

VRRP

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General Information

Summary

Virtual Router Redundancy Protocol (VRRP) implementation in the MikroTik RouterOS is RFC2338 compliant. VRRP protocol is used to ensure constant access to some resources. Two or more routers (referred as VRRP Routers in this context) create a highly available cluster (also referred as Virtual routers) with dynamic fail over. Each router can participate in not more than 255 virtual routers per interface. Many modern routers support this protocol.

Network setups with VRRP clusters provide high availability for routers without using clumsy ping-based scripts.

Specifications

Packages required: *system*

License required: *level1*

Home menu level: */ip vrrp*

Standards and Technologies: [*VRRP*](#), [*AH*](#), [*HMAC-MD5-96 within ESP and AH*](#)

Hardware usage: *Not significant*

Related Documents

- [Software Package Management](#)
- [IP Addresses and ARP](#)

Description

Virtual Router Redundancy Protocol is an election protocol that provides high availability for routers. A number of routers may participate in one or more virtual routers. One or more IP addresses may be assigned to a virtual router. A node of a virtual router can be in one of the following states:

- **MASTER** state, when the node answers all the requests to the instance's IP addresses. There may only be one MASTER node in a virtual router. This node sends VRRP advertisement packets to all the backup routers (using multicast address) every once in a while (set in **interval** property).
- **BACKUP** state, when the VRRP router monitors the availability and state of the Master Router. It does not answer any requests to the instance's IP addresses. Should master become unavailable (if at least three sequential VRRP packets are lost), election process happens, and new master is proclaimed based on its priority. For more details on virtual routers, see RFC2338.

Notes

VRRP does not currently work on VLAN interfaces, as it is impossible to have the MAC address of a VLAN interface different from the MAC address of the physical interface it is put on.

VRRP Routers

Home menu level: */ip vrrp*

Description

A number of VRRP routers may form a virtual router. The maximal number of clusters on one network is 255 each having a unique VRID (Virtual Router ID). Each router participating in a VRRP cluster must have its priority set to a valid value.

Property Description

authentication (*none* | *simple* | *ah*; default: **none**) - authentication method to use for VRRP advertisement packets

- **none** - no authentication
- **simple** - plain text authentication
- **ah** - Authentication Header using HMAC-MD5-96 algorithm

interface (*name*) - interface name the instance is running on

interval (*integer*: 1..255; default: **1**) - VRRP update interval in seconds. Defines how frequently the master of the given cluster sends VRRP advertisement packets

name (*name*) - assigned name of the VRRP instance

on-backup (*name*; default: "") - script to execute when the node switch to backup state

on-master (*name*; default: "") - script to execute when the node switch to master state

password (*text*; default: "") - password required for authentication depending on method used can be ignored (if no authentication used), 8-character long text string (for plain-text authentication) or 16-character long text string (128-bit key required for AH authentication)

preemption-mode (yes | no; default: **yes**) - whether preemption mode is enabled

- **no** - a backup node will not be elected to be a master until the current master fail even if the backup node has higher priority than the current master
- **yes** - the master node always has the priority

priority (*integer*: 1..255; default: **100**) - priority of the current node (higher values mean higher priority)

- **255** - RFC requires that the router that owns the IP addresses assigned to this instance had the priority of 255

vrid (*integer*: 0..255; default: **1**) - Virtual Router Identifier (must be unique on one interface)

Notes

All the nodes of one cluster must have the same **vrid**, **interval**, **preemption-mode**, **authentication** and **password**.

As said before, priority of 255 is reserved for the real owner of the virtual router's IP addresses. Theoretically, the owner should have the IP address added statically to its IP address list and also to the VRRP virtual address list, but you should never do this! Any addresses that you are using as virtual addresses (i.e. they are added in **/ip vrrp address**) must not appear in **/ip address** list as they otherwise can cause IP address conflict, which will not be resolved automatically.

Also You must have an IP address (no matter what) on the interface you want to run VRRP on.

Example

To add a VRRP instance on **ether1** interface, forming (because **priority** is **255**) a virtual router with **vrid** of **1**:

```
[admin@MikroTik] ip vrrp> add interface=ether1 vrid=1 priority=255
[admin@MikroTik] ip vrrp> print
Flags: X - disabled, I - invalid, M - master, B - backup
 0 I name="vr1" interface=ether1 vrid=1 priority=255 interval=1
    preemption-mode=yes authentication=none password="" on-backup=""
    on-master=""

[admin@MikroTik] ip vrrp>
```

Virtual IP addresses

Home menu level: **/ip vrrp address**

Property Description

address (*IP address*) - IP address belongs to the virtual router

broadcast (*IP address*) - broadcasting IP address

interface (*name*; default: **default**) - interface, where to put the address on (may be different from the interface this VRRP instance is running on)

- **default** - put this address on the interface the given VRRP instance is working on

network (*IP address*) - IP address of the network

virtual-router (*name*) - VRRP router's name the address belongs to

Notes

The virtual IP addresses should be the same for each node of a virtual router.

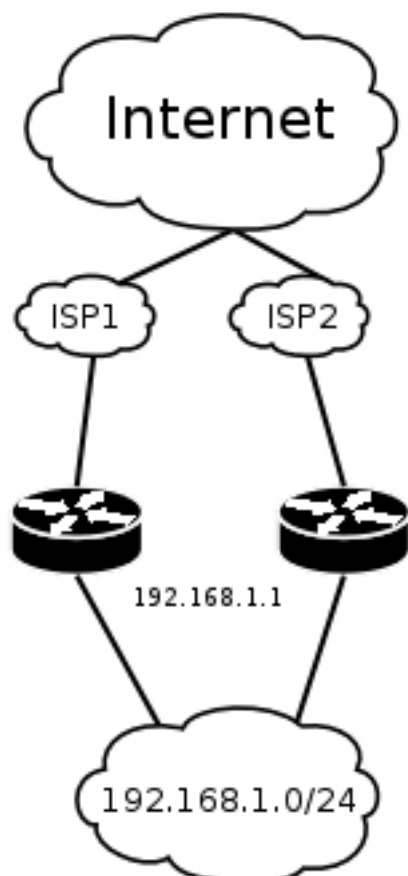
Example

To add a virtual address of **192.168.1.1/24** to the **vr1** VRRP router:

```
[admin@MikroTik] ip vrrp> address add address=192.168.1.1/24 \
\... virtual-router=vr1
[admin@MikroTik] ip vrrp> address print
Flags: X - disabled, A - active
#   ADDRESS      NETWORK      BROADCAST    INSTANCE  INTERFACE
0   192.168.1.1/24  192.168.1.0  192.168.1.255  vr1       default
[admin@MikroTik] ip vrrp>
```

A simple example of VRRP fail over

Description



VRRP protocol may be used to make a redundant Internet connection with seamless fail-over. Let us assume that we have 192.168.1.0/24 network and we need to provide highly available Internet connection for it. This network should be NATted (to make fail-over with public IPs, use such dynamic routing protocols as BGP or OSPF together with VRRP). We have connections to two different Internet Service Providers (ISPs), and one of them is preferred (for example, it is cheaper or faster).

This example shows how to configure VRRP on the two routers shown on the diagram. The routers must have initial configuration: interfaces are enabled, each interface have appropriate IP address (note that each of the two interfaces should have an IP address), routing table is set correctly (it should have at least a default route). SRC-NAT or masquerading should also be configured before. See the respective manual chapters on how to make this configuration.

We will assume that the interface the 192.168.1.0/24 network is connected to is named **local** on both VRRP routers

Configuring Master VRRP router

First of all we should create a VRRP instance on this router. We will use the priority of 255 for this router as it should be preferred router.

```
[admin@MikroTik] ip vrrp> add interface=local priority=255
[admin@MikroTik] ip vrrp> print
Flags: X - disabled, I - invalid, M - master, B - backup
0    M name="vr1" interface=local vrid=1 priority=255 interval=1
      preemption-mode=yes authentication=none password="" on-backup=""
      on-master=""
```

```
[admin@MikroTik] ip vrrp>
```

Next the virtual IP address should be added to this VRRP instance

```
[admin@MikroTik] ip vrrp> address add address=192.168.1.1/24 \
\... virtual-router=vrl
[admin@MikroTik] ip vrrp> address print
Flags: X - disabled, A - active
# ADDRESS NETWORK BROADCAST INSTANCE INTERFACE
0 192.168.1.1/24 192.168.1.0 192.168.1.255 vrl default

[admin@MikroTik] ip vrrp>
```

Now this address should appear in **/ip address** list:

```
[admin@MikroTik] ip address> print
Flags: X - disabled, I - invalid, D - dynamic
# ADDRESS NETWORK BROADCAST INTERFACE
0 10.0.0.1/24 10.0.0.0 10.0.0.255 public
1 192.168.1.2/24 192.168.1.0 192.168.1.255 local
2 D 192.168.1.1/24 192.168.1.0 192.168.1.255 local

[admin@MikroTik] ip address>
```

Configuring Backup VRRP router

Now we will create VRRP instance with lower priority (we can use the default value of **100**), so this router will back up the preferred one:

```
[admin@MikroTik] ip vrrp> add interface=local
[admin@MikroTik] ip vrrp> print
Flags: X - disabled, I - invalid, M - master, B - backup
0 B name="vrl" interface=local vrid=1 priority=100 interval=1
preemption-mode=yes authentication=none password="" on-backup=""
on-master=""

[admin@MikroTik] ip vrrp>
```

Now we should add the same virtual address as was added to the master node:

```
[admin@MikroTik] ip vrrp> address add address=192.168.1.1/24 \
\... virtual-router=vrl
[admin@MikroTik] ip vrrp> address print
Flags: X - disabled, A - active
# ADDRESS NETWORK BROADCAST INSTANCE INTERFACE
0 192.168.1.1/24 192.168.1.0 192.168.1.255 vrl default

[admin@MikroTik] ip vrrp>
```

Note that this address will not appear in **/ip address** list:

```
[admin@MikroTik] ip address> print
Flags: X - disabled, I - invalid, D - dynamic
# ADDRESS NETWORK BROADCAST INTERFACE
0 10.1.0.1/24 10.0.0.0 10.0.0.255 public
1 192.168.1.3/24 192.168.1.0 192.168.1.255 local

[admin@MikroTik] ip address>
```

Testing fail over

Now, when we will disconnect the master router, the backup one will switch to the master state:

```
[admin@MikroTik] ip vrrp> print
Flags: X - disabled, I - invalid, M - master, B - backup
 0 M name="vr1" interface=local vrid=1 priority=100 interval=1
    preemption-mode=yes authentication=none password="" on-backup=""
    on-master=""

[admin@MikroTik] ip vrrp> /ip address print
Flags: X - disabled, I - invalid, D - dynamic
# ADDRESS NETWORK BROADCAST INTERFACE
0 10.1.0.1/24 10.0.0.0 10.0.0.255 public
1 192.168.1.3/24 192.168.1.0 192.168.1.255 local
2 D 192.168.1.1/24 192.168.1.0 192.168.1.255 local

[admin@MikroTik] ip vrrp>
```