

# 策略路由技术

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# Objectives

- Upon completing this lesson, you will be able to:
  - Describe the PBR mechanism
  - Configure the PBR mechanism on Cisco routers
  - Monitor and troubleshoot PBR

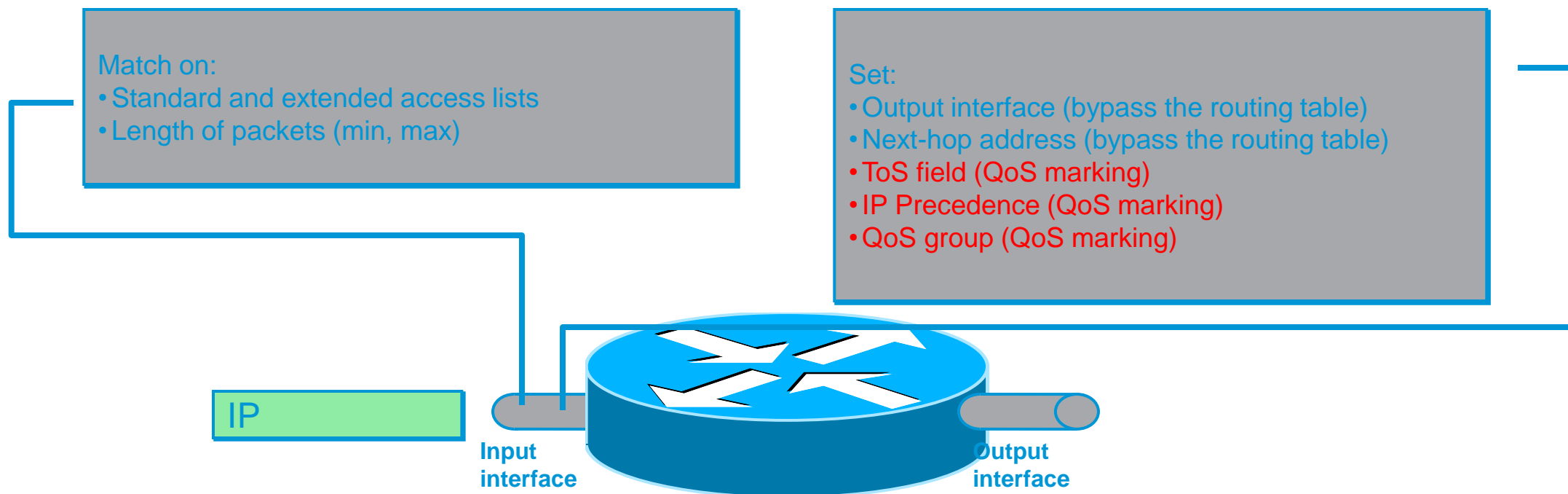
# Policy-based Routing

**Policy-based Routing** (PBR) is a mechanism that can be used to **bypass** the default destination-based forwarding functionality of routers

PBR is implemented **using a route map** where **match** commands are used to classify packets and **set** commands are used to process packets

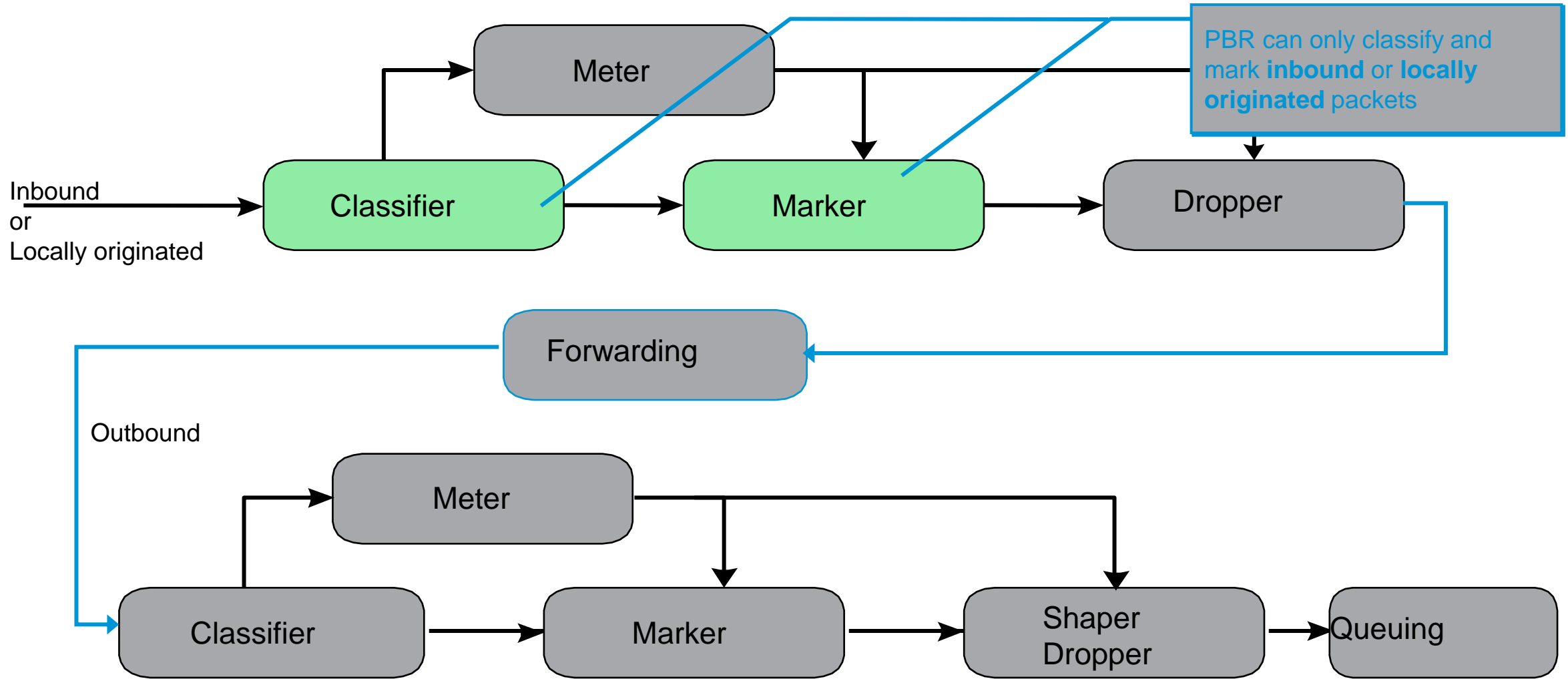
Route maps are applied to interfaces for processing of **inbound** packets (forwarding and/or **marking**)

# PBR Match and Set Options



- ▶ PBR has two primary applications:
  - Implementation of more complex routing paradigms than a simple destination-based forwarding
  - Classification and marking of packets for QoS purposes

# PBR Capabilities



# Configuring Classification and Marking Using PBR

Create a route map

Apply the route map to:

- An incoming interface, or

Apply the route map to:

- Locally originated traffic

Monitor and debug policy routing

# Route Map Rules

Router(config)#

```
route-map <name> [permit | deny] [<sequence-number>]  
  match <condition>  
  set <parameter>
```

Route maps are identified by a case-sensitive name.

Route maps can have multiple statements (same name, different sequence number).

Packets are processed in the specified sequence.

Packets not matched by the route map are forwarded using the default destination-based forwarding.

If packets are matched by the “match” condition but the route map statement is using the “deny” option, the default destination-based forwarding is applied to the packet.

# PBR Classification

```
Router(config-route-map) #
```

```
match ip address <#acl>
```

- **Classify using a standard access list against the source address**
- **Classify using an extended access list against the source or destination address; source or destination TCP/UDP port; IP Precedence; DSCP; or ToS**

```
Router(config-route-map) #
```

```
match length <min> <max>
```

- **Classify using a range of packet lengths that will be matched by the route-map statement**



# PBR Marking

Router(config-route-map) #

```
set ip precedence <precedence>
```

- **Set the specified IP Precedence to packets matched by the route map**
- **IP Precedence supports eight classes, two are reserved (6 and 7)**

Router(config-route-map) #

```
set ip qos-group <qos-group>
```

- **Classify using a range of packet lengths that will be matched by the route-map statement**
- **QoS group supports 100 classes (0-99)**

Router(config-route-map) #

```
set ip tos <tos>
```

- **Set the low-order four bits of the type of service (ToS) field**
- **These bits are used to specify the delay, throughput, reliability and monetary cost parameters. (specified in RFC 791; no longer used after RFC 1812)**

# Applying a Route Map

```
Router(config-if)#
```

```
ip policy-map <route-map-name>
```

- **Specifies the route map used to set QoS and other policy-routing parameters for packets received through the specified interface**

```
Router(config)#
```

```
ip local policy-map <route-map-name>
```

- **Specifies the route map used to set QoS and other policy-routing parameters for packets generated by the router**

# Monitoring and Troubleshooting PBR

Router#

```
show route-map <name>
```

- **Displays the route map and number of packets and bytes matched by each statement**

Router#

```
debug ip policy
```

- **Displays all packets matched by policy routing route maps**

# Monitoring and Debugging Policy Routing

```
Router#show route-map CPE
route-map CPE, permit, sequence 10
  Match clauses:
    ip address (access-lists): 199
  Set clauses:
    ip precedence flash-override
  Policy routing matches: 3418 packets, 412108 bytes
route-map CPE, permit, sequence 20
  Match clauses:
    ip address (access-lists): MatchPing
  Set clauses:
    ip precedence priority
  Policy routing matches: 82 packets, 31045 bytes
Router#show access-list MatchPing
Extended IP access list MatchPing
  permit icmp any any echo (25 matches)
Router#
```

# Monitoring and Debugging Policy Routing (cont.)

```
Router#debug ip policy
Policy routing debugging is on
Router#ping 192.168.1.1

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.1.1, timeout is 2 seconds:
!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 28/31/32 ms
Router#
2d02h: IP: s=192.168.1.2 (local), d=192.168.1.1, len 100, policy match
2d02h: IP: route map CPE, item 20, permit
...
```

Thank you.

