

# First Hop Redundancy Protocol with Mikrotik

By Huy Eav  
Innovative Technology Training Centre (ITTC)  
[www.ittc.edu.kh](http://www.ittc.edu.kh)

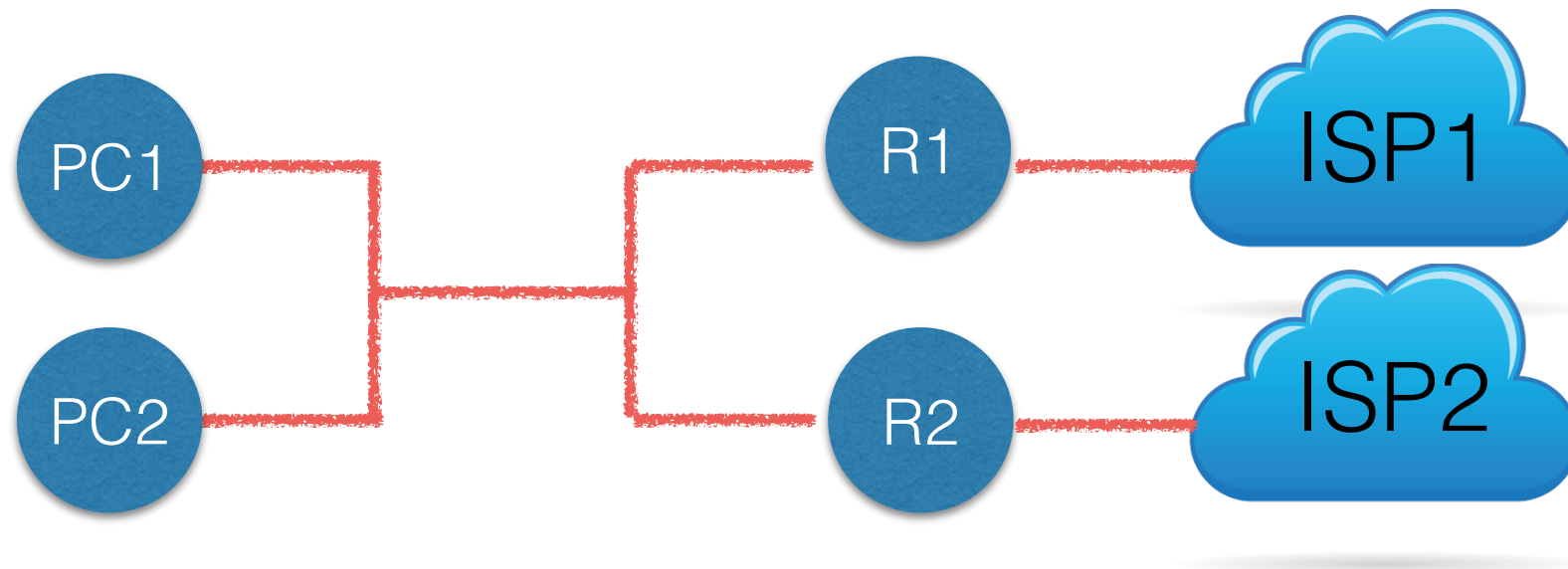
# About ITTC

- Mikrotik Certified Training Center
  - MTCNA
  - MTCRE
  - MTCTCE
  - MTCINE
  - MTCWE
  - MTCUME

# About Me

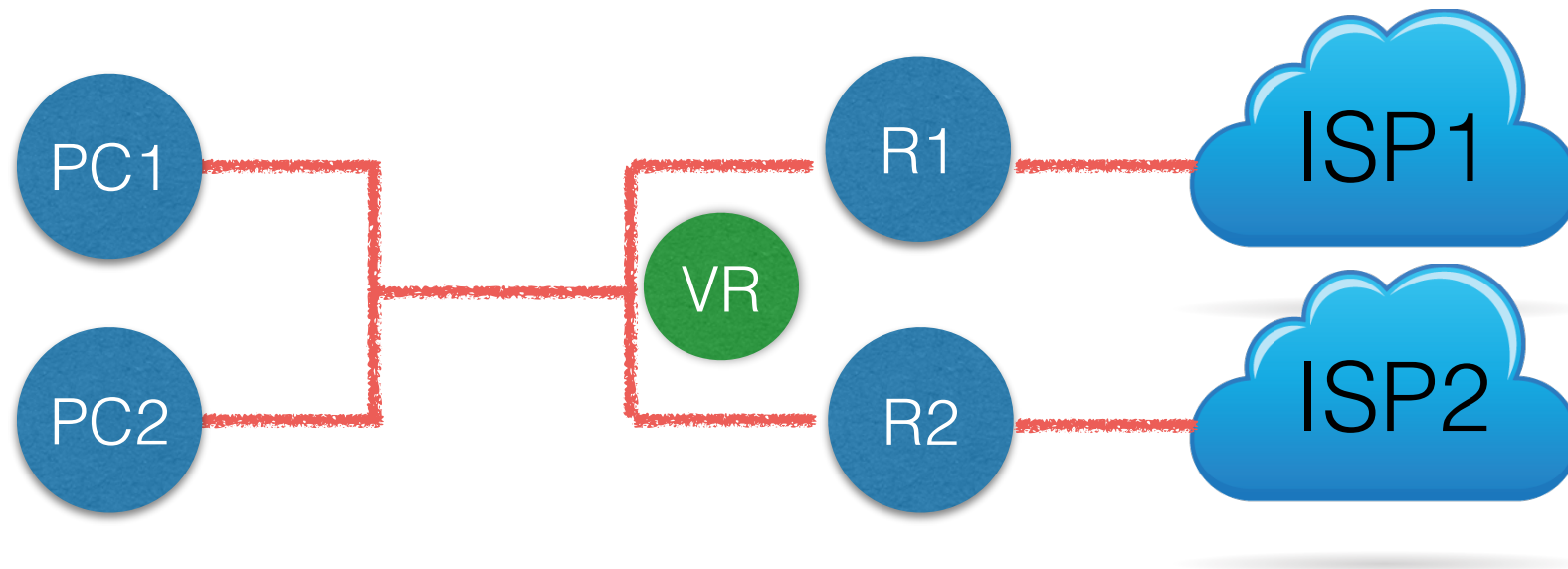
- Huy Eav
- I hold a few certificates like
  - MTCNA, MTCRE, MTCTCE
  - CCNP R&S
- Working at Sabay as Network Manager and trainer at ITTC

# Problem



- Normally, we do static default route on clients to point to a single IP of default gateway. We rarely do dynamic routing protocol between hosts :)
- In case, one of primary router fails or ISP link fails, we need to manually change default gateway IP on client to point to other available gateway

# Solution

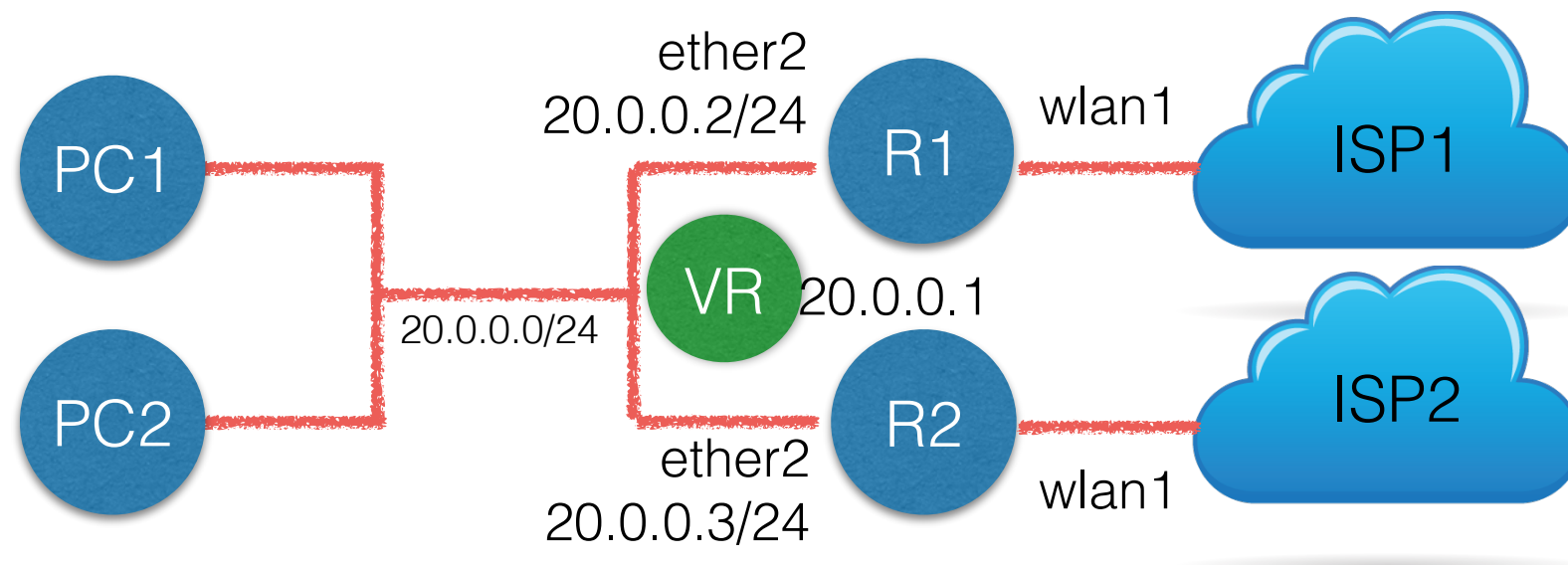


- We can use Virtual Router Redundancy Protocol (**VRRP**) to solve the problem
- Basically, the protocol will create another **Virtual IP**
- Virtual IP will be assigned to master router (ex: R1)
- In case the master router fails, the backup router (ex: R2) will be assigned the Virtual IP
- So, we only need to configure clients to use the virtual IP as default gateway

# Solution

- VRRP can detect unreachable router within 3 seconds without additional traffic overhead
- Mikrotik RouterOS supports both VRRPv2 (IPv4) and VRRPv3 (IPv4 and IPv6)

# Simple Setup

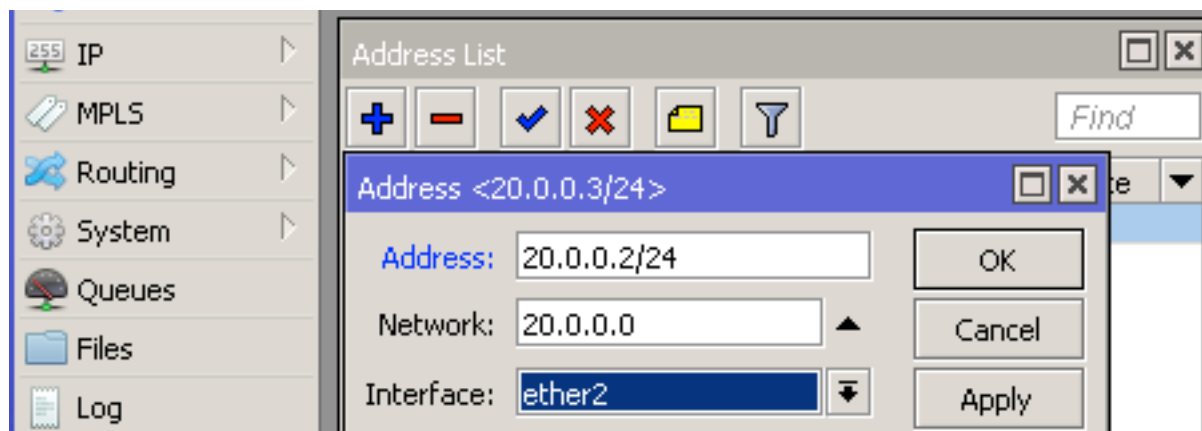


1. Assign IP address on ether2 of both R1 and R2
2. Create VRRP interface on both R1 and R2
3. Assign 20.0.0.1 as Virtual IP on the VRRP interface
4. Verify the status

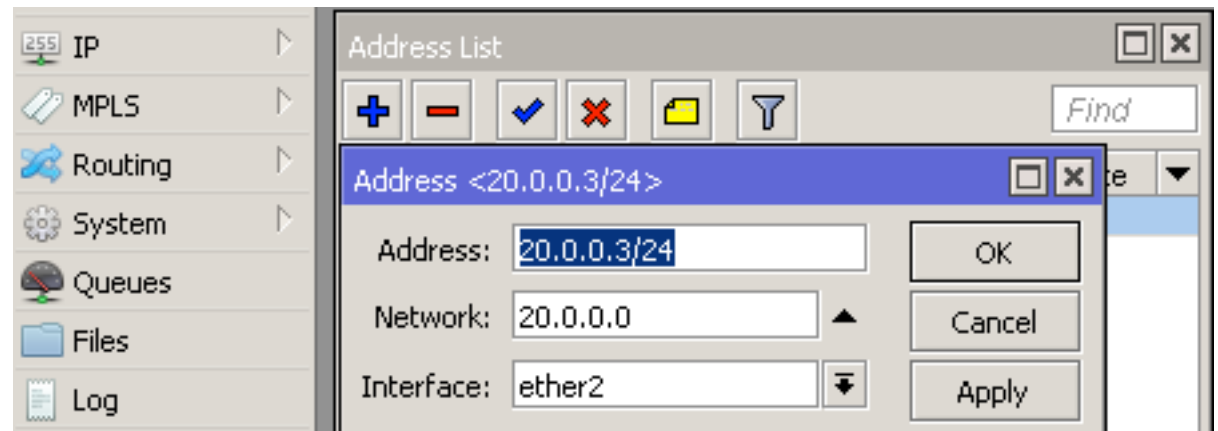
# Simple Setup

1. Assign IP address on Ether2 on both R1 and R2

R1



R2

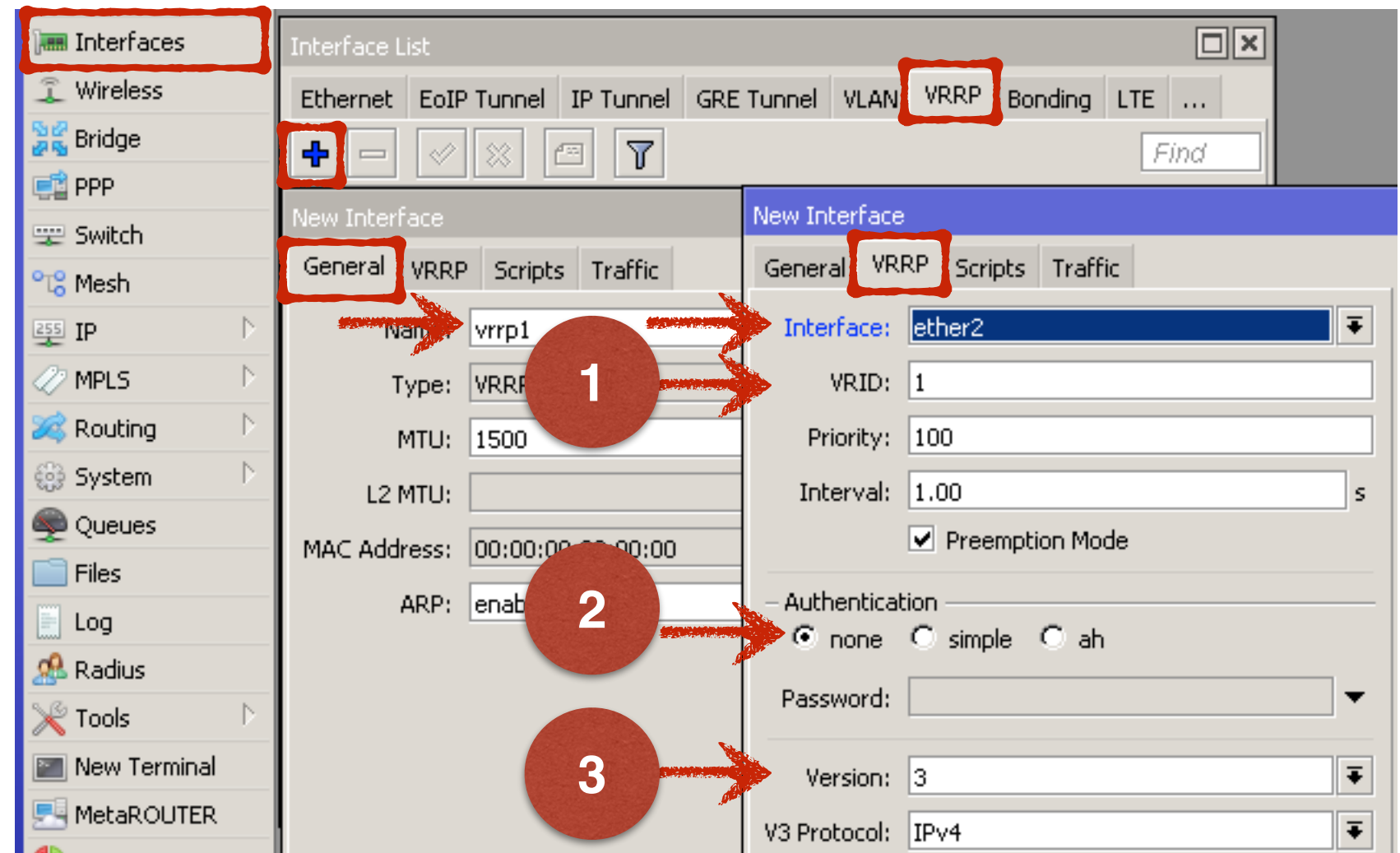




# Simple Setup

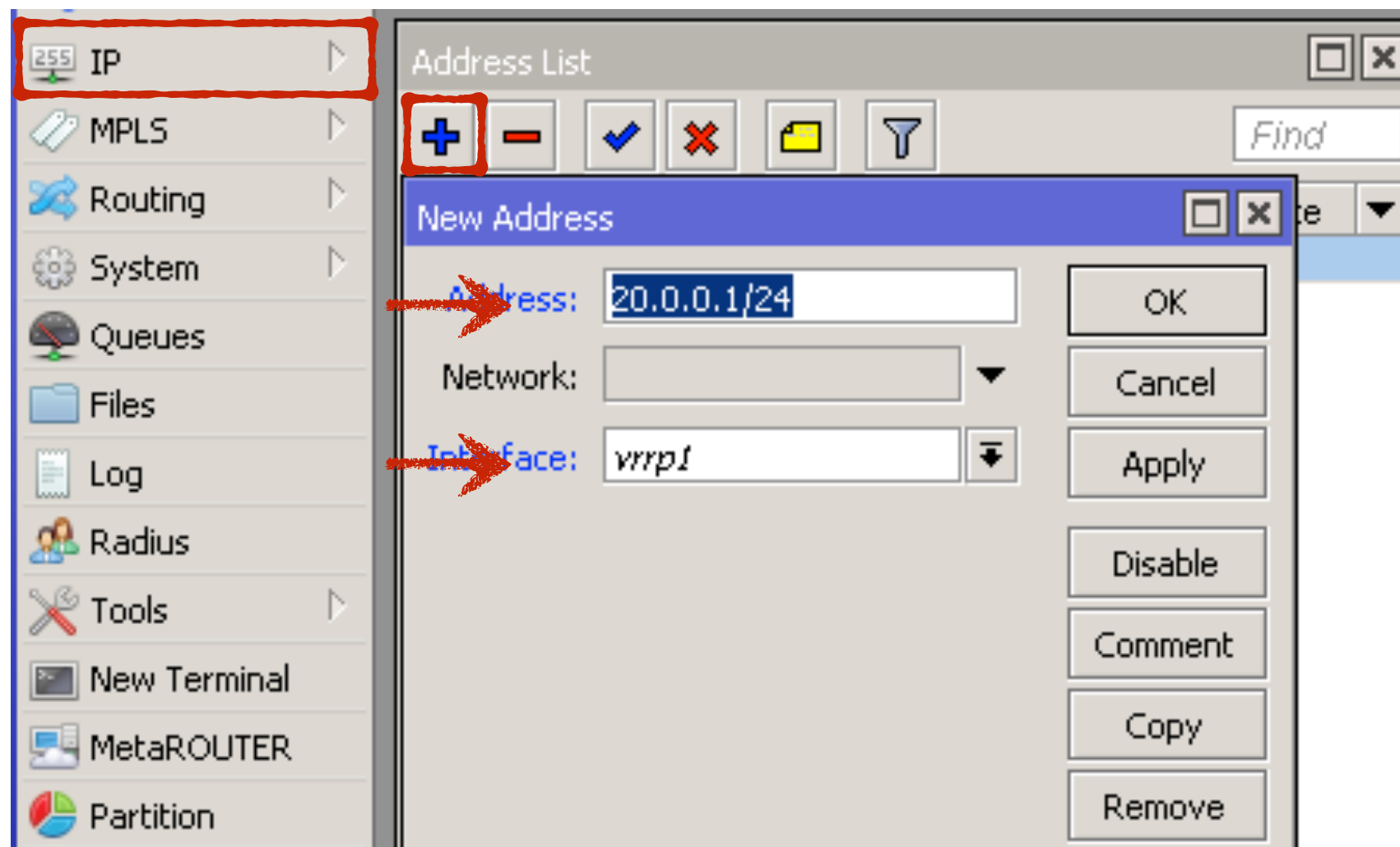
## 2. Create VRRP interface on both R1 and R2

1. **VRID** must be the same
2. **Authentication** must be the same
3. **Version** must be the same



# Simple Setup

3. Assign 20.0.0.1 as Virtual IP on the VRRP interface on both R1 and R2



# Simple Setup

## 4. Verify the status on Backup router

The screenshot displays the MikroTik WinBox interface. On the left sidebar, the 'Interfaces' menu item is highlighted with a red box. The main window shows the 'Interface List' tab, where the 'Interface' sub-tab is also highlighted with a red box. The table below lists the configured interfaces:

	Name	Type	L2 MTU	Tx	Rx	Tx Packet (p/s)
	ether1-gateway	Ethernet	1598	0 bps	0 bps	
R	ether2	Ethernet	1598	54.6 kbps	3.8 kbps	
B	vrrp1	VRRP		0 bps	0 bps	
S	ether3-slave-l...	Ethernet	1598	0 bps	0 bps	
S	ether4-slave-l...	Ethernet	1598	0 bps	0 bps	
S	ether5-slave-l...	Ethernet	1598	0 bps	0 bps	
X	wlan1	Wireless (Atheros AR...	1600	0 bps	0 bps	

Below the interface list, the 'Log' window is open, showing a list of system events. The entry 'vrrp1 now BACKUP' is highlighted with a red box:

Time	Memory	System	Info	Message
Jan/02/1970 01:38:27	memory	system, info		item added
Jan/02/1970 01:38:28	memory	dhcp, info		dhcp-client on vrrp1 got IP address 20.0.0.250
Jan/02/1970 01:38:56	memory	system, info		address changed by admin
Jan/02/1970 01:38:56	memory	dhcp, info		dhcp-client on vrrp1 lost IP address 20.0.0.250 - lease stopped locally
Jan/02/1970 01:38:56	memory	vrrp, info		vrrp1 now BACKUP
Jan/02/1970 01:38:56	memory	system, info		item removed
Jan/02/1970 01:38:56	memory	system, info		item removed
Jan/02/1970 01:38:56	memory	system, info		item removed
Jan/02/1970 01:38:56	memory	system, info		item removed
Jan/02/1970 01:38:56	memory	system, info, account		user admin logged out from 20.0.0.254 via winbox
Jan/02/1970 01:39:24	memory	system, info, account		user admin logged in from 20.0.0.254 via winbox

# Simple Setup

## 4. Verify the status on Master router

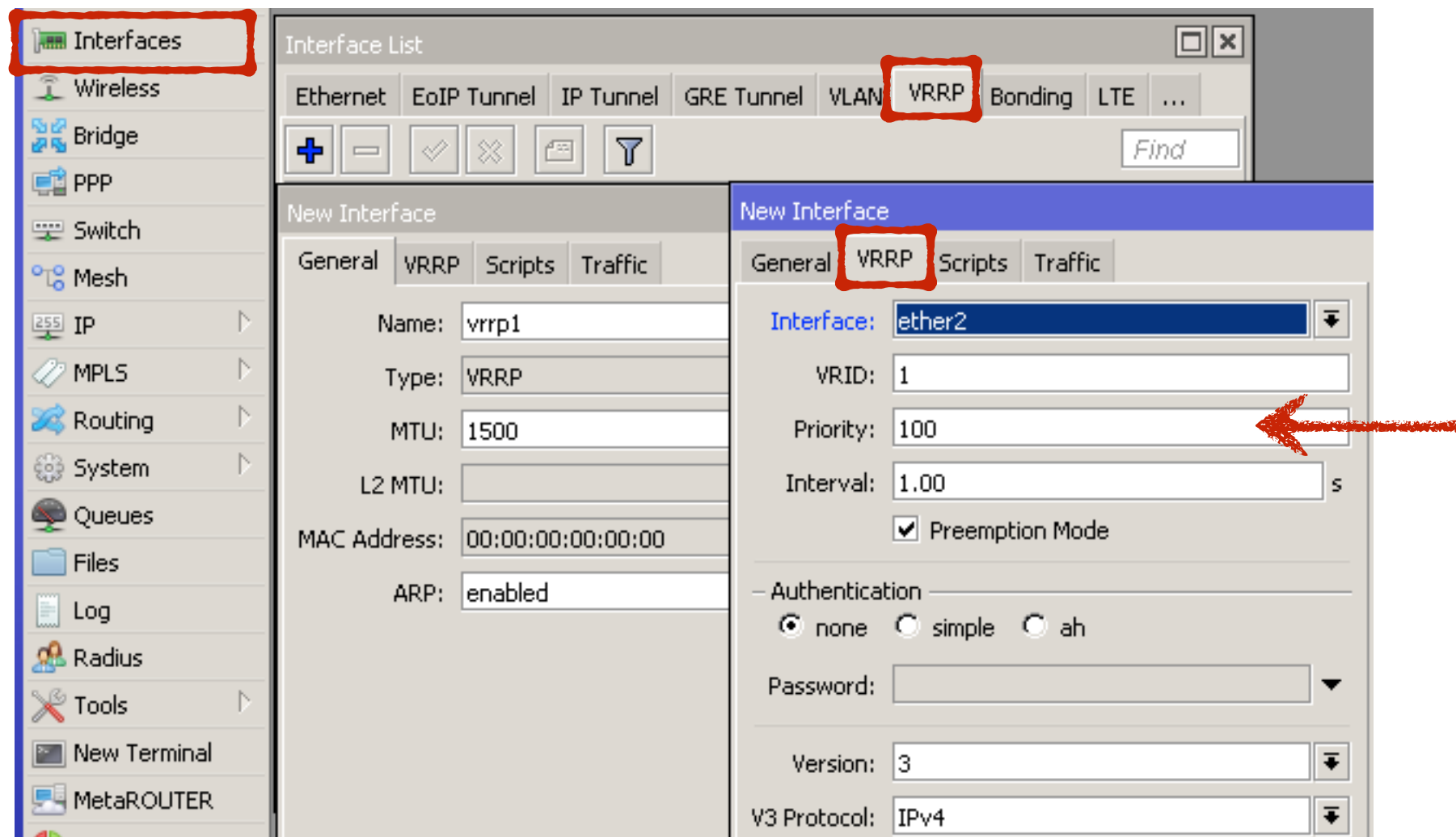
The screenshot displays the Mikrotik WinBox interface. On the left sidebar, the 'Interfaces' menu item is highlighted. The main window is divided into two panes. The top pane, titled 'Interface List', shows a table of network interfaces. The 'Interface' tab is selected, and the row for 'ether2' is highlighted. The bottom pane, titled 'Log', shows a list of system events. The entry 'vrrp1 misconfigured IP addresses' is highlighted.

	Name	Type	L2 MTU	Tx	Rx	Tx
	ether1-gateway	Ethernet	1598	0 bps	0 bps	
R	ether2	Ethernet	1598	54.4 kbps	3.3 kbps	
RM	vrrp1	VRRP		368 bps	0 bps	
S	ether3-slave-local	Ethernet	1598	0 bps	0 bps	
S	ether4-slave-local	Ethernet	1598	0 bps	0 bps	
S	ether5-slave-local	Ethernet	1598	0 bps	0 bps	
X	wlan1	Wireless (Atheros AR...	1600	0 bps	0 bps	

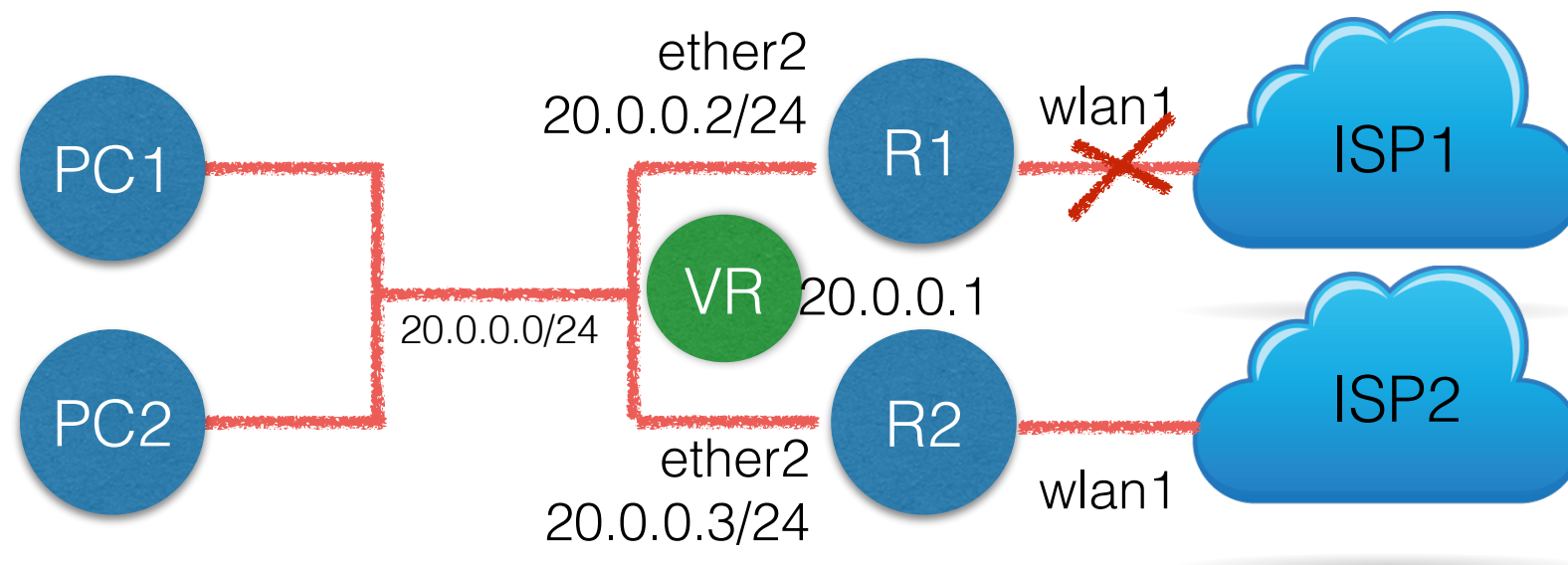
Time	Memory	System	Info	Message
Jan/02/1970 00:30:45	memory	system, info		address added by admin
Jan/02/1970 00:30:45	memory	vrrp, info		vrrp1 now BACKUP
Jan/02/1970 00:30:54	memory	vrrp, info		vrrp1 now MASTER, master down timer
Jan/02/1970 00:30:59	memory	system, info, account		user admin logged out from 20.0.0.254 via winbox
Jan/02/1970 00:33:38	memory	system, info, account		user admin logged in from 20.0.0.254 via winbox
Jan/02/1970 00:35:48	memory	system, info		device changed by admin
Jan/02/1970 00:35:50	memory	system, info		device changed by admin
Jan/02/1970 00:35:50	memory	vrrp, info		vrrp1 now BACKUP
Jan/02/1970 00:35:54	memory	vrrp, warning		vrrp1 misconfigured IP addresses
Jan/02/1970 00:36:24	memory	vrrp, info		vrrp1 now MASTER, master down timer

# Master and Backup Role

- Highest priority (max: 255) will become master. Default priority is 100
- or, highest IP address will become master

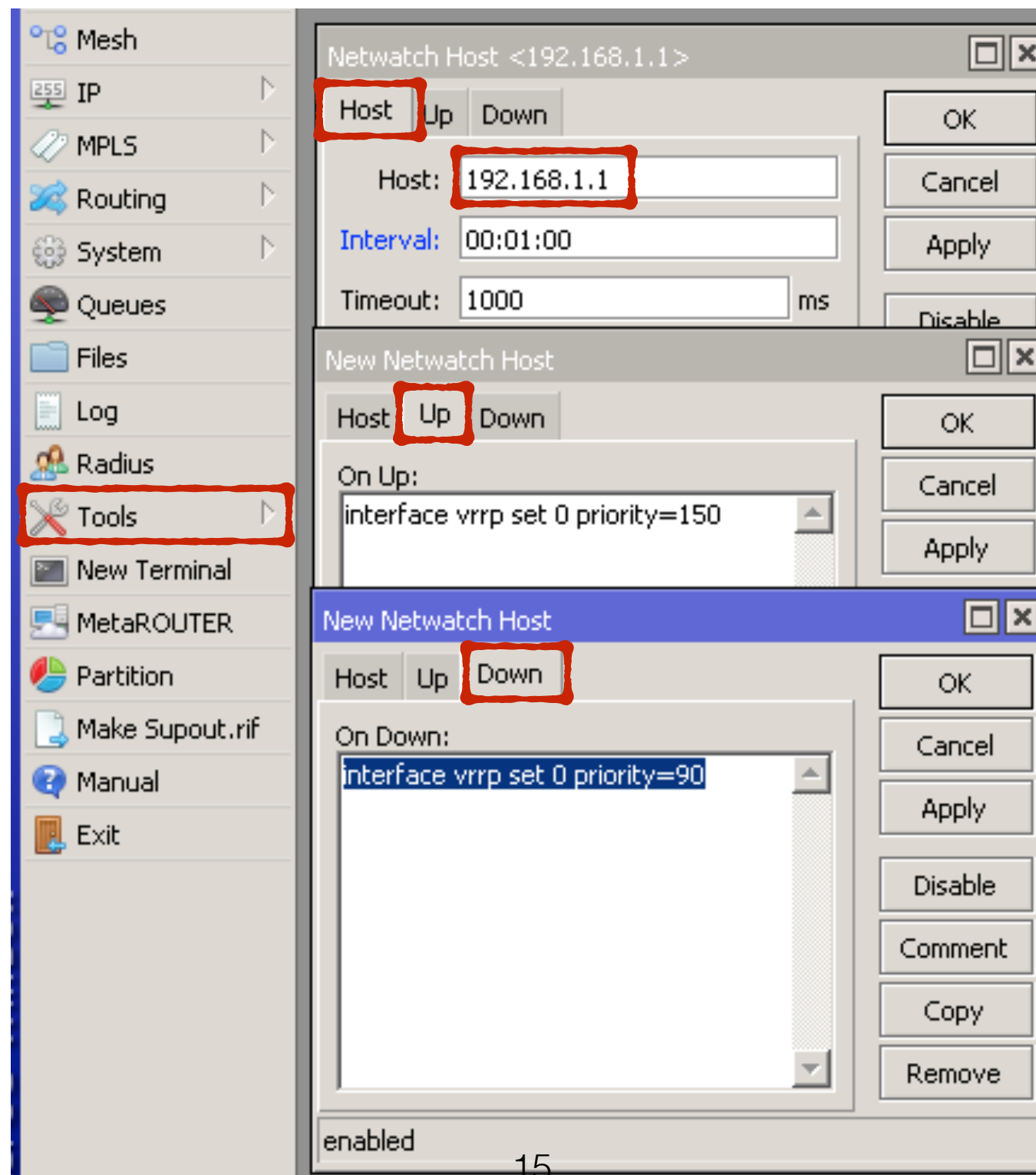


# Master and Backup Role



- R1 as master is still up but the link to ISP1 is down
- So, we want to switch R2 to be master
- We can do by using **NetWatch** which will send **Ping** to ISP1. If no response in 1000ms (default), we will set VRRP Priority of R1 to **90** . Else, we will set VRRP Priority of R1 to **150**.

# Master and Backup Role



# VRRP Authentication

- VRRP control traffic is sent to multicast group, 224.0.0.12 or FF02::12
- So, anyone can get it and do man in the middle attack :(
- We can protect by using **Authentication**
- We have configure the same on both R1 and R2

The screenshot shows the 'Interface <vrrp1>' configuration window. The 'VRRP' tab is selected and highlighted with a red box. The configuration fields are as follows:

- Interface: ether2
- VRID: 1
- Priority: 150
- Interval: 1.00 s
- ☒ Preemption Mode

The 'Authentication' section is also highlighted with a red box and contains:

- Authentication: none, simple, ah (ah is selected)
- Password: password

At the bottom, the status bar shows: enabled, running, slave, master.



Question ?

សូមអរគុណ  
saum arkoun

Thanks