

## ◆ 1. Voice VLAN – Detailed Explanation

### Command Set

```
interface fa0/1
switchport mode access
switchport access vlan 10
switchport voice vlan 20
mls qos trust cos
```

### Explanation

Command	Meaning
<b>switchport mode access</b>	Makes the port an access port (not trunk).
<b>switchport access vlan 10</b>	All data traffic from the PC (connected via IP phone) goes to VLAN 10.
<b>switchport voice vlan 20</b>	All voice traffic from the IP phone goes to a separate VLAN (20). This improves security & QoS.
<b>mls qos trust cos</b>	Tells the switch to trust the <b>CoS value</b> coming from the IP phone. That means the phone marks packets with priority, and the switch honors that priority.

## ◆ 2. CoS (Layer 2 Priority) – Detailed Explanation

### Commands

```
mls qos trust cos
mls qos cos 5
```

### Explanation

- **mls qos trust cos**
  - The switch trusts the CoS value in the Ethernet frame coming from the device.
  - IP phones usually send CoS = 5 for voice.
  - This ensures the voice frame gets high priority.
- **mls qos cos 5**
  - If the device does **not** mark its own frames, this command forces the switch to mark them with CoS = 5.

## ◆ 3. DSCP (Layer 3 Priority) – Detailed Explanation

### Commands

```
mls qos trust dscp  
class-map match-all VOICE  
match ip dscp ef
```

### Explanation

- **mls qos trust dscp**

The switch accepts DSCP values from the device (IP phone or router).

- **class-map match-all VOICE**

Creates a **traffic group** called “VOICE”.

- **match ip dscp ef**

Matches packets with DSCP **EF (46)** which is standard for VoIP RTP traffic.

This allows routers/switches to identify voice traffic correctly.

## ◆ 4. QoS Methods Explained with Commands

### ★ A) Classification Commands – Detailed

```
class-map match-any VOICE  
match ip dscp ef
```

### Explanation

- A **class-map** is used to **identify** traffic.
- This class-map selects all packets marked with **DSCP EF (46)**.
- These packets are usually VoIP audio streams.

Classification is the *first step* in QoS.

### ★ B) Marking Commands – Detailed

```
policy-map MARKING  
class VOICE  
set dscp ef
```

### Explanation

- A **policy-map** applies actions to a class.
- **set dscp ef** tells the network to mark voice packets with high priority (EF).

Why? To ensure voice gets priority throughout the entire network.

### ★ C) Policing Commands – Detailed

```
policy-map POLICE-VOICE  
class VOICE  
police 8000 conform-action transmit exceed-action drop
```

## Explanation

- **police 8000** means the allowed traffic rate is **8,000 bits/sec.**
- If traffic stays within limit → **transmit**
- If traffic exceeds the limit → **drop**

Policing prevents greedy apps from flooding the network.

## ★ D) Shaping Commands – Detailed

```
policy-map SHAPE-WAN
class class-default
shape average 2000000
```

## Explanation

- **shape average 2000000** means shape traffic to **2 Mbps**.
- Traffic is smoothed (delayed slightly) instead of dropped.
- Useful on WAN links where sudden bursts cause packet loss.

## ◆ 6. Verification Commands – Detailed

### Check if policy is working

show policy-map interface

Shows:

- Which class matches
- How much traffic
- Drops, bandwidth, queuing

### Check interface QoS trust

show mls qos interface

Shows whether the interface trusts CoS or DSCP.

### Check DSCP and CoS values

show mls qos maps dscp-out

show mls qos maps cos-out

Displays mapping between CoS <-> DSCP.