

# About me



## Farzad Heydari

- Training, Support & Consultant
- MikroTik Certified Trainer
- Over 10000 hours teaching network
- 17 years experience in IT
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# Agenda

- **VRRP Introduction**
- **Sample Configuration**
- **Operation**
- **Security consideration**
- **VRRP Hello Packet**
- **Ipv6 Configuration**
- **Q&A**



# VRRP

**Virtual Router Redundancy Protocol**



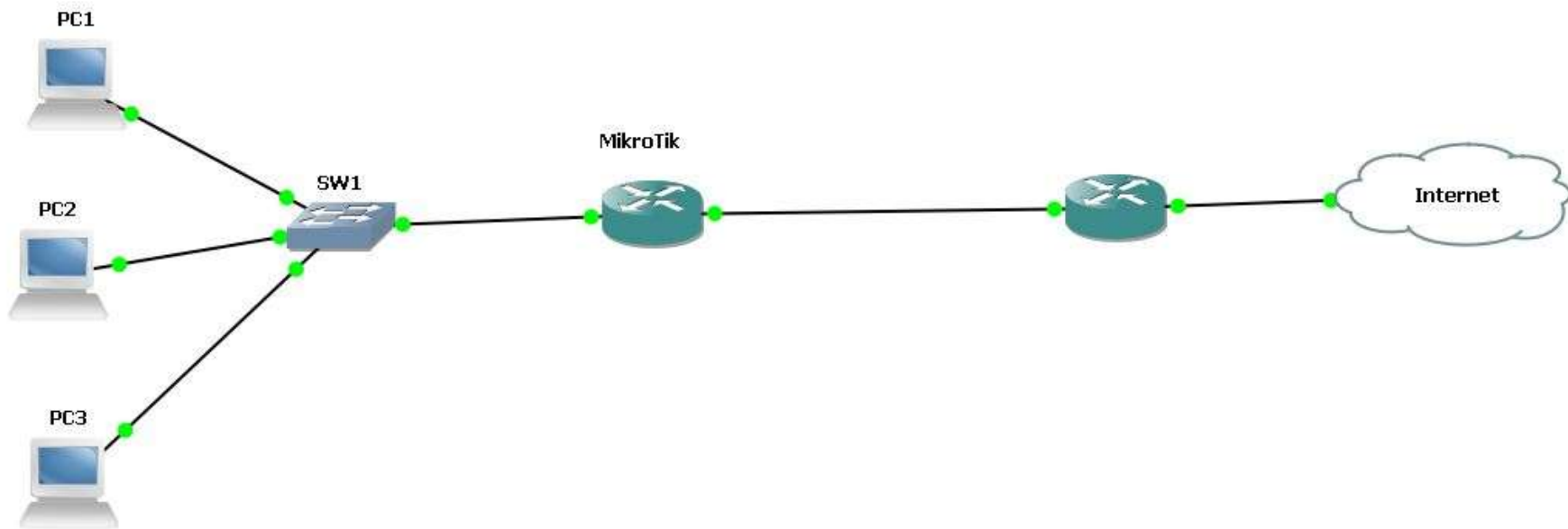
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# Why we should use VRRP?

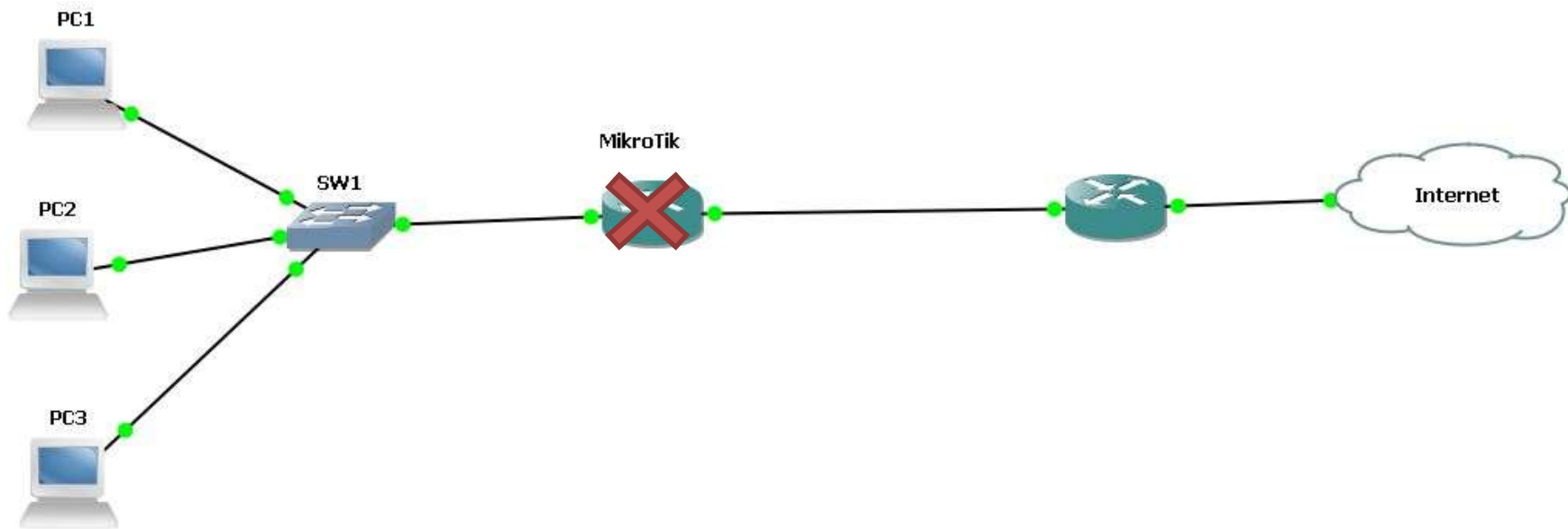
Insure the availability of the default gateway as long as one is Master and the other is Backup



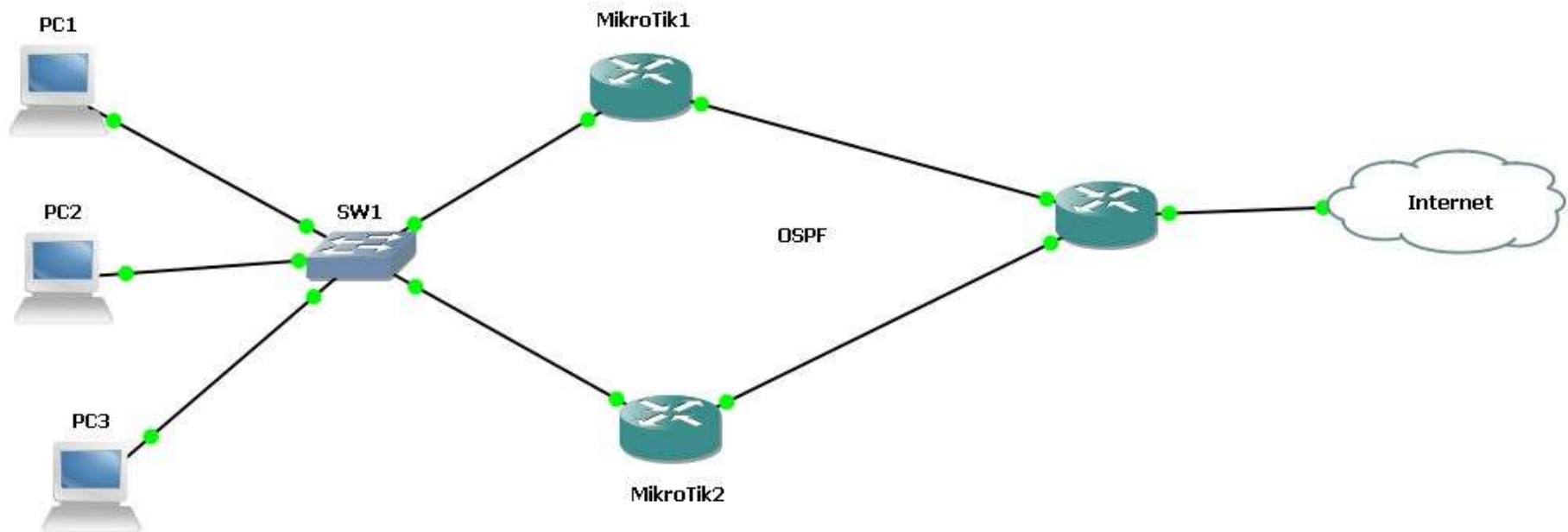
# Why we should use VRRP?



# Why we should use VRRP?

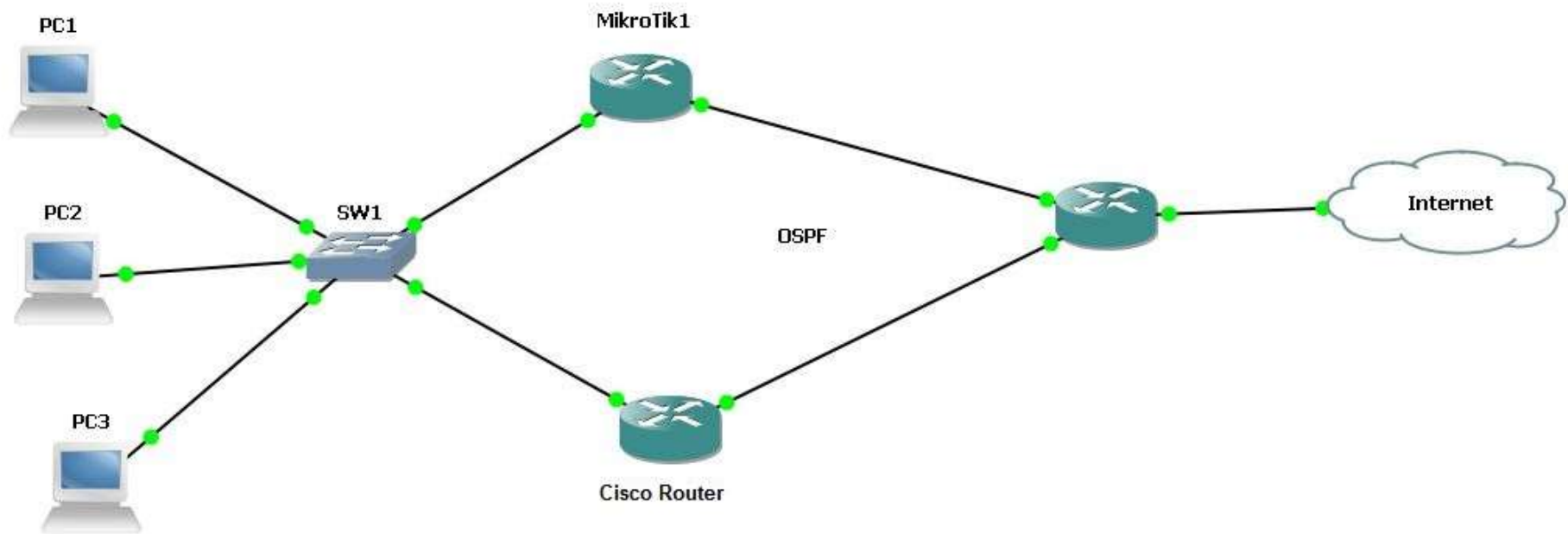


# Why we should use VRRP?





# Why we should use VRRP?



# Advertising Default route into OSPF

The screenshot shows the Mikrotik WinBox interface. On the left sidebar, the 'Routing' menu is expanded, and 'OSPF' is highlighted with a red box. In the main window, the 'OSPF' configuration window is open, with the 'Instances' tab selected and highlighted with a red box. Below the tabs, a table lists the OSPF instances:

Name	Router ID	Running
default	0.0.0.0	yes

The 'OSPF Instance <default>' dialog is open, showing the 'General' tab. The 'Redistribute Default Route' option is set to 'if installed (as type 2)' and is highlighted with a red box. Other options include 'Redistribute Connected Routes', 'Redistribute Static Routes', 'Redistribute RIP Routes', 'Redistribute BGP Routes', and 'Redistribute Other OSPF Routes', all set to 'no'. The 'In Filter' is set to 'ospf-in' and the 'Out Filter' is set to 'ospf-out'. The 'Routing Table' and 'Use DN' fields are empty. The 'enabled' checkbox is checked, and the 'default' instance is selected.

# VRRP Configuration Router 1 (step by step)

The screenshot illustrates the configuration of VRRP on Router 1. The left sidebar shows the 'Interfaces' menu highlighted. The main window displays the 'Interface List' with the 'VRRP' tab selected. A 'New Interface' dialog box is open, showing the 'VRRP' tab with the following configuration:

- Interface: ether2
- VRID: 9
- Priority: 150
- Interval: 1.00 s
- Preemption Mode
- Authentication: ah
- Password: M!kr0t!k
- Version: 2
- V3 Protocol: IPv4

The status bar at the bottom shows 'enabled', 'running', and 'slave'.

# VRRP Configuration Router 2 (step by step)

The screenshot displays the Mikrotik WinBox interface for configuring VRRP on Router 2. The left sidebar shows a tree view of configuration categories, with 'Interfaces' selected. The main window shows the 'Interface <vmp 1>' configuration dialog, with the 'VRRP' tab active. A red arrow points to the 'Interface' dropdown menu, which is set to 'ether2'. The configuration parameters are as follows:

Parameter	Value
Interface	ether2
VRID	9
Priority	110
Interval	1.00 s
Preemption Mode	<input checked="" type="checkbox"/>
Authentication	ah
Password	M!kr0t!k
Version	2
V3 Protocol	IPv4

At the bottom of the dialog, the status is shown as 'enabled', 'running', 'slave', and 'backup'. The 'Interface List' table below the dialog shows the following entry:

Interface	Interface List
B	vmp 1

# ✓ VRID

Virtual Router Identifier. Range 1-255

New Interface

General VRRP Scripts Status Traffic

Interface: ether2

VRID: 9

Priority: 150

Interval: 1.00 s

Preemption Mode

Authentication

none  simple  ah

Password: Mikr0t!k

Version: 2

V3 Protocol: IPv4

OK Cancel Apply Disable Comment Copy Remove Torch

enabled running slave

Interface <vmp1>

General VRRP Scripts Status Traffic

Interface: ether2

VRID: 9

Priority: 110

Interval: 1.00 s

Preemption Mode

Authentication

none  simple  ah

Password: Mikr0t!k

Version: 2

V3 Protocol: IPv4

OK Cancel Apply Disable Comment Copy Remove Torch

enabled running slave backup

# ✓ Priority

Priority value use for selection Master. The range 1-254 is available.

Default value is 100

The screenshot shows the 'New Interface' configuration window with the VRRP tab selected. The 'Priority' field is highlighted with a red box and a red arrow pointing to it, indicating its importance. The value '150' is entered in this field. Other visible fields include 'Interface: ether2', 'VRID: 9', 'Interval: 1.00', 'Preemption Mode' checked, 'Authentication' set to 'ah', 'Password: Mikr0t!k', 'Version: 2', and 'V3 Protocol: IPv4'. The window also has 'OK', 'Cancel', 'Apply', 'Disable', 'Comment', 'Copy', 'Remove', and 'Torch' buttons on the right side.

# ✓ Priority

Priority value use for selection Backup.

Interface <vrrp1>

General VRRP Scripts Status Traffic

Interface: ether2

VRID: 9

Priority: 110

Interval: 1.00 s

Preemption Mode

Authentication

none  simple  ah

Password: Mikrotik

Version: 2

V3 Protocol: IPv4

OK  
Cancel  
Apply  
Disable  
Comment  
Copy  
Remove  
Torch

enabled running slave backup

- ✓ All VRRP routers belonging to the same VR must be configured with the same advertisement interval. If interval does not match router will discard received advertisement packet

Interface <vrrp1>

General VRRP Scripts Status Traffic

Interface: ether2

VRID: 9

Priority: 110

Interval: 1.00 s

Preemption Mode

Authentication

none  simple  ah

Password: Mikrotik

Version: 2

V3 Protocol: IPv4

OK Cancel Apply Disable Comment Copy Remove Torch

enabled running slave backup



# Preemption Mode

when router with higher priority becomes available it is switched to master. Sometimes this behavior is not necessary. To override it [preemption mode](#) should be disabled.

Interface <vrrp1>

General VRRP Scripts Status Traffic

Interface: ether2

VRID: 9

Priority: 150

Interval: 1.00 s

Preemption Mode

Authentication

none  simple  ah

Password: Mikrotik

Version: 2

V3 Protocol: IPv4

OK Cancel Apply Disable Comment Copy Remove Torch

enabled running slave master

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# Authentication Method

❖ Simple

❖ AH

The screenshot shows the Mikrotik WinBox configuration window for an interface named 'vmp1'. The 'VRRP' tab is selected. The configuration includes the following fields:

- Interface: ether2
- VRID: 9
- Priority: 150
- Interval: 1.00 s
- Preemption Mode:
- Authentication:  none  simple  ah
- Password: Mikrotik
- Version: 2
- V3 Protocol: IPv4

At the bottom of the window, there are status indicators for 'enabled', 'running', 'slave', and 'master'. On the right side, there are buttons for 'OK', 'Cancel', 'Apply', 'Disable', 'Comment', 'Copy', 'Remove', and 'Torch'.

# Add IP address on VRRP Interface

The screenshot displays the Mikrotik WinBox interface. The main window is titled "Interface List" and shows a table with the following data:

Name	Type	MTU	Actual MTU	L2 MTU	Tx	Rx
vrrp1	VRRP	1500				0 bps

An "Address List" dialog box is open, showing a table with the following data:

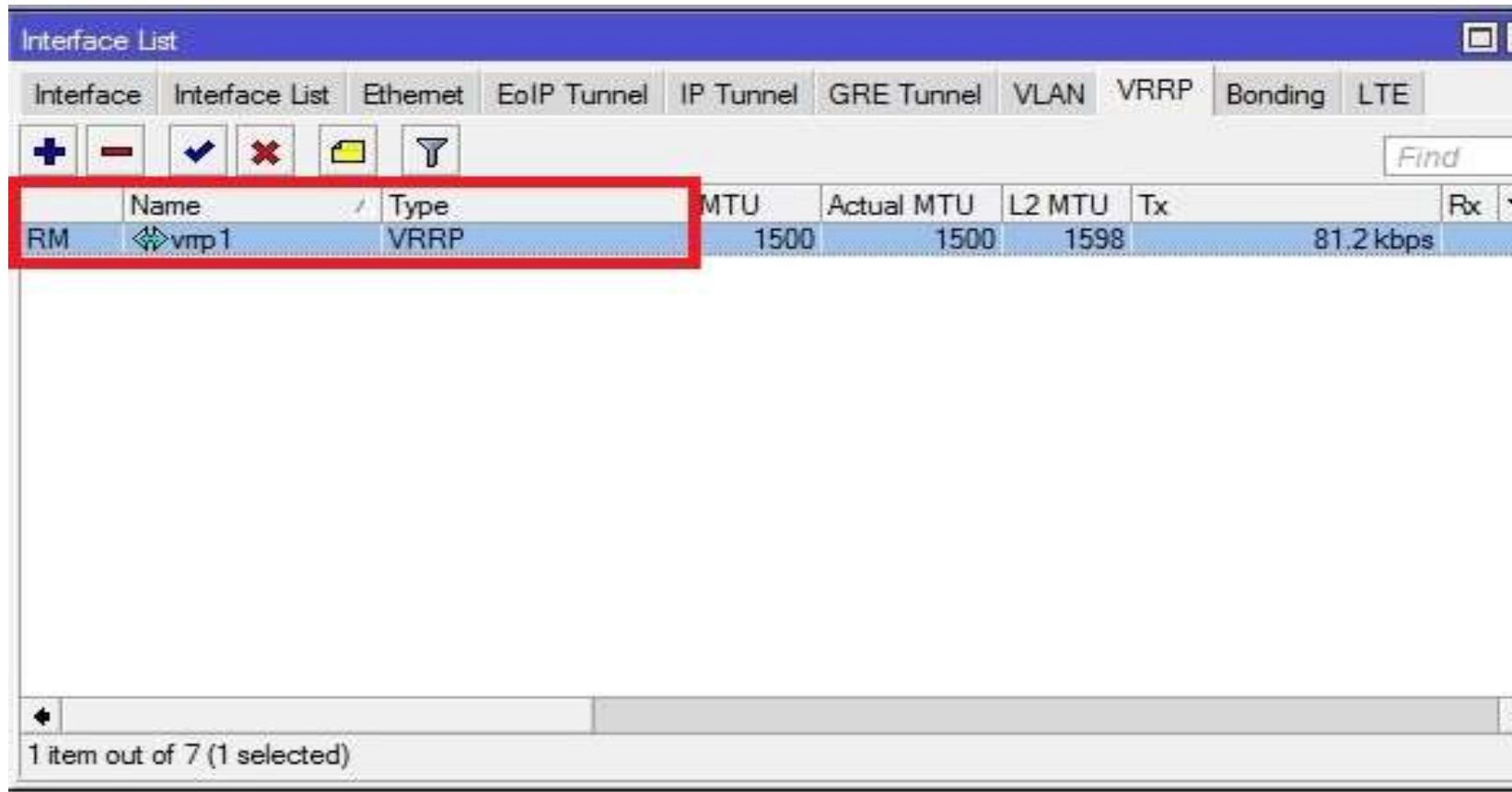
Address	Network	Interface
10.0.0.6/30	10.0.0.4	ether1
192.168.1.1/24	192.168.1.0	ether2

A "New Address" dialog box is also open, with the following fields filled in:

- Address: 192.168.1.254/24
- Network: (empty dropdown)
- Interface: vrrp1

Red arrows point to the "Address" and "Interface" fields in the "New Address" dialog box. The "New Address" dialog box also includes buttons for "OK", "Cancel", "Apply", "Disable", "Comment", "Copy", and "Remove".

# Identify Master

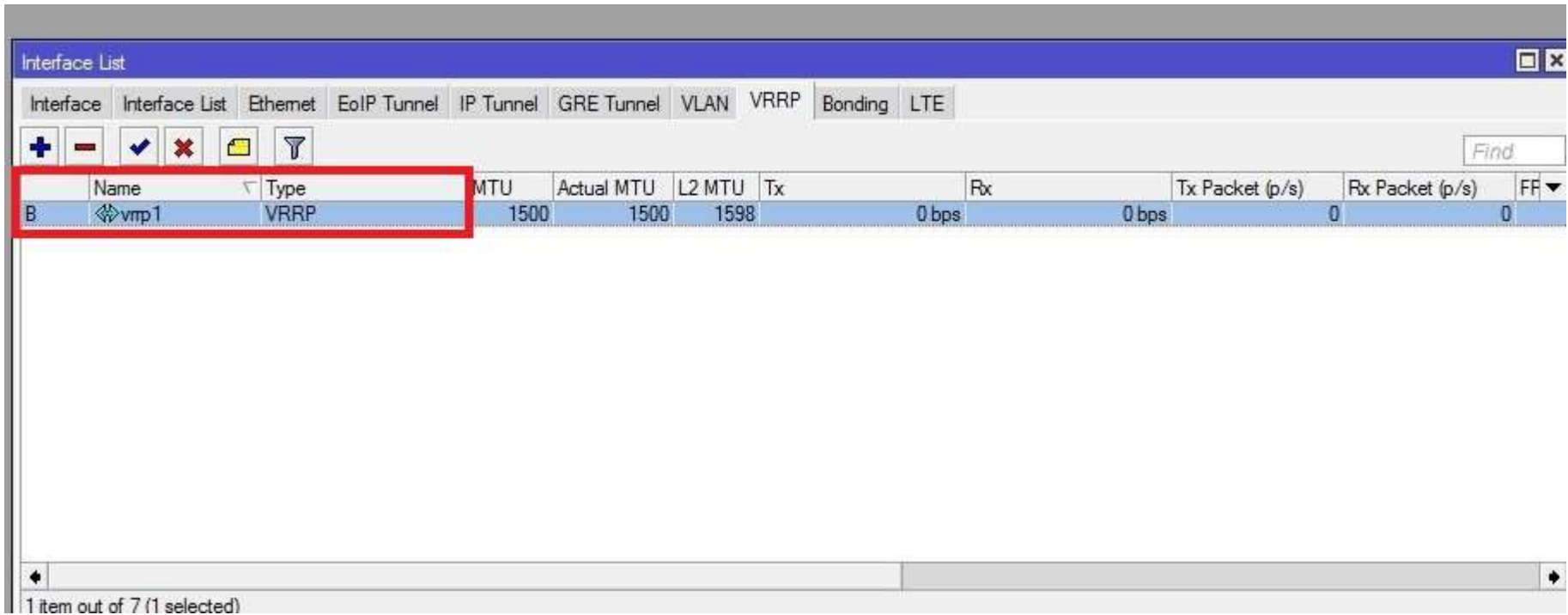


The screenshot shows the Mikrotik WinBox 'Interface List' window. The 'VRRP' tab is selected. A table lists the VRRP configuration for the 'RM' interface. The row for 'vrrp1' is highlighted with a red box, indicating it is the master.

Name	Type	MTU	Actual MTU	L2 MTU	Tx	Rx
vrrp1	VRRP	1500	1500	1598	81.2 kbps	

1 item out of 7 (1 selected)

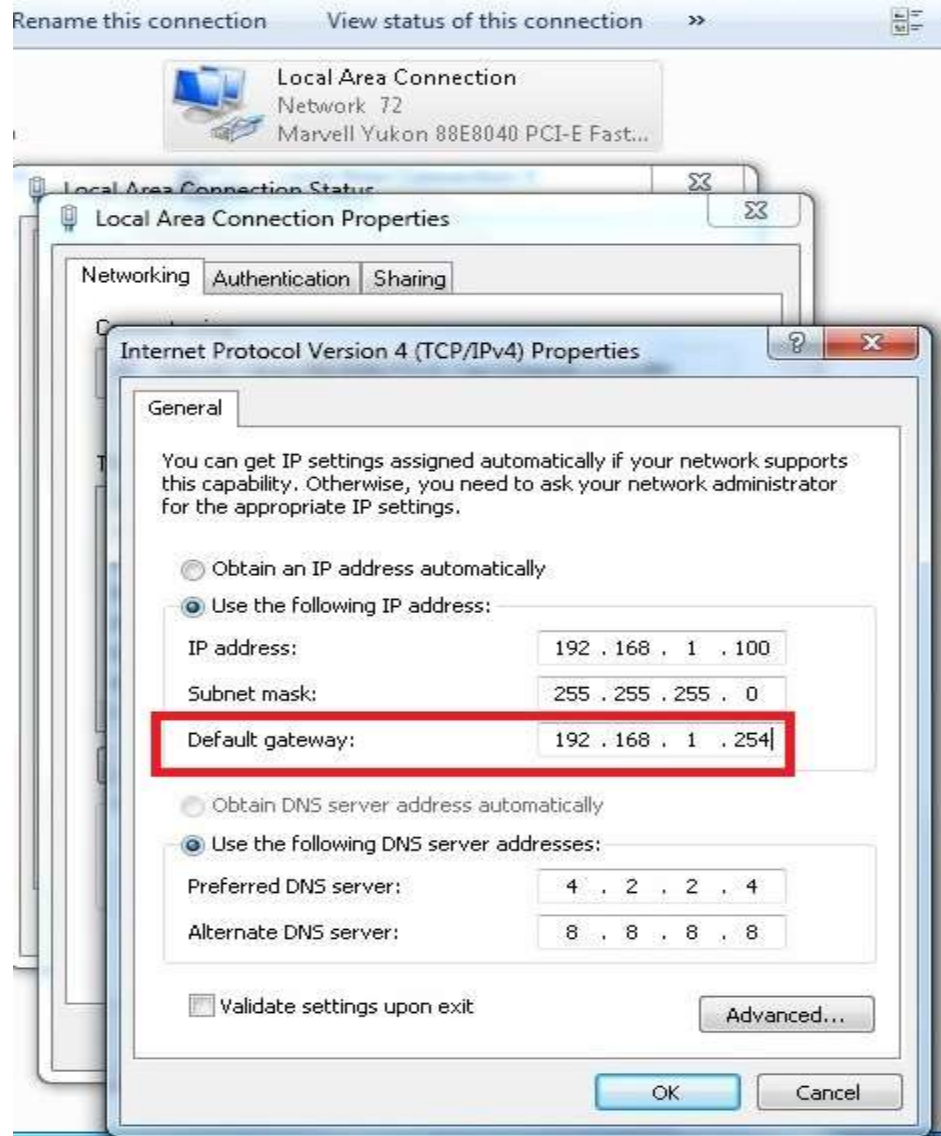
# Identify Backup



The screenshot shows the Mikrotik WinBox 'Interface List' window. The 'VRRP' tab is selected. A table lists the interfaces, with the first row, 'B vrp1 VRRP', highlighted in blue and enclosed in a red rectangular box. The table columns are: Name, Type, MTU, Actual MTU, L2 MTU, Tx, Rx, Tx Packet (p/s), Rx Packet (p/s), and FF. The status bar at the bottom indicates '1 item out of 7 (1 selected)'.

Name	Type	MTU	Actual MTU	L2 MTU	Tx	Rx	Tx Packet (p/s)	Rx Packet (p/s)	FF
B vrp1	VRRP	1500	1500	1598		0 bps	0 bps	0	0


# Add IP address on Windows Device



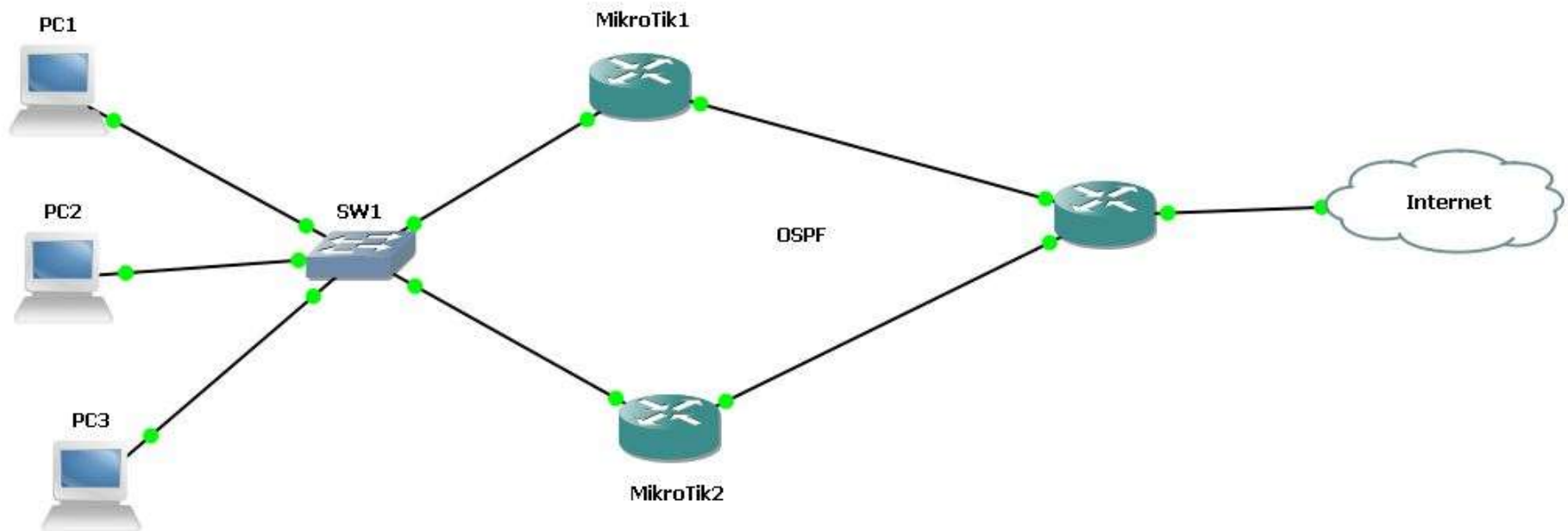
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## Testing VRRP

```
Administrator: C:\Windows\system32\cmd.exe - ping 4.2.2.4 -t
Reply from 4.2.2.4: bytes=32 time=97ms TTL=47
Reply from 4.2.2.4: bytes=32 time=95ms TTL=47
Reply from 4.2.2.4: bytes=32 time=94ms TTL=47
Reply from 4.2.2.4: bytes=32 time=93ms TTL=47
Reply from 4.2.2.4: bytes=32 time=99ms TTL=47
Reply from 4.2.2.4: bytes=32 time=107ms TTL=47
Reply from 4.2.2.4: bytes=32 time=106ms TTL=47
Reply from 4.2.2.4: bytes=32 time=101ms TTL=47
Reply from 4.2.2.4: bytes=32 time=124ms TTL=47
Reply from 4.2.2.4: bytes=32 time=99ms TTL=47
Reply from 4.2.2.4: bytes=32 time=98ms TTL=47
Reply from 4.2.2.4: bytes=32 time=100ms TTL=47
Reply from 4.2.2.4: bytes=32 time=102ms TTL=47
Reply from 4.2.2.4: bytes=32 time=95ms TTL=47
Request timed out.
Reply from 4.2.2.4: bytes=32 time=112ms TTL=47
Reply from 4.2.2.4: bytes=32 time=98ms TTL=47
Reply from 4.2.2.4: bytes=32 time=101ms TTL=47
Reply from 4.2.2.4: bytes=32 time=100ms TTL=47
Reply from 4.2.2.4: bytes=32 time=99ms TTL=47
Reply from 4.2.2.4: bytes=32 time=97ms TTL=47
Reply from 4.2.2.4: bytes=32 time=96ms TTL=47
Reply from 4.2.2.4: bytes=32 time=94ms TTL=47
Reply from 4.2.2.4: bytes=32 time=100ms TTL=47
```



# Which MAC Address?





# Virtual Router MAC Address

The virtual router MAC address associated with a virtual router is an IEEE 802 MAC address in the following format:

00-00-5E-00-01-[VRID]



# Host ARP Request

When a host sends an ARP request for one of the virtual router IP address, the Master virtual router must respond to the ARP request with the virtual Mac address for the virtual router.

The Master virtual router must not respond with physical MAC address. This allows the client to always use the same MAC address regardless of the current Master router.



# VRRP Virtual MAC address

WinBox v3.18 (Addresses)

File Tools

Connect To: 6C:3B:6B:EB:17:DD

Login: admin

Password:

Add/Set Connect To RoM

Managed Neighbors

Refresh

MAC Address	IP Address	Identity	Version	Board	Uptime
<b>6C:3B:6B...</b>					
6C:3B:6B:EB:17:DD	0.0.0.0	DSPF	6.43.8 (stable)	RB951Ui-2HnD	00:18:56
6C:3B:6B:EB:15:1D	192.168.1.2	VRRP2	6.43.8 (stable)	RB951Ui-2HnD	00:38:01
6C:3B:6B:EA:8A:93	192.168.1.1	VRRP1	6.43.8 (stable)	RB951Ui-2HnD	00:37:39
<b>00:00:5E...</b>					
00:00:5E:00:01:09	192.168.1.254	VRRP1	6.43.8 (stable)	RB951Ui-2HnD	00:37:39

# ARP Table

```
Administrator: C:\Windows\system32\cmd.exe
Tunnel adapter isatap.<CDDDB2FE5-80E6-47B1-B0A9-81CF82C9B47E>:
    Media State . . . . . : Media disconnected
    Connection-specific DNS Suffix  . :
C:\Users\Farzad>
C:\Users\Farzad>
C:\Users\Farzad>
C:\Users\Farzad>arp -a

Interface: 192.168.1.20 --- 0xb
Internet Address      Physical Address      Type
169.254.70.220        bc-ae-c5-5e-2c-d1    dynamic
192.168.1.1           6c-3b-6b-ea-8a-93    dynamic
192.168.1.2           6c-3b-6b-eb-15-1d    dynamic
192.168.1.254         00-00-5e-00-01-09    dynamic
172.16.0.1.255        11-11-11-11-11-11    static
224.0.0.18            01-00-5e-00-00-12    static
224.0.0.22            01-00-5e-00-00-16    static
224.0.0.251           01-00-5e-00-00-fb    static
224.0.0.252           01-00-5e-00-00-fc    static
239.255.255.250      01-00-5e-7f-ff-fa    static
255.255.255.255      ff-ff-ff-ff-ff-ff    static

C:\Users\Farzad>p
```

## Source Address of VRRP packet

The primary IP address of the interface the packet is being sent from.

## Destination Address

The IP multicast address as assigned by the IANA for VRRP is :

224.0.0.18

14	31.380507	192.168.1.1	224.0.0.18	VRRP	60 Announcement (v2)
15	32.819027	192.168.1.1	224.0.0.18	VRRP	60 Announcement (v2)
16	34.134385	192.168.1.1	224.0.0.18	VRRP	60 Announcement (v2)
17	35.557450	192.168.1.1	224.0.0.18	VRRP	60 Announcement (v2)

```
> Frame 5: 60 bytes on wire (480 bits), 60 bytes captured (480 bits) on interface 0
> Ethernet II, Src: IETF-VRRP-VRID 09 (00:00:5e:00:01:09), Dst: IPv4mcast_12 (01:00:5e:00:
> Internet Protocol Version 4, Src: 192.168.1.1, Dst: 224.0.0.18
> Virtual Router Redundancy Protocol
```

# TTL

The TTL must be set to 255. A VRRP router receiving a packet with the TTL not equal to 255 will discard the packet

# IPv6 Configuration

To make VRRP work in IPv6 networks, several additional options must be enabled - v3 support is required and protocol type should be set to IPv6:

```
/interface vrrp add name=vrrp1 interface=ether1 version=3  
v3-protocol=ipv6
```

Now when VRRP interface is set, we can add global address and enable ND advertisement:

```
/ipv6 address add address=FEC0:0:0:FFFF::1/64 advertise=yes  
interface=vrrp1
```

No additional address configuration is required as it is in IPv4 case. IPv6 uses link-local addresses to communicate between nodes.



ANY  
QUESTIONS  
?





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