

# **QoS**

**GS1900 series**

## **Support Note**

**Version 1.00 July 2013**



## Overview of QoS

QoS encompasses functions and features that guarantee quality of provided service. These include functions for bandwidth control (Rate limit) or traffic priority (802.1p and DSCP).

Quality of Service allows the prioritization and management of bandwidth for specific traffic and services such as voice or data.

## QoS operation

### Classification

1. **ACL** – Use Access Control List to classify each incoming packets
2. **Port** – According to the port for incoming packets, each port of the switch will have a default priority.
3. **Existing priority tag** – Classify the incoming packets by the existing priority tag.

CoS/802.1p – Class of Service (CoS) is a 3-bit field called the Priority Code Point (PCP) within an Ethernet frame header when using VLAN tagged frames as defined by IEEE 802.1Q. It specifies a priority value of between 0 and 7 inclusive that can be used by QoS disciplines to differentiate traffic.

DSCP or IP precedence – The Type of Service field in the IP header was originally defined in RFC 791. It defined a mechanism for assigning a priority to each IP packet as well as a mechanism to request specific treatment such as high throughput, high reliability or low latency.

## Queuing

Queue management is a part of packet classification and QoS schemes, in which flows are identified and classified, and then placed in queues that provide appropriate service levels.

1. **Strict priority** – The highest priority queue should be managed first and then turn to the lower priority queue. But the only problem with this method is that lower-priority queues may not get serviced at all if high-priority traffic is excessive.
2. **WRR** – make sure each queue gets some service time without fear of starvation. However, it provides no true mechanism for giving higher priority traffic preferential treatment.
3. **WFQ** – This can be seen as a combination of priority queuing and fair queuing. All queues are serviced so that none are starved, but some queues are serviced more than others.
4. **SP+WRR** – The combination of SP+WRR. Normally, it will set the high priority queue into the strict priority queue. When an important information enters into the strict priority queue, it will get high priority service and will not share the bandwidth with WRR. And for the lower priority information, it will use WRR to share with the bandwidth to prevent starvation.

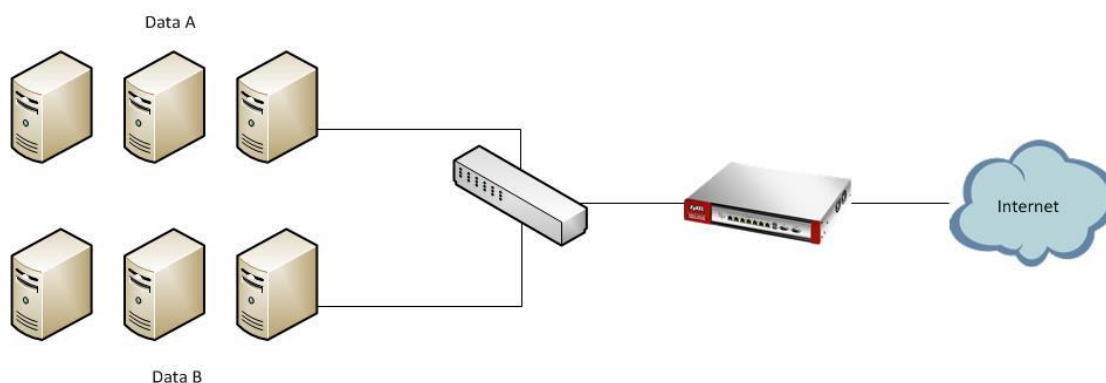
## Rate limit

Bandwidth control, the bandwidth limit per port.

## Policy

The bandwidth limit per queue. In addition to servicing higher priority queues first, we can also limit the bandwidth per queue on each port. This will prevent a scenario where two or three queues have the same weight but one queue sends most of the traffic and as a result the other queues cannot get service.

## Scenario



In an enterprise network, there are various types of traffic. But since most of companies' Internet bandwidth is limited, all traffic will contend for it and this may result in some important traffic, for example, the traffic from Data A getting slow or even starved. Therefore, intelligent bandwidth management for improved productivity becomes a matter of high concern for network administrators. The GS1900 series can provide QoS features in such a scenario. Below is an example which uses rate limit and 802.1p to implement this case.

### Network conditions:

GS1900-8HP

Data A VLAN : VLAN 100

Data B VLAN : VLAN 100

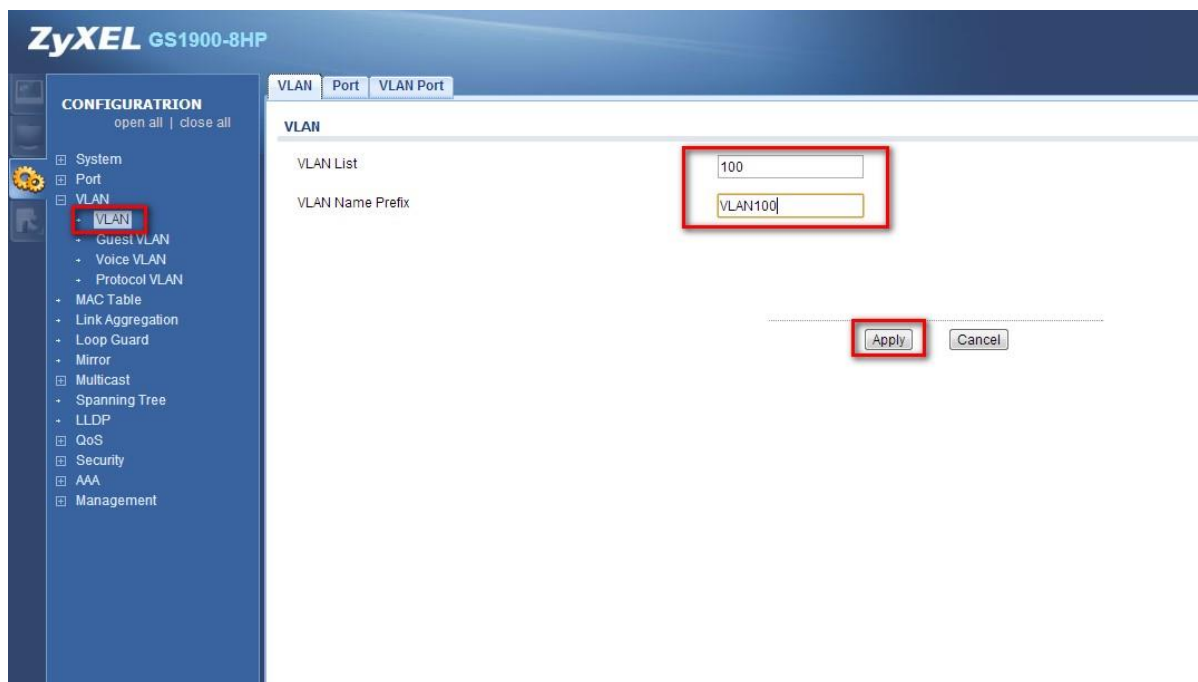
Port 3 is for Data A VLAN usage.

Port 4 is for Data B VLAN usage.

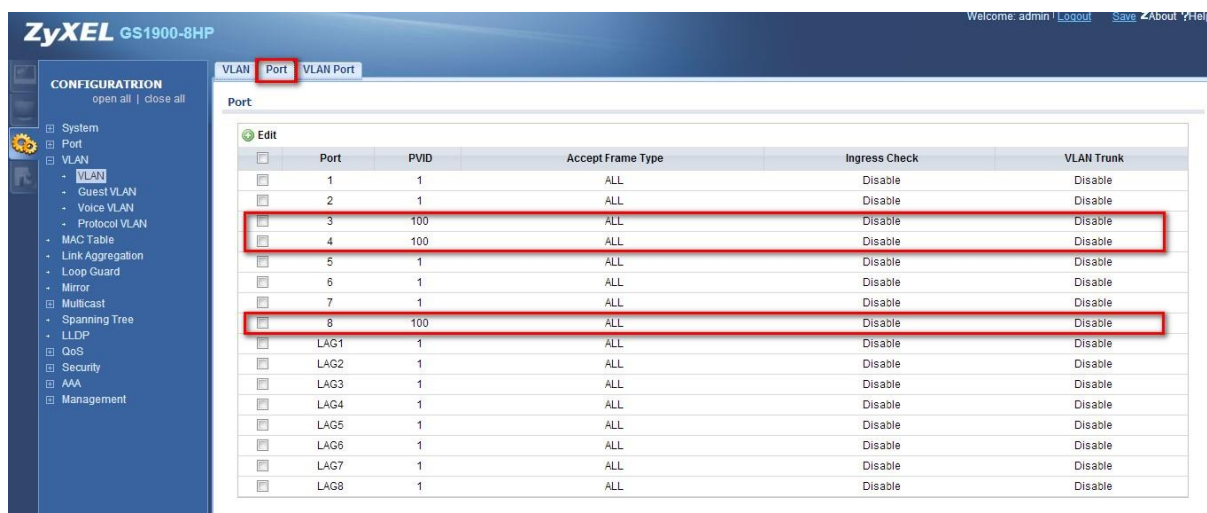
Port 8 is an uplink port.

## Web GUI configuration

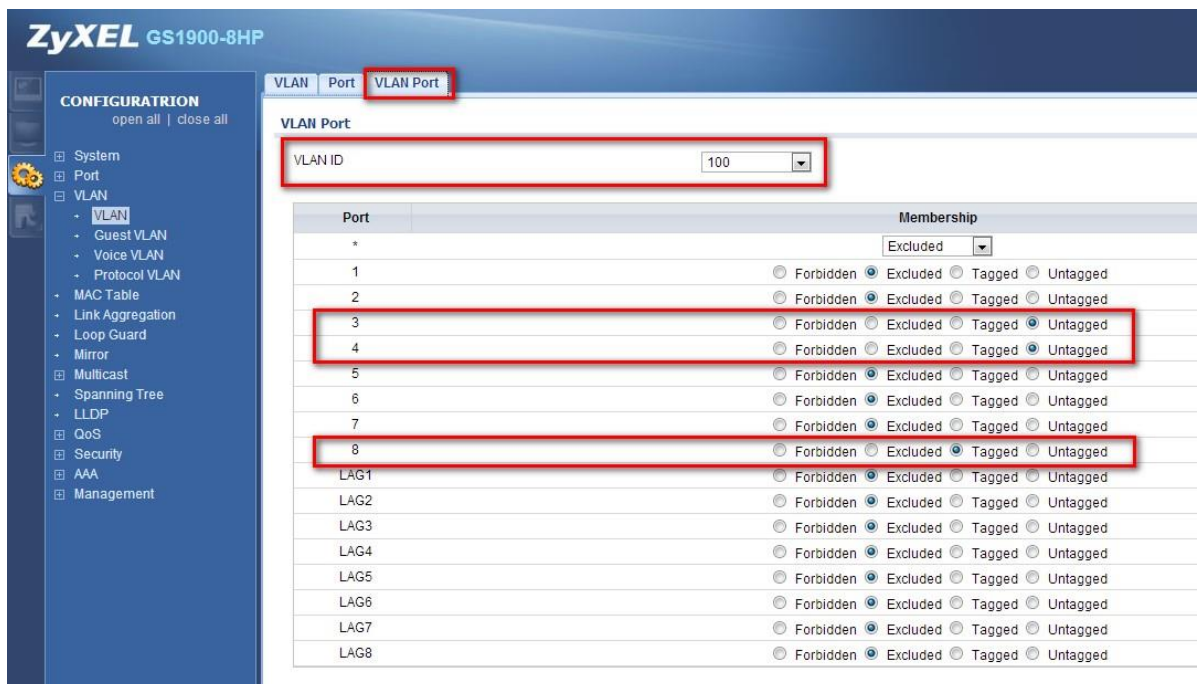
Step 1. Create VLAN 100.



Step 2. Configure PVID=100 for port 3, port 4 and port 8



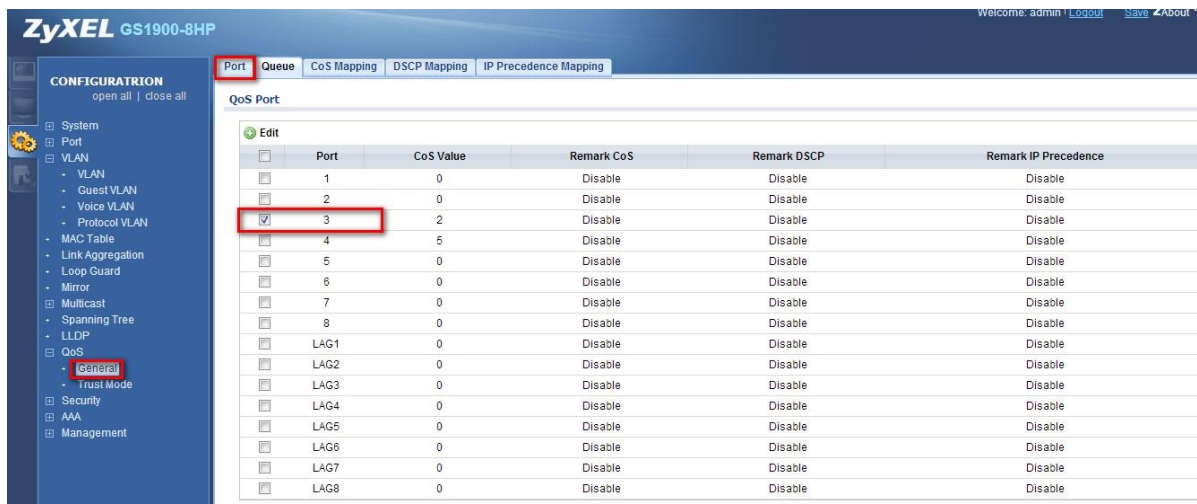
Step 3. Set port members for VLAN 100.



The screenshot shows the ZyXEL GS1900-8HP web interface. The left sidebar contains a navigation menu with options like System, Port, VLAN, MAC Table, Link Aggregation, Loop Guard, Mirror, Multicast, Spanning Tree, LLDP, QoS, Security, AAA, and Management. The main area is titled 'VLAN Port' and has a 'VLAN ID' dropdown set to '100'. Below this is a table with columns 'Port' and 'Membership'. The 'Membership' column has a dropdown menu set to 'Excluded'. The table lists ports 1 through 8, and LAG1 through LAG8. Ports 3 and 4 are highlighted with red boxes, and their 'Membership' is set to 'Untagged'.

Port	Membership
1	Forbidden Excluded Tagged Untagged
2	Forbidden Excluded Tagged Untagged
3	Forbidden Excluded Tagged <b>Untagged</b>
4	Forbidden Excluded Tagged <b>Untagged</b>
5	Forbidden Excluded Tagged Untagged
6	Forbidden Excluded Tagged Untagged
7	Forbidden Excluded Tagged Untagged
8	Forbidden Excluded <b>Tagged</b> Untagged
LAG1	Forbidden Excluded Tagged Untagged
LAG2	Forbidden Excluded Tagged Untagged
LAG3	Forbidden Excluded Tagged Untagged
LAG4	Forbidden Excluded Tagged Untagged
LAG5	Forbidden Excluded Tagged Untagged
LAG6	Forbidden Excluded Tagged Untagged
LAG7	Forbidden Excluded Tagged Untagged
LAG8	Forbidden Excluded Tagged Untagged

Step 4. Setup CoS value for port 3 and port 4.



The screenshot shows the ZyXEL GS1900-8HP web interface. The left sidebar contains a navigation menu with options like System, Port, VLAN, MAC Table, Link Aggregation, Loop Guard, Mirror, Multicast, Spanning Tree, LLDP, QoS, Security, AAA, and Management. The main area is titled 'QoS Port' and has a 'Port' dropdown set to '3'. Below this is a table with columns 'Port', 'CoS Value', 'Remark CoS', 'Remark DSCP', and 'Remark IP Precedence'. The 'CoS Value' for port 3 is set to 2, and port 4 is set to 5. Ports 1, 2, 5, 6, 7, 8, LAG1, LAG2, LAG3, LAG4, LAG5, LAG6, LAG7, and LAG8 are all set to 0.

Port	CoS Value	Remark CoS	Remark DSCP	Remark IP Precedence
1	0	Disable	Disable	Disable
2	0	Disable	Disable	Disable
3	2	Disable	Disable	Disable
4	5	Disable	Disable	Disable
5	0	Disable	Disable	Disable
6	0	Disable	Disable	Disable
7	0	Disable	Disable	Disable
8	0	Disable	Disable	Disable
LAG1	0	Disable	Disable	Disable
LAG2	0	Disable	Disable	Disable
LAG3	0	Disable	Disable	Disable
LAG4	0	Disable	Disable	Disable
LAG5	0	Disable	Disable	Disable
LAG6	0	Disable	Disable	Disable
LAG7	0	Disable	Disable	Disable
LAG8	0	Disable	Disable	Disable

**ZyXEL GS1900-8HP**

**CONFIGURATION**  
open all | close all

- System
- Port
- VLAN
  - VLAN
  - Guest VLAN
  - Voice VLAN
  - Protocol VLAN
- MAC Table
- Link Aggregation
- Loop Guard
- Mirror
- Multicast
- Spanning Tree
- LLDP
- QoS
  - General**
  - Trust Mode
- Security
- AAA
- Management

**Port Queue CoS Mapping DSCP Mapping IP Precedence Mapping**

**QoS Port**

Port List 3

CoS Value 2

CoS Remark ☐ Enable ☒ Disable

DSCP Remark ☐ Enable ☒ Disable

IP Precedence Remark ☐ Enable ☒ Disable

**Apply** **Cancel**

**ZyXEL GS1900-8HP** Welcome: admin | Logout Save About ?

**CONFIGURATION**  
open all | close all

- System
- Port
- VLAN
  - VLAN
  - Guest VLAN
  - Voice VLAN
  - Protocol VLAN
- MAC Table
- Link Aggregation
- Loop Guard
- Mirror
- Multicast
- Spanning Tree
- LLDP
- QoS
  - General**
  - Trust Mode
- Security
- AAA
- Management

**Port Queue CoS Mapping DSCP Mapping IP Precedence Mapping**

**QoS Port**

**Edit**

	Port	CoS Value	Remark CoS	Remark DSCP	Remark IP Precedence
<input type="checkbox"/>	1	0	Disable	Disable	Disable
<input type="checkbox"/>	2	0	Disable	Disable	Disable
<input type="checkbox"/>	3	2	Disable	Disable	Disable
<input checked="" type="checkbox"/>	4	5	Disable	Disable	Disable
<input type="checkbox"/>	5	0	Disable	Disable	Disable
<input type="checkbox"/>	6	0	Disable	Disable	Disable
<input type="checkbox"/>	7	0	Disable	Disable	Disable
<input type="checkbox"/>	8	0	Disable	Disable	Disable
<input type="checkbox"/>	LAG1	0	Disable	Disable	Disable
<input type="checkbox"/>	LAG2	0	Disable	Disable	Disable
<input type="checkbox"/>	LAG3	0	Disable	Disable	Disable
<input type="checkbox"/>	LAG4	0	Disable	Disable	Disable
<input type="checkbox"/>	LAG5	0	Disable	Disable	Disable
<input type="checkbox"/>	LAG6	0	Disable	Disable	Disable
<input type="checkbox"/>	LAG7	0	Disable	Disable	Disable
<input type="checkbox"/>	LAG8	0	Disable	Disable	Disable

**ZyXEL GS1900-8HP**

**CONFIGURATION**  
open all | close all

- System
- Port
- VLAN
  - VLAN
  - Guest VLAN
  - Voice VLAN
  - Protocol VLAN
- MAC Table
- Link Aggregation
- Loop Guard
- Mirror
- Multicast
- Spanning Tree
- LLDP
- QoS
  - General**
  - Trust Mode
- Security
- AAA
- Management

**QoS Port**

Port List 4

CoS Value 5

CoS Remark ☐ Enable ☒ Disable

DSCP Remark ☐ Enable ☒ Disable

IP Precedence Remark ☐ Enable ☒ Disable

**Apply** **Cancel**

Step 5. Set the QoS queue.

**ZyXEL GS1900-8HP**

**CONFIGURATION**  
open all | close all

- System
- Port
- VLAN
  - VLAN
  - Guest VLAN
  - Voice VLAN
  - Protocol VLAN
- MAC Table
- Link Aggregation
- Loop Guard
- Mirror
- Multicast
- Spanning Tree
- LLDP
- QoS
  - General**
  - Trust Mode
- Security
- AAA
- Management

**QoS Queue**

Queue ID	Schedule Algorithm	Weight(1 - 127)
0	<input checked="" type="radio"/> Strict <input type="radio"/> WRR	1
1	<input checked="" type="radio"/> Strict <input type="radio"/> WRR	2
2	<input checked="" type="radio"/> Strict <input type="radio"/> WRR	3
3	<input checked="" type="radio"/> Strict <input type="radio"/> WRR	4
4	<input checked="" type="radio"/> Strict <input type="radio"/> WRR	5
5	<input checked="" type="radio"/> Strict <input type="radio"/> WRR	9
6	<input checked="" type="radio"/> Strict <input type="radio"/> WRR	13
7	<input checked="" type="radio"/> Strict <input type="radio"/> WRR	15

**Apply** **Cancel**



Step 6. Configure the CoS mapping.

The screenshot shows the ZyXEL GS1900-8HP web interface. The 'CONFIGURATION' menu is on the left, and the 'CoS Mapping' tab is selected. The 'CoS to Queue Mapping' table is shown below.

Class of Service(CoS)	Queue ID (0 - 7)
0	1
1	0
2	2
3	3
4	4
5	7
6	6
7	5

The 'Queue to CoS Mapping' table is also shown below.

Queue ID	Class of Service (CoS) (0 - 7)
0	1
1	0
2	2
3	3
4	4