

RSTP and MVR

(Rapid Spanning Tree Protocol + MVR)

Ring work as the **Aggregation Layer**

Ethernet Switch

ZyNOS 3.7

Support Notes

Version 3.70

December 2006



Overview of RSTP

ZyXEL Management Switch uses IEEE 802.1w RSTP (Rapid Spanning Tree Protocol) that allows faster convergence of the spanning tree than STP (while also being backwards compatible with STP-only aware bridges). In RSTP, topology change information is directly propagated throughout the network from the device that generates the topology change. In STP, a longer delay is required as the device that causes a topology change first notifies the root bridge and only then notifies the network. Both RSTP and STP flush unwanted learned addresses from the filtering database. In RSTP, the port states are Discarding, Learning, and Forwarding.

(Rapid) STP detects and breaks network loops and provides backup links between switches, bridges or routers. It allows a switch to interact with other (R)STP -compliant switches in your network in order to ensure that only one path exists between any two stations on the network.

Note: "STP" refers to both STP and RSTP on ZyXEL Management Switch.

Overview of MVR

Multicast VLAN Registration (MVR) is designed for applications (such as Media-on-Demand (MoD)) that use multicast traffic across an Ethernet ring-based service provider network.

MVR allows one single multicast VLAN to be shared among different subscriber VLANs on the network. While isolated in different subscriber VLANs, connected devices can both subscribe to and unsubscribe from the multicast stream in the multicast VLAN. This improves bandwidth utilization with reduced multicast traffic in the subscriber VLANs, and simplifies multicast group management.

Scenario of RSTP + MVR (Ring works as the aggregation later)

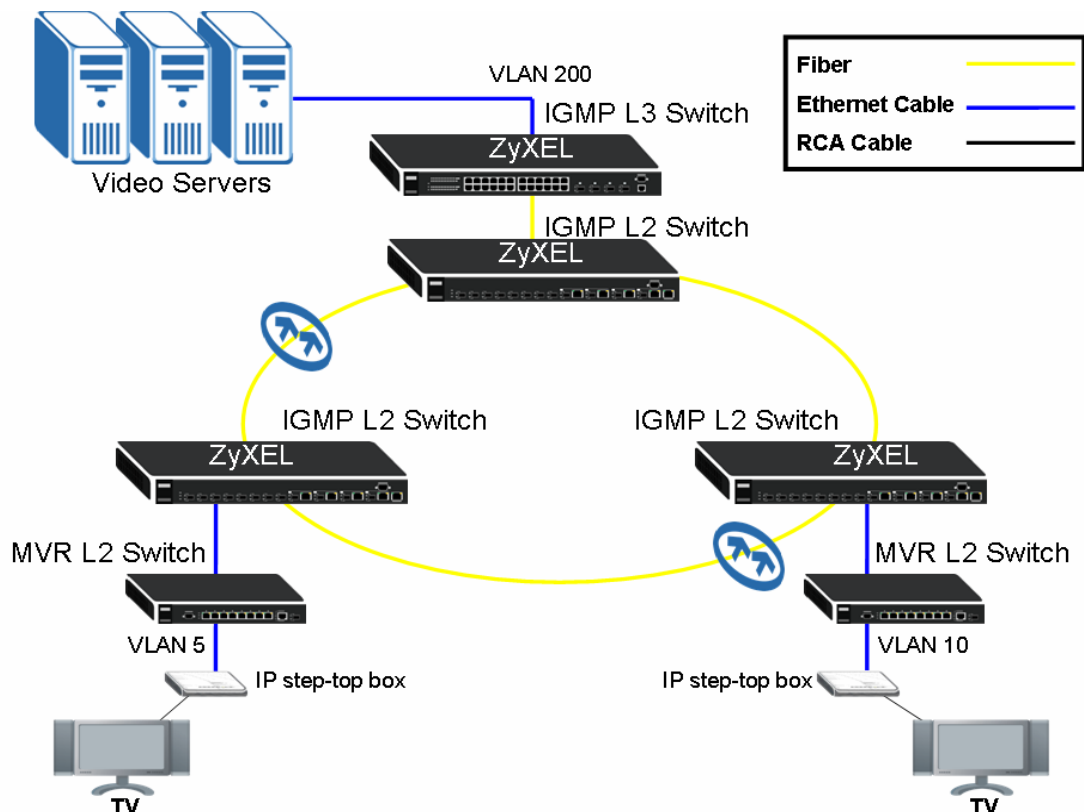
In the following section, we will provide an example to illustrate how to create a multicast network with IGMP Router (IGMP L3 Switch), IGMP Snooping L2 Switch on a ring using RSTP, and MVR L2 Switch with IGMP Snooping Enabled. In this scenario, the Video Servers are located in VLAN200. Thus, the Multicast VLAN is going to be VLAN200.

There are two clients subscribing the Multicast Video. One of them is located in VLAN 5 and the other one is located in VLAN 10. IGMP Route is enabled on the IGMP L3 Switch. RSTP, IGMP Snooping is enabled on the Aggregation layer L2 Switches which located in the ring. MVR is enabled on the Access Layer L2 Switches which are used for connecting with the clients.

Action to perform in this scenario:

1. Create and activate VLAN and IGMP Route on the L3 Switch.
2. Create and activate VLAN, RSTP, IGMP Snooping on the Aggregation Layer Switches
3. Create and activate VLAN, IGMP Snooping, MVR on the Access Layer L2 Switches

Illustration of this scenario



Configuration using the Web GUI - ZyXEL L3 Management Switch

1. Connect port 1 with a PC or Notebook via the RJ45 Cable.
2. By default, the MGMT IP of the out-band port is 192.168.0.1/24
3. Set your NIC to 192.168.0.100/24
4. Open an Internet browser (e.g. IE) and enter <http://192.168.0.1> in the URL field.
5. By default, the username for the administrator is “admin” and the corresponding password is “1234”.
6. After successful login you will see a screen similar to the one on the screenshot below.

Port	Name	Link	State	PD	LACP	TxPkts	RxPkts	Errors	Tx KB/s	Rx KB/s	Up Time
1		Down	STOP	Off	Disabled	0	0	0	0.0	0.0	0:00:00
2		Down	STOP	Off	Disabled	0	0	0	0.0	0.0	0:00:00
3		Down	STOP	Off	Disabled	0	0	0	0.0	0.0	0:00:00
4		Down	STOP	Off	Disabled	0	0	0	0.0	0.0	0:00:00
5		Down	STOP	Off	Disabled	0	0	0	0.0	0.0	0:00:00
6		Down	STOP	Off	Disabled	0	0	0	0.0	0.0	0:00:00
7		Down	STOP	Off	Disabled	0	0	0	0.0	0.0	0:00:00
8		Down	STOP	Off	Disabled	0	0	0	0.0	0.0	0:00:00
9		Down	STOP	Off	Disabled	0	0	0	0.0	0.0	0:00:00
10		Down	STOP	Off	Disabled	0	0	0	0.0	0.0	0:00:00
11		Down	STOP	Off	Disabled	0	0	0	0.0	0.0	0:00:00
12		Down	STOP	Off	Disabled	0	0	0	0.0	0.0	0:00:00
13		Down	STOP	Off	Disabled	0	0	0	0.0	0.0	0:00:00
14		Down	STOP	Off	Disabled	0	0	0	0.0	0.0	0:00:00
15		Down	STOP	Off	Disabled	0	0	0	0.0	0.0	0:00:00
16		Down	STOP	Off	Disabled	0	0	0	0.0	0.0	0:00:00
17		Down	STOP	Off	Disabled	0	0	0	0.0	0.0	0:00:00
18		Down	STOP	Off	Disabled	0	0	0	0.0	0.0	0:00:00
19		Down	STOP	Off	Disabled	0	0	0	0.0	0.0	0:00:00
20		Down	STOP	Off	Disabled	0	0	0	0.0	0.0	0:00:00

☒ Any
☐ Port

7. First of all, the IP domain of the video servers is 192.168.10.1/24. The video servers will be put under VLAN200, so we will need to create VLAN200 as well as the IP domain on the Switch first. To do so, click

“Advanced Application” → “VLAN”.

The screenshot shows the ZyXEL web management interface. On the left is a 'MENU' sidebar with options: Basic Setting, Advanced Application, IP Application, and Management. Under 'Advanced Application', the 'VLAN' option is highlighted with a black arrow. On the right, the 'Port Status' table is displayed, showing ports 1 through 12. Ports 1-8 are 'Down' with 'STOP' state. Ports 9 and 12 are '1000M/F Copper FORWARDING' with 'Disabled' LACP. Ports 10 and 11 are 'Down' with 'STOP' state. A 'Save' button is in the top right corner.

Port	Name	Link	State	LACP	TxPkts	RxPkts
1		Down	STOP	Disabled	0	0
2		Down	STOP	Disabled	0	0
3		Down	STOP	Disabled	0	0
4		Down	STOP	Disabled	0	0
5		Down	STOP	Disabled	0	0
6		Down	STOP	Disabled	0	0
7		Down	STOP	Disabled	0	0
8		Down	STOP	Disabled	0	0
9		1000M/F Copper FORWARDING	Disabled	Disabled	4	0
10		Down	STOP	Disabled	0	0
11		Down	STOP	Disabled	0	0
12		1000M/F Copper FORWARDING	Disabled	Disabled	16	4

8. Click the “Static VLAN” to create the VLAN first.

The screenshot shows the 'VLAN Status' page. At the top, it says 'The Number of VLAN = 1'. Below is a table with columns: Index, VID, Elapsed Time, and Status. The first row shows Index 1, VID 1, Elapsed Time 0:57:09, and Status Static. To the right of the table, there are two links: 'VLAN Port Setting' and 'Static VLAN'. The 'Static VLAN' link is highlighted with a purple arrow pointing to it.

Index	VID	Elapsed Time	Status
1	1	0:57:09	Static

9. Now, tick the “Active” check box to activate the VLAN. Give it a name as well as its VID (200 in our case). Since the Video Servers are connected to port 10 through another L2 VLAN unaware Switch, we need to take away the “Tx Tagging” and let the Switch to take away the VLAN tag during Egress. Port 12 should be joined to the VLAN200 since it is used to connect to the first MVR L2 Switch. Finally click “Add” to create this VLAN.

Static VLAN
[VLAN Status](#)

ACTIVE
☒

Name

VLAN Group ID

Port	Control			Tagging
*		Normal		<input checked="" type="checkbox"/> Tx Tagging
1	<input checked="" type="radio"/> Normal	<input type="radio"/> Fixed	<input type="radio"/> Forbidden	<input checked="" type="checkbox"/> Tx Tagging
2	<input checked="" type="radio"/> Normal	<input type="radio"/> Fixed	<input type="radio"/> Forbidden	<input checked="" type="checkbox"/> Tx Tagging
3	<input checked="" type="radio"/> Normal	<input type="radio"/> Fixed	<input type="radio"/> Forbidden	<input checked="" type="checkbox"/> Tx Tagging
4	<input checked="" type="radio"/> Normal	<input type="radio"/> Fixed	<input type="radio"/> Forbidden	<input checked="" type="checkbox"/> Tx Tagging
5	<input checked="" type="radio"/> Normal	<input type="radio"/> Fixed	<input type="radio"/> Forbidden	<input checked="" type="checkbox"/> Tx Tagging
6	<input checked="" type="radio"/> Normal	<input type="radio"/> Fixed	<input type="radio"/> Forbidden	<input checked="" type="checkbox"/> Tx Tagging
7	<input checked="" type="radio"/> Normal	<input type="radio"/> Fixed	<input type="radio"/> Forbidden	<input checked="" type="checkbox"/> Tx Tagging
8	<input checked="" type="radio"/> Normal	<input type="radio"/> Fixed	<input type="radio"/> Forbidden	<input checked="" type="checkbox"/> Tx Tagging
9	<input checked="" type="radio"/> Normal	<input type="radio"/> Fixed	<input type="radio"/> Forbidden	<input checked="" type="checkbox"/> Tx Tagging
10	<input type="radio"/> Normal	<input checked="" type="radio"/> Fixed	<input type="radio"/> Forbidden	<input type="checkbox"/> Tx Tagging
11	<input checked="" type="radio"/> Normal	<input type="radio"/> Fixed	<input type="radio"/> Forbidden	<input checked="" type="checkbox"/> Tx Tagging
12	<input type="radio"/> Normal	<input checked="" type="radio"/> Fixed	<input type="radio"/> Forbidden	<input checked="" type="checkbox"/> Tx Tagging

Add
Cancel
Clear

10. When the task is finished, go back to the VLAN Status screen and click “VLAN Port Setting” to modify the PVID.

VLAN Status
The Number of VLAN = 2

[VLAN Port Setting](#)
↑

[Static VLAN](#)

Index	VID	Elapsed Time	Status
1	1	1:08:24	Static
2	200	0:04:48	Static

11. For PVID, it is necessary to assign the port 10 with PVID200 since all the packets coming from the video servers are untagged. This Switch should apply the VID200 tag to all those packets in order for them to go into VLAN 200. Click “Apply” to apply your changes.

VLAN Port Setting

[VLAN Status](#)

GVRP
☐

Port isolation
☐

Port	Ingress Check	PVID	GVRP	Acceptable Frame Type	VLAN Trunking
*	<input type="checkbox"/>		<input type="checkbox"/>	All	<input type="checkbox"/>
1	<input type="checkbox"/>	1	<input type="checkbox"/>	All	<input type="checkbox"/>
2	<input type="checkbox"/>	1	<input type="checkbox"/>	All	<input type="checkbox"/>
3	<input type="checkbox"/>	1	<input type="checkbox"/>	All	<input type="checkbox"/>
4	<input type="checkbox"/>	1	<input type="checkbox"/>	All	<input type="checkbox"/>
5	<input type="checkbox"/>	1	<input type="checkbox"/>	All	<input type="checkbox"/>
6	<input type="checkbox"/>	1	<input type="checkbox"/>	All	<input type="checkbox"/>
7	<input type="checkbox"/>	1	<input type="checkbox"/>	All	<input type="checkbox"/>
8	<input type="checkbox"/>	1	<input type="checkbox"/>	All	<input type="checkbox"/>
9	<input type="checkbox"/>	1	<input type="checkbox"/>	All	<input type="checkbox"/>
10	<input type="checkbox"/>	200	<input type="checkbox"/>	All	<input type="checkbox"/>
11	<input type="checkbox"/>	1	<input type="checkbox"/>	All	<input type="checkbox"/>
12	<input type="checkbox"/>	1	<input type="checkbox"/>	All	<input type="checkbox"/>

12. Second, since the VLAN is ready now, we need to create the corresponding IP domain for this VLAN. To create a new IP domain, click “IP Setup” under “Basic Setting”.

Save
 Status

MENU

Basic Setting ←

Advanced Application

IP Application

Management

System Info

General Setup

Switch Setup


IP Setup ←

Port Setup

Port Status

Port	Name	Link	State	LACP	TxPkts	RxPkts	Errors	Tx KB/s
1		Down	STOP	Disabled	0	0	0	0.0
2		Down	STOP	Disabled	0	0	0	0.0
3		Down	STOP	Disabled	0	0	0	0.0
4		Down	STOP	Disabled	0	0	0	0.0
5		Down	STOP	Disabled	0	0	0	0.0
6		Down	STOP	Disabled	0	0	0	0.0
7		Down	STOP	Disabled	0	0	0	0.0
8		Down	STOP	Disabled	0	0	0	0.0
9		1000M/F Copper	FORWARDING	Disabled	27	0	0	0.0
10		Down	STOP	Disabled	0	0	0	0.0
11		Down	STOP	Disabled	0	0	0	0.0
12		1000M/F Copper	FORWARDING	Disabled	58	27	0	0.0

13. Since we will give the same IP domain as the video server, use 192.168.10.1 /24 again, and again, make it belong to VLAN 200. Click “Add” to add this VLAN.

 **IP Setup**

Default Gateway	<input type="text" value="0.0.0.0"/>
Domain Name Server	<input type="text" value="0.0.0.0"/>
Default Management	<input checked="" type="radio"/> In-band <input type="radio"/> Out-of-band

Management IP Address

IP Address	<input type="text" value="192.168.0.1"/>
IP Subnet Mask	<input type="text" value="255.255.255.0"/>
Default Gateway	<input type="text" value="0.0.0.0"/>

IP Interface

IP Address	<input type="text" value="192.168.10.1"/>	<input type="button" value="Add"/> <input type="button" value="Cancel"/>
IP Subnet Mask	<input type="text" value="255.255.255.0"/>	
VID	<input type="text" value="200"/>	

14. Now, the last step is to activate IGMP Route V2 in our newly created IP Domain. To do so we click "IP Application" → "IGMP".

ZyXEL
Save Status

MENU

- Basic Setting
- Advanced Application
- IP Application** ←
- Management
- Static Routing
- RIP
- OSPF
- IGMP** ←
- DVMRP
- IP Multicast
- DiffServ
- DHCP
- VRRP

Port Status

Port	Name	Link	State	LACP	TxPkts	RxPkts	Errors	Tx KB/s
1		Down	STOP	Disabled	0	0	0	0.0
2		Down	STOP	Disabled	0	0	0	0.0
3		Down	STOP	Disabled	0	0	0	0.0
4		Down	STOP	Disabled	0	0	0	0.0
5		Down	STOP	Disabled	0	0	0	0.0
6		Down	STOP	Disabled	0	0	0	0.0
7		Down	STOP	Disabled	0	0	0	0.0
8		Down	STOP	Disabled	0	0	0	0.0
9		1000M/F Copper	FORWARDING	Disabled	745	0	0	0.0
10		Down	STOP	Disabled	0	0	0	0.0
11		Down	STOP	Disabled	0	0	0	0.0
12		1000M/F Copper	FORWARDING	Disabled	58	752	0	0.0

15. First, tick the check box and assign "IGMP v2" to the IP domain 192.168.10.1/24.

IGMP

Active ☒ ←

Index	Network	Version
1	192.168.1.1/24	None
2	192.168.10.1/24	IGMP-v2 ←

Apply Cancel

16. Finally, in the upper right corner, click “Save” to write all the changes to the memory. At this point everything is done on this Switch.

Save Status Logout Help

Configuration using the Web GUI - IGMP L2 Management Switch [The first L2 Switch on the top of the ring]

1. Connect the port 1 with a PC or Notebook via the RJ45 Cable.
2. By default, the MGMT IP of the out-band port is 192.168.0.1/24
3. Set your NIC to 192.168.0.100/24
4. Open an Internet browser (e.g. IE) and enter <http://192.168.0.1> in the URL field.
5. By default, the username for the administrator is “admin” and the corresponding password is “1234”.
6. After successful login you will see a screen similar to the one on the screenshot below.

Port	Name	Link	State	PD	LACP	TxPkts	RxPkts	Errors	Tx KB/s	Rx KB/s	Up Time
1		Down	STOP	Off	Disabled	0	0	0	0.0	0.0	0:00:00
2		Down	STOP	Off	Disabled	0	0	0	0.0	0.0	0:00:00
3		Down	STOP	Off	Disabled	0	0	0	0.0	0.0	0:00:00
4		Down	STOP	Off	Disabled	0	0	0	0.0	0.0	0:00:00
5		Down	STOP	Off	Disabled	0	0	0	0.0	0.0	0:00:00
6		Down	STOP	Off	Disabled	0	0	0	0.0	0.0	0:00:00
7		Down	STOP	Off	Disabled	0	0	0	0.0	0.0	0:00:00
8		Down	STOP	Off	Disabled	0	0	0	0.0	0.0	0:00:00
9		Down	STOP	Off	Disabled	0	0	0	0.0	0.0	0:00:00
10		Down	STOP	Off	Disabled	0	0	0	0.0	0.0	0:00:00
11		Down	STOP	Off	Disabled	0	0	0	0.0	0.0	0:00:00
12		Down	STOP	Off	Disabled	0	0	0	0.0	0.0	0:00:00
13		Down	STOP	Off	Disabled	0	0	0	0.0	0.0	0:00:00
14		Down	STOP	Off	Disabled	0	0	0	0.0	0.0	0:00:00
15		Down	STOP	Off	Disabled	0	0	0	0.0	0.0	0:00:00
16		Down	STOP	Off	Disabled	0	0	0	0.0	0.0	0:00:00
17		Down	STOP	Off	Disabled	0	0	0	0.0	0.0	0:00:00
18		Down	STOP	Off	Disabled	0	0	0	0.0	0.0	0:00:00
19		Down	STOP	Off	Disabled	0	0	0	0.0	0.0	0:00:00
20		Down	STOP	Off	Disabled	0	0	0	0.0	0.0	0:00:00

7. First, we are going to create the multicast VLAN 200 on this switch. Also, RSTP is needed in our case to build the Aggregation layer ring (3x IGMP L2 Switches) for case of physical wire being disconnected. To enable the RSTP, click “Advanced Application” → “Spanning Tree Protocol”.

The screenshot shows the ZyXEL web interface. On the left is a 'MENU' sidebar with options: Basic Setting, Advanced Application, IP Application, and Management. Under 'Management', there is a sub-menu for 'VLAN' with options: Static MAC Forwarding, Filtering, Spanning Tree Protocol, Bandwidth Control, Broadcast Storm Control, Mirroring, Link Aggregation, Port Authentication, Port Security, Classifier, Policy Rule, Queuing Method, Multicast, and DHCP Relay. The main area displays the 'Port Status' table. Arrows point from 'Advanced Application' in the menu to the table and from 'Spanning Tree Protocol' to the table.

Port	Name	Link	State	LACP	TxPkts	RxPkts	Errors	Tx KB/s
1		Down	STOP	Disabled	0	0	0	0.0
2		Down	STOP	Disabled	1	2	0	0.0
3		Down	STOP	Disabled	29	41	0	0.0
4		Down	STOP	Disabled	0	0	0	0.0
5		Down	STOP	Disabled	0	0	0	0.0
6		100M/F	FORWARDING	Disabled	15135474	2949132	0	0.0
7		Down	STOP	Disabled	3	96	0	0.0
8		Down	STOP	Disabled	0	0	0	0.0
9		Down	STOP	Disabled	0	0	0	0.0
10		Down	STOP	Disabled	0	0	0	0.0
11		1000M/F Copper	FORWARDING	Disabled	1488289215	1498942593	0	0.0
12		1000M/F Copper	FORWARDING	Disabled	1497825341	1486402409	0	0.0

8. Choose "RSTP".

The screenshot shows the 'Spanning Tree Protocol Status' page. At the top, there are three tabs: 'Configuration', 'RSTP', and 'MRSTP'. An arrow points from the 'RSTP' tab to the table below. The table is titled 'Spanning Tree Protocol: RSTP' and contains the following data:

Bridge	Root	Our Bridge
Bridge ID	0000-0013496aeca5	0000-0013496aeca5
Hello Time (second)	2	2
Max Age (second)	20	20
Forwarding Delay (second)	15	15
Cost to Bridge	0	
Port ID	0X0000	
Topology Changed Times	0	
Time Since Last Change	0:00:00	

9. To configure RSTP, check "Active" to enable this feature first. Since this switch is going to be the root switch in our ring, we will give it the highest spanning tree priority 0 (The lower the number, the higher the priority). Also, port 11 and 12 are the ports that will be used in our ring so we need to activate them by ticking the corresponding check box.

Rapid Spanning Tree Protocol

Status

Active	<input checked="" type="checkbox"/>	
Bridge Priority	0	
Hello Time	2	Seconds
MAX Age	20	Seconds
Forwarding Delay	15	Seconds

Port	Active	Priority	Path Cost
*	<input type="checkbox"/>		
1	<input type="checkbox"/>	128	4
2	<input type="checkbox"/>	128	4
3	<input type="checkbox"/>	128	4
4	<input type="checkbox"/>	128	4
5	<input type="checkbox"/>	128	4
6	<input type="checkbox"/>	128	4
7	<input type="checkbox"/>	128	4
8	<input type="checkbox"/>	128	4
9	<input type="checkbox"/>	128	4
10	<input type="checkbox"/>	128	4
11	<input checked="" type="checkbox"/>	128	4
12	<input checked="" type="checkbox"/>	128	4

10. Now we are going to create the multicast VLAN 200 on the ports within the ring (port 11 and port 12) and also the uplink port (port 9). Port 9 is connected to the L3 IGMP Switch.

ZyXEL Save

MENU

- Basic Setting
- Advanced Application
- IP Application
- Management
 - VLAN**
 - Static MAC Forwarding
 - Filtering
 - Spanning Tree Protocol
 - Bandwidth Control
 - Broadcast Storm Control
 - Mirroring
 - Link Aggregation
 - Port Authentication
 - Port Security
 - Classifier

Port Status

Port	Name	Link	State	LACP	TxPkts	RxPkts	Errors	Tx
1		Down	STOP	Disabled	0	0	0	C
2		Down	STOP	Disabled	0	0	0	C
3		Down	STOP	Disabled	0	0	0	C
4		Down	STOP	Disabled	0	0	0	C
5		Down	STOP	Disabled	0	0	0	C
6		Down	STOP	Disabled	0	0	0	C
7		Down	STOP	Disabled	0	0	0	C
8		Down	STOP	Disabled	418692	418220	0	C
9	1000M/F Copper	FORWARDING	Disabled	1531722542	19904162	0	C	
10		Down	STOP	Disabled	84	152	0	C
11	1000M/F Copper	FORWARDING	Disabled	1498582593	1488061256	0	0	
12	1000M/F SFP	FORWARDING	Disabled	1498253930	1489224540	0	0	

11. Click on "Static VLAN"

VLAN Status
The Number of VLAN = 1

[VLAN Port Setting](#) [Static VLAN](#)

Index	VID	Elapsed Time	Status
1	1	240:36:17	Static

12. Tick the check box and give this VLAN a name. (In this example, VLAN200) and its VLAN ID, 200. Also, we set the port 11 and the port 12 as "Fixed" with Tagging since these two ports are in the ring. Finally, click "Add" to create this VLAN.

Static VLAN

VLAN Status

ACTIVE

☒

Name

VLAN200

VLAN Group ID

200

Port	Control			Tagging
*	Normal			<input checked="" type="checkbox"/> Tx Tagging
1	<input checked="" type="radio"/> Normal	<input type="radio"/> Fixed	<input type="radio"/> Forbidden	<input checked="" type="checkbox"/> Tx Tagging
2	<input checked="" type="radio"/> Normal	<input type="radio"/> Fixed	<input type="radio"/> Forbidden	<input checked="" type="checkbox"/> Tx Tagging
3	<input checked="" type="radio"/> Normal	<input type="radio"/> Fixed	<input type="radio"/> Forbidden	<input checked="" type="checkbox"/> Tx Tagging
4	<input checked="" type="radio"/> Normal	<input type="radio"/> Fixed	<input type="radio"/> Forbidden	<input checked="" type="checkbox"/> Tx Tagging
5	<input checked="" type="radio"/> Normal	<input type="radio"/> Fixed	<input type="radio"/> Forbidden	<input checked="" type="checkbox"/> Tx Tagging
6	<input checked="" type="radio"/> Normal	<input type="radio"/> Fixed	<input type="radio"/> Forbidden	<input checked="" type="checkbox"/> Tx Tagging
7	<input checked="" type="radio"/> Normal	<input type="radio"/> Fixed	<input type="radio"/> Forbidden	<input checked="" type="checkbox"/> Tx Tagging
8	<input checked="" type="radio"/> Normal	<input type="radio"/> Fixed	<input type="radio"/> Forbidden	<input checked="" type="checkbox"/> Tx Tagging
9	<input type="radio"/> Normal	<input checked="" type="radio"/> Fixed	<input type="radio"/> Forbidden	<input checked="" type="checkbox"/> Tx Tagging
10	<input checked="" type="radio"/> Normal	<input type="radio"/> Fixed	<input type="radio"/> Forbidden	<input checked="" type="checkbox"/> Tx Tagging
11	<input type="radio"/> Normal	<input checked="" type="radio"/> Fixed	<input type="radio"/> Forbidden	<input checked="" type="checkbox"/> Tx Tagging
12	<input type="radio"/> Normal	<input checked="" type="radio"/> Fixed	<input type="radio"/> Forbidden	<input checked="" type="checkbox"/> Tx Tagging

Add
Cancel
Clear

13. Now we need to configure all the multicast related settings. To do so, click “Advanced Application” → “Multicast”.

ZyXEL

Save Status

MENU

- Basic Setting
- Advanced Application
- IP Application
- Management

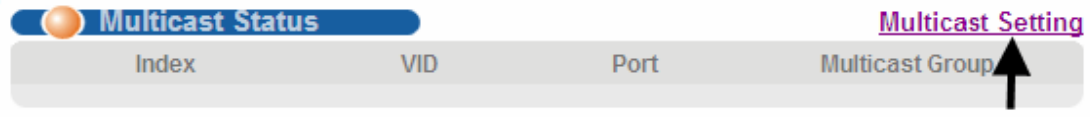
VLAN

- Static MAC Forwarding
- Filtering
- Spanning Tree Protocol
- Bandwidth Control
- Broadcast Storm Control
- Mirroring
- Link Aggregation
- Port Authentication
- Port Security
- Classifier
- Policy Rule
- Queuing Method
- Multicast
- DHCP Relay

Port Status

Port	Name	Link	State	LACP	TxPkts	RxPkts	Errors	Tx KB/s	Rx KB/s
1		Down	STOP	Disabled	0	0	0	0.0	0.0
2		Down	STOP	Disabled	1	2	0	0.0	0.0
3		Down	STOP	Disabled	29	41	0	0.0	0.0
4		Down	STOP	Disabled	0	0	0	0.0	0.0
5		Down	STOP	Disabled	0	0	0	0.0	0.0
6	100M/F		FORWARDING	Disabled	15148301	2967385	0	0.64	0.43
7		Down	STOP	Disabled	3	96	0	0.0	0.0
8		Down	STOP	Disabled	0	0	0	0.0	0.0
9		Down	STOP	Disabled	0	0	0	0.0	0.0
10		Down	STOP	Disabled	0	0	0	0.0	0.0
11	1000M/F Copper		FORWARDING	Disabled	1488307462	1498957300	0	0.443	0.6
12	1000M/F Copper		FORWARDING	Disabled	1497827599	1486402412	0	0.64	0.0

14. First, we need to activate IGMP snooping. To do so, click “Multicast Setting”.



15. Tick the “Active” check box to activate IGMP Snooping first. Choose “Drop” for Unknown Multicast Frame to avoid Multicast Flooding. Also, for the ports associated with the Ring and the upstream port, we pick “Fixed” as the IGMP Querier Mode.

Port	Immed. Leave	Group Limited	Max Group Num.	IGMP Filtering Profile	IGMP Querier Mode
*	<input type="checkbox"/>	<input type="checkbox"/>		Default	Auto
1	<input type="checkbox"/>	<input type="checkbox"/>	0	Default	Auto
2	<input type="checkbox"/>	<input type="checkbox"/>	0	Default	Auto
3	<input type="checkbox"/>	<input type="checkbox"/>	0	Default	Auto
4	<input type="checkbox"/>	<input type="checkbox"/>	0	Default	Auto
5	<input type="checkbox"/>	<input type="checkbox"/>	0	Default	Auto
6	<input type="checkbox"/>	<input type="checkbox"/>	0	Default	Auto
7	<input type="checkbox"/>	<input type="checkbox"/>	0	Default	Auto
8	<input type="checkbox"/>	<input type="checkbox"/>	0	Default	Auto
9	<input type="checkbox"/>	<input type="checkbox"/>	0	Default	Fixed
10	<input type="checkbox"/>	<input type="checkbox"/>	0	Default	Auto
11	<input type="checkbox"/>	<input type="checkbox"/>	0	Default	Fixed
12	<input type="checkbox"/>	<input type="checkbox"/>	0	Default	Fixed

16. Finally, in the top right corner, click “Save” to write all the changes to the memory. At this point everything is done on this Switch.



Configuration using Web GUI - IGMP L2 Management Switch [The second L2 Switch located on the left of the ring]

1. Connect port 1 with a PC or Notebook via the RJ45 Cable.
2. By default the MGMT IP the out-band port is 192.168.0.1/24
3. Set your NIC to 192.168.0.100/24
4. Open an Internet browser (e.g. IE) and enter <http://192.168.0.1> on the URL.
5. By default, the username for the administrator is “admin” and the corresponding password is “1234”.
6. After successful login you will see a screen similar to the one on the screenshot below.

Port	Name	Link	State	PD	LACP	TxPkts	RxPkts	Errors	Tx KB/s	Rx KB/s	Up Time
1		Down	STOP	Off	Disabled	0	0	0	0.0	0.0	0:00:00
2		Down	STOP	Off	Disabled	0	0	0	0.0	0.0	0:00:00
3		Down	STOP	Off	Disabled	0	0	0	0.0	0.0	0:00:00
4		Down	STOP	Off	Disabled	0	0	0	0.0	0.0	0:00:00
5		Down	STOP	Off	Disabled	0	0	0	0.0	0.0	0:00:00
6		Down	STOP	Off	Disabled	0	0	0	0.0	0.0	0:00:00
7		Down	STOP	Off	Disabled	0	0	0	0.0	0.0	0:00:00
8		Down	STOP	Off	Disabled	0	0	0	0.0	0.0	0:00:00
9		Down	STOP	Off	Disabled	0	0	0	0.0	0.0	0:00:00
10		Down	STOP	Off	Disabled	0	0	0	0.0	0.0	0:00:00
11		Down	STOP	Off	Disabled	0	0	0	0.0	0.0	0:00:00
12		Down	STOP	Off	Disabled	0	0	0	0.0	0.0	0:00:00
13		Down	STOP	Off	Disabled	0	0	0	0.0	0.0	0:00:00
14		Down	STOP	Off	Disabled	0	0	0	0.0	0.0	0:00:00
15		Down	STOP	Off	Disabled	0	0	0	0.0	0.0	0:00:00
16		Down	STOP	Off	Disabled	0	0	0	0.0	0.0	0:00:00
17		Down	STOP	Off	Disabled	0	0	0	0.0	0.0	0:00:00
18		Down	STOP	Off	Disabled	0	0	0	0.0	0.0	0:00:00
19		Down	STOP	Off	Disabled	0	0	0	0.0	0.0	0:00:00
20		Down	STOP	Off	Disabled	0	0	0	0.0	0.0	0:00:00

7. First, we need to create the multicast VLAN (200) in our network. Moreover, RSTP is needed to build the aggregation network (3x IGMP L2 Switches) as a ring for the case of physical wire disconnection. To enable the RSTP, click “Advanced Application” → “Spanning Tree Protocol”

The screenshot shows the ZyXEL web interface. On the left is a 'MENU' sidebar with options: Basic Setting, Advanced Application, IP Application, and Management. Under 'Management', there is a sub-menu for 'Spanning Tree Protocol' which is highlighted with a red arrow. The main content area shows the 'Port Status' table. A red arrow points to the 'Spanning Tree Protocol' link in the sidebar, and another red arrow points to the 'Spanning Tree Protocol' link in the main content area.

Port	Name	Link	State	LACP	TxPkts	RxPkts	Errors	Tx KB/s
1		Down	STOP	Disabled	0	0	0	0.0
2		Down	STOP	Disabled	1	2	0	0.0
3		Down	STOP	Disabled	29	41	0	0.0
4		Down	STOP	Disabled	0	0	0	0.0
5		Down	STOP	Disabled	0	0	0	0.0
6		100M/F	FORWARDING	Disabled	15135474	2949132	0	0.0
7		Down	STOP	Disabled	3	96	0	0.0
8		Down	STOP	Disabled	0	0	0	0.0
9		Down	STOP	Disabled	0	0	0	0.0
10		Down	STOP	Disabled	0	0	0	0.0
11		1000M/F Copper	FORWARDING	Disabled	1488289215	1498942593	0	0.0
12		1000M/F Copper	FORWARDING	Disabled	1497825341	1486402409	0	0.0

8. Choose "RSTP"

The screenshot shows the 'Spanning Tree Protocol Status' page. At the top, there are three tabs: 'Configuration', 'RSTP', and 'MRSTP'. The 'RSTP' tab is selected and highlighted with a red arrow. Below the tabs, the page title is 'Spanning Tree Protocol: RSTP'. The main content area shows a table with the following data:

Bridge	Root	Our Bridge
Bridge ID	0000-0013496aeca5	0000-0013496aeca5
Hello Time (second)	2	2
Max Age (second)	20	20
Forwarding Delay (second)	15	15
Cost to Bridge	0	
Port ID	0X0000	
Topology Changed Times	0	
Time Since Last Change	0:00:00	

9. To configure RSTP, tick "Active" to enable this feature first. Ports 11 and 12 will be the ports used to form the ring so we need to tick the corresponding the check box.

Rapid Spanning Tree Protocol

Status

Active	<input checked="" type="checkbox"/>	
Bridge Priority	32768	
Hello Time	2	Seconds
MAX Age	20	Seconds
Forwarding Delay	15	Seconds

Port	Active	Priority	Path Cost
*	<input type="checkbox"/>		
1	<input type="checkbox"/>	128	4
2	<input type="checkbox"/>	128	4
3	<input type="checkbox"/>	128	4
4	<input type="checkbox"/>	128	4
5	<input type="checkbox"/>	128	4
6	<input type="checkbox"/>	128	4
7	<input type="checkbox"/>	128	4
8	<input type="checkbox"/>	128	4
9	<input type="checkbox"/>	128	4
10	<input type="checkbox"/>	128	4
11	<input checked="" type="checkbox"/>	128	4
12	<input checked="" type="checkbox"/>	128	4

10. Now we are going to create a VLAN 200 for the multicast on the ports within the ring (port 11 and port 12) and port 6 (port 6 is connected to the access layer MVR Switch). To do so, click "Advanced Application" → "VLAN".

The screenshot shows the ZyXEL web interface. On the left is a menu with options: MENU, Basic Setting, Advanced Application, IP Application, Management, VLAN, Static MAC Forwarding, Filtering, Spanning Tree Protocol, Bandwidth Control, Broadcast Storm Control, Mirroring, Link Aggregation, Port Authentication, Port Security, and Classifier. Arrows point from 'Advanced Application' and 'VLAN' to the main content area. The main content area has a 'Port Status' tab selected, showing a table with 12 ports. The table columns are Port, Name, Link, State, LACP, TxPkts, RxPkts, Errors, and Tx. Ports 1-5 are Down, ports 6-10 are Down, and ports 11-12 are FORWARDING.

Port	Name	Link	State	LACP	TxPkts	RxPkts	Errors	Tx
1		Down	STOP	Disabled	0	0	0	0
2		Down	STOP	Disabled	0	0	0	0
3		Down	STOP	Disabled	0	0	0	0
4		Down	STOP	Disabled	0	0	0	0
5		Down	STOP	Disabled	0	0	0	0
6		Down	STOP	Disabled	0	0	0	0
7		Down	STOP	Disabled	0	0	0	0
8		Down	STOP	Disabled	418692	418220	0	0
9	1000M/F Copper	FORWARDING	Disabled	1531722542	19904162	0	0	0
10		Down	STOP	Disabled	84	152	0	0
11	1000M/F Copper	FORWARDING	Disabled	1498582593	1488061256	0	0	0
12	1000M/F SFP	FORWARDING	Disabled	1498253930	1489224540	0	0	0

11. Click on “Static VLAN”.

The screenshot shows the ZyXEL web interface. At the top, there are links for 'VLAN Port Setting' and 'Static VLAN'. Below them is a 'VLAN Status' section with the text 'The Number of VLAN = 1'. Below this is a table with 4 columns: Index, VID, Elapsed Time, and Status. The table has one row with Index 1, VID 1, Elapsed Time 240:36:17, and Status Static. An arrow points from the 'Static VLAN' link to the table.

Index	VID	Elapsed Time	Status
1	1	240:36:17	Static

12. Tick the check box and give this VLAN a name (in this example VLAN200) and its VLAN ID, 200. Also, we set port 6, port 11 and port 12 as “Fixed” with Tagging. Finally, click “Add” to create this VLAN.

Static VLAN
[VLAN Status](#)

ACTIVE
☒

Name

VLAN Group ID

Port	Control			Tagging
*	Normal <input type="button" value="v"/>			<input checked="" type="checkbox"/> Tx Tagging
1	<input checked="" type="radio"/> Normal	<input type="radio"/> Fixed	<input type="radio"/> Forbidden	<input checked="" type="checkbox"/> Tx Tagging
2	<input checked="" type="radio"/> Normal	<input type="radio"/> Fixed	<input type="radio"/> Forbidden	<input checked="" type="checkbox"/> Tx Tagging
3	<input checked="" type="radio"/> Normal	<input type="radio"/> Fixed	<input type="radio"/> Forbidden	<input checked="" type="checkbox"/> Tx Tagging
4	<input checked="" type="radio"/> Normal	<input type="radio"/> Fixed	<input type="radio"/> Forbidden	<input checked="" type="checkbox"/> Tx Tagging
5	<input checked="" type="radio"/> Normal	<input type="radio"/> Fixed	<input type="radio"/> Forbidden	<input checked="" type="checkbox"/> Tx Tagging
6	<input type="radio"/> Normal	<input checked="" type="radio"/> Fixed	<input type="radio"/> Forbidden	<input checked="" type="checkbox"/> Tx Tagging
7	<input checked="" type="radio"/> Normal	<input type="radio"/> Fixed	<input type="radio"/> Forbidden	<input checked="" type="checkbox"/> Tx Tagging
8	<input checked="" type="radio"/> Normal	<input type="radio"/> Fixed	<input type="radio"/> Forbidden	<input checked="" type="checkbox"/> Tx Tagging
9	<input checked="" type="radio"/> Normal	<input type="radio"/> Fixed	<input type="radio"/> Forbidden	<input checked="" type="checkbox"/> Tx Tagging
10	<input checked="" type="radio"/> Normal	<input type="radio"/> Fixed	<input type="radio"/> Forbidden	<input checked="" type="checkbox"/> Tx Tagging
11	<input type="radio"/> Normal	<input checked="" type="radio"/> Fixed	<input type="radio"/> Forbidden	<input checked="" type="checkbox"/> Tx Tagging
12	<input type="radio"/> Normal	<input checked="" type="radio"/> Fixed	<input type="radio"/> Forbidden	<input checked="" type="checkbox"/> Tx Tagging

13. Now we need to configure all the multicast related settings. To do so, click "Advanced Application" → "Multicast".

ZyXEL

MENU

Basic Setting

Advanced Application

IP Application

Management

VLAN

Static MAC Forwarding

Filtering

Spanning Tree Protocol

Bandwidth Control

Broadcast Storm Control

Mirroring

Link Aggregation

Port Authentication

Port Security

Classifier

Policy Rule

Queuing Method

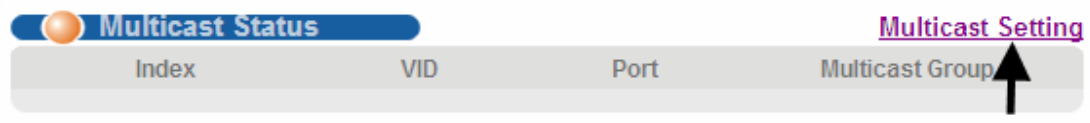
Multicast

DHCP Relay

Port Status

Port	Name	Link	State	LACP	TxPkts	RxPkts	Errors	Tx KB/s	Rx KB/s
1		Down	STOP	Disabled	0	0	0	0.0	0.0
2		Down	STOP	Disabled	1	2	0	0.0	0.0
3		Down	STOP	Disabled	29	41	0	0.0	0.0
4		Down	STOP	Disabled	0	0	0	0.0	0.0
5		Down	STOP	Disabled	0	0	0	0.0	0.0
6	100M/F		FORWARDING	Disabled	15148301	2967385	0	0.64	0.43
7		Down	STOP	Disabled	3	96	0	0.0	0.0
8		Down	STOP	Disabled	0	0	0	0.0	0.0
9		Down	STOP	Disabled	0	0	0	0.0	0.0
10		Down	STOP	Disabled	0	0	0	0.0	0.0
11	1000M/F	Copper	FORWARDING	Disabled	1488307462	1498957300	0	0.443	0.6
12	1000M/F	Copper	FORWARDING	Disabled	1497827599	1486402412	0	0.64	0.0

14. To activate IGMP snooping, click “Multicast Setting”.



15. Here, tick the “Active” check box to activate the IGMP Snooping first. Choose “Drop” for Unknown Multicast Frame to avoid Multicast Flooding. Also, for the ports associated with the Ring, pick “Fixed” as the IGMP Querier Mode. For the downlink port (port 6), pick “Edge” as the IGMP Querier Mode.

Port	Immed. Leave	Group Limited	Max Group Num.	IGMP Filtering Profile	IGMP Querier Mode
*	<input type="checkbox"/>	<input type="checkbox"/>		Default	Auto
1	<input type="checkbox"/>	<input type="checkbox"/>	0	Default	Auto
2	<input type="checkbox"/>	<input type="checkbox"/>	0	Default	Auto
3	<input type="checkbox"/>	<input type="checkbox"/>	0	Default	Auto
4	<input type="checkbox"/>	<input type="checkbox"/>	0	Default	Auto
5	<input type="checkbox"/>	<input type="checkbox"/>	0	Default	Auto
6	<input type="checkbox"/>	<input type="checkbox"/>	0	Default	Edge
7	<input type="checkbox"/>	<input type="checkbox"/>	0	Default	Auto
8	<input type="checkbox"/>	<input type="checkbox"/>	0	Default	Auto
9	<input type="checkbox"/>	<input type="checkbox"/>	0	Default	Auto
10	<input type="checkbox"/>	<input type="checkbox"/>	0	Default	Auto
11	<input type="checkbox"/>	<input type="checkbox"/>	0	Default	Fixed
12	<input type="checkbox"/>	<input type="checkbox"/>	0	Default	Fixed

16. Finally, in the top right corner, click “Save” to write all the changes to the memory. At this point everything is done on this Switch.



Configuration using the Web GUI - IGMP L2 Management Switch [The third L2 Switch located on the right of the ring]

1. Connect port 1 with a PC or Notebook via the RJ45 Cable.
2. By default the MGMT IP the out-band port is 192.168.0.1/24
3. Set your NIC to 192.168.0.100/24
4. Open an Internet browser (e.g. IE) and enter <http://192.168.0.1> on the URL.
5. By default, the username for the administrator is “admin” and the corresponding password is “1234”.
6. After successful login you will see a screen similar to the one on the screenshot below.

Port	Name	Link	State	PD	LACP	TxPkts	RxPkts	Errors	Tx KB/s	Rx KB/s	Up Time
1		Down	STOP	Off	Disabled	0	0	0	0.0	0.0	0:00:00
2		Down	STOP	Off	Disabled	0	0	0	0.0	0.0	0:00:00
3		Down	STOP	Off	Disabled	0	0	0	0.0	0.0	0:00:00
4		Down	STOP	Off	Disabled	0	0	0	0.0	0.0	0:00:00
5		Down	STOP	Off	Disabled	0	0	0	0.0	0.0	0:00:00
6		Down	STOP	Off	Disabled	0	0	0	0.0	0.0	0:00:00
7		Down	STOP	Off	Disabled	0	0	0	0.0	0.0	0:00:00
8		Down	STOP	Off	Disabled	0	0	0	0.0	0.0	0:00:00
9		Down	STOP	Off	Disabled	0	0	0	0.0	0.0	0:00:00
10		Down	STOP	Off	Disabled	0	0	0	0.0	0.0	0:00:00
11		Down	STOP	Off	Disabled	0	0	0	0.0	0.0	0:00:00
12		Down	STOP	Off	Disabled	0	0	0	0.0	0.0	0:00:00
13		Down	STOP	Off	Disabled	0	0	0	0.0	0.0	0:00:00
14		Down	STOP	Off	Disabled	0	0	0	0.0	0.0	0:00:00
15		Down	STOP	Off	Disabled	0	0	0	0.0	0.0	0:00:00
16		Down	STOP	Off	Disabled	0	0	0	0.0	0.0	0:00:00
17		Down	STOP	Off	Disabled	0	0	0	0.0	0.0	0:00:00
18		Down	STOP	Off	Disabled	0	0	0	0.0	0.0	0:00:00
19		Down	STOP	Off	Disabled	0	0	0	0.0	0.0	0:00:00
20		Down	STOP	Off	Disabled	0	0	0	0.0	0.0	0:00:00

7. First, we need to create the multicast VLAN (200) in our network. Moreover, RSTP is needed in our case to build the aggregation network (3x IGMP L2 Switches) as a ring for a case of physical wire being disconnected. To enable the RSTP, we can click “Advanced Application” → “Spanning Tree Protocol”.

The screenshot shows the ZyXEL web interface. On the left is a 'MENU' sidebar with options: Basic Setting, Advanced Application, IP Application, and Management. Under 'Management', there is a sub-menu with options: VLAN, Static MAC Forwarding, Filtering, Spanning Tree Protocol, Bandwidth Control, Broadcast Storm Control, Mirroring, Link Aggregation, Port Authentication, Port Security, Classifier, Policy Rule, Queuing Method, Multicast, and DHCP Relay. An arrow points from 'Spanning Tree Protocol' in the sidebar to the 'Port Status' table. The 'Port Status' table has columns: Port, Name, Link, State, LACP, TxPkts, RxPkts, Errors, and Tx KB/s. It lists 12 ports. Ports 1-10 are in a 'STOP' state with 'Down' link. Ports 11 and 12 are in a 'FORWARDING' state with '1000M/F Copper' link. Arrows also point from 'Advanced Application' and 'Spanning Tree Protocol' in the sidebar to the 'Port Status' table header.

Port	Name	Link	State	LACP	TxPkts	RxPkts	Errors	Tx KB/s
1		Down	STOP	Disabled	0	0	0	0.0
2		Down	STOP	Disabled	1	2	0	0.0
3		Down	STOP	Disabled	29	41	0	0.0
4		Down	STOP	Disabled	0	0	0	0.0
5		Down	STOP	Disabled	0	0	0	0.0
6		100M/F	FORWARDING	Disabled	15135474	2949132	0	0.0
7		Down	STOP	Disabled	3	96	0	0.0
8		Down	STOP	Disabled	0	0	0	0.0
9		Down	STOP	Disabled	0	0	0	0.0
10		Down	STOP	Disabled	0	0	0	0.0
11		1000M/F Copper	FORWARDING	Disabled	1488289215	1498942593	0	0.0
12		1000M/F Copper	FORWARDING	Disabled	1497825341	1486402409	0	0.0

8. Choose "RSTP".

The screenshot shows the 'Spanning Tree Protocol Status' page. At the top, there are three tabs: 'Configuration', 'RSTP', and 'MRSTP'. An arrow points from the 'RSTP' tab to the 'Spanning Tree Protocol: RSTP' table below. The table has columns: Bridge, Root, and Our Bridge. It lists various STP parameters and their values for the current bridge and the root bridge.

Bridge	Root	Our Bridge
Bridge ID	0000-0013496aeca5	0000-0013496aeca5
Hello Time (second)	2	2
Max Age (second)	20	20
Forwarding Delay (second)	15	15
Cost to Bridge	0	
Port ID	0X0000	
Topology Changed Times	0	
Time Since Last Change	0:00:00	

9. To configure RSTP, check "Active" to enable this feature. Ports 11 and 12 will be the ports used in our ring so we need to tick the corresponding check box.

Rapid Spanning Tree Protocol

Status

Active	<input checked="" type="checkbox"/>	
Bridge Priority		32768
Hello Time	2	Seconds
MAX Age	20	Seconds
Forwarding Delay	15	Seconds

Port	Active	Priority	Path Cost
*	<input type="checkbox"/>		
1	<input type="checkbox"/>	128	4
2	<input type="checkbox"/>	128	4
3	<input type="checkbox"/>	128	4
4	<input type="checkbox"/>	128	4
5	<input type="checkbox"/>	128	4
6	<input type="checkbox"/>	128	4
7	<input type="checkbox"/>	128	4
8	<input type="checkbox"/>	128	4
9	<input type="checkbox"/>	128	4
10	<input type="checkbox"/>	128	4
11	<input checked="" type="checkbox"/>	128	4
12	<input checked="" type="checkbox"/>	128	4

10. Now we are going to create a VLAN 200 for the multicast on the ports within the ring (port 11 and port 12) and port 6 (port 6 is connected to the access layer MVR Switch). To do so, click "Advanced Application" → "VLAN".

The screenshot shows the ZyXEL web management interface. On the left is a 'MENU' sidebar with categories: Basic Setting, Advanced Application, IP Application, and Management. Under 'Management', the 'VLAN' option is highlighted with a black arrow. The main content area is titled 'Port Status' and contains a table with 10 columns: Port, Name, Link, State, LACP, TxPkts, RxPkts, Errors, and Tx. The table lists 12 ports. Ports 1-5 are 'Down' with 'STOP' state. Ports 6-12 are '1000M/F Copper' or '1000M/F SFP' with 'FORWARDING' state. An arrow points from the 'VLAN' menu item to the 'Port Status' table.

Port	Name	Link	State	LACP	TxPkts	RxPkts	Errors	Tx
1		Down	STOP	Disabled	0	0	0	0
2		Down	STOP	Disabled	0	0	0	0
3		Down	STOP	Disabled	0	0	0	0
4		Down	STOP	Disabled	0	0	0	0
5		Down	STOP	Disabled	0	0	0	0
6		Down	STOP	Disabled	0	0	0	0
7		Down	STOP	Disabled	0	0	0	0
8		Down	STOP	Disabled	418692	418220	0	0
9	1000M/F Copper	FORWARDING	Disabled	1531722542	19904162	0	0	0
10		Down	STOP	Disabled	84	152	0	0
11	1000M/F Copper	FORWARDING	Disabled	1498582593	1488061256	0	0	0
12	1000M/F SFP	FORWARDING	Disabled	1498253930	1489224540	0	0	0

11. Click on "Static VLAN".

The screenshot shows the 'VLAN Status' page. It has a sub-header 'VLAN Status' and a note 'The Number of VLAN = 1'. Below this is a table with 4 columns: Index, VID, Elapsed Time, and Status. The table contains one entry with Index 1, VID 1, and Elapsed Time 240:36:17, with a status of 'Static'. To the right of the table are two links: 'VLAN Port Setting' and 'Static VLAN'. An arrow points from the 'Static VLAN' link to the 'Static' status in the table.

Index	VID	Elapsed Time	Status
1	1	240:36:17	Static

12. Tick the check box and give this VLAN a name (in this example it is VLAN200) and its VLAN ID, 200. Also, we set port 6, port 11 and port12 as "Fixed" with Tagging. Finally, click "Add" to create this VLAN.

Static VLAN
[VLAN Status](#)

ACTIVE
☒

Name

VLAN Group ID

Port	Control			Tagging
*	Normal <input type="button" value="v"/>			<input checked="" type="checkbox"/> Tx Tagging
1	<input checked="" type="radio"/> Normal	<input type="radio"/> Fixed	<input type="radio"/> Forbidden	<input checked="" type="checkbox"/> Tx Tagging
2	<input checked="" type="radio"/> Normal	<input type="radio"/> Fixed	<input type="radio"/> Forbidden	<input checked="" type="checkbox"/> Tx Tagging
3	<input checked="" type="radio"/> Normal	<input type="radio"/> Fixed	<input type="radio"/> Forbidden	<input checked="" type="checkbox"/> Tx Tagging
4	<input checked="" type="radio"/> Normal	<input type="radio"/> Fixed	<input type="radio"/> Forbidden	<input checked="" type="checkbox"/> Tx Tagging
5	<input checked="" type="radio"/> Normal	<input type="radio"/> Fixed	<input type="radio"/> Forbidden	<input checked="" type="checkbox"/> Tx Tagging
6	<input type="radio"/> Normal	<input checked="" type="radio"/> Fixed	<input type="radio"/> Forbidden	<input checked="" type="checkbox"/> Tx Tagging
7	<input checked="" type="radio"/> Normal	<input type="radio"/> Fixed	<input type="radio"/> Forbidden	<input checked="" type="checkbox"/> Tx Tagging
8	<input checked="" type="radio"/> Normal	<input type="radio"/> Fixed	<input type="radio"/> Forbidden	<input checked="" type="checkbox"/> Tx Tagging
9	<input checked="" type="radio"/> Normal	<input type="radio"/> Fixed	<input type="radio"/> Forbidden	<input checked="" type="checkbox"/> Tx Tagging
10	<input checked="" type="radio"/> Normal	<input type="radio"/> Fixed	<input type="radio"/> Forbidden	<input checked="" type="checkbox"/> Tx Tagging
11	<input type="radio"/> Normal	<input checked="" type="radio"/> Fixed	<input type="radio"/> Forbidden	<input checked="" type="checkbox"/> Tx Tagging
12	<input type="radio"/> Normal	<input checked="" type="radio"/> Fixed	<input type="radio"/> Forbidden	<input checked="" type="checkbox"/> Tx Tagging

13. Now we need to configure all the multicast-related settings. To do so, click “Advanced Application” → “Multicast”.

ZyXEL

MENU

Basic Setting

Advanced Application

IP Application

Management

VLAN

Static MAC Forwarding

Filtering

Spanning Tree Protocol

Bandwidth Control

Broadcast Storm Control

Mirroring

Link Aggregation

Port Authentication

Port Security

Classifier

Policy Rule

Queuing Method

Multicast

DHCP Relay

Port Status

Port	Name	Link	State	LACP	TxPkts	RxPkts	Errors	Tx KB/s	Rx KB/s
1		Down	STOP	Disabled	0	0	0	0.0	0.0
2		Down	STOP	Disabled	1	2	0	0.0	0.0
3		Down	STOP	Disabled	29	41	0	0.0	0.0
4		Down	STOP	Disabled	0	0	0	0.0	0.0
5		Down	STOP	Disabled	0	0	0	0.0	0.0
6	100M/F		FORWARDING	Disabled	15148301	2967385	0	0.64	0.43
7		Down	STOP	Disabled	3	96	0	0.0	0.0
8		Down	STOP	Disabled	0	0	0	0.0	0.0
9		Down	STOP	Disabled	0	0	0	0.0	0.0
10		Down	STOP	Disabled	0	0	0	0.0	0.0
11	1000M/F Copper		FORWARDING	Disabled	1488307462	1498957300	0	0.443	0.6
12	1000M/F Copper		FORWARDING	Disabled	1497827599	1486402412	0	0.64	0.0

14. First of all, we need to active IGMP snooping. To do so, click “Multicast Setting”.



15. Tick the “Active” checkbox to activate IGMP Snooping. Choose “Drop” for Unknown Multicast Frame to avoid multicast flooding. Also, for the ports associated with the Ring, we pick “Fixed” as the IGMP Querier Mode. For the downlink port (port 6), we pick “Edge” as the IGMP Querier Mode.

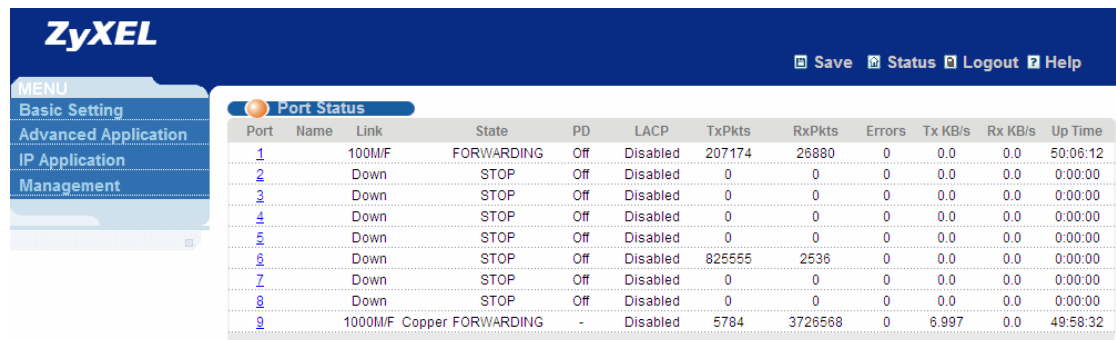
Port	Immed. Leave	Group Limited	Max Group Num.	IGMP Filtering Profile	IGMP Querier Mode
*	<input type="checkbox"/>	<input type="checkbox"/>		Default	Auto
1	<input type="checkbox"/>	<input type="checkbox"/>	0	Default	Auto
2	<input type="checkbox"/>	<input type="checkbox"/>	0	Default	Auto
3	<input type="checkbox"/>	<input type="checkbox"/>	0	Default	Auto
4	<input type="checkbox"/>	<input type="checkbox"/>	0	Default	Auto
5	<input type="checkbox"/>	<input type="checkbox"/>	0	Default	Auto
6	<input type="checkbox"/>	<input type="checkbox"/>	0	Default	Edge
7	<input type="checkbox"/>	<input type="checkbox"/>	0	Default	Auto
8	<input type="checkbox"/>	<input type="checkbox"/>	0	Default	Auto
9	<input type="checkbox"/>	<input type="checkbox"/>	0	Default	Auto
10	<input type="checkbox"/>	<input type="checkbox"/>	0	Default	Auto
11	<input type="checkbox"/>	<input type="checkbox"/>	0	Default	Fixed
12	<input type="checkbox"/>	<input type="checkbox"/>	0	Default	Fixed

16. Finally, in the top right corner, click “Save” to write all the changes to the memory. At this point everything is done on this Switch.



Configuration via Web GUI on the MVR L2 Management Switch [The bottom L2 Switch located on the left]

1. Connect port 1 with a PC or Notebook via the RJ45 Cable.
2. By default the MGMT IP the in-band port is 192.168.1.1/24
3. Set your NIC to 192.168.1.100/24
4. 4.Open an Internet browser (e.g. IE) and enter <http://192.168.1.1> on the URL.
5. By default, the username for the administrator is “admin” and the corresponding password is “1234”.
6. After successful login you will see a screen similar to the one on the screenshot below.



Port	Name	Link	State	PD	LACP	TxPkts	RxPkts	Errors	Tx KB/s	Rx KB/s	Up Time
1	100M/F		FORWARDING	Off	Disabled	207174	26880	0	0.0	0.0	50:06:12
2		Down	STOP	Off	Disabled	0	0	0	0.0	0.0	0:00:00
3		Down	STOP	Off	Disabled	0	0	0	0.0	0.0	0:00:00
4		Down	STOP	Off	Disabled	0	0	0	0.0	0.0	0:00:00
5		Down	STOP	Off	Disabled	0	0	0	0.0	0.0	0:00:00
6		Down	STOP	Off	Disabled	825555	2536	0	0.0	0.0	0:00:00
7		Down	STOP	Off	Disabled	0	0	0	0.0	0.0	0:00:00
8		Down	STOP	Off	Disabled	0	0	0	0.0	0.0	0:00:00
9	1000M/F Copper		FORWARDING	-	Disabled	5784	3728568	0	6.997	0.0	49:58:32

7. Now we are going to create the customer VLAN on both the downlink port (port 6) and the uplink port (port 9). To do so, we click “Advanced Application” → “VLAN”.

The screenshot shows the ZyXEL web interface. On the left is a menu with options: Basic Setting, Advanced Application, IP Application, and Management. Under Management, there is a sub-menu with options: VLAN, Static MAC Forwarding, Filtering, Spanning Tree Protocol, Bandwidth Control, Broadcast Storm Control, Mirroring, Link Aggregation, Port Authentication, Port Security, and Queuing Method. An arrow points to the 'VLAN' option. The main content area shows the 'Port Status' table.

Port	Name	Link	State	PD	LACP	TxPkts	RxPkts	Errors
1		100M/F	FORWARDING	Off	Disabled	207174	26880	0
2		Down	STOP	Off	Disabled	0	0	0
3		Down	STOP	Off	Disabled	0	0	0
4		Down	STOP	Off	Disabled	0	0	0
5		Down	STOP	Off	Disabled	0	0	0
6		Down	STOP	Off	Disabled	825555	2536	0
7		Down	STOP	Off	Disabled	0	0	0
8		Down	STOP	Off	Disabled	0	0	0
9		1000M/F Copper	FORWARDING	-	Disabled	5784	3726568	0

8. Click on “Static VLAN”

The screenshot shows the 'VLAN Status' section with the text 'The Number of VLAN = 1'. Below this is a table with one entry. To the right of the table are two links: 'VLAN Port Setting' and 'Static VLAN'. An arrow points to the 'Static VLAN' link.

Index	VID	Elapsed Time	Status
1	1	240:36:17	Static

9. Tick the check box and give this VLAN a name (in this example, Customer5) and its VLAN ID, 5. Also, we set port 6 and port 9 as “Fixed”. Port 9 should be tagged during Egress and port 6 should be untagged since it is connected to the user’s “VLAN unaware CPE”. Finally, click “Add” to create this VLAN.

Static VLAN

VLAN Status

ACTIVE

☒

Name

Customer5

VLAN Group ID

5

Port	Control			Tagging
*		Normal		<input checked="" type="checkbox"/> Tx Tagging
1	<input checked="" type="radio"/> Normal	<input type="radio"/> Fixed	<input type="radio"/> Forbidden	<input checked="" type="checkbox"/> Tx Tagging
2	<input checked="" type="radio"/> Normal	<input type="radio"/> Fixed	<input type="radio"/> Forbidden	<input checked="" type="checkbox"/> Tx Tagging
3	<input checked="" type="radio"/> Normal	<input type="radio"/> Fixed	<input type="radio"/> Forbidden	<input checked="" type="checkbox"/> Tx Tagging
4	<input checked="" type="radio"/> Normal	<input type="radio"/> Fixed	<input type="radio"/> Forbidden	<input checked="" type="checkbox"/> Tx Tagging
5	<input checked="" type="radio"/> Normal	<input type="radio"/> Fixed	<input type="radio"/> Forbidden	<input checked="" type="checkbox"/> Tx Tagging
6	<input type="radio"/> Normal	<input checked="" type="radio"/> Fixed	<input type="radio"/> Forbidden	<input type="checkbox"/> Tx Tagging
7	<input checked="" type="radio"/> Normal	<input type="radio"/> Fixed	<input type="radio"/> Forbidden	<input checked="" type="checkbox"/> Tx Tagging
8	<input checked="" type="radio"/> Normal	<input type="radio"/> Fixed	<input type="radio"/> Forbidden	<input checked="" type="checkbox"/> Tx Tagging
9	<input type="radio"/> Normal	<input checked="" type="radio"/> Fixed	<input type="radio"/> Forbidden	<input checked="" type="checkbox"/> Tx Tagging

Add

Cancel

Clear

10. As for the VLAN we need to modify the PVID of port 6 from 1 to 5. To do so, go back to the VLAN Status page and click "VLAN Port Setting".

VLAN Status
 The Number of VLAN = 3

VLAN Port Setting

Static VLAN

Index	VID	Elapsed Time	Status
1	1	51:05:23	Static
2	5	49:24:55	Static
3	200	50:53:30	Other

11. Put 5 into the PVID box of port 6.

VLAN Port Setting

[VLAN Status](#)

GVRP	<input type="checkbox"/>
Port isolation	<input type="checkbox"/>
Ingress Check	<input type="checkbox"/>

Port	PVID	GVRP	Acceptable Frame Type	VLAN Trunking
*	<input type="text"/>	<input type="checkbox"/>	All ▼	<input type="checkbox"/>
1	1	<input type="checkbox"/>	All ▼	<input type="checkbox"/>
2	1	<input type="checkbox"/>	All ▼	<input type="checkbox"/>
3	1	<input type="checkbox"/>	All ▼	<input type="checkbox"/>
4	1	<input type="checkbox"/>	All ▼	<input type="checkbox"/>
5	1	<input type="checkbox"/>	All ▼	<input type="checkbox"/>
6	5	<input type="checkbox"/>	All ▼	<input type="checkbox"/>
7	1	<input type="checkbox"/>	All ▼	<input type="checkbox"/>
8	1	<input type="checkbox"/>	All ▼	<input type="checkbox"/>
9	1	<input type="checkbox"/>	All ▼	<input type="checkbox"/>

12. Now we need to configure all the multicast related settings. To do so, click “Advanced Application” → “Multicast”.

MENU

Basic Setting

Advanced Application

IP Application

Management

VLAN

Static MAC Forwarding

Filtering

Spanning Tree Protocol

Bandwidth Control

Broadcast Storm Control

Mirroring

Link Aggregation

Port Authentication

Port Security

Queueing Method

Multicast

Port Status

Port	Name	Link	State	PD	LACP	TxPkts	RxPkts	Errors	Tx
1	100M/F	FORWARDING	Off	Disabled	209105	27722	0	23	
2	Down	STOP	Off	Disabled	0	0	0	0	
3	Down	STOP	Off	Disabled	0	0	0	0	
4	Down	STOP	Off	Disabled	0	0	0	0	
5	Down	STOP	Off	Disabled	0	0	0	0	
6	Down	STOP	Off	Disabled	825555	2536	0	0	
7	Down	STOP	Off	Disabled	0	0	0	0	
8	Down	STOP	Off	Disabled	0	0	0	0	
9	1000M/F Copper	FORWARDING	-	Disabled	6750	3727625	0	0	

13. First of all, we need to active IGMP snooping since MVR needs it. Click “Multicast Setting”.

Multicast Status			
Index	VID	Port	Multicast Group

14. Tick the “Active” checkbox to activate IGMP Snooping first. Choose “Drop” for Unknown Multicast Frame to avoid Multicast Flooding. Also, on the uplink port (port 9), pick “Fixed” as the IGMP Querier Mode. And for the client port (port 6), pick “Edge” as the IGMP Querier Mode. Click “Apply” to activate these settings.

Multicast Setting		Multicast Status	IGMP Filtering Profile	MVR
IGMP Snooping		Active <input checked="" type="checkbox"/>		
		Host Timeout	260	
		Leave Timeout	2	
		802.1p Priority	No-Change	
IGMP Filtering		Active	<input type="checkbox"/>	
Unknown Multicast Frame		<input type="radio"/> Flooding	<input checked="" type="radio"/> Drop	

Port	Immed. Leave	Group Limited	Max Group Num.	IGMP Filtering Profile	IGMP Querier Mode
*	<input type="checkbox"/>	<input type="checkbox"/>		Default	Auto
1	<input type="checkbox"/>	<input type="checkbox"/>	0	Default	Auto
2	<input type="checkbox"/>	<input type="checkbox"/>	0	Default	Auto
3	<input type="checkbox"/>	<input type="checkbox"/>	0	Default	Auto
4	<input type="checkbox"/>	<input type="checkbox"/>	0	Default	Auto
5	<input type="checkbox"/>	<input type="checkbox"/>	0	Default	Auto
6	<input type="checkbox"/>	<input type="checkbox"/>	0	Default	Edge
7	<input type="checkbox"/>	<input type="checkbox"/>	0	Default	Auto
8	<input type="checkbox"/>	<input type="checkbox"/>	0	Default	Auto
9	<input type="checkbox"/>	<input type="checkbox"/>	0	Default	Fixed

Apply Cancel

15. Now we can configure MVR after IGMP Snooping has been activated. To do so click “MVR” on the top.

Multicast Setting [Multicast Status](#) [IGMP Filtering Profile](#) [MVR](#)

Active ☒

Host Timeout

16. Tick the “Active” checkbox and give this MVR a name along with its VLAN ID (200). Moreover, set port 6 as “Receiver Port” since Multicast Traffic may be sent out through this port. For the uplink port (port 9), please make it “Source Port” and allow “Tagging” during Egress.

MVR [Multicast Setting](#) [Group Configuration](#)

Active ☒

Name

Multicast VLAN ID

802.1p Priority

Mode ☒ Dynamic ☐ Compatible

Port	Source Port	Receiver Port	None	Tagging
*		Source Port		<input type="checkbox"/>
1	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="checkbox"/>
2	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="checkbox"/>
3	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="checkbox"/>
4	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="checkbox"/>
5	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="checkbox"/>
6	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="checkbox"/>
7	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="checkbox"/>
8	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="checkbox"/>
9	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="checkbox"/>

17. Now we need to tell the switch what number of group (Multicast channel) belongs to the MVR. To do so we click “Group Configuration”

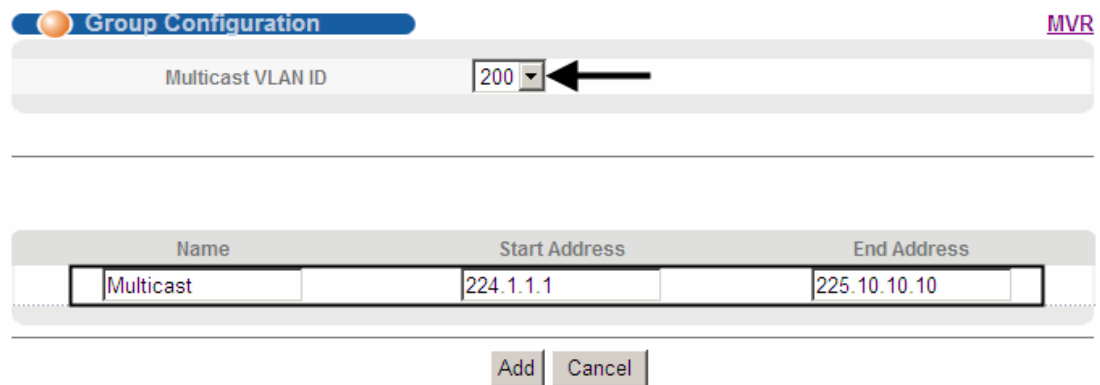
MVR [Multicast Setting](#) [Group Configuration](#)

Active ☒


Name

18. First, we pick the Multicast VLAN ID (200) that we just created. Then set the start address and end address of this Multicast VLAN (It should

be Class D address and in our example 224.1.1.1~ 225.10.10.10).
Give this range a name and click “Add” to add it.

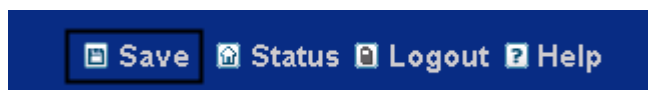


Group Configuration MVR

Multicast VLAN ID: 

Name	Start Address	End Address
Multicast	224.1.1.1	225.10.10.10

19. Finally, in the top right corner, click “Save” to write all the changes to the memory. At this point everything is done on this Switch.

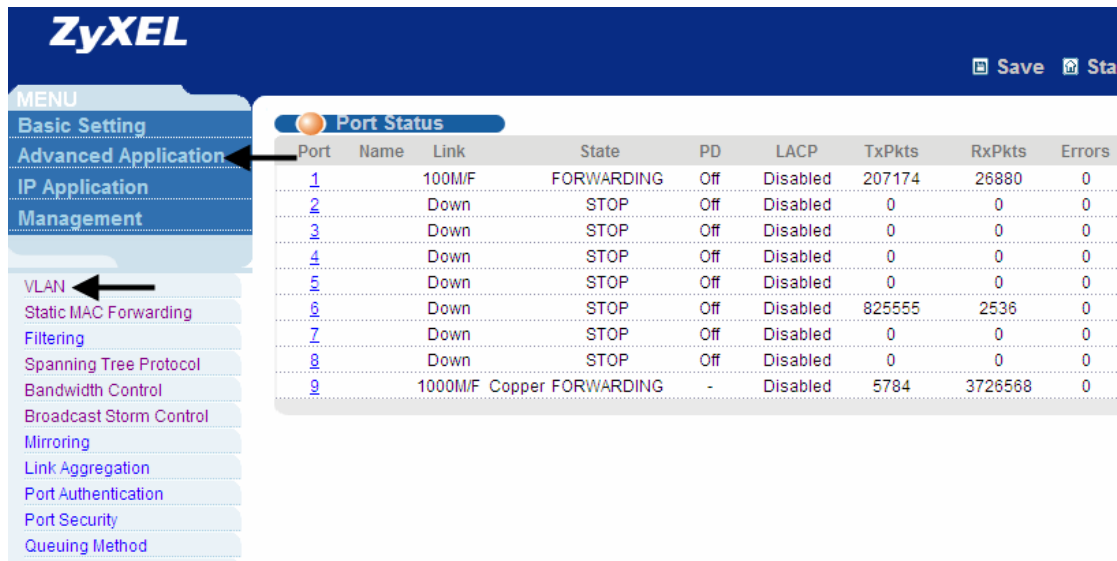


Configuration using the Web GUI - MVR L2 Management Switch [The bottom L2 Switch located on the right]

1. Connect port 1 with a PC or Notebook via the RJ45 Cable.
2. By default the MGMT IP the in-band port is 192.168.1.1/24
3. Set your NIC to 192.168.1.100/24
4. Open an Internet browser (e.g. IE) and enter <http://192.168.1.1> on the URL.
5. By default, the username for the administrator is “admin” and the corresponding password is “1234”.
6. After successful login you will see a screen similar to the one on the screenshot below.

Port	Name	Link	State	PD	LACP	TxPkts	RxPkts	Errors	Tx KB/s	Rx KB/s	Up Time
1	100M/F		FORWARDING	Off	Disabled	207174	26880	0	0.0	0.0	50:06:12
2		Down	STOP	Off	Disabled	0	0	0	0.0	0.0	0:00:00
3		Down	STOP	Off	Disabled	0	0	0	0.0	0.0	0:00:00
4		Down	STOP	Off	Disabled	0	0	0	0.0	0.0	0:00:00
5		Down	STOP	Off	Disabled	0	0	0	0.0	0.0	0:00:00
6		Down	STOP	Off	Disabled	825555	2536	0	0.0	0.0	0:00:00
7		Down	STOP	Off	Disabled	0	0	0	0.0	0.0	0:00:00
8		Down	STOP	Off	Disabled	0	0	0	0.0	0.0	0:00:00
9	1000M/F Copper		FORWARDING	-	Disabled	5784	3726568	0	6.997	0.0	49:58:32

7. Now we are going to create the customer VLAN on both the downlink port (port 6) and the uplink port (port 9). To do so, click “Advanced Application” → “VLAN”



ZyXEL Save Sta

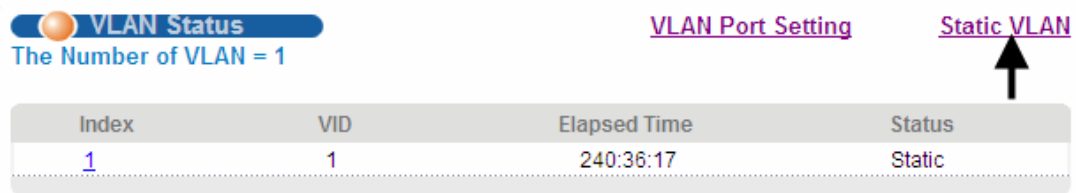
MENU

- Basic Setting
- Advanced Application
- IP Application
- Management
- VLAN** ←
- Static MAC Forwarding
- Filtering
- Spanning Tree Protocol
- Bandwidth Control
- Broadcast Storm Control
- Mirroring
- Link Aggregation
- Port Authentication
- Port Security
- Queueing Method

Port Status

Port	Name	Link	State	PD	LACP	TxPkts	RxPkts	Errors
1	100M/F		FORWARDING	Off	Disabled	207174	26880	0
2	Down		STOP	Off	Disabled	0	0	0
3	Down		STOP	Off	Disabled	0	0	0
4	Down		STOP	Off	Disabled	0	0	0
5	Down		STOP	Off	Disabled	0	0	0
6	Down		STOP	Off	Disabled	825555	2536	0
7	Down		STOP	Off	Disabled	0	0	0
8	Down		STOP	Off	Disabled	0	0	0
9	1000M/F Copper		FORWARDING	-	Disabled	5784	3726568	0

8. Click on “Static VLAN”



VLAN Status
The Number of VLAN = 1

[VLAN Port Setting](#) [Static VLAN](#) ↑

Index	VID	Elapsed Time	Status
1	1	240:36:17	Static

9. Tick the check box and give this VLAN a name. (In this example, Customer10) and its VLAN ID, 10. Also, we set port 6 and port 9 as “Fixed”. Port 9 should be Tagged during Egress and port 6 should be Untagged since it is connected to the user’s “VLAN unaware CPE”. Finally, click “Add” to create this VLAN.

Static VLAN

[VLAN Status](#)

ACTIVE

☒

Name

Customer10

VLAN Group ID

10

Port	Control			Tagging
*	Normal			<input checked="" type="checkbox"/> Tx Tagging
1	<input checked="" type="radio"/> Normal	<input type="radio"/> Fixed	<input type="radio"/> Forbidden	<input checked="" type="checkbox"/> Tx Tagging
2	<input checked="" type="radio"/> Normal	<input type="radio"/> Fixed	<input type="radio"/> Forbidden	<input checked="" type="checkbox"/> Tx Tagging
3	<input checked="" type="radio"/> Normal	<input type="radio"/> Fixed	<input type="radio"/> Forbidden	<input checked="" type="checkbox"/> Tx Tagging
4	<input checked="" type="radio"/> Normal	<input type="radio"/> Fixed	<input type="radio"/> Forbidden	<input checked="" type="checkbox"/> Tx Tagging
5	<input checked="" type="radio"/> Normal	<input type="radio"/> Fixed	<input type="radio"/> Forbidden	<input checked="" type="checkbox"/> Tx Tagging
6	<input type="radio"/> Normal	<input checked="" type="radio"/> Fixed	<input type="radio"/> Forbidden	<input type="checkbox"/> Tx Tagging
7	<input checked="" type="radio"/> Normal	<input type="radio"/> Fixed	<input type="radio"/> Forbidden	<input checked="" type="checkbox"/> Tx Tagging
8	<input checked="" type="radio"/> Normal	<input type="radio"/> Fixed	<input type="radio"/> Forbidden	<input checked="" type="checkbox"/> Tx Tagging
9	<input type="radio"/> Normal	<input checked="" type="radio"/> Fixed	<input type="radio"/> Forbidden	<input checked="" type="checkbox"/> Tx Tagging

Add

Cancel

Clear

10. For the VLAN we need to modify the PVID of port 6 from 1 to 10. To do so go back to the VLAN Status page and click "VLAN Port Setting".

VLAN Status

The Number of VLAN = 3

[VLAN Port Setting](#)

[Static VLAN](#)

Index	VID	Elapsed Time	Status
1	1	51:56:49	Static
2	10	0:00:07	Static
3	200	51:44:56	Other

11. Put 10 into the PVID box of port 6.

VLAN Port Setting

[VLAN Status](#)

GVRP	<input type="checkbox"/>
Port isolation	<input type="checkbox"/>
Ingress Check	<input type="checkbox"/>

Port	PVID	GVRP	Acceptable Frame Type	VLAN Trunking
*	<input type="text"/>	<input type="checkbox"/>	All ▼	<input type="checkbox"/>
1	<input type="text" value="1"/>	<input type="checkbox"/>	All ▼	<input type="checkbox"/>
2	<input type="text" value="1"/>	<input type="checkbox"/>	All ▼	<input type="checkbox"/>
3	<input type="text" value="1"/>	<input type="checkbox"/>	All ▼	<input type="checkbox"/>
4	<input type="text" value="1"/>	<input type="checkbox"/>	All ▼	<input type="checkbox"/>
5	<input type="text" value="1"/>	<input type="checkbox"/>	All ▼	<input type="checkbox"/>
6	<input style="border: 2px solid black;" type="text" value="10"/>	<input type="checkbox"/>	All ▼	<input type="checkbox"/>
7	<input type="text" value="1"/>	<input type="checkbox"/>	All ▼	<input type="checkbox"/>
8	<input type="text" value="1"/>	<input type="checkbox"/>	All ▼	<input type="checkbox"/>
9	<input type="text" value="1"/>	<input type="checkbox"/>	All ▼	<input type="checkbox"/>

12. Now we need to configure all the multicast-related settings. To do so, click “Advanced Application” → “Multicast”.

ZyXEL

Save
 Status

MENU

Basic Setting

Advanced Application

IP Application

Management

VLAN

Static MAC Forwarding

Filtering

Spanning Tree Protocol

Bandwidth Control

Broadcast Storm Control

Mirroring

Link Aggregation

Port Authentication

Port Security

Queuing Method

Multicast

Port Status

Port	Name	Link	State	PD	LACP	TxPkts	RxPkts	Errors	Tx
1	100M/F	Up	FORWARDING	Off	Disabled	209105	27722	0	23
2	Down	Down	STOP	Off	Disabled	0	0	0	0
3	Down	Down	STOP	Off	Disabled	0	0	0	0
4	Down	Down	STOP	Off	Disabled	0	0	0	0
5	Down	Down	STOP	Off	Disabled	0	0	0	0
6	Down	Down	STOP	Off	Disabled	825555	2536	0	0
7	Down	Down	STOP	Off	Disabled	0	0	0	0
8	Down	Down	STOP	Off	Disabled	0	0	0	0
9	1000M/F Copper	Up	FORWARDING	-	Disabled	6750	3727625	0	0

13. First of all, we need to activate IGMP snooping since MVR needs it. Click “Multicast Setting”.

Multicast Status

[Multicast Setting](#)

Index	VID	Port	Multicast Group
-------	-----	------	-----------------

14. Tick the “Active” checkbox to activate IGMP Snooping first. Choose “Drop” for Unknown Multicast Frame to avoid Multicast Flooding. Also, for the uplink port (port 9), pick “Fixed” as the IGMP Querier Mode. And for the client port (port 6), we pick “Edge” as the IGMP Querier Mode. Click “Apply” to activate these settings.

Multicast Setting

[Multicast Status](#)
[IGMP Filtering Profile](#)
[MVR](#)

IGMP Snooping	Active	<input checked="" type="checkbox"/>
	Host Timeout	<input type="text" value="260"/>
	Leave Timeout	<input type="text" value="2"/>
	802.1p Priority	<input type="text" value="No-Change"/>
IGMP Filtering	Active	<input type="checkbox"/>
Unknown Multicast Frame	<input type="radio"/> Flooding <input checked="" type="radio"/> Drop	

Port	Immed. Leave	Group Limited	Max Group Num.	IGMP Filtering Profile	IGMP Querier Mode
*	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text" value=""/>	Default	Auto
1	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text" value="0"/>	Default	Auto
2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text" value="0"/>	Default	Auto
3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text" value="0"/>	Default	Auto
4	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text" value="0"/>	Default	Auto
5	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text" value="0"/>	Default	Auto
6	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text" value="0"/>	Default	Edge
7	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text" value="0"/>	Default	Auto
8	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text" value="0"/>	Default	Auto
9	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text" value="0"/>	Default	Fixed

15. Now we can configure MVR after IGMP Snooping has been activated. Click “MVR” on the top.

Multicast Setting [Multicast Status](#) [IGMP Filtering Profile](#) [MVR](#)

Active ☒

Host Timeout

16. Tick the “Active” checkbox and give this MVR a name along with its VLAN ID (200). Moreover, put port6 as “Receiver Port” since Multicast Traffic may be sent out through this port. As for the uplink port (port 9), make it “Source Port” and make it “Tagging” during Egress.

MVR [Multicast Setting](#) [Group Configuration](#)

Active ☒

Name

Multicast VLAN ID

802.1p Priority

Mode ☒ Dynamic ☐ Compatible

Port	Source Port	Receiver Port	None	Tagging
*		Source Port		<input type="checkbox"/>
1	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="checkbox"/>
2	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="checkbox"/>
3	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="checkbox"/>
4	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="checkbox"/>
5	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="checkbox"/>
6	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="checkbox"/>
7	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="checkbox"/>
8	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="checkbox"/>
9	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="checkbox"/>

17. Now we need to tell the Switch what number of Group (Multicast channel) belongs to the MVR. To do so we click “Group Configuration”

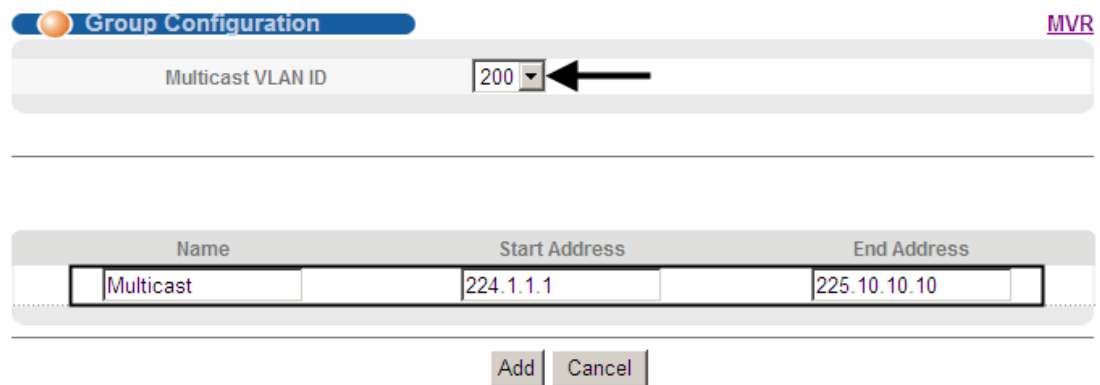
MVR [Multicast Setting](#) [Group Configuration](#)

Active ☒


Name

18. First, we pick the Multicast VLAN ID (200) that we just created. Then set the start address and end address of this Multicast VLAN (It should

be Class D address and in our example 224.1.1.1~ 225.10.10.10).
Also, assign this range a name and click “Add” to add it.

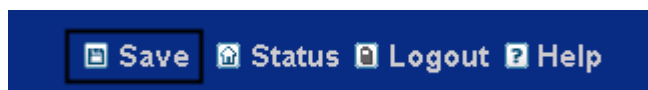


Group Configuration MVR

Multicast VLAN ID: 

Name	Start Address	End Address
Multicast	224.1.1.1	225.10.10.10

19. Finally, in the right corner, click “Save” to write all the changes to the memory. At this point everything is done on this Switch.



Configuration using CLI - ZyXEL L3 Management Switch

1. Connect the Switch Console port with your PC or Notebook.
2. Open your Terminal program (E.g. Hyper Terminal in Windows System).
3. Make sure that your port settings are

bps:9600

Data bits:8

Parity: None

Stop bits:1

Flow control: None:

OR you can telnet / SSH the IP of the Switch Management Interface

For In-band interface, the default management is 192.168.1.1 (VLAN 1).

For out-band interface, the default management is 192.168.0.1.

4. After you have connected successfully, enter the correct administrator user name and the password.
5. Now you are in the privileged mode.
6. Enter "configure" to switch to the configuration mode.

Issue the following CLI commands to conclude the configuration of this switch:

vlan 200

name MulticastVLAN200

normal 1-9,11

fixed 10,12

forbidden ""

untagged 10

ip address 192.168.10.1 255.255.255.0

exit

router igmp

exit

interface port-channel 10

pvid 200

exit

interface route-domain 192.168.1.1/24

exit

interface route-domain 192.168.10.1/24

```
ip igmp v2
exit
ip address 192.168.0.1 255.255.255.0
```

To save the configuration while in privileged mode (or so called Enable Mode):

```
Switch#write mem
```

Configuration using Web GUI - IGMP L2 Management Switch [The first L2 Switch on the top of the ring]

1. Connect the Switch Console port with your PC or Notebook.
2. Open your Terminal program (E.g., Hyper Terminal in Windows System).
3. Make sure that your port settings are

bps:9600

Data bits:8

Parity: None

Stop bits:1

Flow control: None:

OR you can telnet / SSH the IP of the Switch Management Interface

For In-band interface, the default management is 192.168.1.1 (VLAN 1)

For out-band interface, the default management is 192.168.0.1.

4. After you have connected successfully, enter the correct administrator user name and the password.
5. Now you are in the privileged mode.
6. Then put "configure" to switch to the configuration mode.

Issue the following CLI commands to conclude the configuration of this switch:

```
vlan 1
```

```
normal ""
```

```
fixed 1-12
```

```
forbidden ""
```

```
untagged 1-12
```

```
ip address inband-default 192.168.1.1 255.255.255.0
```

```
exit
```

```
vlan 200
```

```
name VLAN200
```

```
normal 1-8,10
```

```
fixed 9,11-12
```

```
forbidden ""
```

```
untagged ""
```

```
exit
```

```
igmp-snooping
```

```
igmp-snooping unknown-multicast-frame drop
interface port-channel 9
    igmp-querier-mode fixed
exit
interface port-channel 11
    igmp-querier-mode fixed
exit
interface port-channel 12
    igmp-querier-mode fixed
exit
ip address 192.168.0.1 255.255.255.0
spanning-tree
spanning-tree priority 0
spanning-tree 11
spanning-tree 12
```

To save the configuration while in privileged mode (or so called Enable Mode):

```
Switch#write mem
```


Configuration using the Web GUI - IGMP L2 Management Switch [The second L2 Switch located on the left of the ring]

1. Connect the Switch Console port with your PC or Notebook.
2. Open your Terminal program (E.g. Hyper Terminal in Windows System)
3. Make sure that your port settings are

bps:9600

Data bits:8

Parity: None

Stop bits:1

Flow control: None:

OR you can telnet / SSH the IP of the Switch Management Interface

For In-band interface, the default management is 192.168.1.1 (VLAN 1).

For out-band interface, the default management is 192.168.0.1.

4. After you have connected successfully, enter the correct administrator user name and the password.
5. Now you are in the privileged mode.
6. Then put "configure" to switch to the configuration mode.

Issue the following CLI commands to conclude the configuration of this switch:

```
vlan 1
```

```
normal ""
```

```
fixed 1-12
```

```
forbidden ""
```

```
untagged 1-12
```

```
ip address inband-default 192.168.1.1 255.255.255.0
```

```
exit
```

```
vlan 200
```

```
name VLAN200
```

```
normal 1-5,7-10
```

```
fixed 6,11-12
```

```
forbidden ""
```

```
untagged ""
```

```
exit
```

```
igmp-snooping
```

```
igmp-snooping unknown-multicast-frame drop
interface port-channel 6
    igmp-querier-mode edge
exit
interface port-channel 11
    igmp-querier-mode fixed
exit
interface port-channel 12
    igmp-querier-mode fixed
exit
ip address 192.168.0.1 255.255.255.0
spanning-tree
spanning-tree 11
spanning-tree 12
```

To save the configuration in the privileged mode (or so called Enable Mode):

```
Switch#write mem
```

Configuration using the Web GUI - IGMP L2 Management Switch [The third L2 Switch located on the right of the ring]

1. Connect the Switch Console port with your PC or Notebook.
2. Open your Terminal program.(E.g. Hyper Terminal in Windows System)
3. Make sure that your port settings are

bps:9600

Data bits:8

Parity: None

Stop bits:1

Flow control: None:

OR you can telnet / SSH the IP of the Switch Management Interface

For In-band interface, the default management is 192.168.1.1 (VLAN 1)

For out-band interface, the default management is 192.168.0.1

4. After you have connected successfully, enter the correct administrator user name and the password.
5. Now you are in the privileged mode.
6. Then put "configure" to switch to the configuration mode.

Issue the following CLI commands to conclude the configuration of this switch:

```
vlan 200
```

```
name VLAN200
```

```
normal 1-5,7-10
```

```
fixed 6,11-12
```

```
forbidden ""
```

```
untagged ""
```

```
exit
```

```
igmp-snooping
```

```
igmp-snooping unknown-multicast-frame drop
```

```
interface port-channel 6
```

```
igmp-querier-mode edge
```

```
exit
```

```
interface port-channel 11
```

```
igmp-querier-mode fixed
```

```
exit
```

```
interface port-channel 12
  igmp-querier-mode fixed
exit
ip address 192.168.0.1 255.255.255.0
spanning-tree
spanning-tree 11
spanning-tree 12
```

To save the configuration while in privileged mode (or so called Enable Mode):

```
Switch#write mem
```

Configuration using CLI - ZyXEL MVR L2 Management Switch [The bottom L2 Switch located on the left]

1. Connect the Switch Console port with your PC or Notebook.
2. Open your Terminal program.(E.g. Hyper Terminal in Windows System)
3. Make sure that your port settings are

bps:9600

Data bits:8

Parity: None

Stop bits:1

Flow control: None:

OR you can telnet / SSH the IP of the Switch Management Interface

For In-band interface, the default management is 192.168.1.1 (VLAN 1)

For out-band interface, the default management is 192.168.0.1

4. After you have connected successfully, enter the correct administrator user name and the password.
5. Now you are in the privileged mode.
6. Then put "configure" to switch to the configuration mode.

Issue the following CLI commands to conclude the configuration of this switch:

vlan 5

name Customer5

normal 1-5,7-8

fixed 6,9

forbidden ""

untagged 6

exit

igmp-snooping

igmp-snooping unknown-multicast-frame drop

interface port-channel 6

igmp-querier-mode edge

pvid 5

exit

interface port-channel 9

igmp-querier-mode fixed

```
exit
hostname ""
mvr 200
    source-port 9
    receiver-port 6
    name MVR200
    tagged 9
    group Multicast start-address 224.1.1.1 end-address 225.10.10.10
exit
```

To save the configuration while in privileged mode (or so called Enable Mode):

```
Switch#write mem
```

Configuration using CLI - ZyXEL MVR L2 Management Switch [The bottom L2 Switch located on the right]

1. Connect the Switch Console port with your PC or Notebook.
2. Open your Terminal program.(E.g. Hyper Terminal in Windows System)
3. Make sure that your port settings are

bps:9600

Data bits:8

Parity: None

Stop bits:1

Flow control: None:

OR you can telnet / SSH the IP of the Switch Management Interface

For In-band interface, the default management is 192.168.1.1 (VLAN 1)

For out-band interface, the default management is 192.168.0.1

4. After you have connected successfully, enter the correct administrator user name and the password.
5. Now you are in the privileged mode.
6. Then put "configure" to switch to the configuration mode.

Issue the following CLI commands to conclude the configuration of this switch:

vlan 10

name Customer10

normal 1-5,7-8

fixed 6,9

forbidden ""

untagged 6

exit

igmp-snooping

igmp-snooping unknown-multicast-frame drop

interface port-channel 6

igmp-querier-mode edge

pvid 10

exit

interface port-channel 9

igmp-querier-mode fixed

```
exit
hostname ""
mvr 200
    source-port 9
    receiver-port 6
    name MVR200
    tagged 9
    group Multicast start-address 224.1.1.1 end-address 225.10.10.10
exit
```

To save the configuration while in privileged mode (or so called Enable Mode):

```
Switch#write mem
```