

## Configuration of Virtual Local Area Network (VLAN)

The network configuration will be based on two routers, each of them will allow execution connections to selected virtual networks. Virtual networks, commonly known as VLANs, are isolated local subnets within one network local. The division is made in a programmatic way, and the functioning of computers in networks virtual is identical to the situation if individual computers were in a physical one on different local networks. It will be designed to illustrate the practical application of virtual networks configuration that meets the following assumptions: In one company, I have three groups of users that we want to allow access to the network, but only within selected groups. The division into groups is as follows:

- management,
- accounting,
- production workers

The schematic diagram is shown in Figure 1

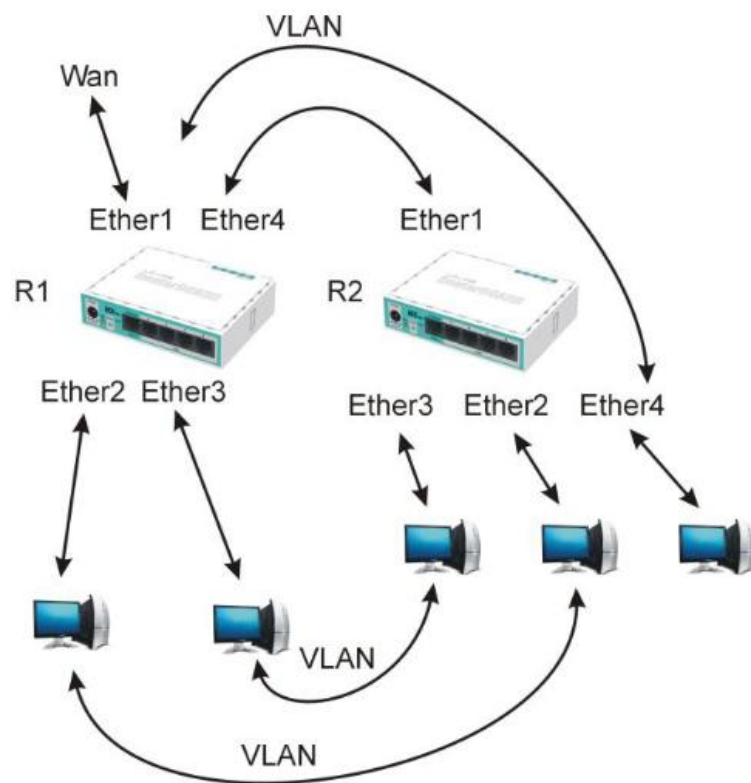


Fig. 1. Schematic diagram of the network

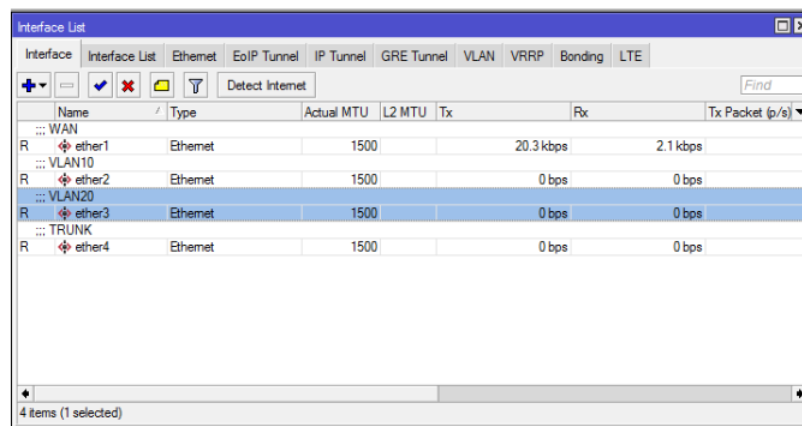
VLAN ports can be tagged, also known as trunks, or untagged. Ports tagged ports are used to connect routers, and untagged ports connect users directly with the selected virtual network. Tagged ports are physically connected to each other.

Virtual networks are given appropriate identifiers, a range of acceptable values IDs are 0 - 4095.

## R1 router configuration

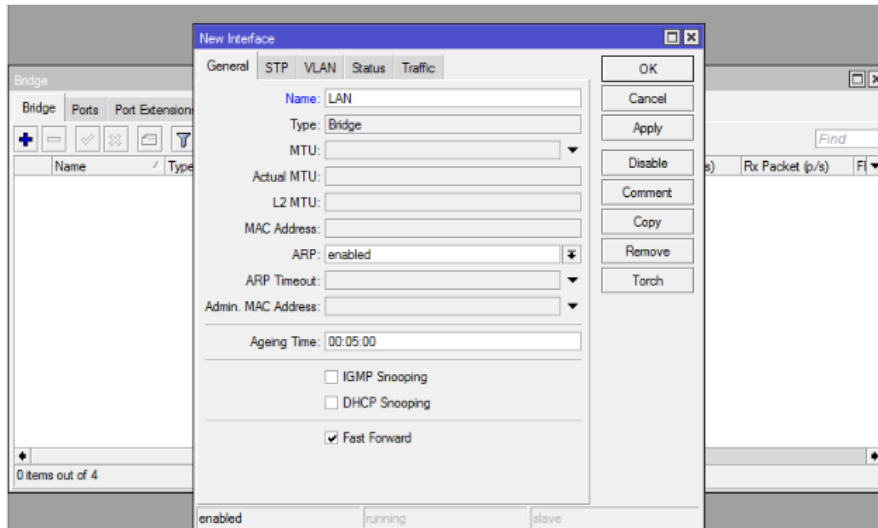
First, let's define the meaning of each interface in the R1 router. You can easily do it using the comment function. Meaning of individual VLANs:

- VLAN10 - accounting
- VLAN20 - board
- VLAN30 - production workers

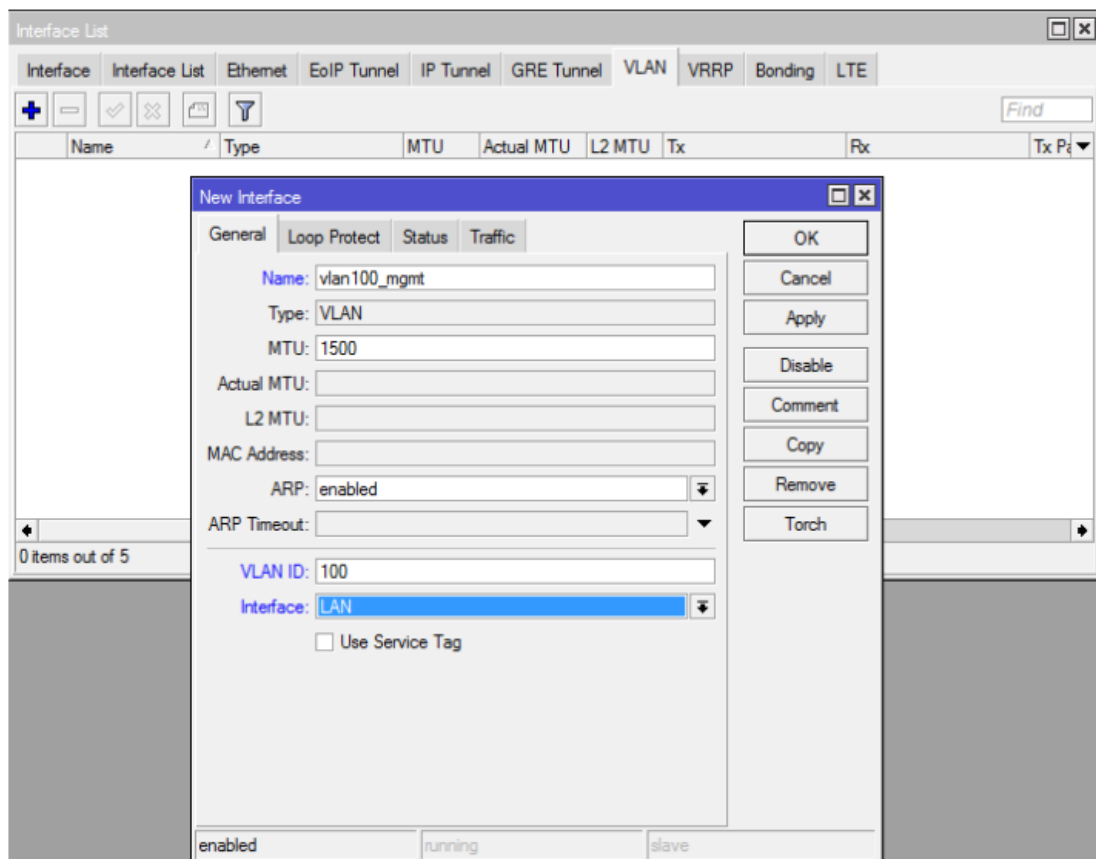


Name	Type	Actual MTU	L2 MTU	Tx	Rx	Tx Packet (p/s)
::: WAN						
R ether1	Ethernet	1500		20.3 kbps	2.1 kbps	
::: VLAN10						
R ether2	Ethernet	1500		0 bps	0 bps	
::: VLAN20						
R ether3	Ethernet	1500		0 bps	0 bps	
::: TRUNK						
R ether4	Ethernet	1500		0 bps	0 bps	

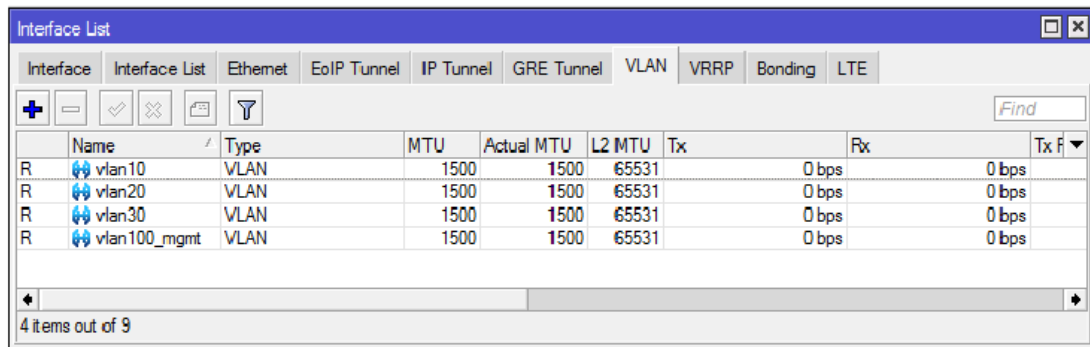
We create a bridge called LAN:



Then we go back to the interfaces, and select the VLAN tab. We add a new interface, na the beginning of the vlan that will be used for management - vlan\_mgmt. As the interface we choose before LAN bridge created. We set the VLAN ID according to the name to 100.



Similarly, we create VLAN10, VLAN20 and VLAN30.

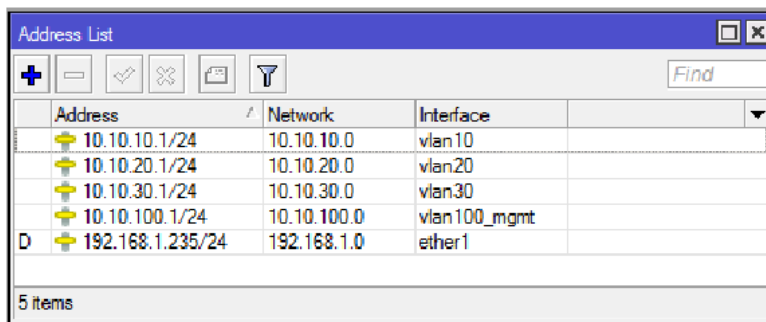


The screenshot shows the 'Interface List' window with the 'VLAN' tab selected. The table below represents the data shown in the interface list:

	Name	Type	MTU	Actual MTU	L2 MTU	Tx	Rx	Tx f
R	vlan10	VLAN	1500	1500	65531		0 bps	0 bps
R	vlan20	VLAN	1500	1500	65531		0 bps	0 bps
R	vlan30	VLAN	1500	1500	65531		0 bps	0 bps
R	vlan100_mgmt	VLAN	1500	1500	65531		0 bps	0 bps

4 items out of 9

We set IP addresses for individual VLANs. For simplicity, we assume that the third octet of the address will match the VLAN name (menu: IP / Addresses). You must provide the IP address along with net mask.

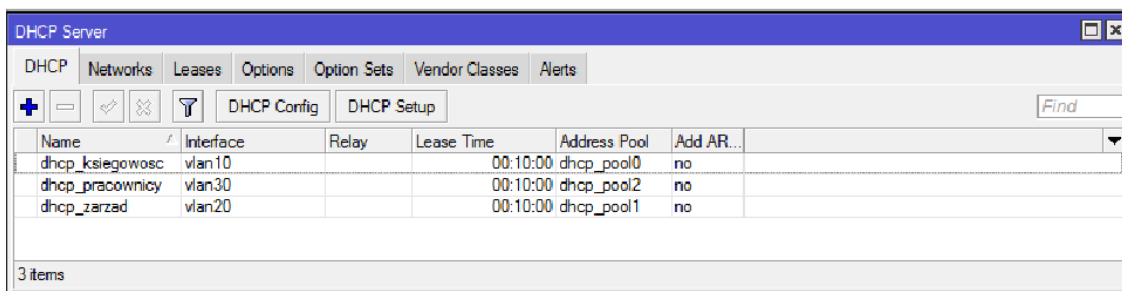
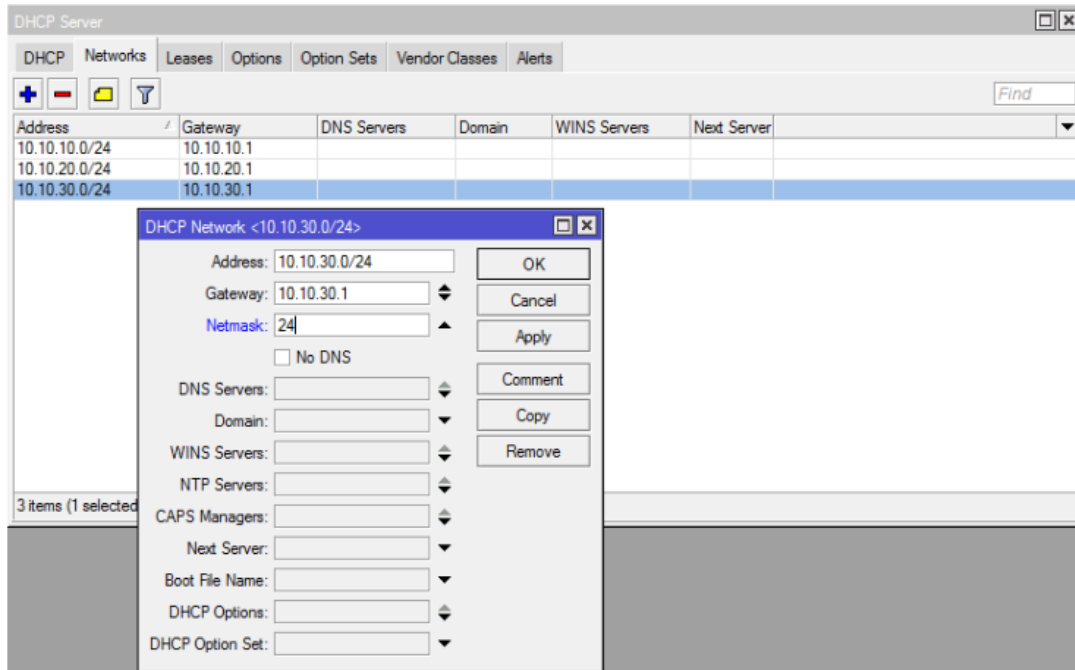


The screenshot shows the 'Address List' window with the following data:

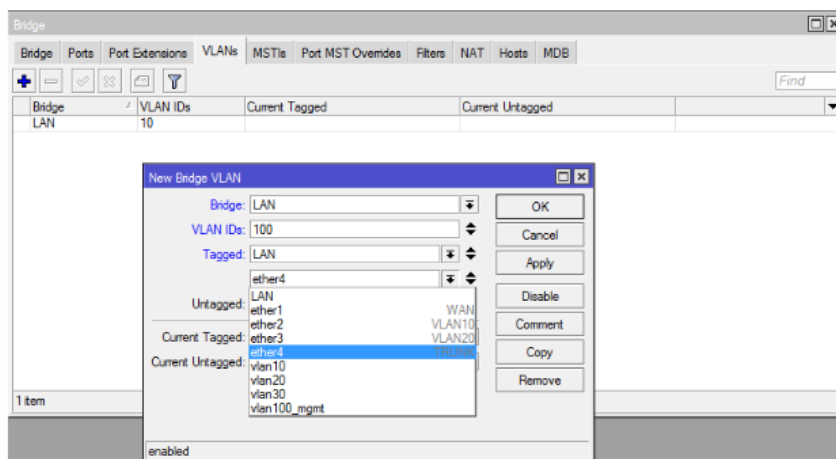
	Address	Network	Interface
	10.10.10.1/24	10.10.10.0	vlan10
	10.10.20.1/24	10.10.20.0	vlan20
	10.10.30.1/24	10.10.30.0	vlan30
	10.10.100.1/24	10.10.100.0	vlan100_mgmt
D	192.168.1.235/24	192.168.1.0	ether1

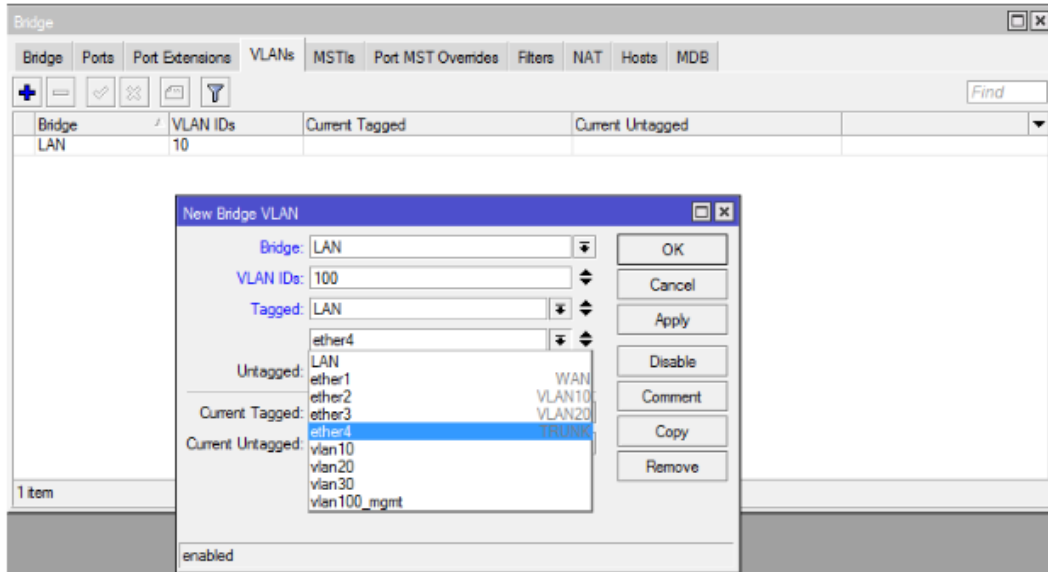
5 items

Then we configure DHCP servers for three groups of users, the management network we will configure manually (menu: IP / DHCP Server). It is worth remembering to set it correctly network mask for each server.

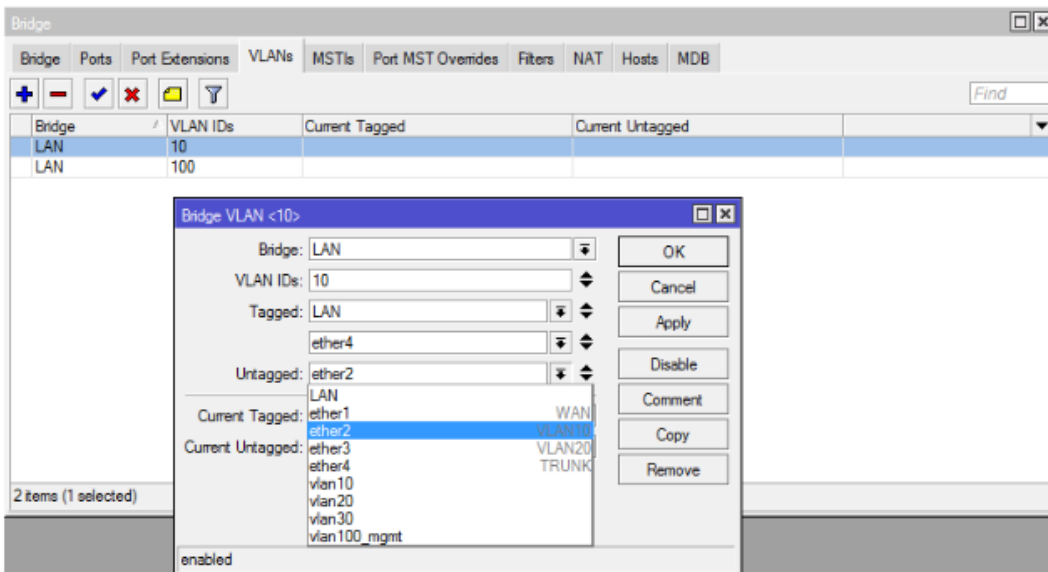


Add VLANs to the bridge (Menu: Bridge / VLANs tab). We start with VLAN100 which will be it was used to connect to another router, so set as a tagged LAN bridge and ether4 port.

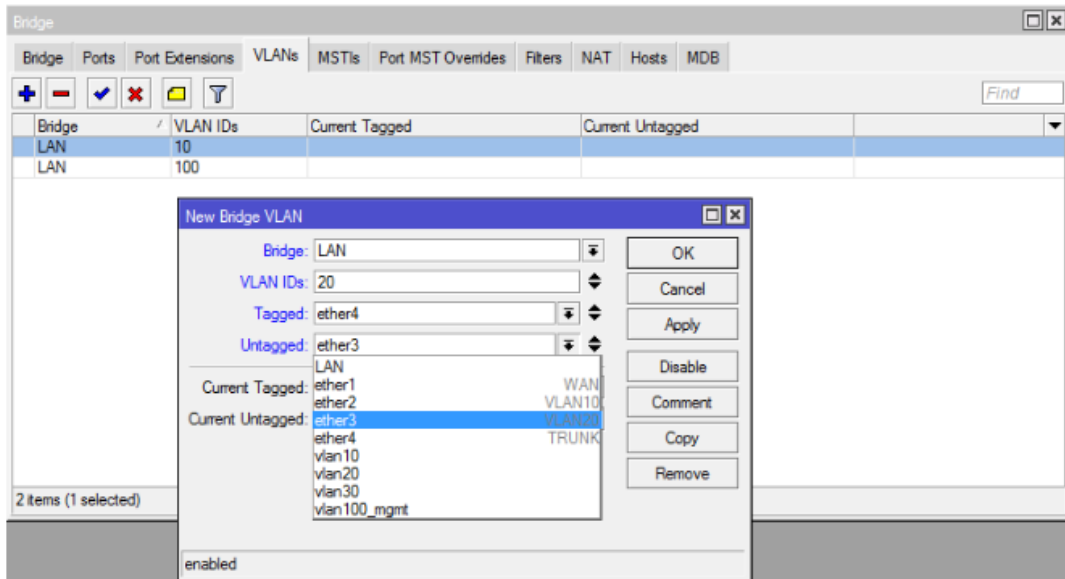




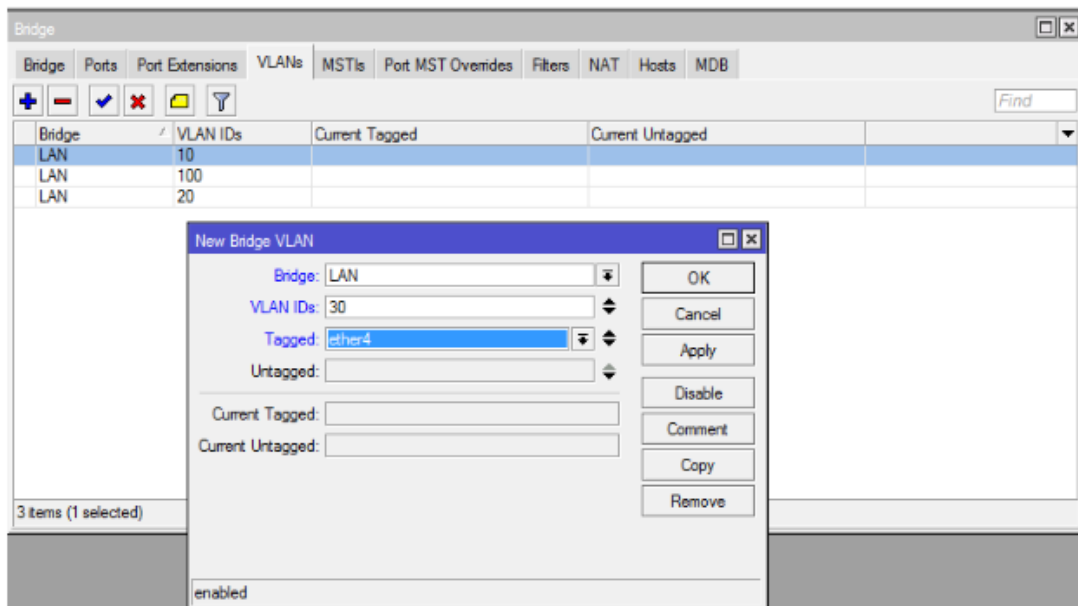
We add another VLAN, as before, with the difference that we want it additionally on the port ether2 was available communication for accounting, so we mark this port as Untagged.



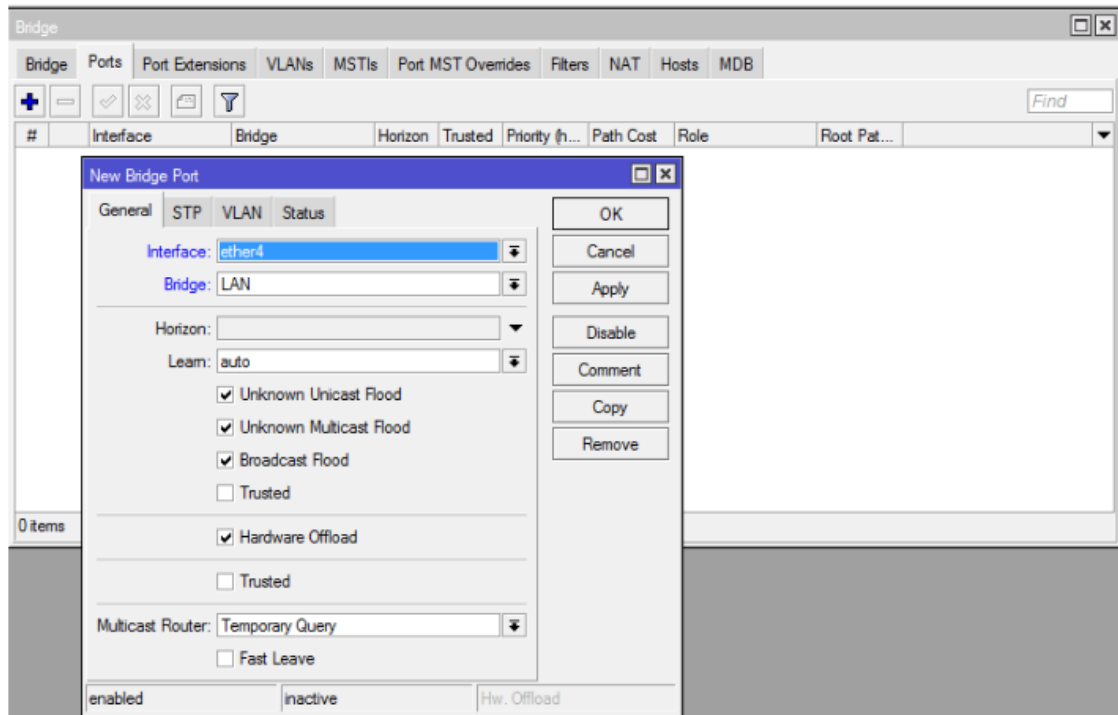
Similarly, we configure the remaining VLANs:



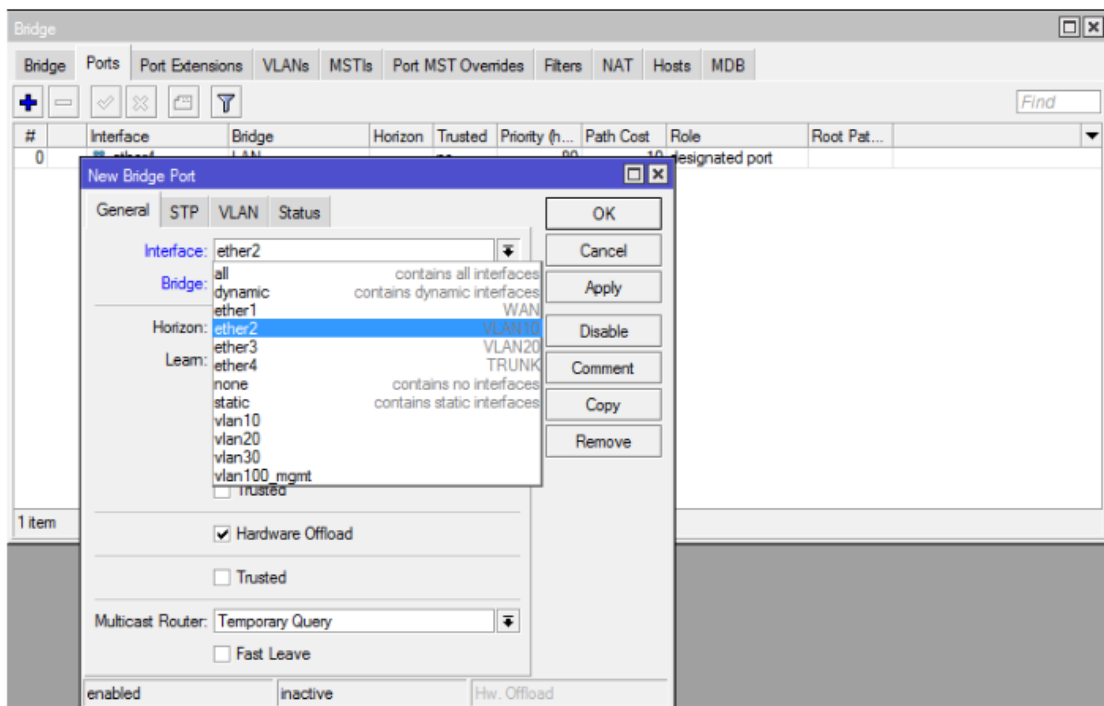
For VLAN30, we don't want to use it on R1, so we only add the port trunk:

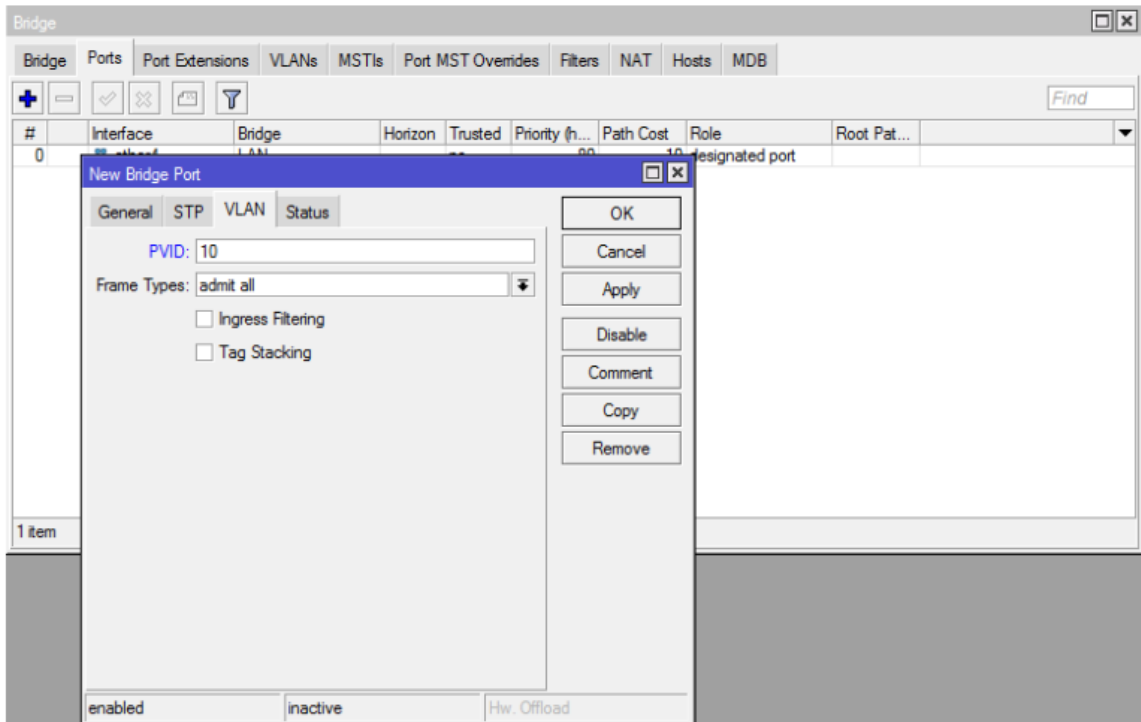


Go to the Bridge / Ports tab and add the trunk port at the beginning:



Then we add another ether2 interface and we want it to be in VLAN10:





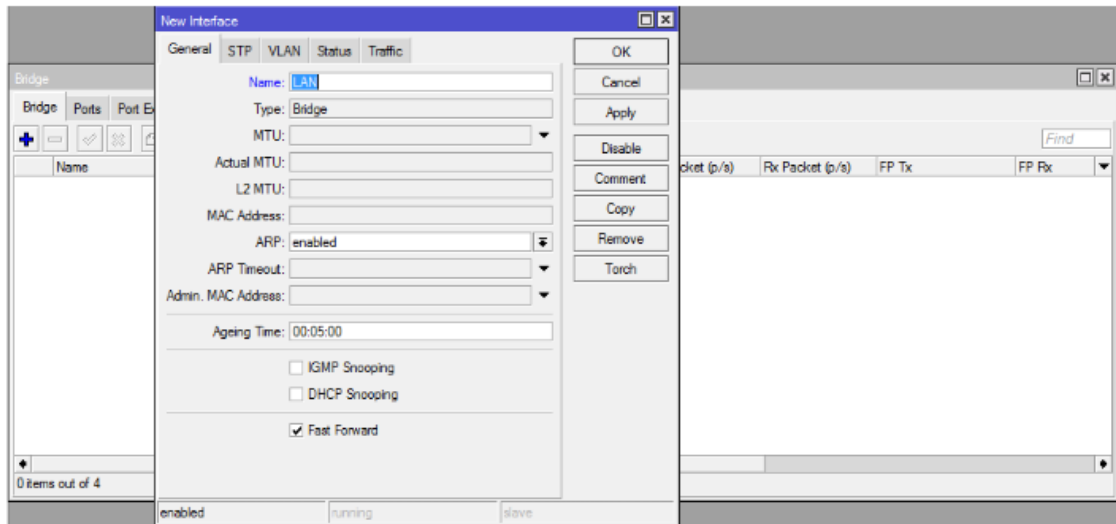
We do the same with the ether3 interface (VLAN20). Finally, we go back to the Bridge tab, and select our bridge by going to the VLAN tab. We check the "VLAN Filtering" option and we can consider that the R1 router is configured.

## R2 router configuration

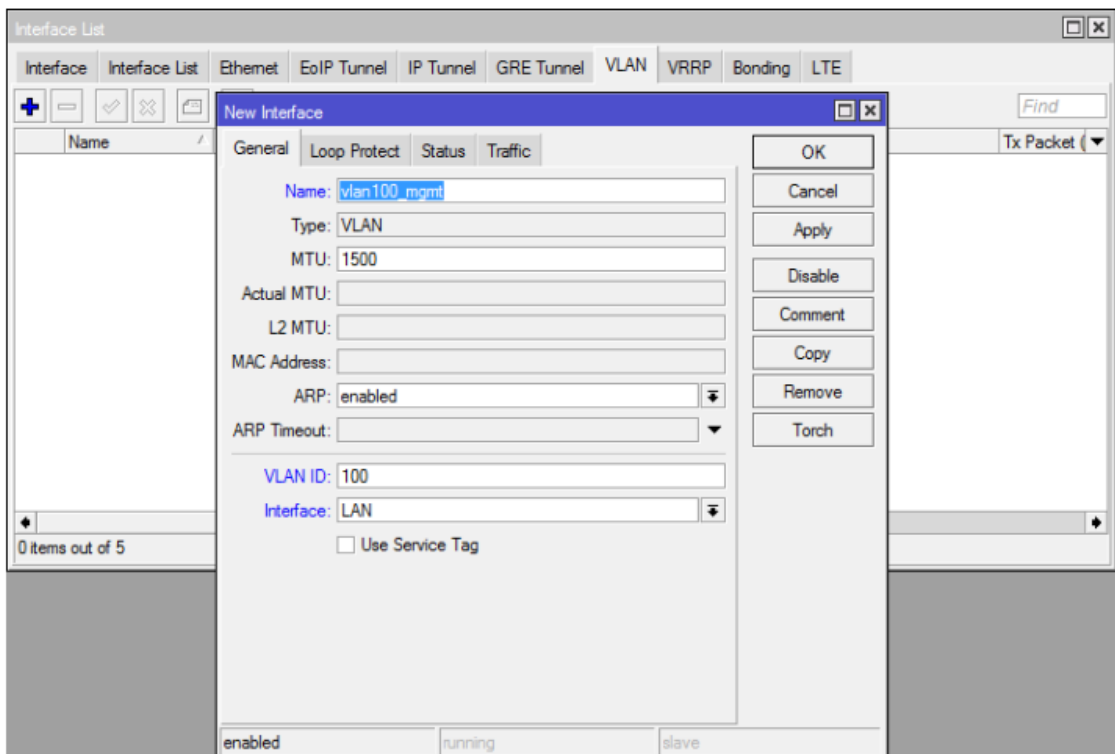
We start with the configuration of the interfaces, first we add a description to individual ports:

Name	Type	Actual MTU	L2 MTU	Tx	Rx	Tx Packet (p/s)
TRUNK						
R ether1	Ethernet	1500		21.3 kbps		2.3 kbps
VLAN10						
R ether2	Ethernet	1500		0 bps		0 bps
VLAN20						
R ether3	Ethernet	1500		0 bps		0 bps
VLAN30						
R ether4	Ethernet	1500		0 bps		0 bps

We create a bridge without assigning ports:



Go to the Interfaces tab and add VLANs, the configuration must be compatible with the settings of the R1 router. It is important to configure the interface before enabling the filtering option managing VLAN\_mgmt - for each VLAN we set the LAN bridge interface.



Name	Type	MTU	Actual MTU	L2 MTU	Tx	Rx	Tx Packet (p/s)
ksiegowosc							
R vlan10	VLAN	1500	1500	65531	0 bps	0 bps	0
zarzad							
R vlan20	VLAN	1500	1500	65531	0 bps	0 bps	0
pracownicy							
R vlan30	VLAN	1500	1500	65531	0 bps	0 bps	0
R vlan100_mgmt	VLAN	1500	1500	65531	0 bps	0 bps	0

4 items out of 9

We set the IP address of the management interface (menu: IP / Addresses):

The 'New Address' dialog box shows the following configuration:

- Address: 10.10.100.2/24
- Network: (empty)
- Interface: vlan100\_mgmt

Other interface options in the list include: ether1, ether2, ether3, ether4, vlan10, vlan20, vlan30, and vlan100\_mgmt (selected). Buttons include OK, Cancel, Apply, Disable, Comment, Copy, and Remove. The status is 'enabled'.

Go to the Bridge function and the VLANs tab and configure in turn:

- vlan100

The 'New Bridge VLAN' dialog box shows the following configuration:

- Bridge: LAN
- VLAN IDs: 100
- Tagged: ether1
- Untagged: LAN

Buttons include OK, Cancel, Apply, Disable, Comment, Copy, and Remove. The status is 'enabled'.

- VLAN10

New Bridge VLAN

Bridge: LAN

VLAN IDs: 10

Tagged: LAN, ether1

Untagged: ether2

Current Tagged:

Current Untagged:

enabled

Buttons: OK, Cancel, Apply, Disable, Comment, Copy, Remove

- VLAN20

Bridge VLAN <20>

Bridge: LAN

VLAN IDs: 20

Tagged: LAN, ether1

Untagged: ether3

Current Tagged:

Current Untagged:

enabled

Buttons: OK, Cancel, Apply, Disable, Comment, Copy, Remove

- VLAN30

Bridge VLAN <30>

Bridge: LAN

VLAN IDs: 30

Tagged: LAN, ether4

Untagged:

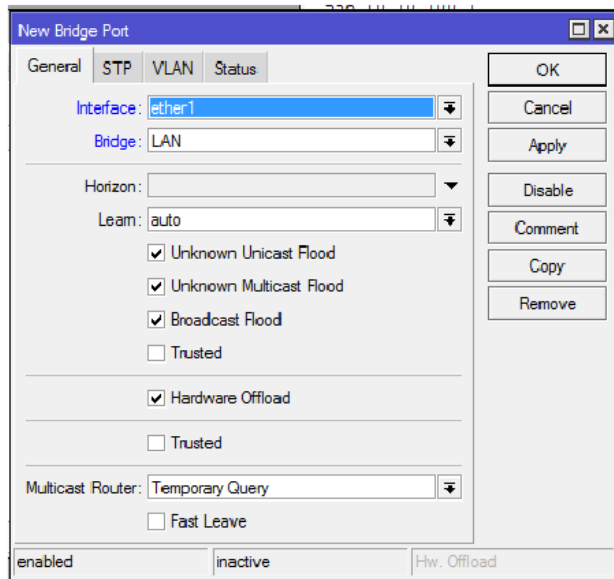
Current Tagged:

Current Untagged:

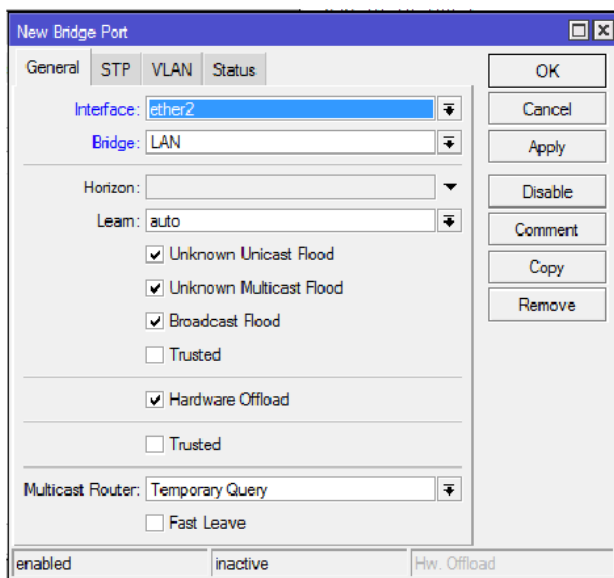
enabled

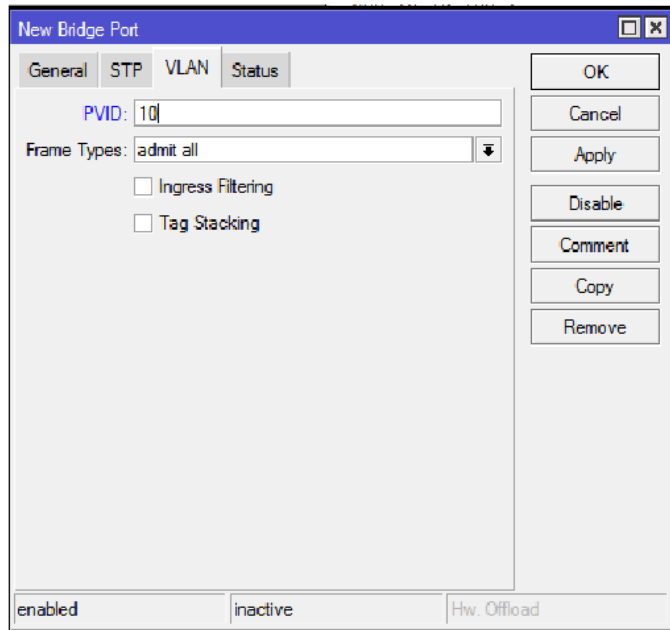
Buttons: OK, Cancel, Apply, Disable, Comment, Copy, Remove

Go to the Bridge / Ports tab and add:



In the next ports, you still need to set the appropriate VLAN:





Bridge

Bridge Ports Port Extensions VLANs MSTIs Port MST Overrides Filters NAT Hosts MDB

#	Interface	Bridge	Horizon	Trusted	Priority (h...)	Path Cost	Role	Root Pat...
0	ether1	LAN		no	80	10	designated port	
1	ether2	LAN		no	80	10	designated port	
2	ether3	LAN		no	80	10	designated port	
3	ether4	LAN		no	80	10	designated port	

4 items

and enable packet filtering over the bridge:

