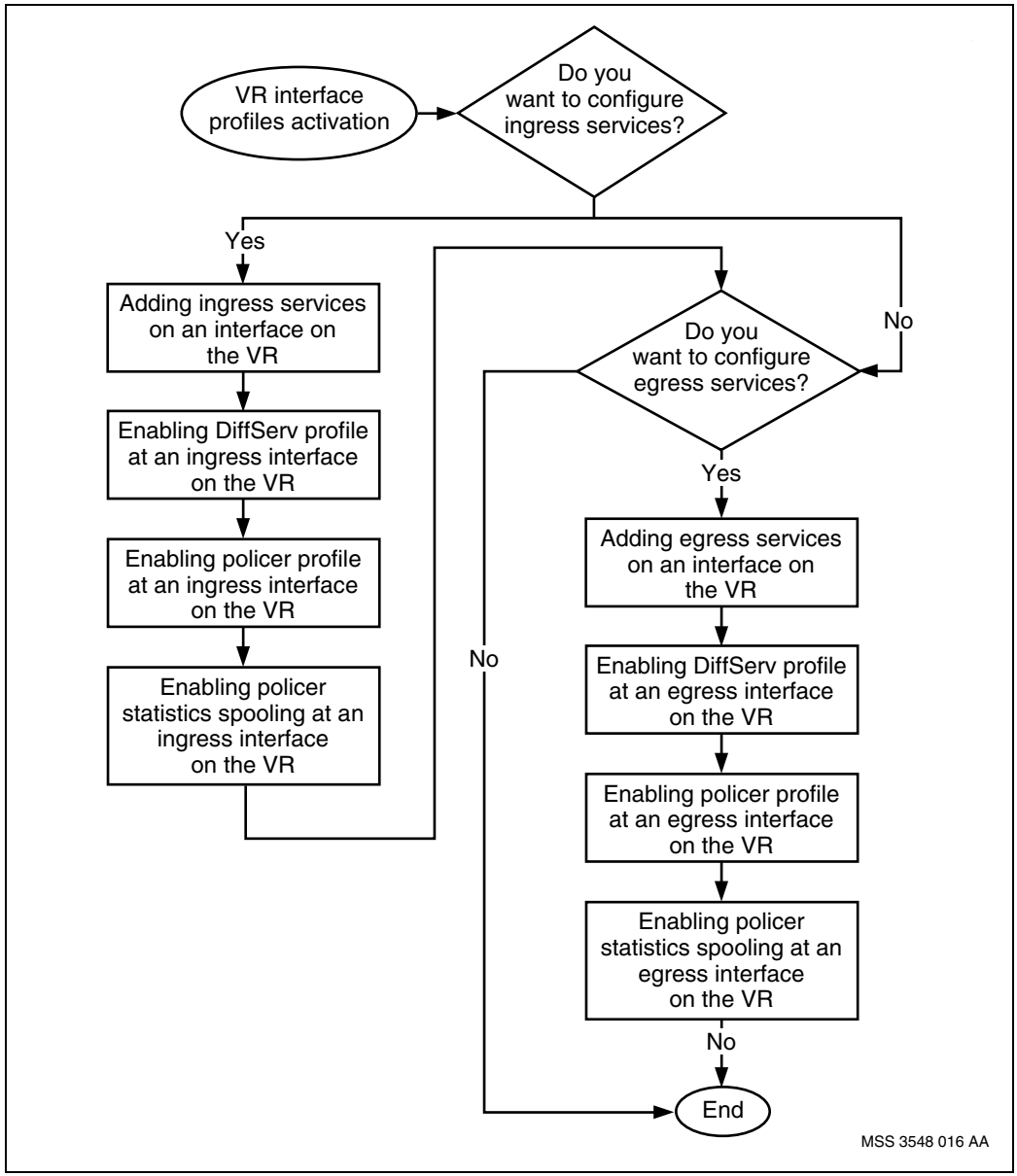
# Chapter 9
# VR interface profiles activation

Activate the interface profiles on the virtual router (VR) to enable the services provisioned under the differentiated services (DiffServ) and policer profiles.

## VR interface profiles activation procedures

This task flow shows you the sequence of procedures you perform to activate interface profiles on the VR. To link to any procedure, go to “VR interface profiles activation procedure navigation” (page 103).

**Figure 34**
**VR interface profiles activation procedures**



## VR interface profiles activation procedure navigation



For an example procedure on the VR interface profiles activation, see "Example procedure for VR interface profiles activation" (page 112).

# Adding ingress services on an interface on the VR

Add ingress services on an interface on the virtual router (VR) to allow the enabling of interface services.

## Procedure steps

1 Add the *IngressServices* component.

```
add Vr/<vr_name> Pp/<pp_name> IpPort Is
```

2 Set the *discardPriorityMode* attribute.

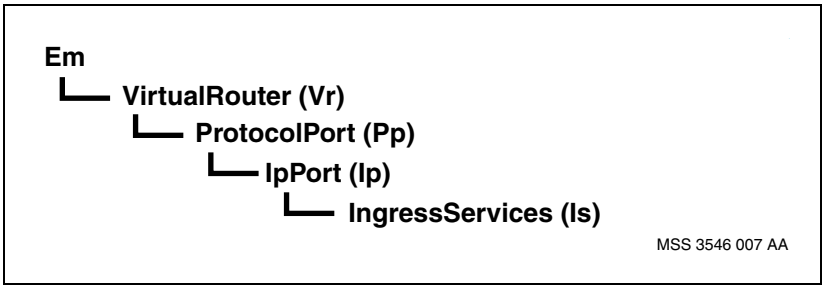
```
set Vr/<vr_name> Pp/<pp_name> IpPort Is dpmode
<dpmode>
```

## Variable definitions

| Variable | Value |
|---|---|
| <dpmode> | is the value that sets the drop precedence mode of IP traffic entering the interface. |
| <pp_name> | is the logical interface to the network. |
| <vr_name> | is the name of the virtual router. |
| | |

## Procedure job aid

**Figure 35**
**VR ingress services on an interface component hierarchy**



# Enabling DiffServ profile at an ingress interface on the VR

Enable a differentiated services (DiffServ) profile at an ingress interface on the virtual router (VR) to activate the services provisioned under the profile.

## Procedure steps

**1** Set the *linkToDiffServProfile* attribute.

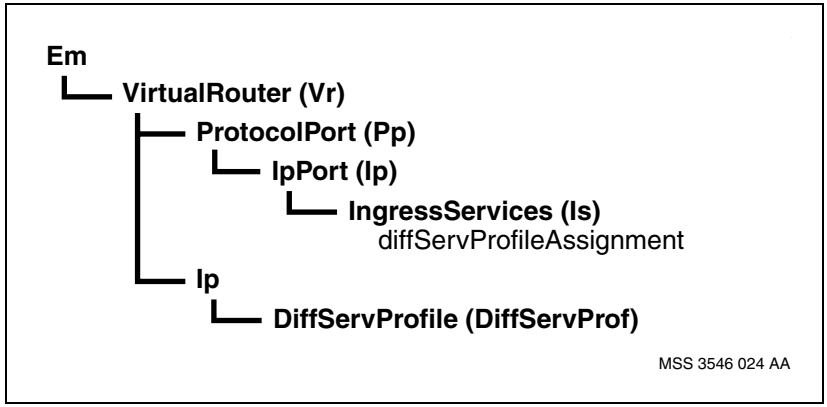
```
set Vr/<vr_name> Pp/<pp_name> Ip Is dsLink Vr/
<vr_name> Ip DiffServProf/<dsprof_name>
```

## Variable definitions

| Variable | Value |
|---|---|
| <dsprof_name> | is any mnemonic. |
| <pp_name> | is the logical interface to the network. |
| <vr_name> | is the name of the virtual router. |
| | |

## Procedure job aid

**Figure 36**
**VR DiffServ profile at an ingress interface component hierarchy**



# Enabling policer profile at an ingress interface on the VR

Enable a policer profile at an ingress interface on the virtual router (VR) to control the traffic received on the interface.

## Procedure steps

1 Set the *IngressServices* attribute.

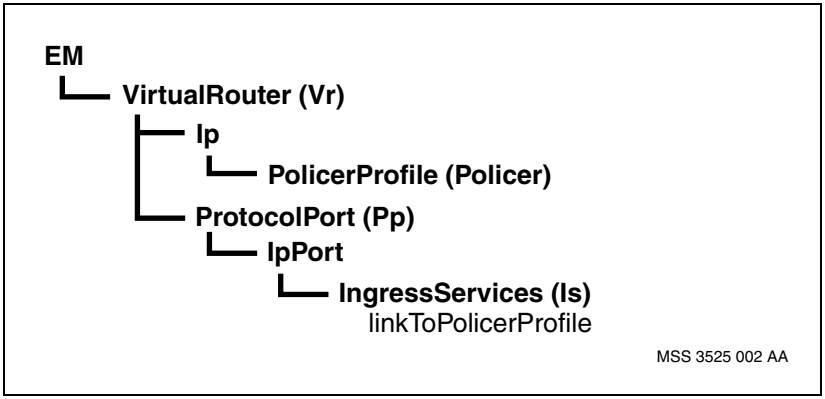
```
set Vr/<vr_name> Pp/<pp_name> Ip Is
linkToPolicerProfile Vr/<vr_name> Ip Policer/
<profile_name>
```

## Variable definitions

| Variable | Value |
|---|---|
| <pp_name> | is the logical interface to the network. |
| <profile_name> | is an instance of a policer profile that can be associated with one or more interfaces. |
| <vr_name> | is the name of the virtual router. |
| | |

## Procedure job aid

**Figure 37**
**VR policer profile at an ingress interface component hierarchy**



# Enabling policer statistics spooling at an ingress interface on the VR

Enable the policer statistics spooling at an ingress interface on the virtual router (VR) to collect data regarding the policer statistics at the IP interface. You can use policer statistics for traffic analysis. This analysis can help you identify the utilization of IP interface resources within a Multiservice Switch network.

## Procedure steps

1 Set the *policerStatsSpooling* attribute.

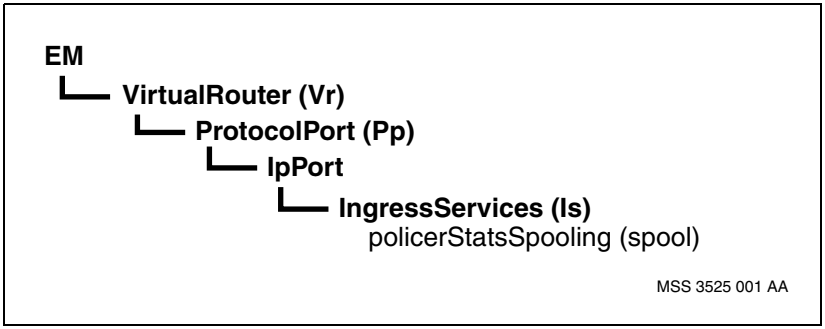
```
set Vr/<vr_name> Pp/<pp_name> Ip Is spool
<stats_value>
```

## Variable definitions

| Variable | Value |
|---|---|
| <pp_name> | is the logical interface to the network. |
| <stats_value> | is the value that specifies whether the statistics for the ingress services policer is spooled or not. |
| <vr_name> | is the name of the virtual router. |
| | |

## Procedure job aid

**Figure 38**
**VR policer statistics spooling at an ingress interface component hierarchy**



# Adding egress services on an interface on the VR

Add egress services on an interface on the virtual router (VR) to allow the enabling of interface services.

## Procedure steps

1 Add the *EgressServices* component.

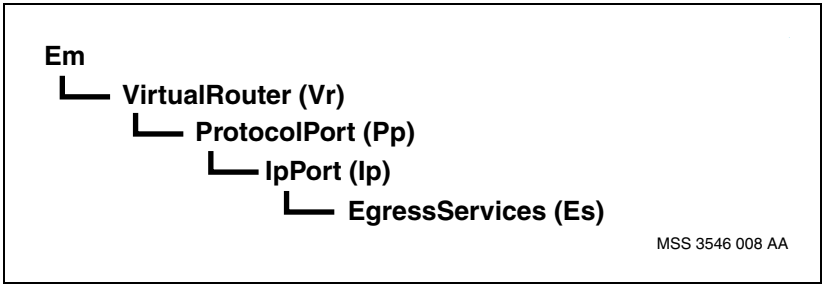
```
add Vr/<vr_name> Pp/<pp_name> Ip Es
```

## Variable definitions

| Variable | Value |
|---|---|
| <pp_name> | is the logical interface to the network. |
| <vr_name> | is the name of the virtual router. |
| | |

## Procedure job aid

**Figure 39**
**VR egress services on an interface component hierarchy**



# Enabling DiffServ profile at an egress interface on the VR

Enable a differentiated services (DiffServ) profile at an egress interface on the virtual router (VR) to activate the services provisioned under the profile.

## Procedure steps

**1** Set the *linkToDiffServProfile* attribute.

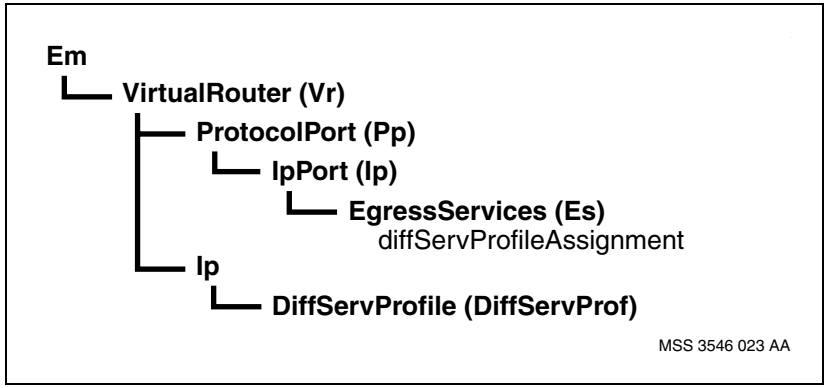
```
set Vr/<vr_name> Pp/<pp_name> Ip Es dsLink Vr/
<vr_name> Ip DiffServProf/<dsprof_name>
```

## Variable definitions

| Variable | Value |
|---|---|
| <dsprof_name> | is any mnemonic. |
| <pp_name> | is the logical interface to the network. |
| <vr_name> | is the name of the virtual router. |
| | |

## Procedure job aid

**Figure 40**
**VR DiffServ profile at an egress interface component hierarchy**



# Enabling policer profile at an egress interface on the VR

Enable a policer profile at an egress interface on the virtual router (VR) to control the traffic sent on the interface.

## Procedure steps

1 Set the *EgressServices* attribute.

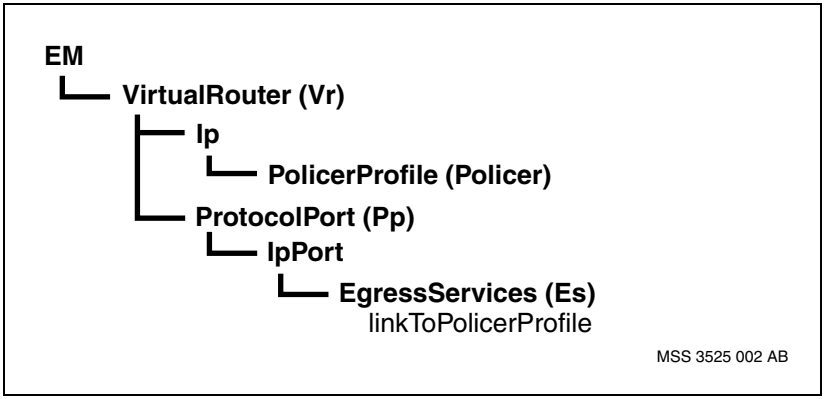
```
set Vr/<vr_name> Pp/<pp_name> Ip Es
linkToPolicerProfile Vr/<vr_name> Ip Policer/
<profile_name>
```

## Variable definitions

| Variable | Value |
|---|---|
| <pp_name> | is the logical interface to the network. |
| <profile_name> | is an instance of a policer profile that can be associated with one or more interfaces. |
| <vr_name> | is the name of the virtual router. |
| | |

## Procedure job aid

**Figure 41**
**VR policer profile at an egress interface component hierarchy**



# Enabling policer statistics spooling at an egress interface on the VR

Enable the policer statistics spooling at an egress interface on the virtual router (VR) to collect data regarding the policer statistics at the IP interface. You can use policer statistics for traffic analysis. This analysis can help you identify the utilization of IP interface resources within a Multiservice Switch network.

## Procedure steps

1 Set the *policerStatsSpooling* attribute.

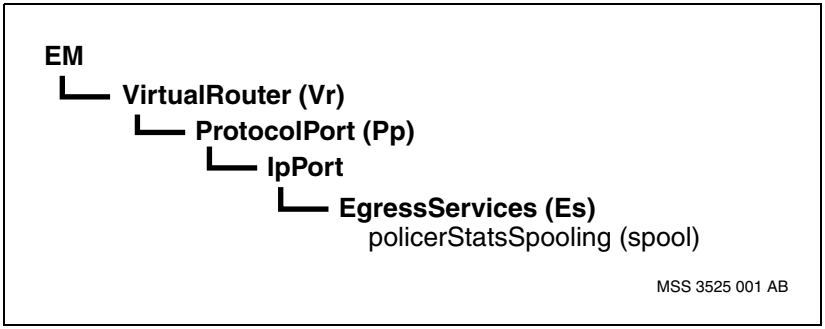
```
set Vr/<vr_name> Pp/<pp_name> Ip Es spool
<stats_value>
```

## Variable definitions

| Variable | Value |
|---|---|
| <pp_name> | is the logical interface to the network. |
| <stats_value> | is the value that specifies whether the statistics for the ingress services policer is spooled or not. |
| <vr_name> | is the name of the virtual router. |

## Procedure job aid

**Figure 42**
**VR policer statistics spooling at an egress interface component hierarchy**



# Example procedure for VR interface profiles activation

This is an example for enabling the interface profiles (ingress and egress interfaces) on the VR.

## Procedure steps

For the ingress services:

1 Add the *IngressServices* component.

```
add Vr/cvr1 Pp/fr1 IpPort Is
```

2 Set the *discardPriorityMode* attribute.

```
set Vr/cvr1 Pp/fr1 IpPort Is dpmode mapPhbToDp
```

3 Set the *linkToDiffServProfile* attribute.

```
set Vr/cvr1 Pp/fr1 IpPort Is dsLink Vr/cvr1 Ip
DiffServProf/mf_profile
```

4 Set the *IngressServices* attribute.

```
set Vr/cvr1 Pp/fr1 IpPort Is linkToPolicerProfile Vr/
cvr1 Ip Policer/policer1
```

5 Set the *policerStatsSpooling* attribute.

```
set Vr/cvr1 Pp/fr1 Ip Is spool on
```

For the egress services:

6 Add the *EgressServices* component.

```
add Vr/cvr1 Pp/fr1 IpPort Es
```

7 Set the *linkToDiffServProfile* attribute.

```
set Vr/cvr1 Pp/fr1 IpPort Es dsLink Vr/cvr1 Ip
DiffServProf/dscp_profile
```

8 Set the *EgressServices* attribute.

```
set Vr/cvr1 Pp/fr1 IpPort Es linkToPolicerProfile Vr/
cvr1 Ip Policer/policer2
```

9 Set the *policerStatsSpooling* attribute.

```
set Vr/cvr1 Pp/fr1 Ip Es spool on
```

# Chapter 10
# VR firewall configuration

Configure flow filters to create a more secure network by defining which IP packet flows are permitted or denied entry to the network.

## Prerequisites for VR firewall configuration

**CAUTION**

**VR flow filters and routing control traffic**

A filter configured to permit certain subnets to traverse the network via the port where you apply the filter automatically denies any remaining subnets. This action may deny routing control traffic, which can bring down the routing adjacency in your network.

Consider carefully the effect of any filter you configure on the routing control traffic (such as OSPF and BGP parcels) in your network before you assign the filter to the virtual router and IP ports. Always include an *Ip Filter FilterFlow* subcomponent that permits your routing control traffic.

If OSPF is configured to make use of IP Multicast destination addresses, an *IP Filter FilterFlow* subcomponent must be added where the *daPrefix* is set to 224.0.0.4 and the *daPrefixLength* is set to 30. This *FilterFlow* will permit packets destined to 224.0.0.5 (AllSPFRouters) and 224.0.0.6 (AllDRouters).

- IP flow filters cannot be assigned to IP tunnelling protocol ports.

- Add the *ipFilter* feature to the feature list of each FP that requires that feature. For more information, refer to NN10600-590 *Nortel Networks Multiservice Switch 7400/15000/20000 Layer 3 Traffic Management Fundamentals*.
- Use the tasks and procedures in NN10600-550 *Nortel Networks Multiservice Switch 7400/15000/20000 Common Configuration Procedures* if you require supporting information or need to provision or reconfigure any node or nodal elements to support *Filter* components.

## Procedure steps

1. Add a *Filter* component as a subcomponent of the *Ip* component.

   ```
   add Vr/<vr_name> Ip Filter/<filter_name>
   ```

2. Add a *FilterFlow* subcomponent to the *Filter* subcomponent.

   ```
   add Vr/<vr_name> Ip Filter/<filter_name> FilterFlow/
   <filterflow_number>
   ```

3. Set the *action* attribute.

   ```
   set Vr/<vr_name> Ip Filter/<filter_name> FilterFlow/
   <filterflow_number> action <action>
   ```

4. Set the *saPrefix* attribute of the *FilterFlow* subcomponent.

   ```
   set Vr/<vr_name> Ip Filter/<filter_name> FilterFlow/
   <filterflow_number> saPrefix <saPrefixAddress>
   ```

5. Set the *saPrefixLength* attribute of the *FilterFlow* subcomponent.

   ```
   set Vr/<vr_name> Ip Filter/<filter_name> FilterFlow/
   <filterflow_number> saPrefixLength <saPrefixLength>
   ```

6. Set the *daPrefix* attribute of the *FilterFlow* subcomponent.

   ```
   set Vr/<vr_name> Ip Filter/<filter_name> FilterFlow/
   <filterflow_number> daPrefix <daPrefixAddress>
   ```

7. Set the *daPrefixLength* attribute of the *FilterFlow* subcomponent.

   ```
   set Vr/<vr_name> Ip Filter/<filter_name> FilterFlow/
   <filterflow_number> daPrefixLength <daPrefixLength>
   ```

8. Assign the filter to a virtual router or a protocol port.

   To assign the filter to a virtual router:

**set Vr/<vr_name> Ip filterAssignment Vr/<vr_name> Ip Filter/<filter_name>**

To assign the filter to a protocol port:

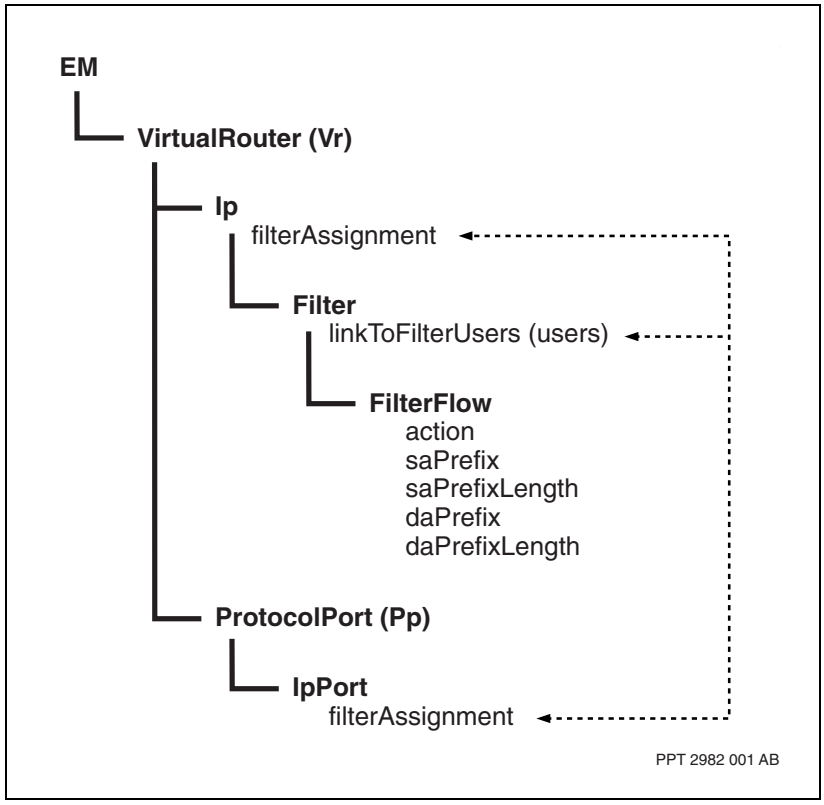
**set Vr/<vr_name> Pp/<pp_name> IpPort filterAssignment Vr/<vr_name> Filter/<filter_name>**

## Variable definitions

| Variable | Value |
|---|---|
| <action> | is the filter flow action attribute. Its value is permit or deny. |
| <daPrefixAddress> | is the IP destination address prefix for the flow. |
| <daPrefixLength> | is the number of most significant bits of an IP destination address that you want matched with the IP destination address prefix |
| <filter_name> | is the name of the filter. |
| <filterflow_number> | is the number of the flow filter. |
| <pp_name> | is the logical interface to the network. |
| <saPrefixAddress> | is the IP source address prefix for the flow. |
| <saPrefixLength> | is the number of most significant bits of an IP source address that you want matched with the IP source address prefix. |
| <vr_name> | is the name of the virtual router. |
| | |

## Procedure job aid

**Figure 43**
**VR firewall component hierarchy**



# Chapter 11
# RTR connection classes configuration

## Configuring connection classes for ATM MPE on the RTR

Configure connection classes for ATM MPE on the router (RTR) to control the multi-connection and single connection congestion.

***Note:*** If there are multiple ATM MPE AtmConnections under an ATM MPE interface with the same connection class, only one registers with the IP ARP table. If that AtmConnection goes down, another *AtmMpe Ac* component with that connection class will register with the IP ARP table.

### Prerequisites

- For details on configuring ATM MPE AtmConnections, see the procedure on Configuring an ATM PVC for an ATM MPE interface in NN10600-801 *Nortel Networks Multiservice Switch 7400/15000/20000 IP Configuration Management*.
- If the router has ATM backbone connections, it is advisable to provision the ATM media under the ATM interfaces for four emission priorities. For more information, see the procedure on Configuring ATM media for multi link congestion control in NN10600-582 *Nortel Networks Multiservice Switch 7400/15000/20000 VPN Configuration Management*. Otherwise, scheduling class differentiation will not occur.

### Procedure steps

1 Add and set the connection class for the ATM connection.

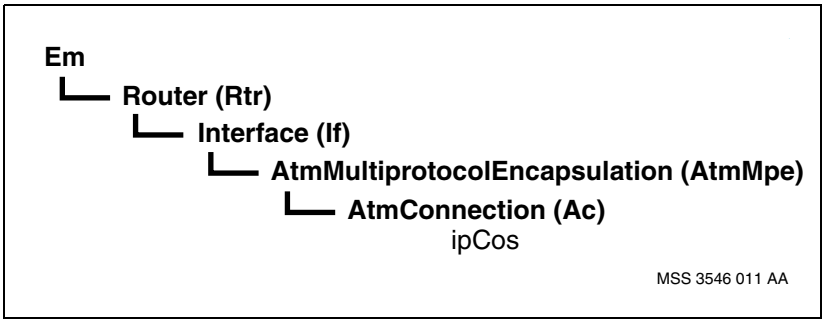
```
add -s Rtr/<router_name> If/<ip_address> AtmMpe/<mpe>
Ac/<ac> ipCos <cos>
```

## Variable definitions

| Variable | Value |
|---|---|
| <ac> | is the instance number of the AtmMpe AtmConnection (AC). |
| <cos> | is the connection class value associated with the AtmMpe AC. Nortel Networks Multiservice Switch systems use this value to select an AC for outgoing IP packets. |
| <ip_address> | is the 32-bit address assigned to this interface. |
| <mpe> | is the instance number of the ATM MPE interface. |
| <router_name> | is any mnemonic. |
| | |

## Procedure job aid

**Figure 44**
**RTR connection classes for ATM MPE component hierarchy**



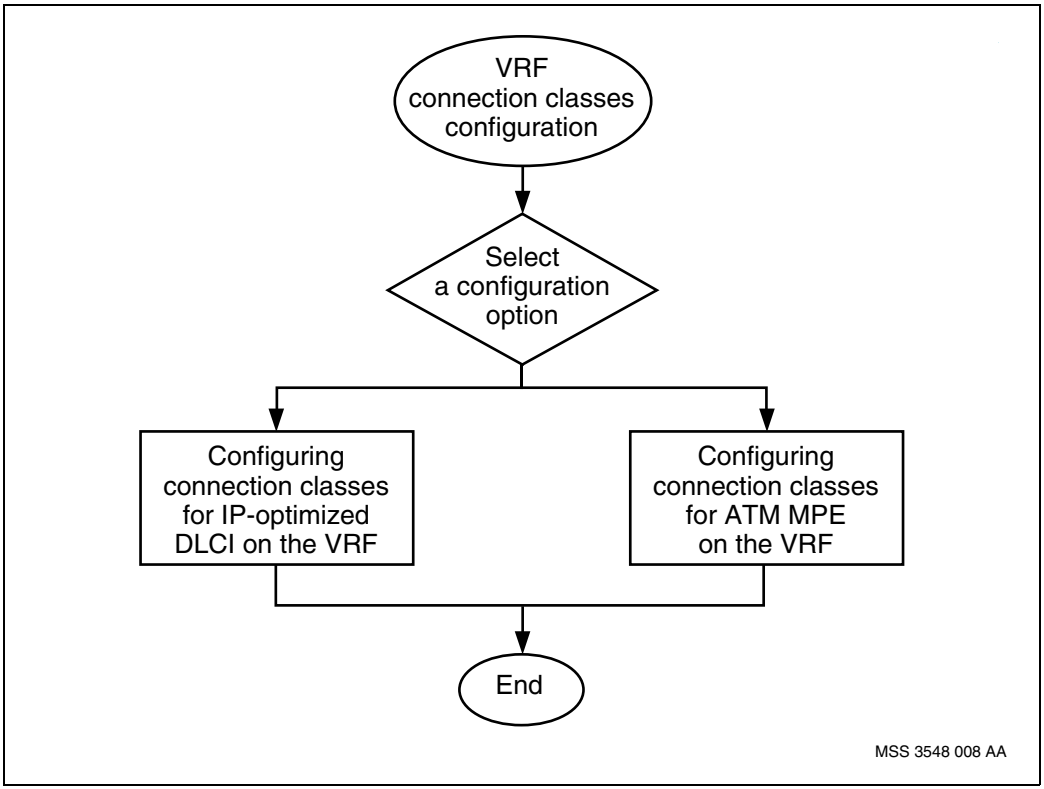
# Chapter 12
# VRF connection classes configuration

Configure the VPN route forwarder (VRF) connection classes to at Layer 2 interfaces to support virtual circuit selection.

## VRF connection classes configuration procedures

This task flow shows you the sequence of procedures you perform to configure connection classes on the VRF. To link to any procedure, go to “VRF connection classes configuration procedure navigation” (page 120).

**Figure 45**
**VRF connection classes configuration procedures**




## VRF connection classes configuration procedure navigation

- "Configuring connection classes for IP-optimized DLCI on the VRF" (page 121)
- "Configuring connection classes for ATM MPE on the VRF" (page 123)

For an example for the VRF connection classes configuration, see "Example procedure for VRF connection classes configuration" (page 125)

# Configuring connection classes for IP-optimized DLCI on the VRF

Configure connection classes for IP-optimized DLCI on the VPN route forwarder (VRF) to control the multi-connection and single connection congestion.

***Note 1:*** If there are multiple frame relay connections under an IP-optimized DLCI with the same connection class value, only one registers with the IP ARP table.

***Note 2:*** If you add a static DLCI with a different connection class to a *Ip Dlci Group* component that has other DLCIs in operation, lock and unlock the *IpPort* component of the IP-optimized DLCI interface's linked protocol port.

## Prerequisites

- For details on configuring IP-optimized DLCIs, see the procedure on the VR IP-optimized DLCI access media configuration in NN10600-801 *Nortel Networks Multiservice Switch 7400/15000/20000 IP Configuration Management*.

## Procedure steps

1 Add and set the connection class value for DLCI.

```
add -s Rtr/<router_name> Vrf/<vrf_name> If/
<ip_address> IpoDlci/<dlci_value> Frc/<frc> ipCos
<cos>
```

## Variable definitions

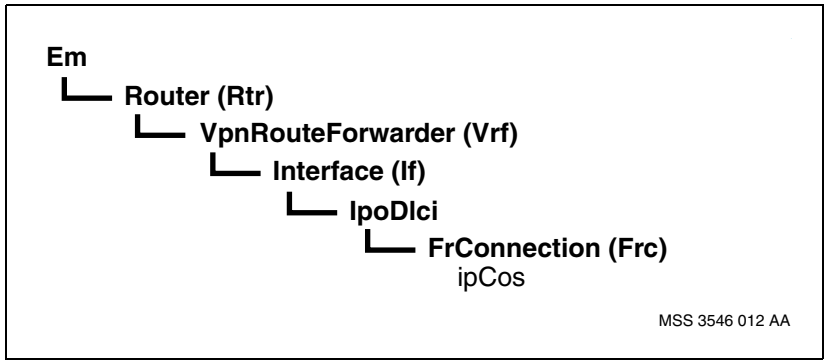
| Variable | Value |
|---|---|
| <cos> | is the connection class value associated with the static DLCI. Nortel Networks Multiservice Switch systems use this value to select a DLCI for outgoing IP packets. |
| <dlci_value> | is the instance value of the interface between the virtual router protocol port and the IP-optimized DLCI. |
| <frc> | is the instance value of the frame relay connection. |

(Sheet 1 of 2)

| Variable | Value |
|---|---|
| <ip_address> | is the 32-bit address assigned to this interface. |
| <router_name> | is any mnemonic. |
| <vrf_name> | is any mnemonic. |
| (Sheet 2 of 2) | |

## Procedure job aid

**Figure 46**
**VRF connection classes for IP-optimized DLCI component hierarchy**



# Configuring connection classes for ATM MPE on the VRF

Configure connection classes for ATM MPE on the VPN route forwarder (VRF) to control the multi-connection and single connection congestion.

***Note:*** If there are multiple ATM MPE AtmConnections under an ATM MPE interface with the same connection class value, only one registers with the IP ARP table. If that AtmConnection goes down, another *AtmMpe Ac* component with that connection class value will register with the IP ARP table.

## Prerequisites

- For details on configuring ATM MPE AtmConnections, see the procedure on Configuring an ATM PVC for an ATM MPE interface in NN10600-801 *Nortel Networks Multiservice Switch 7400/15000/20000 IP Configuration Management*.
- If the router has ATM backbone connections, it is advisable to provision the ATM media under the ATM interfaces for four emission priorities. For more information, see the procedure on Configuring ATM media for multi link congestion control in NN10600-582 *Nortel Networks Multiservice Switch 7400/15000/20000 VPN Configuration Management*. Otherwise, scheduling class differentiation will not occur.

## Procedure steps

1 Add and set the connection class for the ATM connection.

```
add -s Rtr/<router_name> Vrf/<vrf_name> If/
<ip_address> AtmMpe/<mpe> Ac/<ac> ipCos <cos>
```

## Variable definitions

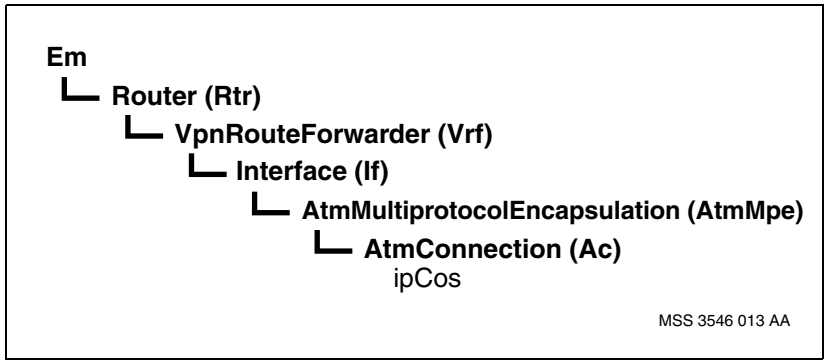
| Variable | Value |
|---|---|
| <ac> | is the instance number of the AtmMpe AtmConnection (AC). |
| <cos> | is the connection class value associated with the AtmMpe AC. Nortel Networks Multiservice Switch systems use this value to select a AC for outgoing IP packets. |
| <ip_address> | is the 32-bit address assigned to this interface. |

(Sheet 1 of 2)

| Variable | Value |
|---|---|
| <mpe> | is the instance number of the ATM MPE interface. |
| <router_name> | is any mnemonic. |
| <vrf_name> | is any mnemonic. |
| (Sheet 2 of 2) | |

## Procedure job aid

**Figure 47**
**VRF connection classes for ATM MPE component hierarchy**



# Example procedure for VRF connection classes configuration

This is an example procedure for configuring connection classes on the VRF.

In this example procedure, an IP address in the network is identified as x.x.x.x.

## Procedure steps

To configure connection classes for IP-optimized DLCI:

1 If one does not already exist, create an IP-optimized DLCI to the next IP hop for a specific connection class.

```
add Rtr/1 Vrf/1 If/x.x.x.x IpoDlciGroup/20
```

When you add *IpoDlciGroup/20*, *Frc/1* and *ipCos 0* are added automatically.

2 Add the *FrConnection* component.

```
add Rtr/1 Vrf/1 If/x.x.x.x IpoDlciGroup/20 Frc/2

add Rtr/1 Vrf/1 If/x.x.x.x IpoDlciGroup/20 Frc/3

add Rtr/1 Vrf/1 If/x.x.x.x IpoDlciGroup/20 Frc/4
```

3 Assign a connection class value to the DLCI.

```
set Rtr/1 Vrf/1 If/x.x.x.x IpoDlciGroup/20 Frc/1
ipCos 0

set Rtr/1 Vrf/1 If/x.x.x.x IpoDlciGroup/20 Frc/2
ipCos 1

set Rtr/1 Vrf/1 If/x.x.x.x IpoDlciGroup/20 Frc/3
ipCos 2

set Rtr/1 Vrf/1 If/x.x.x.x IpoDlciGroup/20 Frc/4
ipCos 3
```

To configure connection classes for ATM MPE:

4 If one does not already exist, create an ATM MPE AtmConnection to the next IP hop for a specific connection class.

```
add Rtr/1 Vrf/1 If/x.x.x.x AtmMpe/30
```

When you add *AtmMpe/30*, *Ac/1* and *ipCos 0* are added automatically.

**5** Add the *AtmConnection* component.

```
add Rtr/1 Vrf/1 If/x.x.x.x AtmMpe/30 Ac/2 ipCos 1
add Rtr/1 Vrf/1 If/x.x.x.x AtmMpe/30 Ac/3 ipCos 2
add Rtr/1 Vrf/1 If/x.x.x.x AtmMpe/30 Ac/4 ipCos 3
```

**6** Assign a connection class value to the *AtmConnection* component.

```
set Rtr/1 Vrf/1 If/x.x.x.x AtmMpe/30 Ac/1 ipCos 0
set Rtr/1 Vrf/1 If/x.x.x.x AtmMpe/30 Ac/2 ipCos 1
set Rtr/1 Vrf/1 If/x.x.x.x AtmMpe/30 Ac/3 ipCos 2
set Rtr/1 Vrf/1 If/x.x.x.x AtmMpe/30 Ac/4 ipCos 3
```

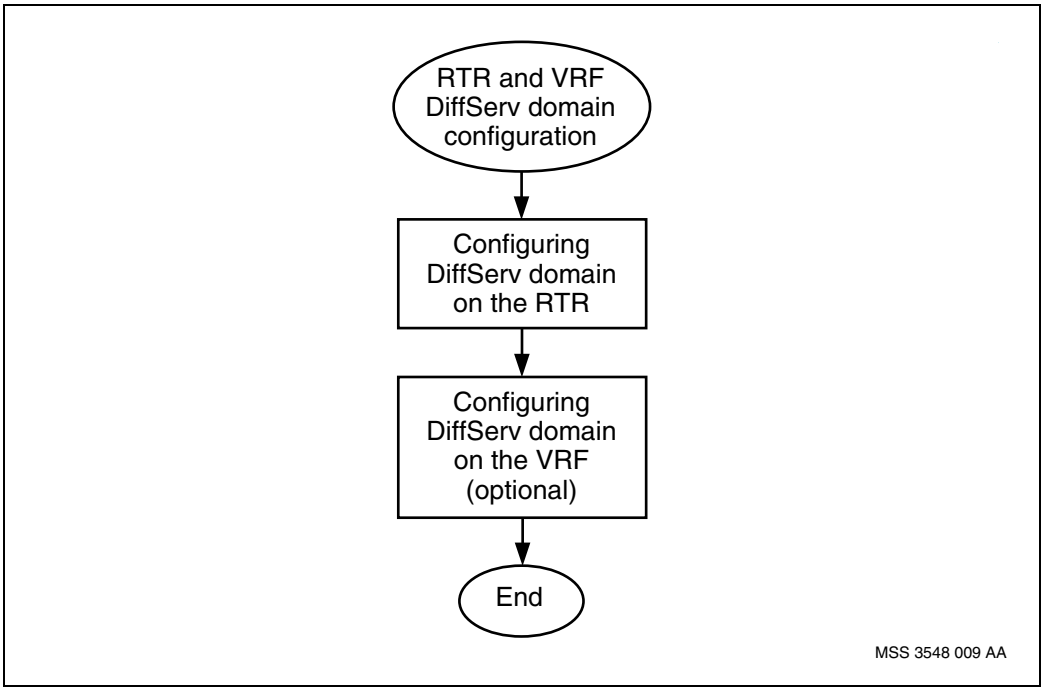
# Chapter 13
# RTR and VRF DiffServ domain configuration

Configure the differentiated services (DiffServ) domain on the VPN route forwarder (VRF) and the router (RTR) to support DiffServ and to include the VRF and RTR in a group (domain) of routers that have the same per-hop behavior (PHB) definitions.

## RTR and VRF DiffServ domain configuration procedures

This task flow shows you the sequence of procedures you perform to configure a DiffServ domain on the RTR and VRF. To link to any procedure, go to "RTR and VRF DiffServ domain procedure navigation" (page 128).

**Figure 48**
**RTR and VRF DiffServ domain configuration procedures**




## RTR and VRF DiffServ domain procedure navigation

- "Configuring DiffServ domain on the RTR" (page 129)
- "Configuring DiffServ domain on the VRF" (page 131)

# Configuring DiffServ domain on the RTR

Configure a differentiated services (DiffServ) domain on the router (RTR) to to include the RTR in a group (domain) of routers that have the same per-hop behavior (PHB) definitions.

***Note:*** If a *DifferentiatedServicesDomain* (*DSD*) component is not added, the router operates as if the Dsd/cu domain had been added.

## Procedure steps

1 Add a *DifferentiatedServicesDomain* (*DSD*) component to the router.

```
add Rtr/<router_name> Dsd/<domain_type>
```

When you add the *DifferentiatedServicesDomain* (*DSD*) component to the RTR, the following components are added automatically: *PerHopBehavior (Phb)*, *TrafficClass (Tc)*, *MplsServiceMap (MplsMap)*, *ExperimentalBitsMap (ExpMap), PerHopBehaviorMap (PhMap)*, and *MarkingPerformance*. The automatic configuration of those components varies depending on the *Dsd* component instance used. For more information, refer to the NN10600-590 *Nortel Networks Multiservice Switch 7400/15000/20000 Layer 3 Traffic Management Fundamentals*.

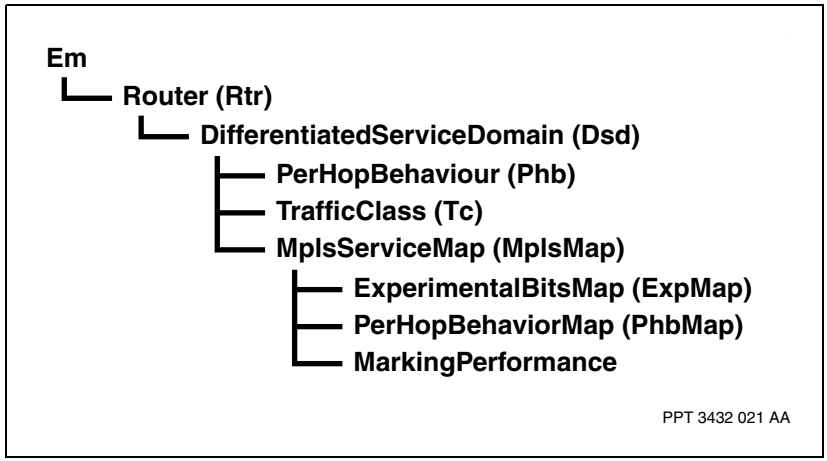
The selected default configuration of the DSD can be modified, but reconfiguration is generally not necessary. For information on each component and its attributes, see NN10600-060 *Nortel Networks Multiservice Switch 7400/15000/20000 Component Reference*.

## Variable definitions

| Variable | Value |
|---|---|
| <domain_type> | is the instance value of the DiffServ domain. |
| <router_name> | is any mnemonic. |
| | |

## Procedure job aid

**Figure 49**
**RTR DiffServ domain component hierarchy**



# Configuring DiffServ domain on the VRF

Configure a *DifferentiatedServicesDomain* (*DSD*) component on the VPN route forwarder (VRF) to define the treatment of IP packets forwarded by the VRF to the CE.

***Note:*** If a *DifferentiatedServicesDomain* (*DSD*) component is not added to the VRF, the VRF inherits the *DSD* configuration of the router. If the router does not have a *DSD* component, the VRF operates as if the Dsd/cu domain had been added.

## Procedure steps

1 Add a *DifferentiatedServicesDomain* (*DSD*) component to the VRF.

```
add Rtr/<router_name> Vrf/<vrf_name> Dsd/<domain_type>
```

When you add the *DifferentiatedServicesDomain* (*DSD*) component to the VRF, the following components are added automatically: *PerHopBehavior (Phb)* and *TrafficClass (Tc)*. The automatic configuration of the *Phb* and *Tc* components varies depending on the *Dsd* component instance used. For more information, refer to the NN10600-590 *Nortel Networks Multiservice Switch 7400/15000/20000 Layer 3 Traffic Management Fundamentals*.

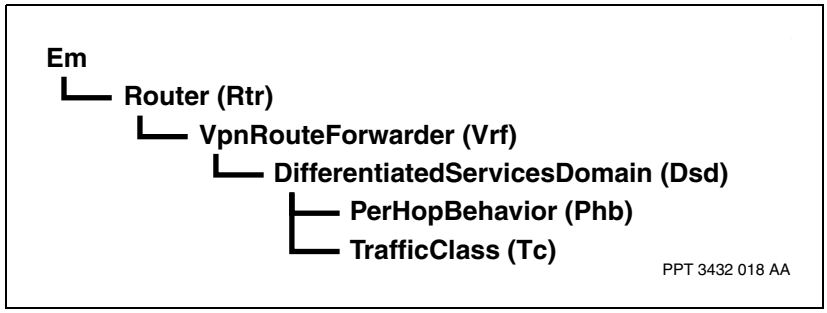
The selected default configuration of the DSD can be modified, but reconfiguration is generally not necessary. For information on each component and its attributes, see NN10600-060 *Nortel Networks Multiservice Switch 7400/15000/20000 Component Reference*.

## Variable definitions

| Variable | Value |
|---|---|
| <domain_type> | is the instance value of the DiffServ domain. |
| <router_name> | is any mnemonic. |
| <vrf_name> | is any mnemonic. |
| | |

## Procedure job aid

**Figure 50**
**VRF DiffServ domain component hierarchy**



# Chapter 14
# RTR MPLS service map configuration

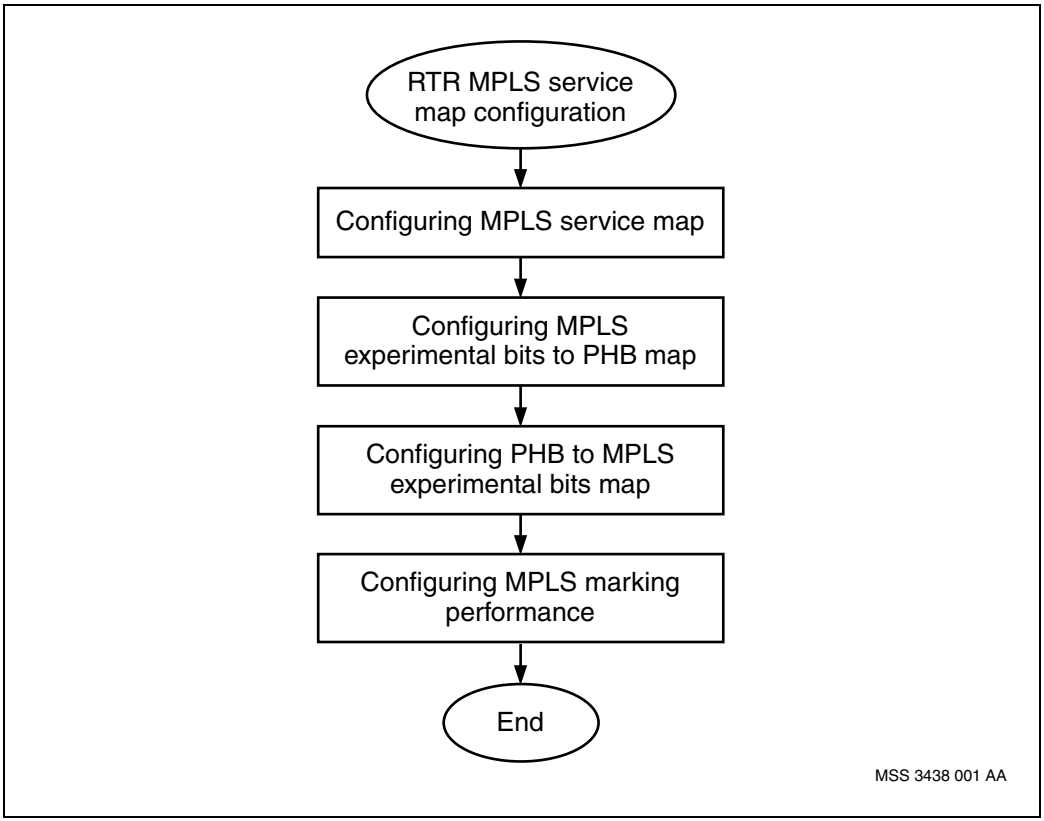
Configure the router (RTR) multiprotocol label switching (MPLS) service map for congestion control of MPLS packets.

For more information about the MPLS service map, refer to NN10600-590 *Nortel Networks Multiservice Switch 7400/15000/20000 Layer 3 Traffic Management Fundamentals*.

## RTR MPLS service map configuration procedures

This task flow shows you the sequence of procedures you perform to configure the MPLS service map on the router. To link to any procedure, go to "RTR MPLS service map configuration procedure navigation" (page 134).

**Figure 51**
**RTR MPLS service map configuration procedures**




# RTR MPLS service map configuration procedure navigation

- "Configuring MPLS service map" (page 135)
- "Configuring MPLS experimental bits to PHB map" (page 137)
- "Configuring PHB to MPLS experimental bits map" (page 138)
- "Configuring MPLS marking performance" (page 139)

For an example procedure for the RTR MPLS service map configuration, see "Example procedure for the RTR MPLS service map configuration" (page 140).

# Configuring MPLS service map

Configure the multiprotocol label switching (MPLS) service map to specify mappings used to control how MPLS packets are forwarded over a label switched path (LSP).

## Procedure steps

1 Add the *MplsServiceMap* (*MplsMap*) component.

```
add Rtr/<router_name> Dsd/<domain_type> MplsMap/0
```

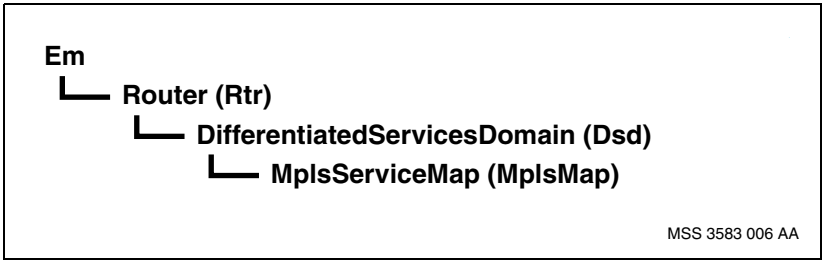
When you add the *MplsMap* component, the following components are added automatically: *ExperimentalBitsMap* (*ExpMap*), *MarkingPerformance*, and *PerHopBehaviorMap* (*PhbMap*).

## Variable definitions

| Variable | Value |
|---|---|
| <domain_type> | is the instance value of the DiffServ domain. |
| <router_name> | is any mnemonic. |
| | |

## Procedure job aid

**Figure 52**
**MPLS service map component hierarchy**



# Configuring MPLS experimental bits to PHB map

Configure a MPLS experimental bits to PHB map to specify the per-hop behavior (PHB) assigned to the MPLS packets.

## Procedure steps

1 Set the *experimentalBits* (*exp*) attribute.

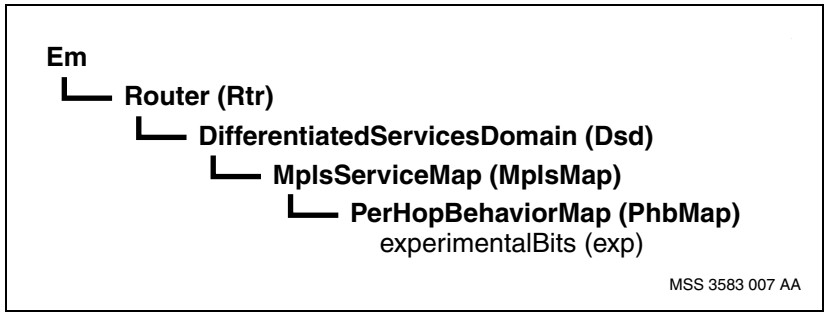
```
set Rtr/<router_name> Dsd/<domain_type> MplsMap/
<mpls_map> PhbMap/<phb_map> exp <exp_value>
```

## Variable definitions

| Variable | Value |
|---|---|
| <domain_type> | is the instance value of the DiffServ domain. |
| <exp_value> | specifies the value of the *experimentalBits* attribute. |
| <mpls_map> | is the instance of the *MplsServiceMap* component. |
| <phb_map> | is the instance of the *PerHopBehaviorMap* component. |
| <router_name> | is any mnemonic. |
| | |

### Procedure job aid

**Figure 53**
**MPLS experimental bits to PHB map component hierarchy**



# Configuring PHB to MPLS experimental bits map

Configure a PHB to MPLS experimental bits map to specify the value marked into the experimental bit field of the MPLS header used to encapsulate a packet.

## Procedure steps

1 Set the *perHopBehavior* (*phb*) attribute for the *ExperimentalBitsMap* (*ExpMap*) component.

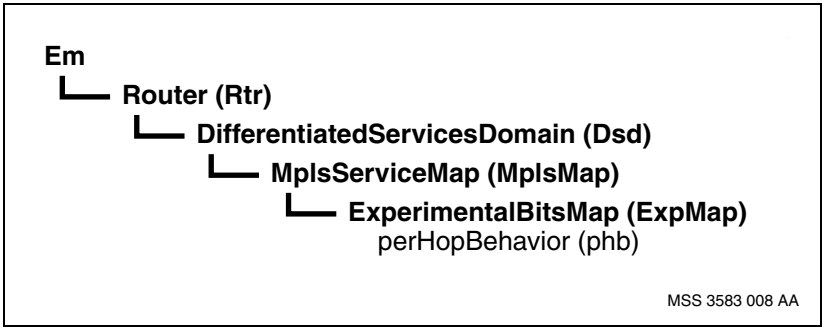
```
set Rtr/<router_name> Dsd/<domain_type> MplsMap/
<mpls_map> ExpMap/<exp_map> phb <phb>
```

## Variable definitions

| Variable | Value |
|---|---|
| <domain_type> | is the instance value of the DiffServ domain. |
| <exp_map> | is the instance of the *ExperimentalBitsMap* component. |
| <mpls_map> | is the instance of the *MplsServiceMap* component. |
| <phb> | is the instance of the *perHopBehavior* attribute. |
| <router_name> | is any mnemonic. |
| | |

### Procedure job aid

**Figure 54**
**PHB to MPLS experimental bits map component hierarchy**



# Configuring MPLS marking performance

Configure the MPLS marking performance to specify the value marked into the experimental bit field of the MPLS header used to encapsulate a packet.

## Procedure steps

1 Set the *MarkingPerformance* component with the *expermentalBitsAlternative* (*expAlt*) attribute.

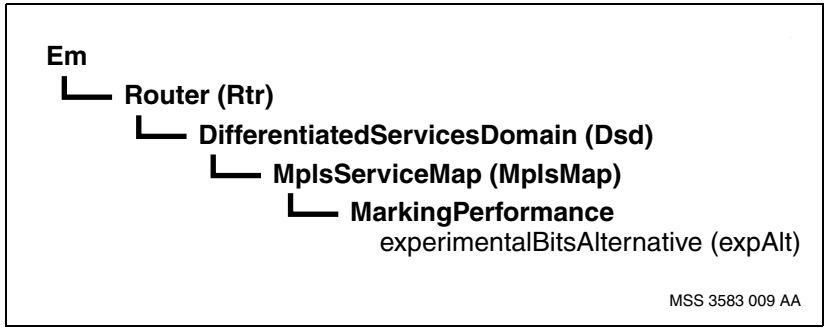
```
set Rtr/<router_name> Dsd/<domain_type> MplsMap/
<mpls_map> MarkingPerformance expAlt <exp_alt_index>
<exp_alt_value>
```

## Variable definitions

| Variable | Value |
|---|---|
| <domain_type> | is the instance value of the DiffServ domain. |
| <exp_alt_index> | is the index of the *expermentalBitsAlternative* attribute. |
| <exp_alt_value> | is the value of the *expermentalBitsAlternative* attribute. |
| <mpls_map> | is the instance of the *MplsServiceMap* component. |
| <router_name> | is any mnemonic. |
| | |

### Procedure job aid

**Figure 55**
**MPLS marking performance component hierarchy**



# Example procedure for the RTR MPLS service map configuration

This is an example procedure for the RTR MPLS service map configuration.

## Procedure steps

1. Add the *MplsServiceMap* (*MplsMap*) component.

   ```
   add Rtr/vcg Dsd/ms MplsMap/0
   ```

   When you add the *MplsMap* component, the following components are added automatically: *ExperimentalBitsMap* (*ExpMap*), *MarkingPerformance*, and *PerHopBehaviorMap* (*PhbMap*).

2. Set the *experimentalBits* (*exp*) component.

   ```
   set Rtr/vcg Dsd/ms MplsMap/0 PhbMap/df exp 0
   ```

3. Set the *perHopBehavior* (*phb*) for the *ExperimentalBitsMap* (*ExpMap*) component.

   ```
   set Rtr/vcg Dsd/ms MplsMap/0 ExpMap/0 phb 0
   ```

4. Set the *MarkingPerformance* component with the *expermentalBitsAlternative* (*expAlt*) attribute.

   ```
   set Rtr/vcg Dsd/ms MplsMap/0 MarkingPerformance
   expAlt 0 2
   ```

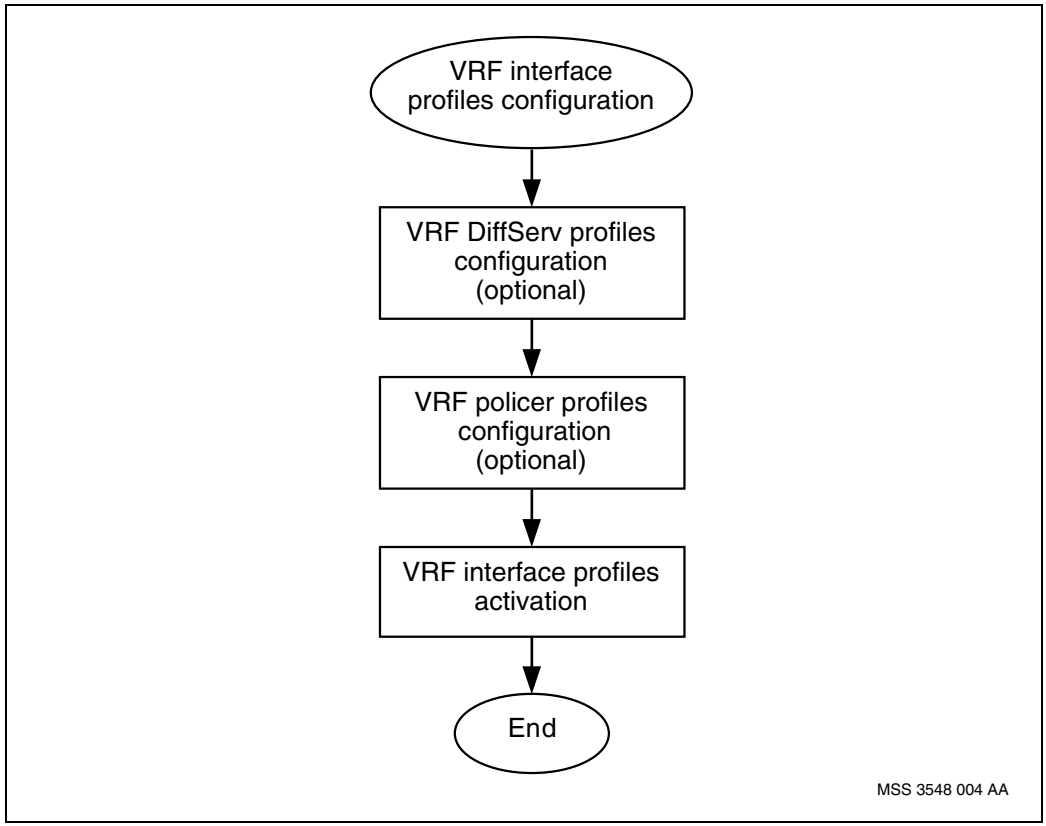
# Chapter 15
# VRF interface profiles configuration

Configure the interface profiles on the VPN route forwarder (VRF) to o manage IP traffic that is received and transmitted at an interface on a VRF.

## VRF interface profiles configuration tasks

This work flow shows you the sequence of tasks you perform to configure interface profiles on the VR. To link to any task, go to “VRF interface profiles configuration task navigation” (page 142).

**Figure 56**
**VRF interface profiles configuration tasks**




## VRF interface profiles configuration task navigation

- “VRF DiffServ profiles configuration” (page 143)
- “VRF policer profiles configuration” (page 159)
- “VRF interface profiles activation” (page 183)

# Chapter 16
# VRF DiffServ profiles configuration

Configure the differentiated services (DiffServ) profile on the VPN route forwarder (VRF) to classify and mark packets that are transmitted and received on the IP port interfaces.

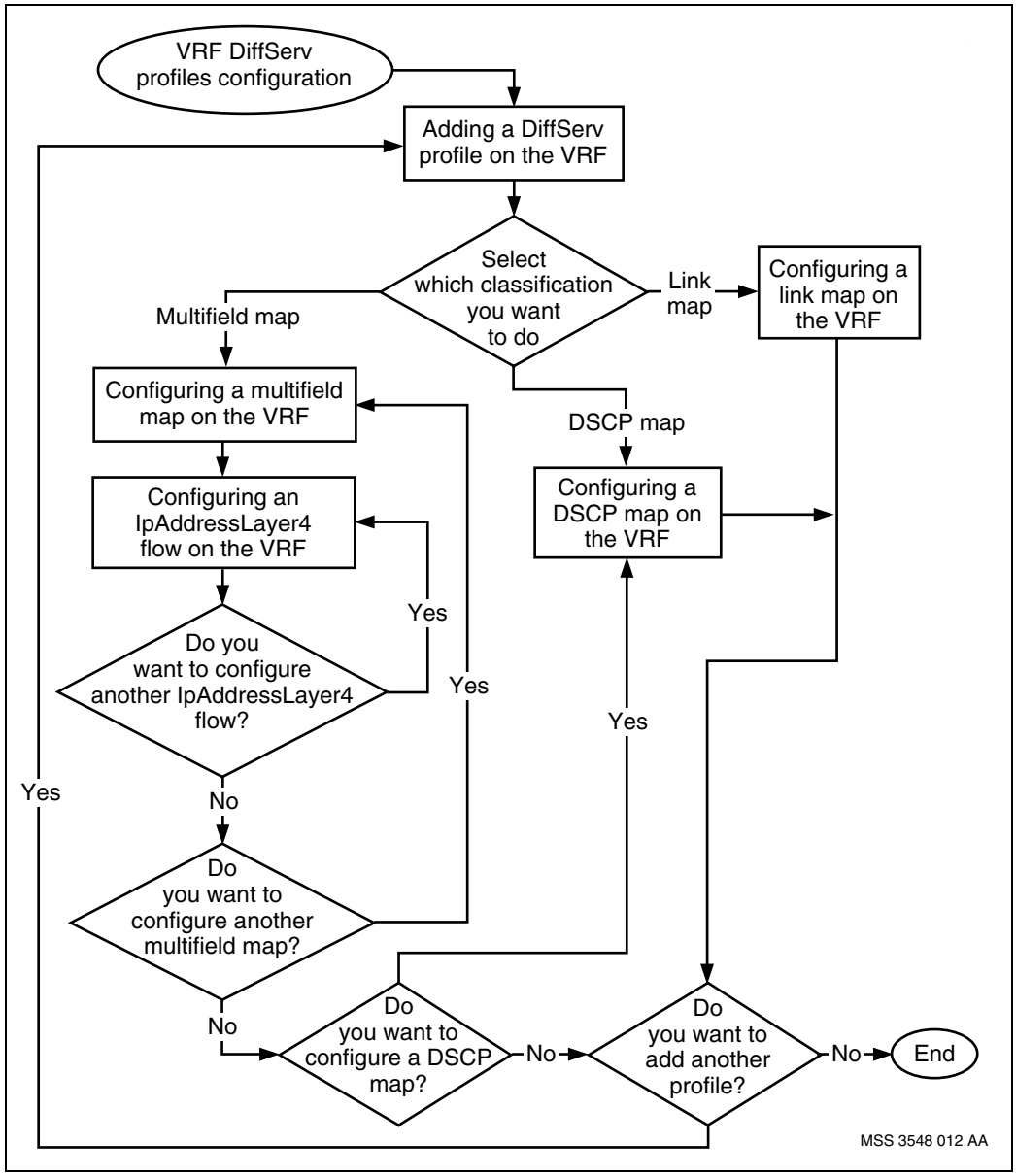
## Prerequisites for VRF DiffServ profiles configuration

- Add the *ipDiffServ* feature to the feature list of each FP that requires that feature. For more information, refer to NN10600-590 *Nortel Networks Multiservice Switch 7400/15000/20000 Layer 3 Traffic Management Fundamentals*.
- Use the tasks and procedures in NN10600-550 *Nortel Networks Multiservice Switch 7400/15000/20000 Common Configuration Procedures* if you require supporting information or need to provision or reconfigure any node or nodal elements to support *DiffServProfile* components.

## VRF DiffServ profiles configuration procedures

This task flow shows you the sequence of procedures you perform to configure a DiffServ profile on the VRF. To link to any procedure, go to "VRF Diffserv profiles configuration procedure navigation" (page 145).

**Figure 57**
**VRF DiffServ profiles configuration procedures**



## VRF Diffserv profiles configuration procedure navigation



For example procedures for the VRF DiffServ profiles configuration, see:

# Adding a DiffServ profile on the VRF

Configure a differentiated services (DiffServ) profile to define traffic classification marking criteria for the packets transmitted and received on the VPN route forwarder (VRF) interface.

## Procedure steps

1 Add a *DiffServProfile* component.

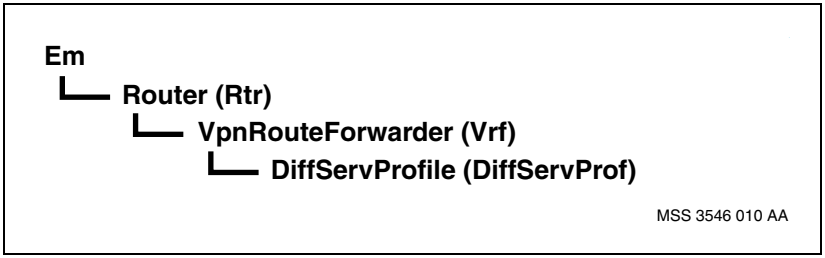
```
add Rtr/<router_name> Vrf/<vrf_name> DiffServProf/
<dsprof_name>
```

## Variable definitions

| Variable | Value |
|---|---|
| <dsprof_name> | is any mnemonic. |
| <router_name> | is any mnemonic. |
| <vrf_name> | is any mnemonic. |
| | |

## Procedure job aid

**Figure 58**
**VRF DiffServ Profile component hierarchy**



# Configuring a multifield map on the VRF

Configure a multifield map to define the traffic conditioning rules for the traffic stream on the VRF interfaces.

## Procedure steps

1 Add *MultiFieldMap* component.

```
add Rtr/<router_name> Vrf/<vrf_name> DiffServProf/
<dsprof_name> MfMap/<map_name>
```

2 Set the *assignedPhb* attribute.

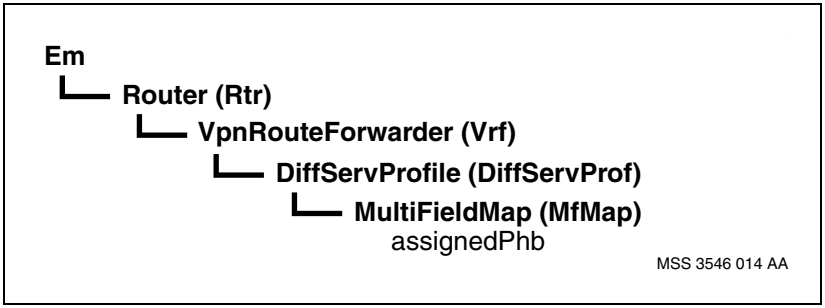
```
set Rtr/<router_name> Vrf/<vrf_name> DiffServProf/
<dsprof_name> MfMap/<map_name> assignedPhb <phb_value>
```

## Variable definitions

| Variable | Value |
|---|---|
| <dsprof_name> | is any mnemonic. |
| <map_name> | is any mnemonic. |
| <phb_value> | is the PHB assigned to the packet which determines the value of the DSCP field after translation. |
| <router_name> | is any mnemonic. |
| <vrf_name> | is any mnemonic. |
| | |

## Procedure job aid

**Figure 59**
**VRF multifield map component hierarchy**



# Configuring an IpAddressLayer4 flow on the VRF

Configure an IpAddressLayer4 flow to identify the multifield criteria for the IP flow received on the VRF interface.

## Procedure steps

1. Add the *IpAddressLayer4Flow* component.

   ```
   add Rtr/<router_name> Vrf/<vrf_name> DiffServProf/
   <dsprof_name> MfMap/<map_name> IpAddressLayer4Flow/
   <layer4flow_value>
   ```

2. Set the *prefix* attribute.

   ```
   set Rtr/<router_name> Vrf/<vrf_name> DiffServProf/
   <dsprof_name> MfMap/<map_name> IpAddressLayer4Flow/
   <layer4flow_value> prefix <prefix_value>
   ```

3. Set the *prefixLength* attribute.

   ```
   set Rtr/<router_name> Vrf/<vrf_name> DiffServProf/
   <dsprof_name> MfMap/<map_name> IpAddressLayer4Flow/
   <layer4flow_value> prefixLength <prefixLength_value>
   ```

4. Set the *protocol* attribute.

   ```
   set Rtr/<router_name> Vrf/<vrf_name> DiffServProf/
   <dsprof_name> MfMap/<map_name> IpAddressLayer4Flow/
   <layer4flow_value> protocol <protocol_value>
   ```

5. Set the *portNumberRange* attribute.

   ```
   set Rtr/<router_name> Vrf/<vrf_name> DiffServProf/
   <dsprof_name> MfMap/<map_name> IpAddressLayer4Flow/
   <layer4flow_value> port <port_value>
   ```

## Variable definitions

| Variable | Value |
|---|---|
| <dsprof_name> | is any mnemonic. |
| <layer4flow_value> | is a decimal value. |
| <map_name> | is any mnemonic. |

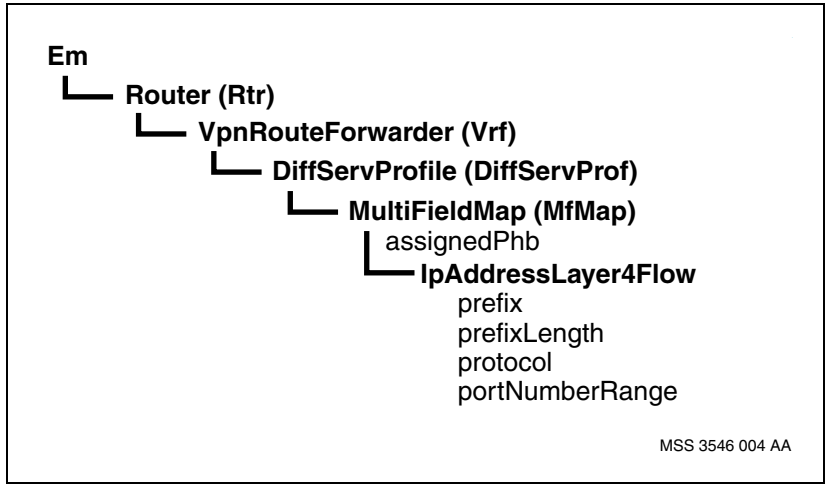
(Sheet 1 of 2)

| Variable | Value |
|---|---|
| <port_value> | specifies the TCP or UDP port number or range of port numbers to which the policy applies. |
| <prefix_value> | specifies the IP address prefix. |
| <prefixLength_value> | specifies the number of the most significant bits of the IP address. Those numbers must match with the ones in the *prefix* attribute. |
| <protocol_value> | specifies the layer 4 protocol. |
| <router_name> | is any mnemonic. |
| <vrf_name> | is any mnemonic. |

(Sheet 2 of 2)

## Procedure job aid

**Figure 60**
**VRF IpAddressLayer4 flow component hierarchy**



# Configuring a DSCP map on the VRF

Configure a differentiated services code point (DSCP) map for the differentiated services profile to translate the DSCP field of the packet to new values when the packet is transmitted and received on the VRF interfaces. The *DscpMap* component identifies the connection class and per-hop behavior (PHB) values of the IP packets associated with the IP traffic flow.

## Procedure steps

1 Add the *DscpMap* component.

```
add Rtr/<router_name> Vrf/<vrf_name> DiffServProf/
<dsprof_name> DscpMap
```

2 Set the *assignedPhb* attribute.

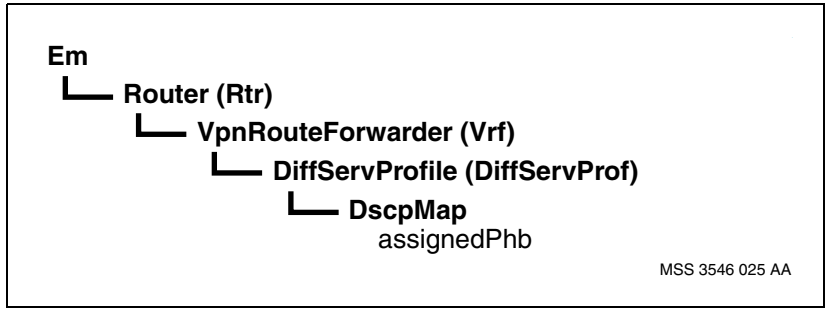
```
set Rtr/<router_name> Vrf/<vrf_name> DiffServProf/
<dsprof_name> DscpMap assignedPhb <dscp_value>
<phb_value>
```

## Variable definitions

| Variable | Value |
|---|---|
| <dscp_value> | is the value of the DSCP field in the IP packet header before translation. |
| <dsprof_name> | is any mnemonic. |
| <phb_value> | is the PHB assigned to the packet which determines the value of the DSCP field after translation. |
| <router_name> | is any mnemonic. |
| <vrf_name> | is any mnemonic. |
| | |

## Procedure job aid

**Figure 61**
**VRF DSCP map component hierarchy**



# Configuring a link map on the VRF

Configure a link map on the virtual router (VR) for the differentiated services profile to translate the connection class values to DSCP values for packets received on the VRF interface.

## Procedure steps

1 Add the *LinkMap* component.

```
add Rtr/<router_name> Vrf/<vrf_name> DiffServProf/
<dsprof_name> LinkMap
```

2 Set the *assignedPhb* attribute.

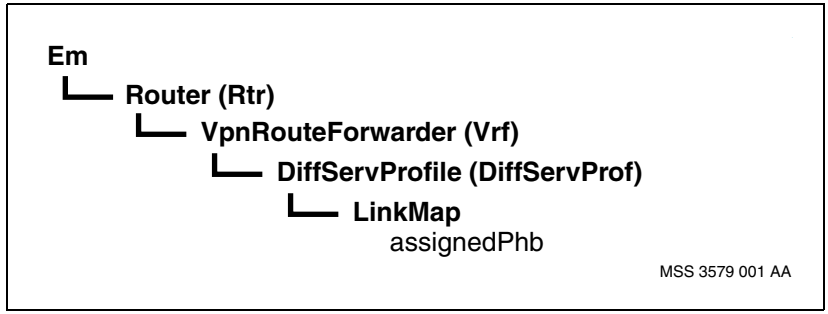
```
set Rtr/<router_name> Vrf/<vrf_name> DiffServProf/
<dsprof_name> LinkMap assignedPhb
<connection_class_value> <phb_value>
```

## Variable definitions

| Variable | Value |
|---|---|
| <connection_class_value> | is the value of the layer 2 interface where the packet is received. |
| <phb_value> | is the PHB assigned to the packet which determines the value of the DSCP field after translation. |
| <dsprof_name> | is any mnemonic. |
| <router_name> | is any mnemonic. |
| <vrf_name> | is any mnemonic. |
| | |

## Procedure job aid

**Figure 62**
**VRF link map component hierarchy**



# Example procedure for configuring a multifield map on the VRF

This is an example procedure for configuring a multifield map on the VRF.

## Procedure steps

1. Add a *DiffServProfile* component.

   ```
   add Rtr/1 Vrf/1 DiffServProf/mf_profile
   ```

2. Add *MultiFieldMap* component.

   ```
   add Rtr/1 Vrf/1 DiffServProf/mf_profile MfMap/1
   ```

3. Set the *assignedPhb* attribute.

   ```
   set Rtr/1 Vrf/1 DiffServProf/mf_profile MfMap/1
   assignedPhb ef
   ```

# Example procedure for configuring an IpAddressLayer4 flow on the VRF

This is an example procedure for configuring an IpAddressLayer4 flow on the VRF.

In this example procedure, an IP address in the network is identified as x.x.x.x.

## Procedure steps

1 Add the *IpAddressLayer4Flow* component.

```
add Rtr/1 Vrf/1 DiffServProf/mf_profile MfMap/1
IpAddressLayer4Flow/1
```

2 Set the *prefix* attribute.

```
set Rtr/1 Vrf/1 DiffServProf/mf_profile MfMap/1
IpAddressLayer4Flow/1 prefix x.x.x.x
```

3 Set the *prefixLength* attribute.

```
set Rtr/1 Vrf/1 DiffServProf/mf_profile MfMap/1
IpAddressLayer4Flow/1 prefixLength 24
```

4 Set the *protocol* attribute.

```
set Rtr/1 Vrf/1 DiffServProf/mf_profile MfMap/1
IpAddressLayer4Flow/1 protocol UDP
```

5 Set the *portNumberRange* attribute.

```
set Rtr/1 Vrf/1 DiffServProf/mf_profile MfMap/1
IpAddressLayer4Flow/1 port 20 23
```

# Example procedure for configuring a DSCP map on the VRF

This is an example procedure for configuring a DSCP map on the VRF.

## Procedure steps

1. Add the *DscpMap* component.

   ```
   add Rtr/1 Vrf/1 DiffServProf/dscp_profile DscpMap
   ```

2. Set the *assignedPhb* attribute.

   ```
   set Rtr/1 Vrf/1 DiffServProf/dscp_profile DscpMap
   assignedPhb 34 46
   ```

# Example procedure for configuring a link map on the VRF

This is an example procedure for configuring a link map on the VRF.

## Procedure steps

1 Add the *LinkMap* component.

```
add Rtr/1 Vrf/1 DiffServProf/link_profile LinkMap
```

2 Set the *assignedPhb* attribute.

```
add Rtr/1 Vrf/1 DiffServProf/link_profile LinkMap
assignedPhb 1 10
```

```
add Rtr/1 Vrf/1 DiffServProf/link_profile LinkMap
assignedPhb 2 48
```

```
add Rtr/1 Vrf/1 DiffServProf/link_profile LinkMap
assignedPhb 3 46
```

# Chapter 17
# VRF policer profiles configuration

Configure policer profiles on the VPN route forwarder (VRF) to be able to control the maximum rate of traffic sent and received on an interface.

Traffic streams are differentiated by their per-hop behavior (PHB), not the source or destination IP address. All received packets on one protocol port sharing the same PHB are measured by the same meter configured with matching PHB value. A policer is assigned to a protocol port on the ingress or egress interface.

If you want to direct packets that have a different PHB to a meter that is already configured, you must complete the procedure, "Selecting a traffic stream for the meter on the VRF" (page 166). Otherwise, you can configure another meter with a different PHB value or another policer with different meter and different PHB value.

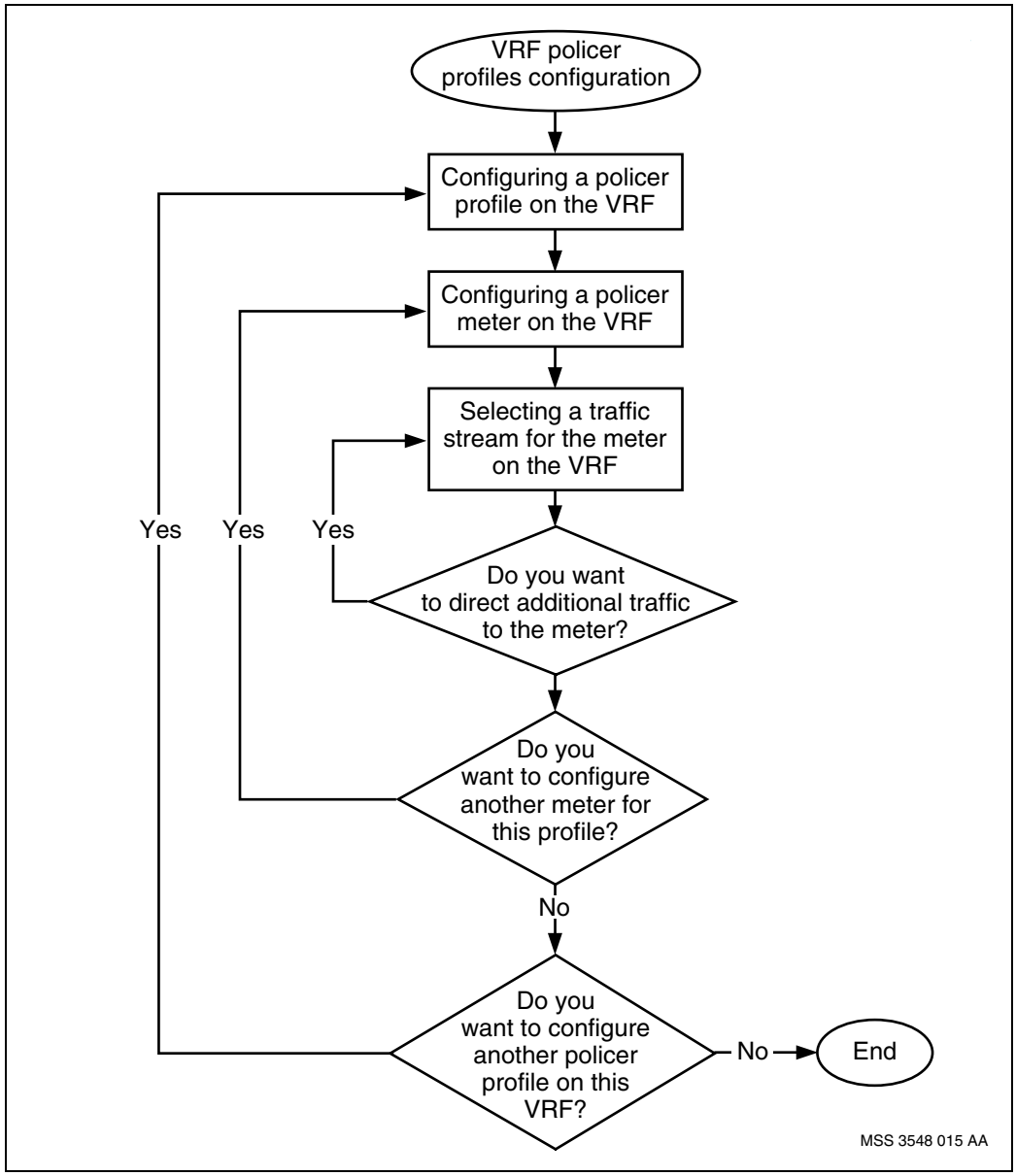
## Prerequisites for VRF policer profiles configuration

- Add the *ipPolicing* feature to the feature list of each FP that requires that feature. For more information, refer to NN10600-590 *Nortel Networks Multiservice Switch 7400/15000/20000 Layer 3 Traffic Management Fundamentals*.
- Use the tasks and procedures in NN10600-550 *Nortel Networks Multiservice Switch 7400/15000/20000 Common Configuration Procedures* if you require supporting information or need to provision or reconfigure any node or nodal elements to support *PolicerProfile* components.

# VRF policer profiles configuration procedures

This task flow shows you the sequence of procedures you perform to configure policer profiles on the VRF. To link to any procedure, go to “VRF policer profiles configuration procedure navigation” (page 162).

**Figure 63**
**VRF policer profiles configuration procedures**



## VRF policer profiles configuration procedure navigation


- "Configuring a policer profile on the VRF" (page 163)
- "Configuring a policer meter on the VRF" (page 164)
- "Selecting a traffic stream for the meter on the VRF" (page 166)


For example procedures for the VRF policer profiles configuration, see:


- "Example procedure for configuring single CIR policer with all excess packets forwarded" (page 168)
- "Example procedure for configuring single CIR policer with all excess packets dropped" (page 170)
- "Example procedure for configuring single EIR policer" (page 172)
- "Example procedure for configuring dual rate policer" (page 174)
- "Example procedure for configuring color blind policer" (page 176)
- "Example procedure for configuring combined traffic class policer" (page 178)
- "Example procedure for configuring IP firewall using DiffServ multifield map and single EIR policer on the VRF" (page 180)

# Configuring a policer profile on the VRF

Configure a policer profile on the VPN route forwarder (VRF) to control the maximum rate of traffic sent and received on an interface.

## Procedure steps

1 Add a *PolicerProfile* component.

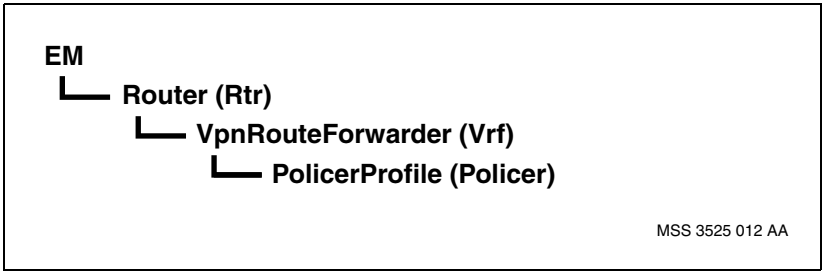
```
add Rtr/<router_name> Vrf/<vrf_name> Policer/
<profile_name>
```

## Variable definitions

| Variable | Value |
|---|---|
| <profile_name> | is an instance of a policer profile that can be associated with one or more interfaces. |
| <router_name> | is any mnemonic. |
| <vrf_name> | is any mnemonic. |
| | |

## Procedure job aid

**Figure 64**
**VRF policer profile component hierarchy**



# Configuring a policer meter on the VRF

Configure a policer meter on the VPN route forwarder (VRF) for every traffic stream that requires policing. The policer meter provides traffic characteristics for the traffic stream.

## Procedure steps

1 Add a *Meter* component.

```
add Rtr/<router_name> Vrf/<vrf_name> Policer/
<profile_name> Meter/<meter_name>
```

2 Set the *committedInformationRate* attribute.

```
set Rtr/<router_name> Vrf/<vrf_name> Policer/
<profile_name> Meter/<meter_name> cir <cir_value>
```

3 Set the *committedBurstSize* attribute.

```
set Rtr/<router_name> Vrf/<vrf_name> Policer/
<profile_name> Meter/<meter_name> bc <bc_value>
```

4 Set the *excessBurstSize* attribute.

```
set Rtr/<router_name> Vrf/<vrf_name> Policer/
<profile_name> Meter/<meter_name> be <be_value>
```

5 Set the *measurementInterval* attribute.

```
set Rtr/<router_name> Vrf/<vrf_name> Policer/
<profile_name> Meter/<meter_name> t <time_value>
```

## Variable definitions

| Variable | Value |
|---|---|
| <bc_value> | is the amount of data that the network transfers under normal conditions over a measurement interval. The measurement interval is determined by the *committedInformationRate* and *committedBurstSize* attributes. |
| <be_value> | is the amount of uncommitted data that the network attempts to deliver over a measurement interval. |

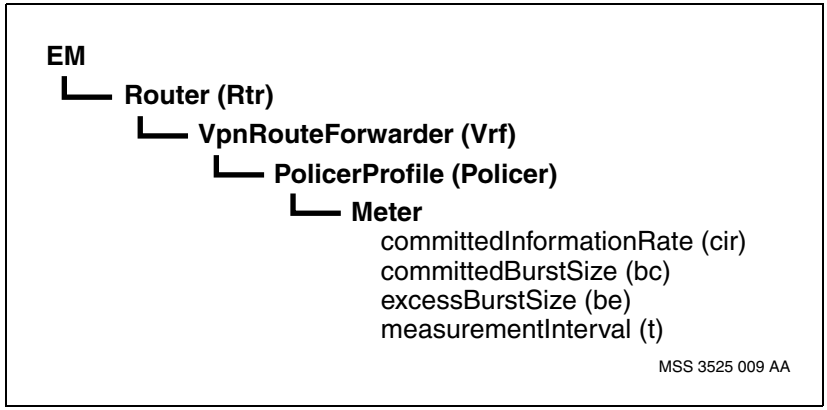
(Sheet 1 of 2)

| Variable | Value |
|---|---|
| <cir_value> | is the rate at which the network transfers information under normal conditions. |
| <meter_name> | is an instance of a traffic conditioner for an interface. |
| <profile_name> | is an instance of a policer profile that can be associated with one or more interfaces. |
| <router_name> | is any mnemonic. |
| <time_value> | is a measurement of time (in milliseconds) over which rates and burst sizes are measured |
| <vrf_name> | is any mnemonic. |

(Sheet 2 of 2)

## Procedure job aid

**Figure 65**
**VRF policer meter component hierarchy**



# Selecting a traffic stream for the meter on the VRF

Select a traffic stream for the meter on the VPN route forwarder (VRF). This traffic stream is controlled by the meter.

## Procedure steps

1 Add a *PolicedPhb* component.

```
add Rtr/<router_name> Vrf/<vrf_name> Policer/
<profile_name> Meter/<meter_name> Phb/<phb_value>
```

2 Set the *initialBucket* attribute.

```
set Rtr/<router_name> Vrf/<vrf_name> Policer/
<profile_name> Meter/<meter_name> Phb/<phb_value>
initialBucket <bucket_value>
```

3 Set the *outOfProfilePhb* attribute.

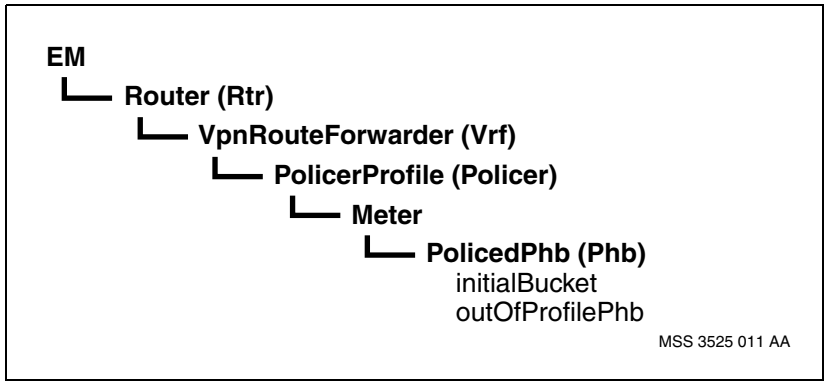
```
set Rtr/<router_name> Vrf/<vrf_name> Policer/
<profile_name> Meter/<meter_name> Phb/<phb_value>
outOfProfilePhb <out_value>
```

## Variable definitions

| Variable | Value |
|---|---|
| <bucket_value> | is the value that specifies whether the traffic with this PHB is forwarded to the CIR bucket, the EIR bucket or both |
| <meter_name> | is an instance of a traffic conditioner for an interface. |
| <out_value> | is the value of the new PHB assigned to the packets that have exceeded the CIR. |
| <phb_value> | is a PHB of a stream directed to this meter. |
| <profile_name> | is an instance of a policer profile that can be associated with one or more interfaces. |
| <router_name> | is any mnemonic. |
| <vrf_name> | is any mnemonic. |
| | |

## Procedure job aid

**Figure 66**
**VRF traffic stream for the meter component hierarchy**



# Example procedure for configuring single CIR policer with all excess packets forwarded

This example procedure illustrates the configuration for the single committed information rate (CIR) policer with all excess packets forwarded for the AF21 traffic. The packet with the AF21 differentiated services code point (DSCP) is directed to the CIR bucket. The conforming traffic is forwarded with the AF21 DSCP. All non-conforming traffic is re-marked to AF22 and sent to the excess information rate (EIR) bucket. Since the *excessBurstSize (be)* attribute is set to the maximum value, all excess packets are forwarded.

## Procedure steps

1 Configure the policer meter.

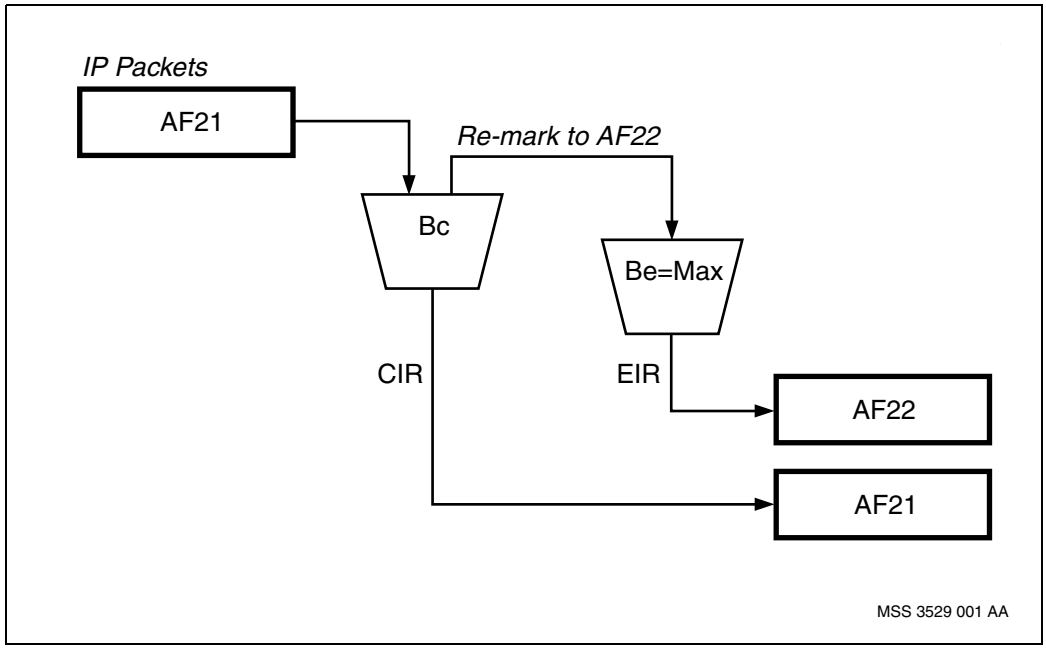
```
add -s Rtr/1 Vrf/1 Policer/sla1 Meter/stream1

set Rtr/1 Vrf/1 Policer/sla1 Meter/stream1 cir 256000

set Rtr/1 Vrf/1 Policer/sla1 Meter/stream1 bc 256000

set Rtr/1 Vrf/1 Policer/sla1 Meter/stream1 be 50000000
```

2 Configure the traffic stream for this meter.

```
add -s Rtr/1 Vrf/1 Policer/sla1 Meter/stream1 Phb/AF21
initialBucket committed
```

## Procedure job aid

**Figure 67**
**Single CIR policer with all excess packets forwarded**



# Example procedure for configuring single CIR policer with all excess packets dropped

This example procedure illustrates the configuration for the single committed information rate (CIR) policer with all excess packets dropped for the EF traffic. The packet with the EF differentiated services code point (DSCP) is directed to the CIR bucket. The conforming traffic is forwarded with the EF DSCP. All non-conforming traffic is sent to the excess information rate (EIR) bucket. Since the *excessBurstSize (be)* attribute is set to 0, all excess packets are dropped.

## Procedure steps

1. Configure the policer meter.

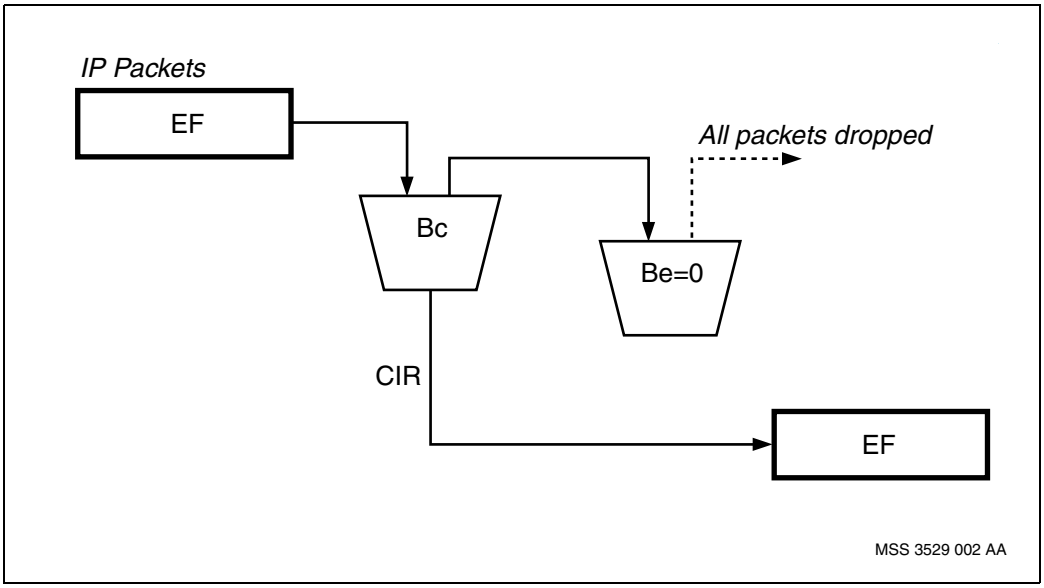
```
add -s Rtr/1 Vrf/1 Policer/sla1 Meter/stream1

set Rtr/1 Vrf/1 Policer/sla1 Meter/stream1 cir 256000

set Rtr/1 Vrf/1 Policer/sla1 Meter/stream1 bc 256000

set Rtr/1 Vrf/1 Policer/sla1 Meter/stream1 be 0
```

2. Configure the traffic stream for this meter.

```
add -s Rtr/1 Vrf/1 Policer/sla1 Meter/stream1 Phb/EF
initialBucket committed
```

## Procedure job aid

**Figure 68**
**Single CIR policer with all excess packets dropped**



# Example procedure for configuring single EIR policer

This example procedure illustrates the configuration for the single excess information rate (EIR) policer for the DF traffic. All packets with the DF differentiated services code point (DSCP) are directed to the EIR bucket. All non-conforming traffic is dropped and conforming traffic is forwarded with the DF DSCP.

## Procedure steps

1 Configure the policer meter.

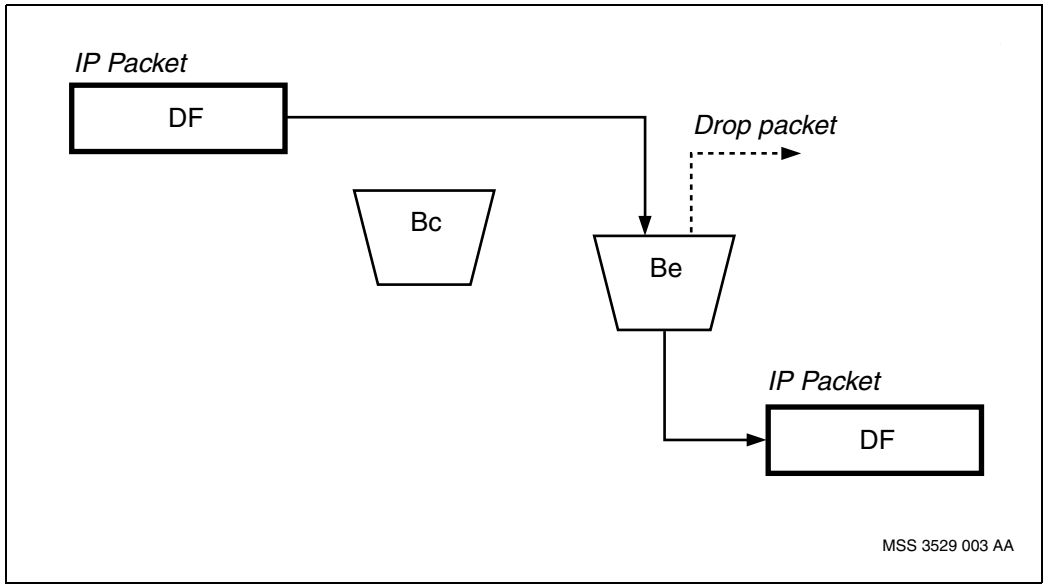
```
add -s Rtr/1 Vrf/1 Policer/sla1 Meter/stream1

set Rtr/1 Vrf/1 Policer/sla1 Meter/stream1 be 256000

set Rtr/1 Vrf/1 Policer/sla1 Meter/stream1 t 1000
```

2 Configure the traffic stream for this meter.

```
add Rtr/1 Vrf/1 Policer/sla1 Meter/stream1 Phb/DF
```

## Procedure job aid

**Figure 69**
**Single EIR policer**



# Example procedure for configuring dual rate policer

This example procedure illustrates the configuration for the dual rate policer for AF31, AF32, and AF33 traffic. The AF31 packet is directed to the committed information rate (CIR) bucket. If the traffic conforms, then the packet is forwarded. If the CIR is exceeded, then the packet is PHB AF32 and is directed to the excess information rate (EIR) bucket. If the traffic conforms to the EIR, then the packet is forwarded. If the EIR is exceeded then the packet is dropped. The AF32 and AF33 packets are directed to the EIR bucket. If the traffic conforms to the EIR, then the packet is forwarded. If the EIR is exceeded then the packet is dropped.

## Procedure steps

1 Configure the policer meter.

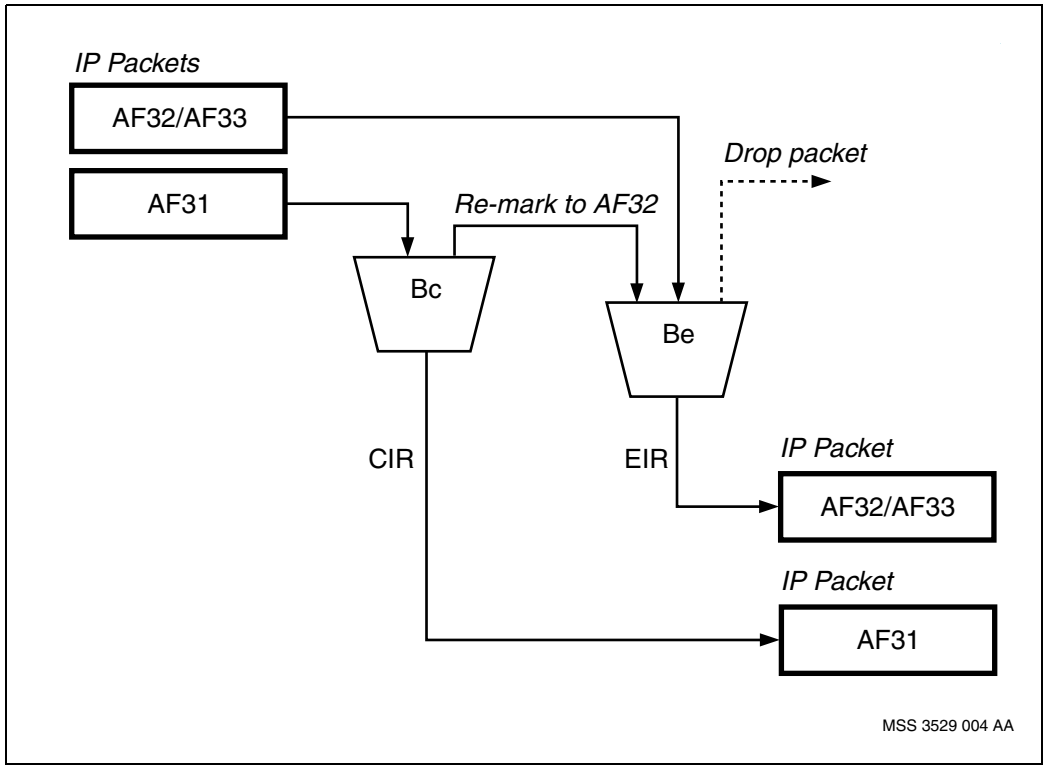
```
add -s Rtr/1 Vrf/1 Policer/sla1 Meter/stream1

set Rtr/1 Vrf/1 Policer/sla1 Meter/stream1 cir 256000

set Rtr/1 Vrf/1 Policer/sla1 Meter/stream1 bc 256000

set Rtr/1 Vrf/1 Policer/sla1 Meter/stream1 be 256000
```

2 Configure the traffic stream for this meter.

```
add Rtr/1 Vrf/1 Policer/sla1 Meter/stream1 Phb/AF32

add Rtr/1 Vrf/1 Policer/sla1 Meter/stream1 Phb/AF33

add -s Rtr/1 Vrf/1 Policer/sla1 Meter/stream1 Phb/AF31
initialBucket committed
```

## Procedure job aid

**Figure 70**
**Dual rate policer**



# Example procedure for configuring color blind policer

This example procedure illustrates the configuration for the color blind policer for AF41 traffic. All packets entering an interface are assigned PHB AF41. All packets are forwarded to the committed information rate (CIR) bucket. If the traffic conforms, then the packet is forwarded. If the CIR is exceeded, then the packet is assigned PHB AF42 and is directed to the excess information rate (EIR) bucket. If the traffic conforms to the EIR, then the packet is forwarded. If the EIR is exceeded, then the packet is dropped.

***Note:*** AF41 is the decimal value of 34.

## Procedure steps

1 Configure the differentiated services (DiffServ) profile.

```
add Rtr/1 Vrf/1 DiffServProf/stream1

add Rtr/1 Vrf/1 DiffServProf/stream1 LinkMap

set Rtr/1 Vrf/1 DiffServProf/stream1 LinkMap
assignedPhb 0 34 1 34 2 34 3 34
```

2 Configuring the policer meter.

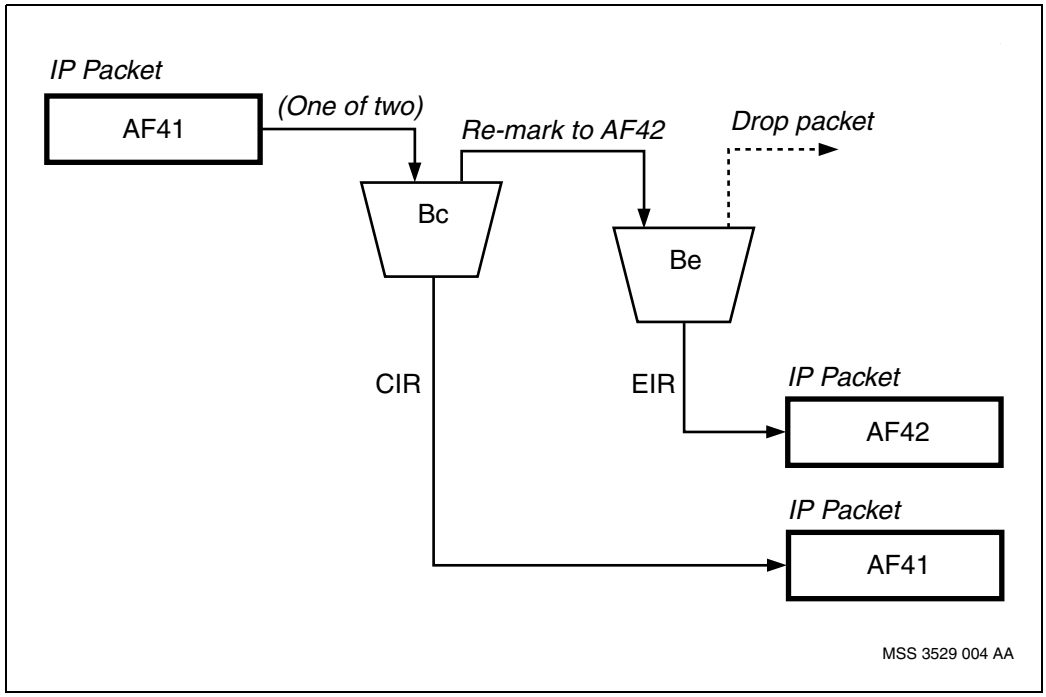
```
add -s Rtr/1 Vrf/1 Policer/sla1 Meter/stream1

set Rtr/1 Vrf/1 Policer/sla1 Meter/stream1 cir 256000

set Rtr/1 Vrf/1 Policer/sla1 Meter/stream1 bc 256000

set Rtr/1 Vrf/1 Policer/sla1 Meter/stream1 be 256000
```

3 Configure the traffic stream for this meter.

```
add -s Rtr/1 Vrf/1 Policer/sla1 Meter/stream1 Phb/AF41
initialBucket committed
```

## Procedure job aid

**Figure 71**
**Color blind policer**



# Example procedure for configuring combined traffic class policer

This example procedure illustrates the configuration of a policer for packets belonging to different traffic classes. Packets with EF, AF41, AF31, AF21, AF11, and DF PHB are directed to the committed information rate (CIR) bucket of a single policer. Packets that do not conform are re-marked and directed to the excess information rate (EIR) bucket as follows: EF to EF, AF41 to AF42, AF31 to AF32, AF21 to AF22, AF11 to AF12, and DF to DF.

## Procedure steps

1 Configuring the policer meter.

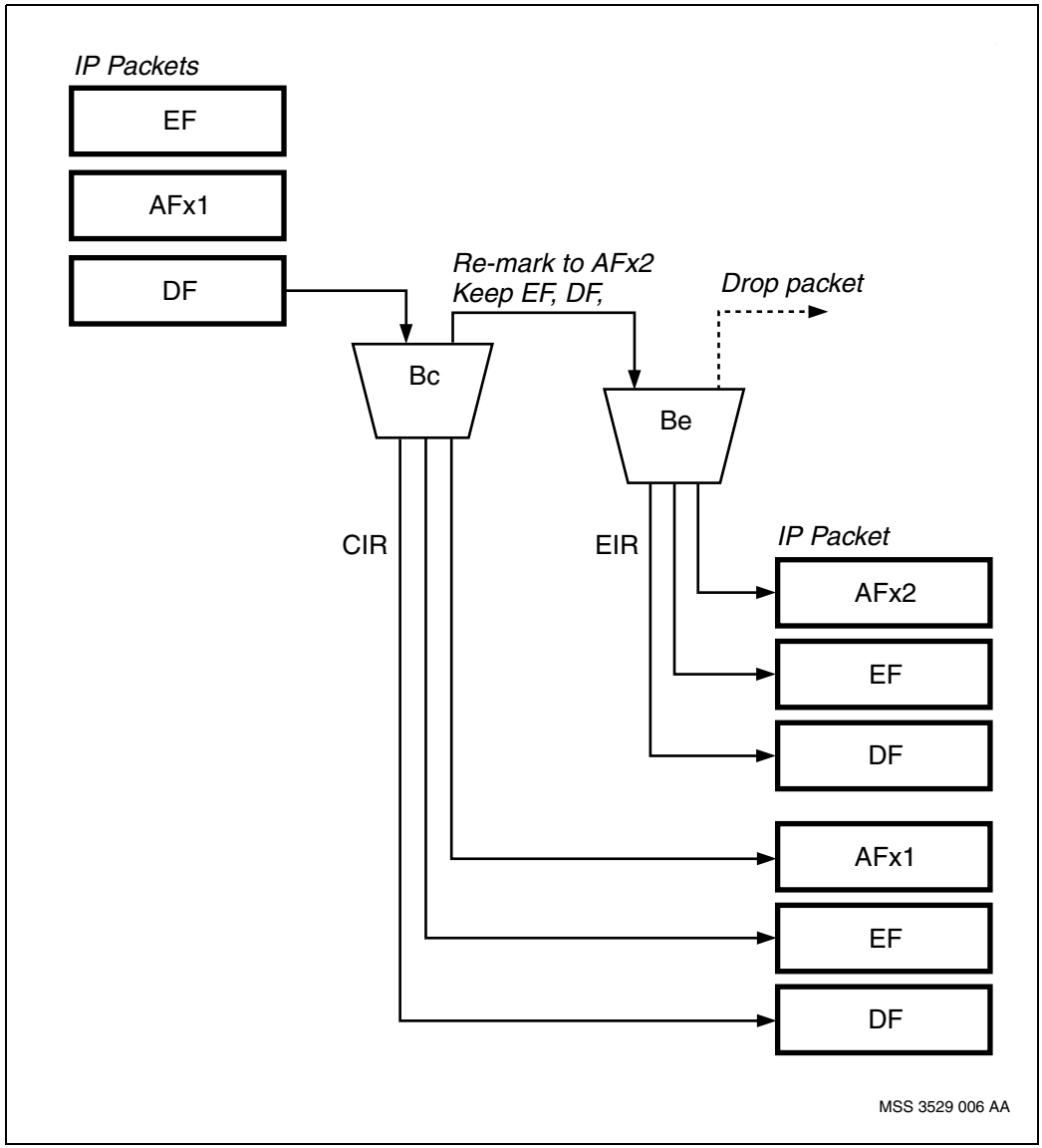
```
add -s Rtr/1 Vrf/1 Policer/sla1 Meter/stream1

set Rtr/1 Vrf/1 Policer/sla1 Meter/stream1 cir 256000

set Rtr/1 Vrf/1 Policer/sla1 Meter/stream1 bc 256000

set Rtr/1 Vrf/1 Policer/sla1 Meter/stream1 be 256000
```

2 Configure the traffic stream for this meter.

```
add -s Rtr/1 Vrf/1 Policer/sla1 Meter/stream1 Phb/EF
initialBucket committed

add -s Rtr/1 Vrf/1 Policer/sla1 Meter/stream1 Phb/AF41
initialBucket committed

add -s Rtr/1 Vrf/1 Policer/sla1 Meter/stream1 Phb/AF31
initialBucket committed

add -s Rtr/1 Vrf/1 Policer/sla1 Meter/stream1 Phb/AF21
initialBucket committed

add -s Rtr/1 Vrf/1 Policer/sla1 Meter/stream1 Phb/AF11
initialBucket committed

add -s Rtr/1 Vrf/1 Policer/sla1 Meter/stream1 Phb/DF
initialBucket committed
```

## Procedure job aid

**Figure 72**
**Combined traffic class policer**



# Example procedure for configuring IP firewall using DiffServ multifield map and single EIR policer on the VRF

This example procedure illustrates the configuration of an IP firewall using the differentiated services (DiffServ) multifield map and the single excess information rate (EIR) policer on the VPN route forwarder (VRF).

You can filter user datagram protocol (UDP) or transmission control protocol (TCP) packets with an IP address (source address or destination address) that you specify in the *prefix* attribute. This example procedure filters UDP packets with an IP address specified in the *prefix* attribute.

In this example procedure, an IP address in the network is identified as x.x.x.x.

## Procedure steps

1. Add a *DifferentiatedServicesDomain* (*Dsd*) component to the VRF.

   ```
   add Rtr/vcg Vrf/1 Dsd/ms
   ```

   When you add the *DifferentiatedServicesDomain* (*Dsd*) component, the following components are added automatically: *PerHopBehavior (Phb)* and *TrafficClass (Tc)*.

   The selected default configuration of the DSD can be modified, but reconfiguration is generally not necessary. For information on each component and its attributes, see NN10600-060 *Nortel Networks Multiservice Switch 7400/15000/20000 Component Reference*.

2. Add the *perHopBehavior* component to the *DifferentiatedServicesDomain* (*Dsd*) component.

   ```
   add Rtr/vcg Vrf/1 Dsd/ms phb/3
   ```

3. Add a *DiffServProfile* component.

   ```
   add Rtr/vcg Vrf/1 DiffServProf/firewall
   ```

4. Add *MultiFieldMap* component.

   ```
   add Rtr/vcg Vrf/1 DiffServProf/firewall MfMap/1
   ```

5. Set the *assignedPhb* attribute.

   ```
   set Rtr/vcg Vrf/1 DiffServProf/firewall MfMap/1
   assignedPhb 3
   ```

**6** Add the *IpAddressLayer4Flow* component.

```
add Rtr/vcg Vrf/1 DiffServProf/firewall MfMap/1
IpAddressLayer4Flow/1
```

**7** Set the *prefix* attribute.

```
set Rtr/vcg Vrf/1 DiffServProf/firewall MfMap/1
IpAddressLayer4Flow/1 prefix x.x.x.x
```

**8** Set the *prefixLength* attribute.

```
set Rtr/vcg Vrf/1 DiffServProf/firewall MfMap/1
IpAddressLayer4Flow/1 prefixLength 16
```

**9** Set the *protocol* attribute.

```
set Rtr/vcg Vrf/1 DiffServProf/firewall MfMap/1
IpAddressLayer4Flow/1 protocol udp
```

For details about multifield map, refer to NN10600-590 *Nortel Networks Multiservice Switch 7400/15000/20000 Layer 3 Traffic Management Fundamentals*.

**10** Add the *DscpMap* component.

```
add Rtr/vcg Vrf/1 DiffServProf/firewall DscpMap
```

**11** Set the *linkToDiffServProfile* attribute.

```
set Rtr/vcg Vrf/1 If/<ip_address> Is dsLink Rtr/vcg
Vrf/1 DiffServProf/firewall
```

**12** Add a *PolicerProfile* component.

```
add Rtr/vcg Vrf/1 Policer/firewall
```

**13** Add a *Meter* component.

```
add Rtr/vcg Vrf/1 Policer/firewall Meter/1
```

**14** Set the *committedInformationRate* attribute.

```
set Rtr/vcg Vrf/1 Policer/firewall Meter/1 cir 0
```

**15** Set the *committedBurstSize* attribute.

```
set Rtr/vcg Vrf/1 Policer/firewall Meter/1 bc 0
```

**16** Set the *excessBurstSize* attribute.

```
set Rtr/vcg Vrf/1 Policer/firewall Meter/1 be 0
```

**17** Set the *measurementInterval* attribute.

```
set Rtr/vcg Vrf/1 Policer/firewall Meter/1 t 1
```

**18** Add a *PolicedPhb* component.

```
add Rtr/vcg Vrf/1 Policer/firewall Meter/1 Phb/3
```

**19** Set the *IngressServices* attribute.

```
set Rtr/vcg Vrf/1 If/<ip_address> Is
linkToPolicerProfile Rtr/vcg Vrf/1 Policer/firewall
```

**20** Activate the configuration changes. For details, refer to “Activating configuration changes” (page 20).

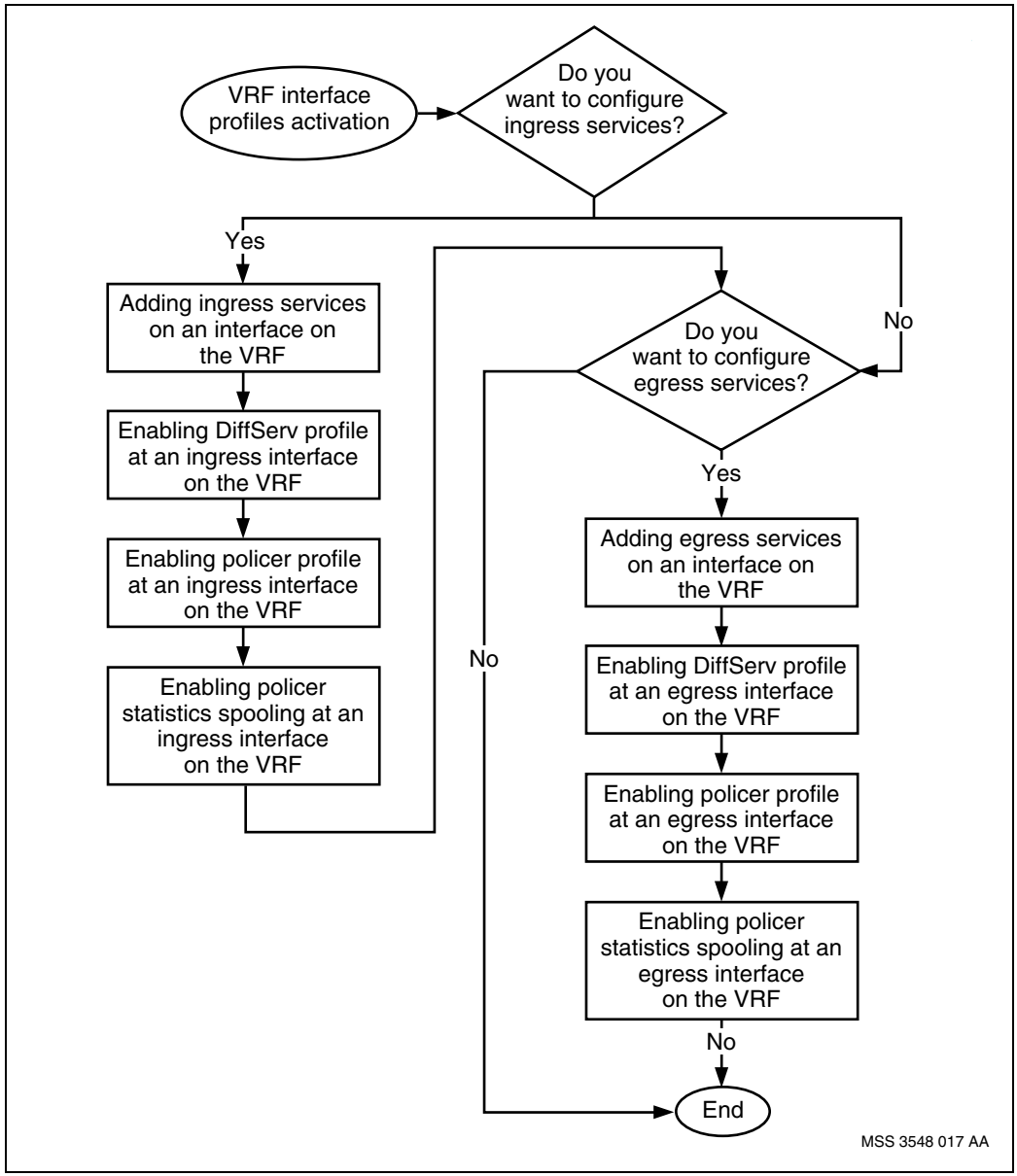
# Chapter 18
# VRF interface profiles activation

Activate the interface profiles on the VPN route forwarder (VRF) to enable the services provisioned under the differentiated services (DiffServ) and policer profiles.

## VRF interface profiles activation procedures

This task flow shows you the sequence of procedures you perform to activate interface profiles on the VRF. To link to any procedure, go to “VRF interface profiles activation procedure navigation” (page 185).

**Figure 73**
**VRF interface profiles activation procedures**



## VRF interface profiles activation procedure navigation



For example procedure for the VRF interface profiles activation, see: "Example procedure for VRF interface profiles activation" (page 196).

# Adding ingress services on an interface on the VRF

Add ingress services on an interface on the VPN route forwarder (VRF) to allow the enabling of interface services.

## Procedure steps

1 Add the *IngressServices* component.

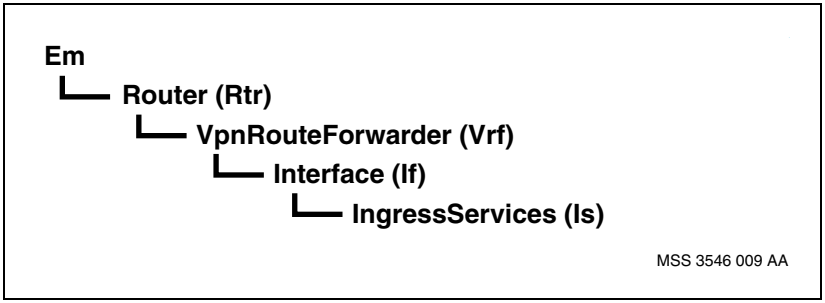
```
add Rtr/<router_name> Vrf/<vrf_name> If/<ip_address>
Is
```

## Variable definitions

| Variable | Value |
|---|---|
| <ip_address> | is the 32-bit address assigned to this interface. |
| <router_name> | is any mnemonic. |
| <vrf_name> | is any mnemonic. |
| | |

## Procedure job aid

**Figure 74**
**VRF ingress services component hierarchy**



# Enabling DiffServ profile at an ingress interface on the VRF

Enable a differentiated services (DiffServ) profile at an ingress interface on the VPN route forwarder (VRF) to activate the services provisioned under the profile.

## Procedure steps

1 Set the *linkToDiffServProfile (dsLink)* attribute.

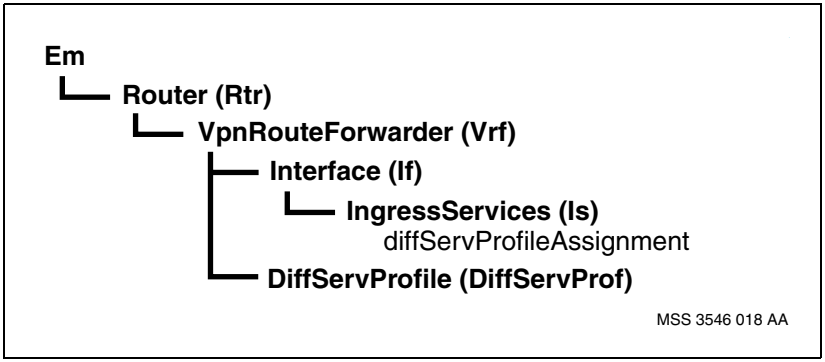
```
set Rtr/<router_name> Vrf/<vrf_name> If/<ip_address>
Is dsLink Rtr/<router_name> Vrf/<vrf_name>
DiffServProf/<dsprof_name>
```

## Variable definitions

| Variable | Value |
|---|---|
| <dsprof_name> | is any mnemonic. |
| <ip_address> | is the 32-bit address assigned to this interface. |
| <router_name> | is any mnemonic. |
| <vrf_name> | is any mnemonic. |
| | |

## Procedure job aid

**Figure 75**
**VRF DiffServ profile at an ingress interface component hierarchy**



# Enabling policer profile at an ingress interface on the VRF

Enable a policer profile on an ingress interface on the VPN route forwarder (VRF) to control traffic received on the interface.

## Procedure steps

1 Set the *IngressServices* attribute.

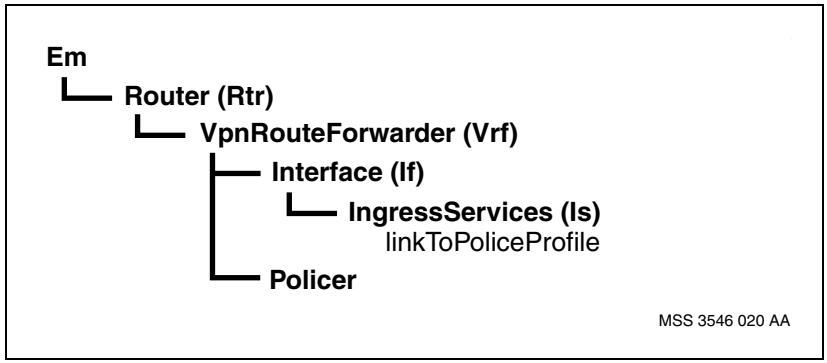
```
set Rtr/<router_name> Vrf/<vrf_name> If/<ip_address>
Is linkToPolicerProfile Rtr/<router_name> Vrf/
<vrf_name> Policer/<profile_name>
```

## Variable definitions

| Variable | Value |
|---|---|
| <ip_address> | is the IP address assigned to this interface. |
| <profile_name> | is an instance of a policer profile that can be associated with one or more interfaces. |
| <router_name> | is any mnemonic. |
| <vrf_name> | is any mnemonic. |
| | |

## Procedure job aid

**Figure 76**
**VRF policer profile at an ingress interface component hierarchy**



# Enabling policer statistics spooling at an ingress interface on the VRF

Enable the policer statistics spooling at an ingress interface on the VPN route forwarder (VRF) to collect data regarding the traffic at the IP interface. You can use policer statistics for traffic analysis. This analysis can help you identify the utilization of IP interface resources within a Multiservice Switch network.

## Procedure steps

1 Set the *policerStatsSpooling* attribute.

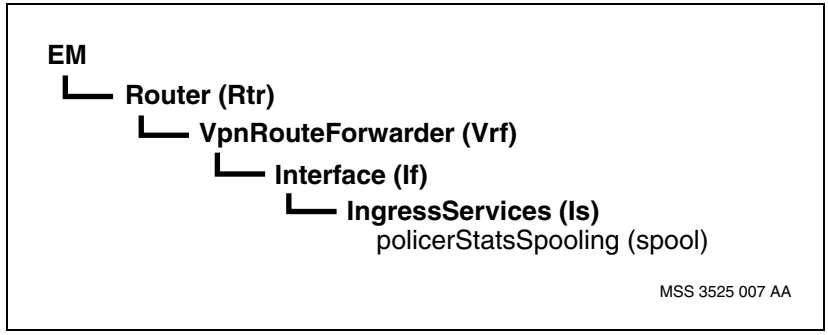
```
set Rtr/<router_name> Vrf/<vrf_name> If/<ip_address>
Is spool <stats_value>
```

## Variable definitions

| Variable | Value |
|---|---|
| <ip_address> | is the IP address assigned to this interface. |
| <router_name> | is any mnemonic. |
| <stats_value> | is the value that specifies whether the statistics for the ingress services policer is spooled or not |
| <vrf_name> | is any mnemonic. |
| | |

## Procedure job aid

**Figure 77**
**VRF policer statistics spooling at an ingress interface component hierarchy**



# Adding egress services on an interface on the VRF

Add egress services on an interface on the VPN route forwarder (VRF) to allow the enabling of interface services.

## Procedure steps

1 Add the *EgressServices* component.

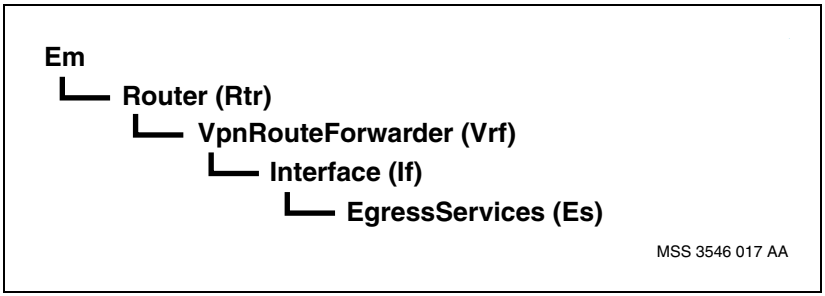
```
add Rtr/<router_name> Vrf/<vrf_name> If/<ip_address>
Es
```

## Variable definitions

| Variable | Value |
|---|---|
| <ip_address> | is the 32-bit address assigned to this interface. |
| <router_name> | is any mnemonic. |
| <vrf_name> | is any mnemonic. |
| | |

## Procedure job aid

**Figure 78**
**VRF egress services component hierarchy**



# Enabling DiffServ profile at an egress interface on the VRF

Enable a differentiated services (DiffServ) profile at an egress interface on the VPN route forwarder (VRF) to activate the services provisioned under the profile.

## Procedure steps

1 Set the *linkToDiffServProfile (dsLink)* attribute.

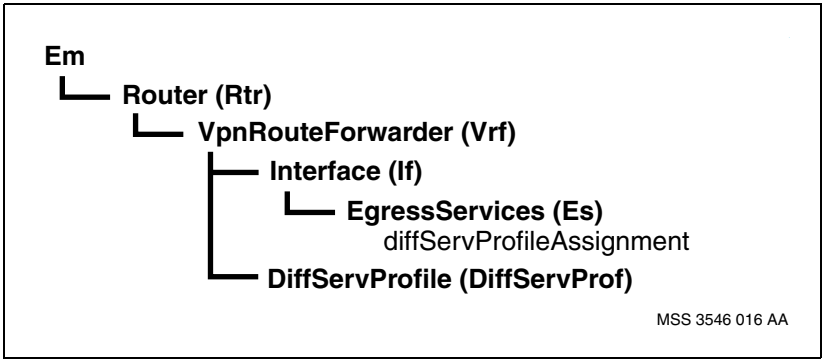
```
set Rtr/<router_name> Vrf/<vrf_name> If/<ip_address>
Es dsLink Rtr/<router_name> Vrf/<vrf_name>
DiffServProf/<dsprof_name>
```

## Variable definitions

| Variable | Value |
|---|---|
| <dsprof_name> | is any mnemonic. |
| <ip_address> | is the 32-bit address assigned to this interface. |
| <router_name> | is any mnemonic. |
| <vrf_name> | is any mnemonic. |
| | |

## Procedure job aid

**Figure 79**
**VRF DiffServ profile at an egress interface component hierarchy**



# Enabling policer profile at an egress interface on the VRF

Enable a policer profile at an egress interface on the VPN route forwarder (VRF) to control traffic sent on the interface.

## Procedure steps

1 Set the *EgressServices* attribute.

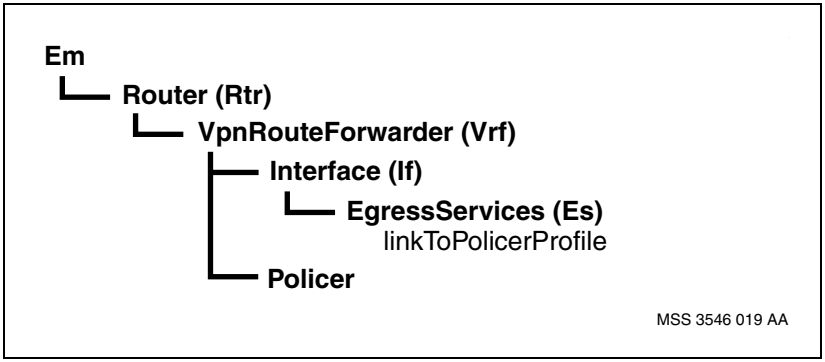
```
set Rtr/<router_name> Vrf/<vrf_name> If/<ip_address>
Es linkToPolicerProfile Rtr/<router_name> Vrf/
<vrf_name> Policer/<profile_name>
```

## Variable definitions

| Variable | Value |
|---|---|
| <ip_address> | is the IP address assigned to this interface. |
| <profile_name> | is an instance of a policer profile that can be associated with one or more interfaces. |
| <router_name> | is any mnemonic. |
| <vrf_name> | is any mnemonic. |
| | |

## Procedure job aid

**Figure 80**
**VRF policer profile at an egress interface component hierarchy**



# Enabling policer statistics spooling at an egress interface on the VRF

Enable the policer statistics spooling at an egress interface on the VPN route forwarder (VRF) to collect data regarding the traffic at the IP interface. You can use policer statistics for traffic analysis. This analysis can help you identify the utilization of IP interface resources within a Multiservice Switch network.

## Procedure steps

1 Set the *policerStatsSpooling* attribute.

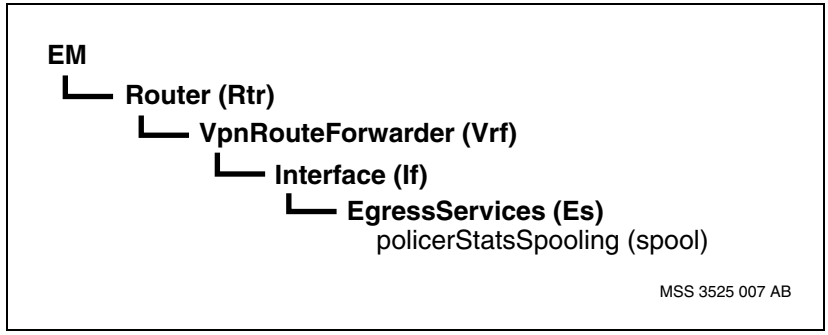
```
set Rtr/<router_name> Vrf/<vrf_name> If/<ip_address>
Es spool <stats_value>
```

## Variable definitions

| Variable | Value |
|---|---|
| <ip_address> | is the IP address assigned to this interface. |
| <profile_name> | is an instance of a policer profile that can be associated with one or more interfaces. |
| <router_name> | is any mnemonic. |
| <stats_value> | is the value that specifies whether the statistics for the egress services policer is spooled or not |
| <vrf_name> | is any mnemonic. |
| | |

## Procedure job aid

**Figure 81**
**VRF policer statistics spooling at an egress interface component hierarchy**



# Example procedure for VRF interface profiles activation

This is an example for enabling the interface profiles (ingress and egress interfaces) on the VRF.

## Procedure steps

For the ingress services:

1 Add the *IngressServices* component.

```
add Rtr/1 Vrf/1 If Is
```

2 Set the *linkToDiffServProfile* (*dsLink*) attribute.

```
set Rtr/1 Vrf/1 If Is dsLink Rtr/1 Vrf/1 DiffServProf/
mf_profile
```

3 Set the *IngressServices* attribute.

```
set Rtr/1 Vrf/1 If Is linkToPolicerProfile Rtr/1 Vrf/
1 Policer/policer1
```

4 Set the *policerStatsSpooling* attribute.

```
set Rtr/1 Vrf/1 If Is spool on
```

For the egress services:

5 Add the *EgressServices* component.

```
add Rtr/1 Vrf/1 If Es
```

6 Set the *linkToDiffServProfile* (*dsLink*) attribute.

```
set Rtr/1 Vrf/1 If Es dsLink Rtr/1 Vrf/1 DiffServProf/
dscp_profile
```

7 Set the *EgressServices* attribute.

```
set Rtr/1 Vrf/1 If Es linkToPolicerProfileRtr/1 Vrf/1
Policer/policer2
```

8 Set the *policerStatsSpooling* attribute.

```
set Rtr/1 Vrf/1 If Es spool on
```

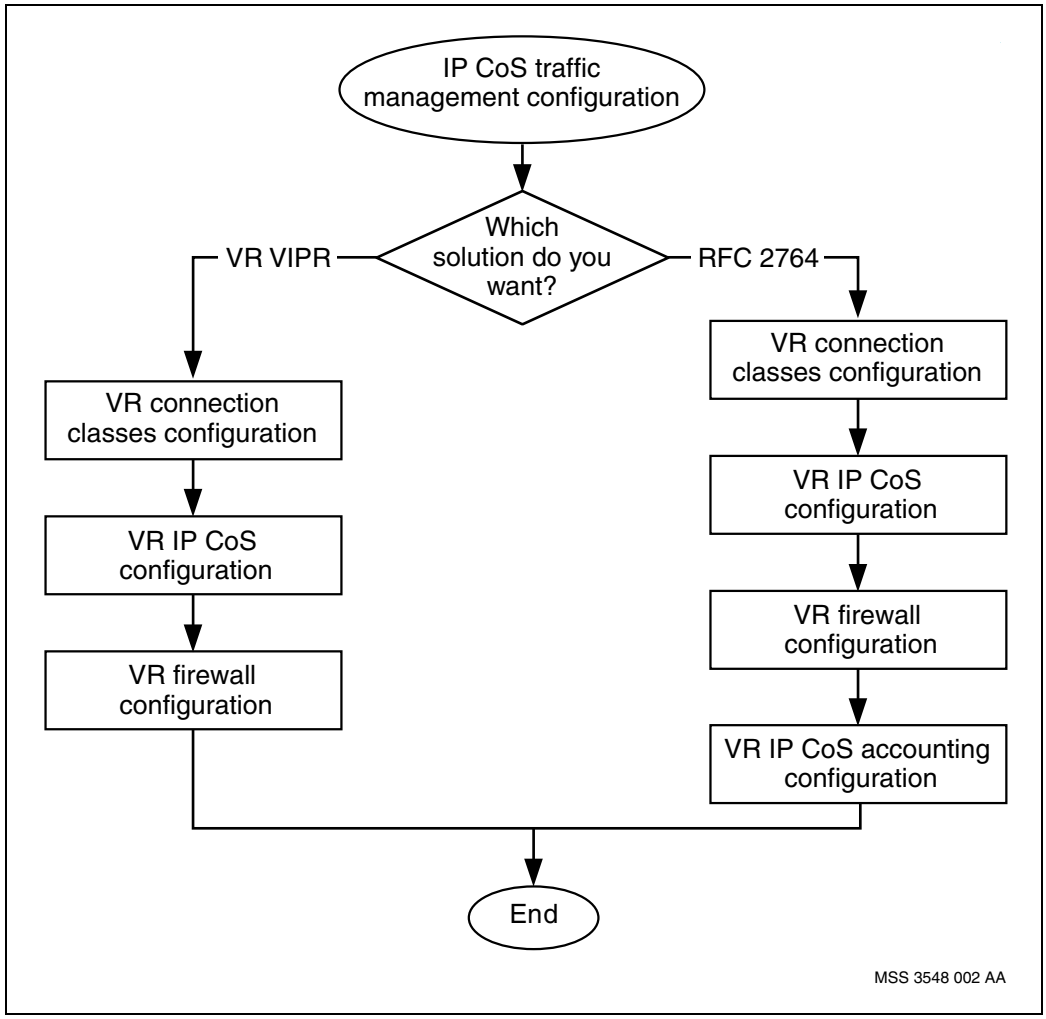
# Chapter 19
# IP CoS traffic management configuration

Configure IP class of service (CoS) traffic management to define packet classification policies and packet treatment options based on CoS values.

## IP CoS traffic management configuration tasks

This work flow shows you the sequence of tasks you perform to configure an IP CoS on the VR. To link to any task, go to “IP CoS traffic management task navigation” (page 198).

**Figure 82**
**IP CoS traffic management configuration tasks**




## IP CoS traffic management task navigation

- "VR connection classes configuration" (page 29)
- "VR IP CoS configuration" (page 201)
- "VR firewall configuration" (page 113)

- "VR IP CoS accounting configuration" (page 211)

# Chapter 20
# VR IP CoS configuration

Configure IP class of service (CoS) on the virtual router (VR) to define packet classification policies and packet treatment options based on IP CoS values.

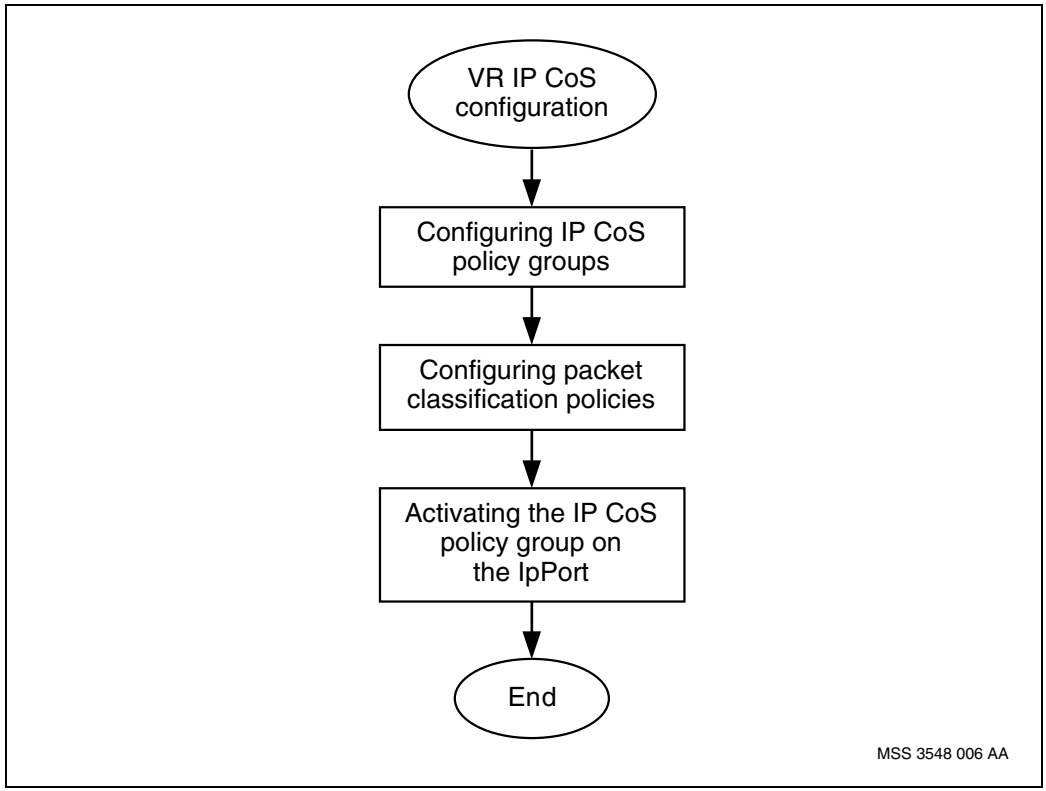
## Prerequisites for VR IP CoS configuration

- Configure IP tunnels if you intend to configure VR CoS over IP tunnels. See the procedure on Configuring PTP tunnels in NN10600-801 *Nortel Networks Multiservice Switch 7400/15000/20000 IP Configuration Management*.
- Add the *ipCos* feature to the feature list of each FP that requires that feature. For more information, refer to NN10600-590 *Nortel Networks Multiservice Switch 7400/15000/20000 Layer 3 Traffic Management Fundamentals*.
- Use the tasks and procedures in NN10600-550 *Nortel Networks Multiservice Switch 7400/15000/20000 Common Configuration Procedures* if you require supporting information or need to provision or reconfigure any node or nodal elements to support *CosPolicyGroup* components.

## VR IP CoS configuration procedures

This task flow shows you the sequence of procedures you perform to configure IP CoS on the VR. To link to any procedure, go to “VR IP CoS configuration procedure navigation” (page 202).

**Figure 83**
**VR IP CoS configuration procedures**




## VR IP CoS configuration procedure navigation

- "Configuring IP CoS policy groups" (page 203)
- "Configuring packet classification policies" (page 206)
- "Activating the IP CoS policy group on the IpPort" (page 209)

# Configuring IP CoS policy groups

Configure IP CoS policy groups to define IP packet classification policies and/or specify IP packet treatment options.

## Procedure steps

1. Create an instance of an IP CoS policy group for the virtual router (VR).

   ```
   add Vr/<vr_name> Ip Pg/<grp>
   ```

   When you add the *CosPolicyGroup (Pg)* component, the system automatically creates four egress and ingress CoS treatment profiles under the CoS policy group for CoS indices 0, 1, 2 and 3.

2. If you want the VR or a specific protocol port to mark packets with a specific DSCP/ToS value on egress, configure the policy group to change the packet's DSCP/ToS value under the appropriate CoS treatment profile.

   ```
   set Vr/<vr_name> Ip Pg/<grp> EgressCosTreatment/<n>
   setTosByte <yes_no>
   ```

   When you enable packet marking, IP CoS updates the packet's ToS byte based on the values configured for the *tos* and *tosMask* attributes.

3. If you have enabled packet marking, specify the value of the DSCP/ToS value to be marked into the packet.

   ```
   set Vr/<vr_name> Ip Pg/<grp> EgressCosTreatment/<n>
   tos <tos>
   ```

   If packet marking is not enabled under the *setTosByte* attribute, IP CoS ignores the values configured for the *tos* attribute.

4. If you have enabled packet marking, specify the bits of the ToS field that are to be updated. If packet marking is not enabled under the *setTosByte* attribute, IP CoS ignores the ToS mask value.

   ```
   set Vr/<vr_name> Ip Pg/<grp> EgressCosTreatment/<n>
   tosMask <tosMask>
   ```

   ***Note:*** All CoS treatment profiles under the same policy group must have the same ToS mask.

5. If you want the VR to assign a discard priority to packets with a specific CoS value, configure the *discardPriority* attribute under the applicable *ingressCosTreatment* component.

   ```
   set Vr/<vr_name> Ip Pg/<grp> IngressCosTreatment/<n>
   dp <dp>
   ```

6 If you want the VR to assign an emission priority (on applicable media) to packets with a specific CoS value, set an *emissionPriority* attribute.

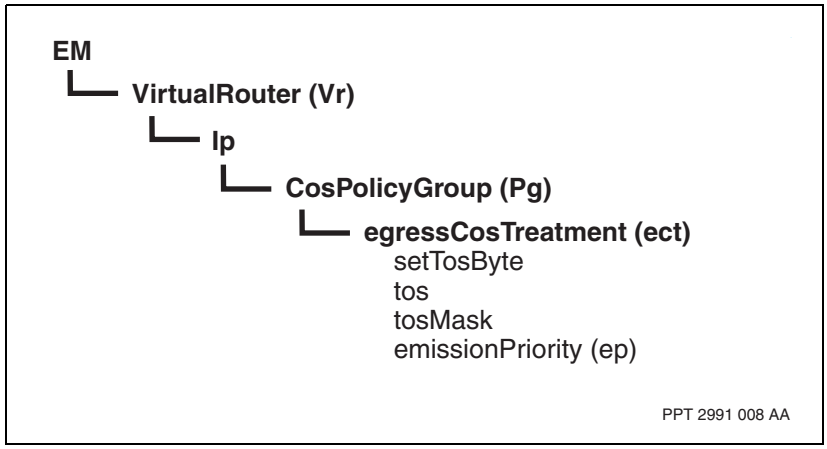
```
set Vr/<vr_name> Ip Pg/<grp> EgressCosTreatment/<n> ep
<ep>
```

## Variable definitions

| Variable | Value |
|---|---|
| <dp> | is the discard priority assigned to the packet. |
| <ep> | is the emission priority assigned to the packet. |
| <grp> | is the identifier for a a common set of IP CoS policies on the VR. |
| <n> | is the CoS value. |
| <tos> | is the DSCP/ToS value assigned to the packet. |
| <tosMask> | is a bit mask of the ToS field to be updated. IP CoS also uses this value to determine which bits to examine when applying a DSCP-based classification policy. A mask of 0 is invalid. On PQC FPs, the tosMask provisioned value is ignored during marking, and assumes a value of OxFC to mark the DSCP portion of the ToS field. *Yes* or *no* specifies whether the DSCP/ToS marking is enabled. |
| <vr_name> | is the name of the virtual router. |
| <yes_no> | specifies whether DSCP marking is enabled. |
| | |

## Procedure job aid

**Figure 84**
**IP CoS policy groups component hierarchy**



# Configuring packet classification policies

Configure packet classification policies to define the criteria that IP CoS uses to determine when the policy is applied.

## Procedure steps

1. If one does not already exist, create an instance of an IP CoS policy group under the virtual router.

   ```
   add Vr/<vr_name> Ip Pg/<grp>
   ```

2. Create an instance of a CoS policy under the policy group:

   ```
   add Vr/<vr_name> Ip Pg/<grp> Policy/<policy>
   ```

3. Assign a CoS value to the policy. This value corresponds to a packet treatment profile defined under the parent policy group.

   ```
   set Vr/<vr_name> Ip Pg/<grp> Policy/<policy>
   assignedCos <n>
   ```

4. If you want to configure DSCP-based packet classification, create an instance of a mapping policy and specify one or more ToS field values for a policy match.

   ```
   add Vr/<vr_name> Ip Pg/<grp> Policy/<policy> TosMap
   ```

   ```
   set Vr/<vr_name> Ip Pg/<grp> Policy/<policy> TosMap
   tos <tos>
   ```

   IP CoS uses the mask specified under the policy's associated CoS treatment profile (in the same policy group) to determine which bits to examine for DSCP-based classification.

   IP CoS also uses the ToS mask to determine which bits of the DSCP field to update when packet marking is applied.

5. If you want to configure flow-based packet classification, create one or more instances of a flow identification policy.

   ```
   add Vr/<vr_name> Ip Pg/<grp> Policy/<policy>
   IpAddrLayer4Flow/<flow>
   ```

6. If you want to configure flow-identification based on the traffic's layer 4 protocol, specify a protocol for a policy match.

   ```
   set Vr/<vr_name> Ip Pg/<grp> Policy/<policy>
   IpAddrLayer4Flow/<flow> proto <protocol>
   ```

**7** If you want to configure flow-identification based on source or destination IP addressing, specify a prefix and prefix length for a policy match.

```
set Vr/<vr_name> Ip Pg/<grp> Policy/<policy>
IpAddrLayer4Flow/<flow> prefix <x.x.x.x>
```

```
set Vr/<vr_name> Ip Pg/<grp> Policy/<policy>
IpAddrLayer4Flow/<flow> len <prlen>
```

If the traffic flow's protocol type has been set to ICMP, IP CoS ignores the values configured for address-based classification.

**8** If you want to configure flow-identification based on TCP or UDP port numbers, specify a port number (or range of port numbers) for a policy match.

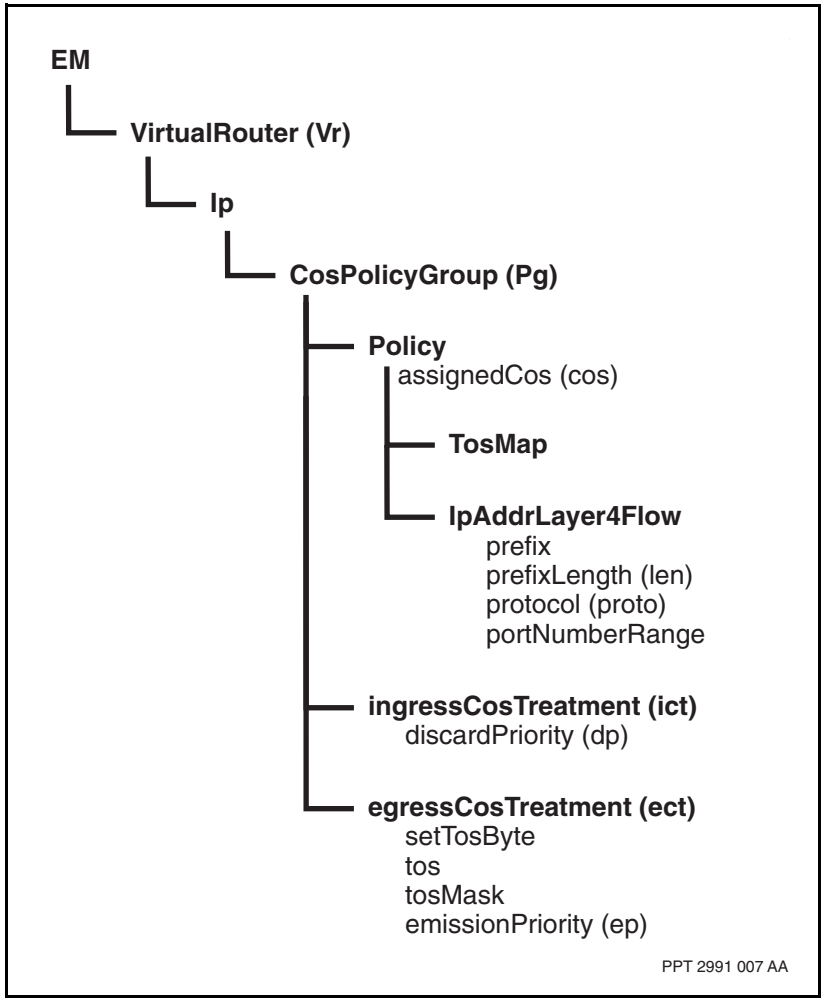
```
set Vr/<vr_name> Ip Pg/<grp> Policy/<policy>
IpAddrLayer4Flow/<flow> portNumberRange <min> <max>
```

## Variable definitions

| Variable | Value |
|---|---|
| <flow> | is the instance of the flow identification policy. |
| <grp> | is the identifier for a a common set of IP CoS policies on the VR. |
| <max> | is the upper limit of the range of port numbers for which the policy applies. |
| <min> | is the lower limit of the range of port numbers for which the policy applies. |
| <n> | a CoS value. |
| <policy> | is the policy within the policy group. |
| <prlen> | is the number of most significant bits in the IP address prefix. |
| <protocol> | is the layer 4 protocol for which the policy applies. |
| <tos> | is the ToS field value(s) for which the policy applies. |
| <vr_name> | is the name of the virtual router. |
| <x.x.x.x> | is the IP address prefix for which the policy applies. |
| | |

## Procedure job aid

**Figure 85**
**IP CoS packet classification policies component hierarchy**



# Activating the IP CoS policy group on the IpPort

Activate the IP CoS policy group on the IpPort to link the provisioned classification and treatment schemes to IP packets that are received and transmitted through the specified IpPort.

***Note:*** This procedure does not apply to Gigabit Ethernet interfaces.

## Procedure steps

1. Activate a CoS Policy Assignment on all IpPorts of a virtual router.

   **set Vr/<vr_name> Ip cosPolicyAssignment Vr/<vr_name> Ip CosPolicyGroup/<cos_pg1>**

2. Optionally, you can activate a CoS Policy Assignment on a specific IpPort of the virtual router. This assignment overrides the assignment for the virtual router at this IpPort in step 1.

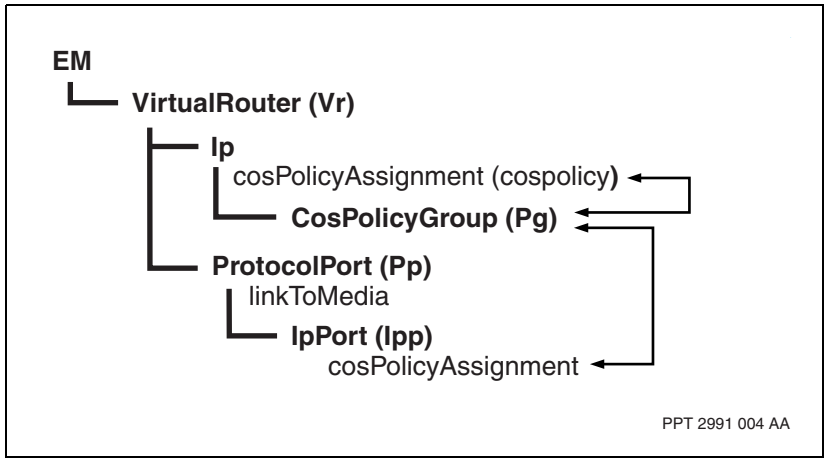
   **set Vr/<vr_name> Pp/<pp_name> IpPort cosPolicyAssingment Vr/<vr_name> Ip CosPolicyGroup/ <cos_pg2>**

## Variable definitions

| Variable | Value |
|---|---|
| <cos_pg1> | is the instance of the IP CoS component whose interface profile applies to all IpPorts on the virtual router. |
| <cos_pg2> | is the instance of the IP Cos component whose interface profile applies to a specific IpPort. |
| <pp_name> | is the logical interface to the network. |
| <vr_name> | is the name of the virtual router. |
| | |

## Procedure job aid

**Figure 86**
**IP CoS policy group family on the IpPort component hierarchy**



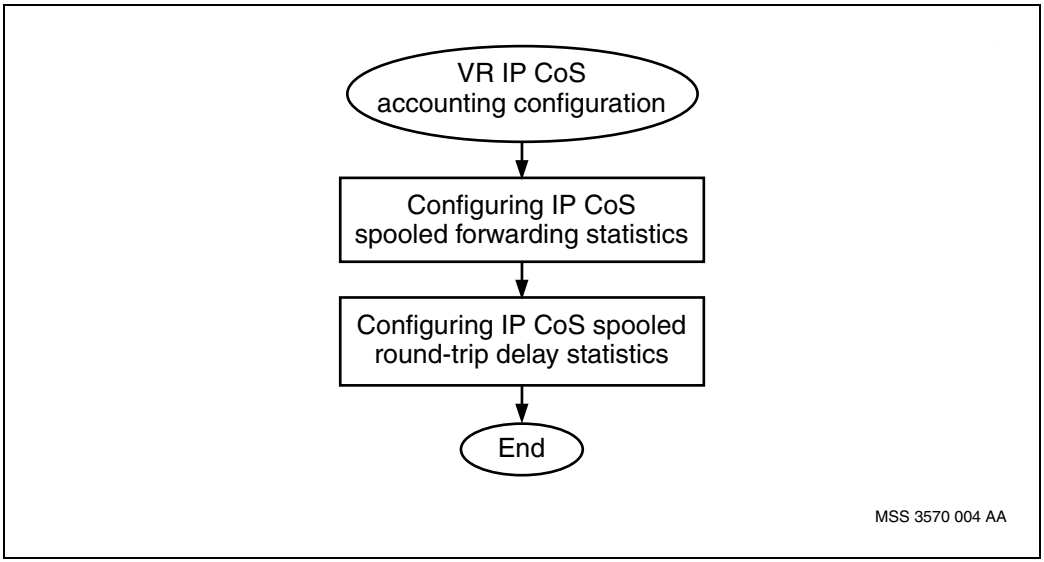
# Chapter 21
# VR IP CoS accounting configuration

Configure IP CoS accounting to gather accounting records for virtual router (VR).

## VR IP CoS accounting configuration procedures

This task flow shows you the sequence of procedures you perform to migrate from IP CoS to IP DiffServ on the VR. To link to any procedure, go to "VR IP CoS accounting configuration procedure navigation" (page 212).

**Figure 87**
**VR IP CoS accounting configuration procedures**



## VR IP CoS accounting configuration procedure navigation

# Configuring IP CoS spooled forwarding statistics

Configure the IP CoS spooled forwarding statistics to gather accounting records for VR IP CoS configurations.

## Procedure steps

1 For each customer VR, configure the *accountCollection* (*acl*) attribute.

```
set Vr/<vr_name> Ip acl <account_reason>
```

2 Set the *accountingControl* (*acc*) attribute for a protocol port.

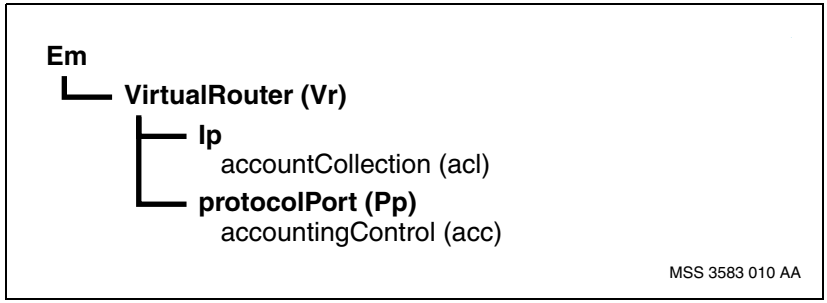
```
set Vr/<vr_name> Pp/<pp_name> acc <accounting_control>
```

## Variable definitions

| Variable | Value |
|---|---|
| <account_reason> | specifies the reasons for which accounting data is collected. |
| <accounting_control> | is used to control accounting for the protocol port. |
| <pp_name> | is the logical interface to the network. |
| <vr_name> | is the name of the virtual router. |
| | |

## Procedure job aid

**Figure 88**
**Spooled gateway statistics component hierarchy**



# Configuring IP CoS spooled round-trip delay statistics

Configure the IP CoS spooled round-trip delay statistics to measure how long it takes for a packet to travel from a host to a remote end and back again.

## Prerequisites

- Ensure that the BGP router ID is the same as the BGP loopback address, which is an always-up IP interface (for example, the IP address of a virtual media protocol port where the mode is set to alwaysUpInterface).

## Procedure steps

1. Configure round-trip delay (RTD) statistics.

   ```
   add Vr/<vr_name> Ip Rtd
   ```

2. Set the *rtdDstAddrList* component.

   ```
   set Vr/<vr_name> Ip Rtd dst <ip_address>
   ```

3. Enable spooling for the RTD statistics. If you do not enable statistics spooling, you cannot gather ongoing information for historical reporting purposes.

   ```
   set Col/<collector_value> Sp spool on

   set Lp/<lp_value> Eng Ds/<datastream_type> agentQ
   <agentQ_value>
   ```

4. Activate changes. See “Activating configuration changes” (page 20).

## Variable definitions

| Variable | Value |
|---|---|
| <agentQ_value> | is the maximum size of the agent queue size for the data stream of the data collection system (DCS) on the LP. |
| <collector_value> | is an instance of a data type, for example stats. The main function of the collector is to coordinate the collection of data from all its Agent subcomponents and distribute that data to the downstream applications which have requested it. |

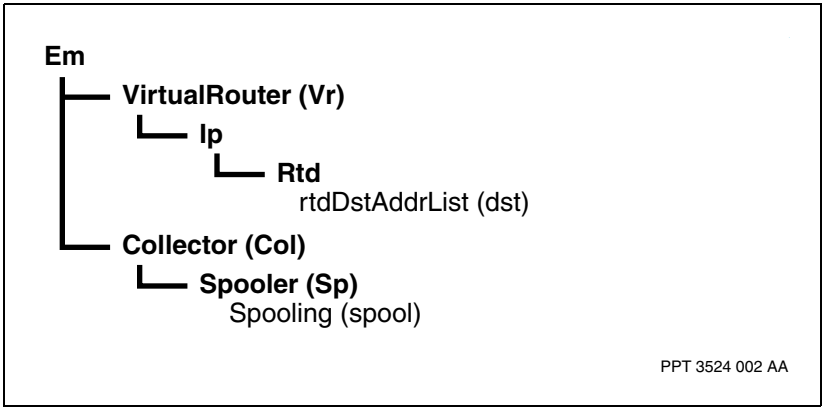
(Sheet 1 of 2)

| Variable | Value |
|---|---|
| <datastream_type> | is engineering parameters used by DCS on this LP for a particular datastream. |
| <ip_address> | is a list of IP destination addresses for which the round trip delays are calculated for the current round trip delay measurement session. |
| <lp_value> | is the number of the LP. |
| <vr_name> | is the name of the virtual router. |

(Sheet 2 of 2)

## Procedure job aid

**Figure 89**
**Round-trip delay statistics component hierarchy**



# Chapter 22
# IP CoS to IP DiffServ migration

Migrate IP class of service (CoS) to IP differentiated services (DiffServ) to offer a better framework for end-to-end quality of service (QoS) purposes.

## Prerequisites to IP CoS to IP DiffServ migration

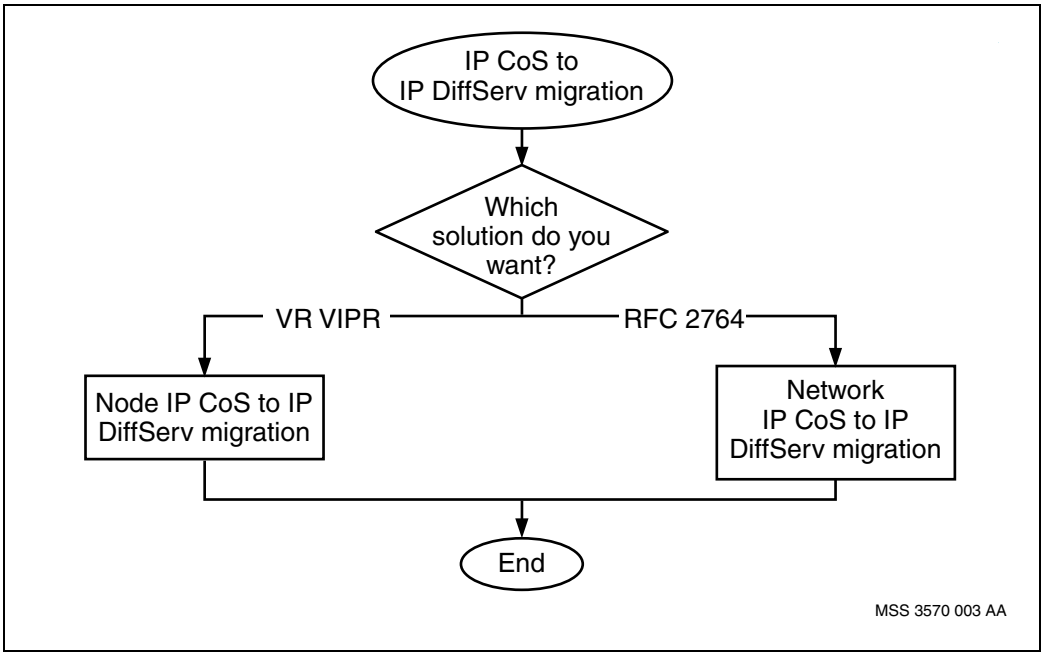
Before starting the IP CoS to IP DiffServ migration, you must determine:

- the carrier DiffServ domain. For details, see the chapter on Ip CoS to IP DiffServ migration in NN10600-590 *Nortel Networks Multiservice Switch 7400/15000/20000 Layer 3 Traffic Management Fundamentals*.
- the IP CoS to DiffServ domain PHB mapping. For details, see the chapter on IP CoS to IP DiffServ migration in NN10600-590 *Nortel Networks Multiservice Switch 7400/15000/20000 Layer 3 Traffic Management Fundamentals*.
- the carrier ATM VCC migration (optional). For details, see the chapter on IP CoS to IP DiffServ migration in NN10600-590 *Nortel Networks Multiservice Switch 7400/15000/20000 Layer 3 Traffic Management Fundamentals*.

## IP CoS to IP DiffServ migration tasks

This work flow shows you the sequence of tasks you perform to migrate from IP CoS to IP DiffServ. To link to any task, go to “IP CoS to IP DiffServ migration tasks” (page 217).

**Figure 90**
**IP CoS to IP DiffServ migration tasks**




## IP CoS to IP DiffServ migration task navigation

- "Node IP CoS to IP DiffServ migration" (page 219)
- "Network IP CoS to IP DiffServ migration" (page 225)

# Chapter 23
# Node IP CoS to IP DiffServ migration

Migrate the IP class of service (CoS) to IP differentiated services (DiffServ) on the virtual router to offer a better framework for end-to-end quality of service (QoS) purposes.

## Node IP CoS to IP DiffServ migration procedures

This task flow shows you the sequence of procedures you perform to migrate from IP CoS to IP DiffServ on the node. To link to any procedure, go to "Node IP CoS to IP DiffServ migration procedure navigation" (page 222).

**Figure 91**
**Node IP CoS to IP DiffServ migration procedures**

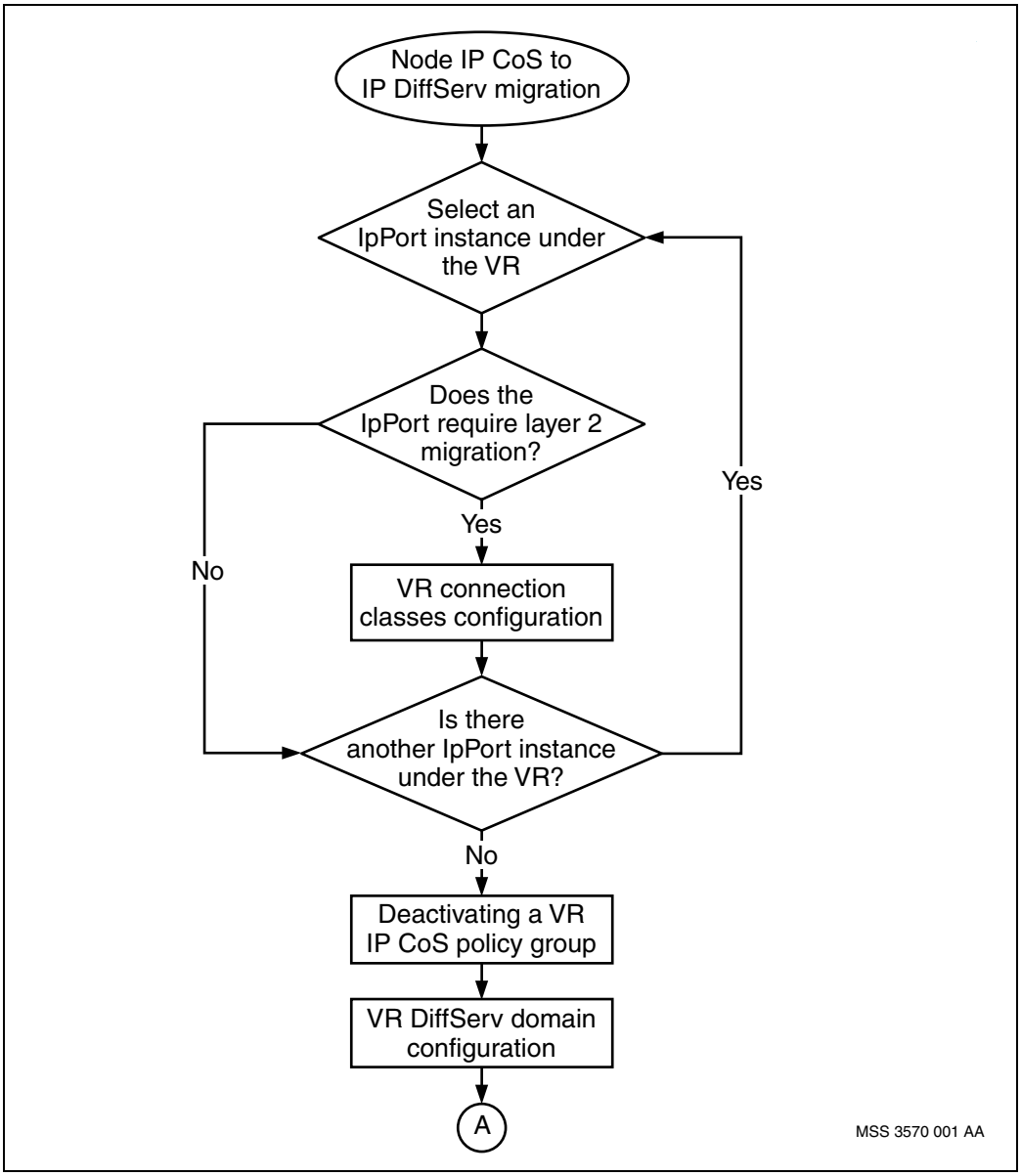
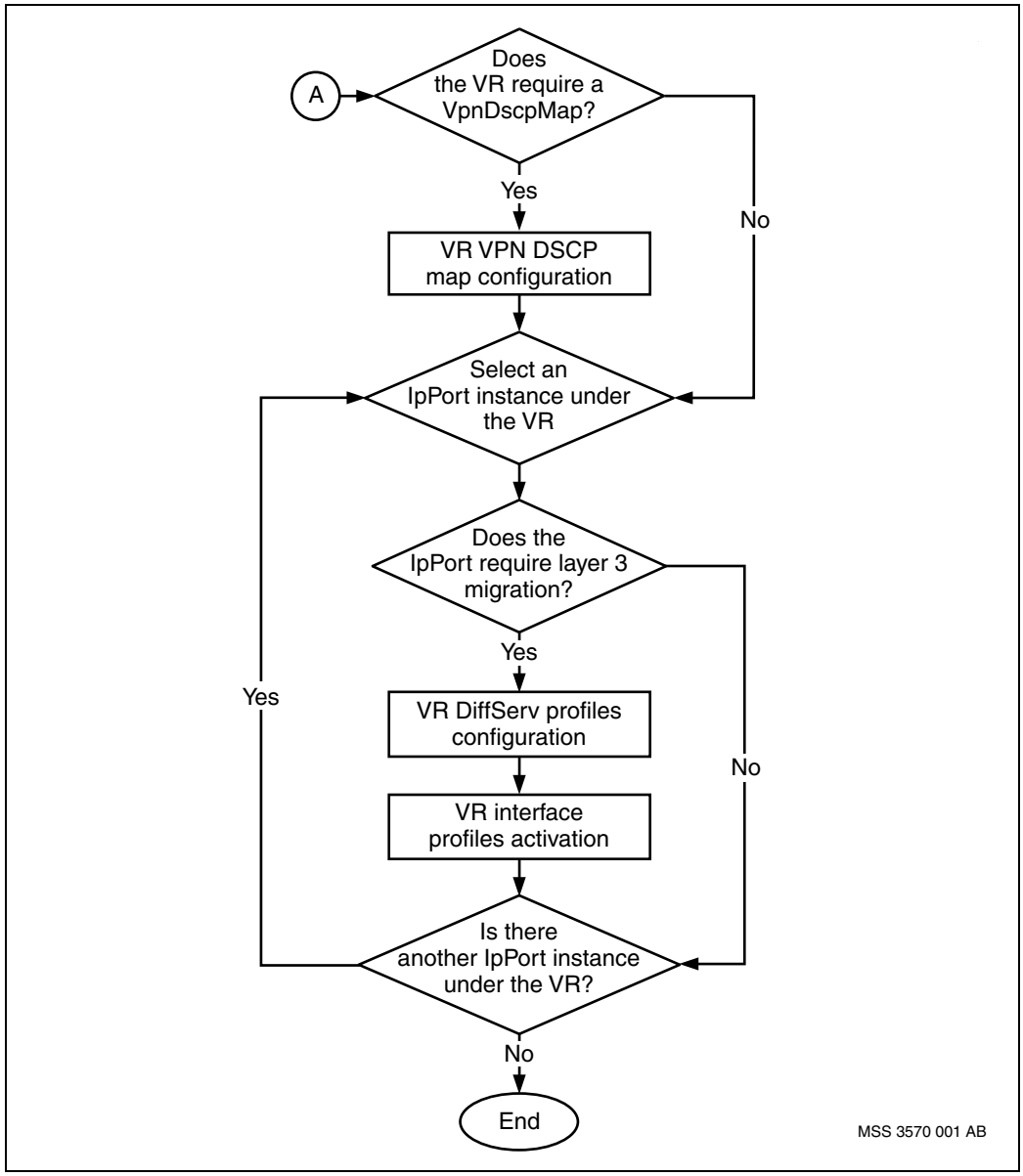


**Figure 92**
**Node IP CoS to IP DiffServ migration procedures (continued)**



## Node IP CoS to IP DiffServ migration procedure navigation

- "VR connection classes configuration" (page 29)
- "Deactivating a VR IP CoS policy group" (page 223)
- "VR DiffServ domain configuration" (page 43)
- "VR VPN DSCP map configuration" (page 55)
- "VR DiffServ profiles configuration" (page 63)
- "VR interface profiles activation" (page 101)

# Deactivating a VR IP CoS policy group

Deactivate and remove a VR IP CoS policy group when it is no longer required.

## Procedure steps

1 Delete the *CoSPolicyGroup (pg).*

```
del Vr/<vr_name> Ip Pg/<grp>
```

2 Repeat step 1 for every CoSPolicyGroup under the VR.

**CAUTION**
**Risk of loss of data**
Step_4 causes the functional processor (FP) to reset. When you reset an FP, it is temporarily unable to provide service. During the time that the FP is resetting, data can be lost.

3 If the instances have been deleted in step 1, then refer to NN10600-590 *Nortel Networks Multiservice Switch 7400/15000/20000 Layer 3 Traffic Management Fundamentals* to see whether the ipCos feature is still required in the feature list of the FP. Remove the ipCos feature from the feature list of the FP where it is no longer required.

```
set sw Lpt/<lpt> featureList ~ipCos
```

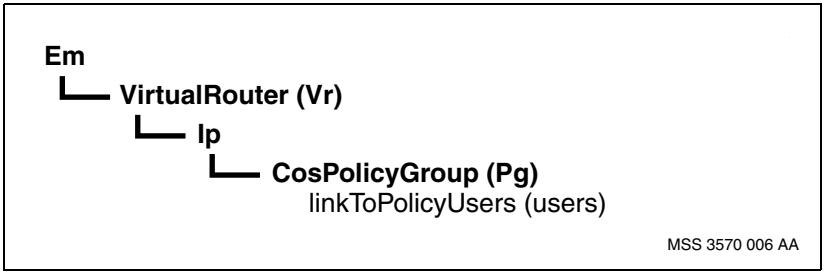
4 Repeat step 3 for each FP where the ipCos option is no longer required in the feature list.

## Variable definitions

| Variable | Value |
|---|---|
| <grp> | is the identifier for a a common set of IP CoS policies on the VR. |
| <lpt> | is the logical processor type, specifying characteristics of the software to be loaded on a card. |
| <vr_name> | is the name of the virtual router. |
| | |

## Procedure job aid

**Figure 93**
**VR IP CoS policy group component hierarchy**



# Chapter 24
# Network IP CoS to IP DiffServ migration

Migrate the IP class of service (CoS) to IP differentiated services (DiffServ) in an RFC2764 network to offer a better framework for end-to-end quality of service (QoS) purposes.

## Network IP CoS to IP DiffServ migration procedures

This task flow shows you the sequence of procedures you perform to migrate from IP CoS to IP DiffServ in the network. To link to any procedure, go to "Network IP CoS to IP DiffServ migration procedure navigation" (page 228).

**Figure 94**
**Network IP CoS to IP DiffServ migration procedures**

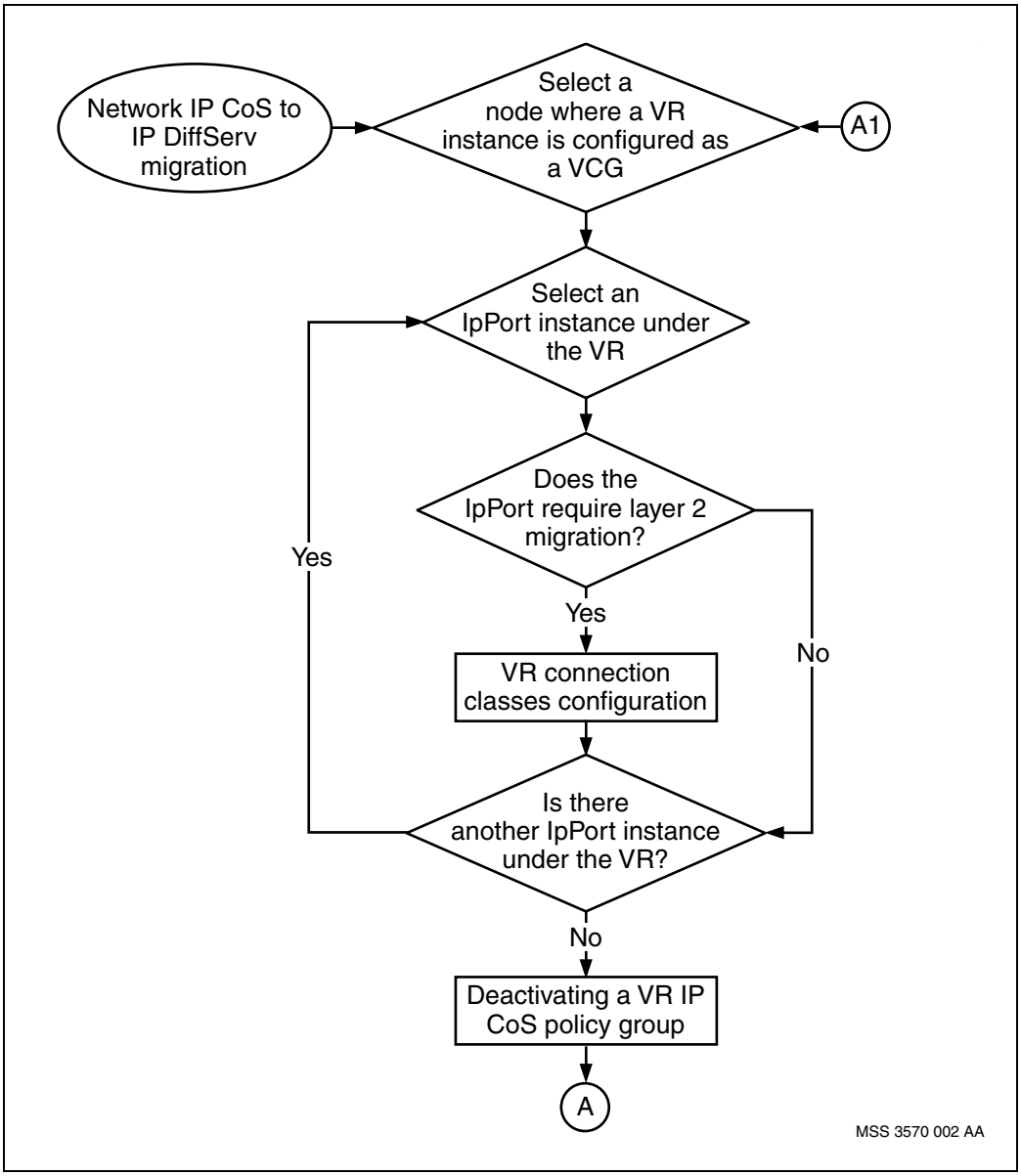
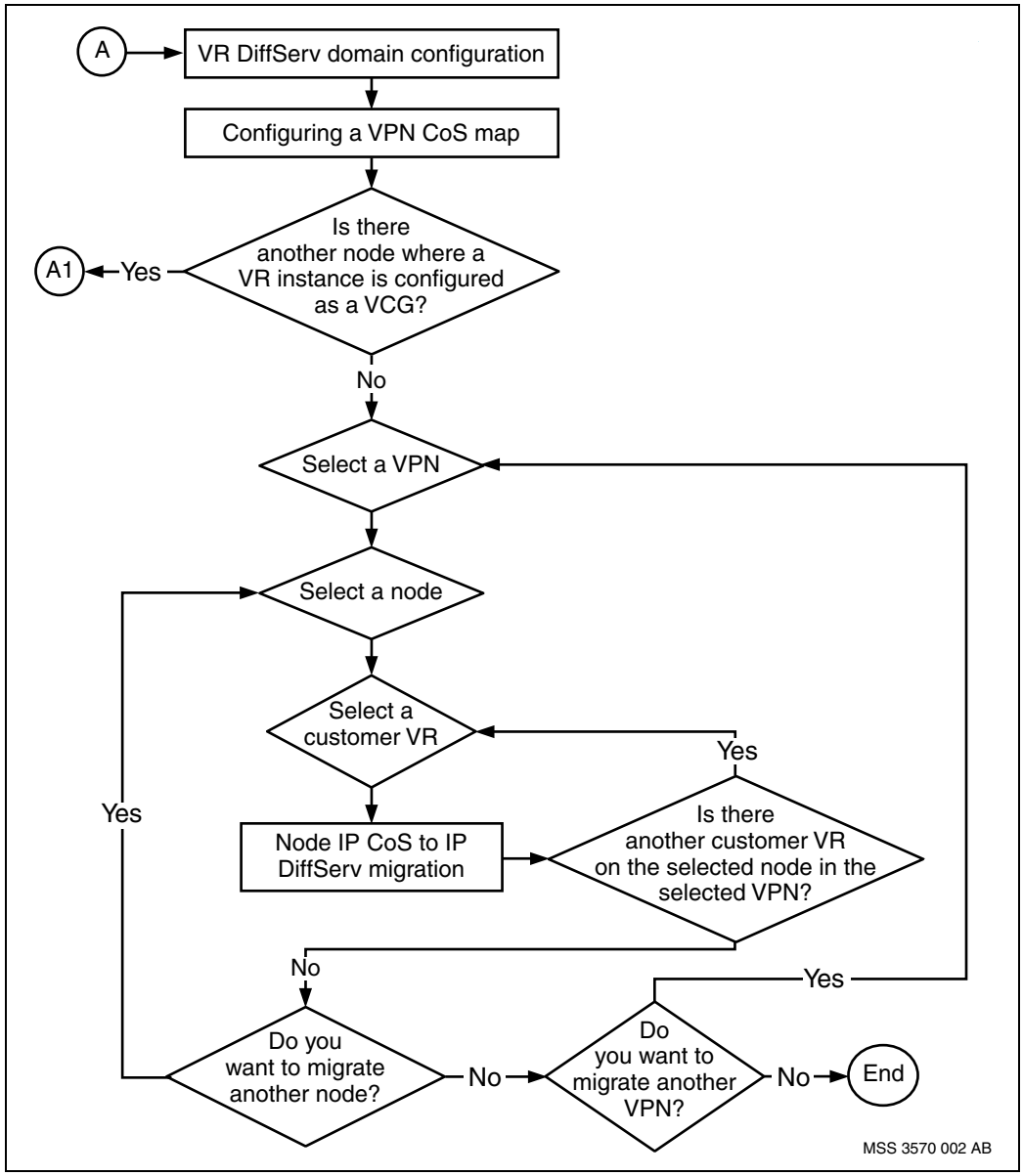


**Figure 95**
**Network IP CoS to IP DiffServ migration procedures (continued)**



## Network IP CoS to IP DiffServ migration procedure navigation

- "VR connection classes configuration" (page 29)
- "Deactivating a VR IP CoS policy group" (page 223)
- "VR DiffServ domain configuration" (page 43)
- "Configuring a VPN CoS map" (page 229)
- "Node IP CoS to IP DiffServ migration" (page 219)

# Configuring a VPN CoS map

Configure a VPN CoS map to map the class of service (CoS) assigned to packets by the virtual router to DSCP values that are used to mark the carrier IP header.

## Procedure steps

1 Add the *VpnCosMap* component.

```
add Vr/<vr_name> Dsd/<domain_type> VpnCosMap
```

2 Set the *assignedPhb* attribute.

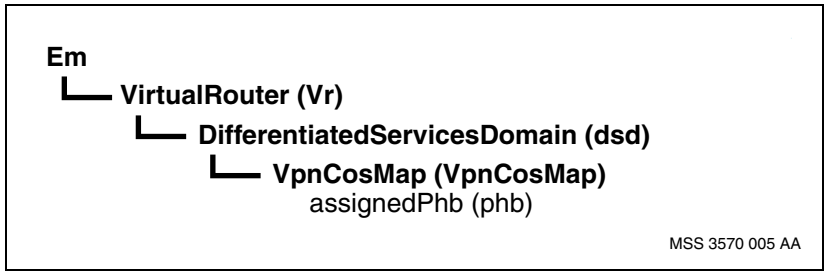
```
set Vr/<vr_name> Dsd/<domain_type> VpnCosMap/
<vpncos_map> phb <cos_value> <phb_value>
```

## Variable definitions

| Variable | Value |
|---|---|
| <domain_type> | is the instance value of the DiffServ domain. |
| <cos_value> | is the CoS value assigned to the packet on the customer virtual router. |
| <phb_value> | is the per-hop behavior (PHB) that determines the value of the DSCP field in the carrier IP header. |
| <vpncos_map> | is the instance value of the VPN CoS map. |
| <vr_name> | is the name of the virtual router. |
| | |

## Procedure job aid

**Figure 96**
**VPN CoS map component hierarchy**



Nortel Networks Multiservice Switch 7400/15000/20000

# Layer 3 Traffic Management Configuration

Release 6.1



Publication: NN10600-591
Document status: Standard
Document version: 6.1S2
Document date: November 2004
Printed in Canada