

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: */interface vrrp*

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

Hardware usage: *Not significant*

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: */interface 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. Each VRRP instance is configured like a virtual interface that bound to a real interface (in a similar manner VLAN is). VRRP addresses are then put on the virtual VRRP interface normally. The VRRP master has **running** flag enabled, making the address (and the associated routes and other configuration) active. A backup instance is not 'running', so all the settings attached to that interface is inactive.

Property Description

arp (*disabled* | *enabled* | *proxy-arp* | *reply-only*; default: **enabled**) - Address Resolution Protocol

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

backup (*read-only: flag*) - whether the instance is in the backup state

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

mac-address (*MAC address*) - MAC address of the VRRP instance. According to the RFC, any VRRP instance should have its unique MAC address

master (*read-only: flag*) - whether the instance is in the master state

mtu (*integer*; default: **1500**) - Maximum Transmission Unit

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**.

Example

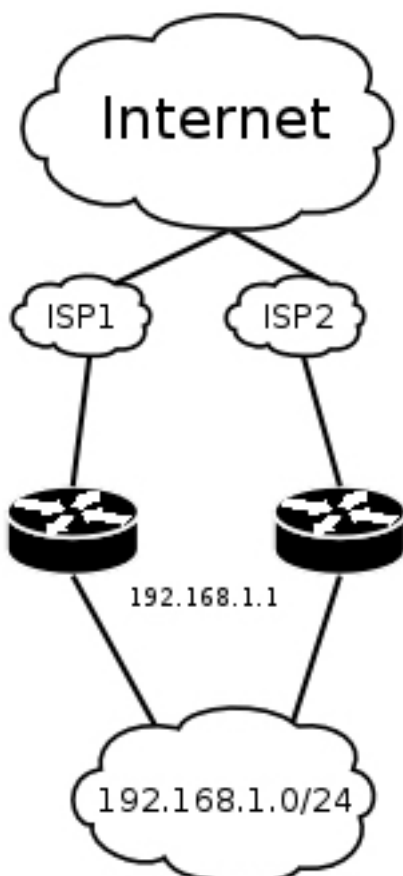
To add a VRRP instance on **ether1** interface, forming (because **priority** is **255**) a virtual router with **vrid** of **1**:

```
[admin@MikroTik] interface vrrp> add interface=ether1 vrid=1 priority=255
[admin@MikroTik] interface vrrp> print
Flags: X - disabled, I - invalid, R - running, M - master, B - backup
 0   RM name="vrrp1" mtu=1500 mac-address=00:00:5E:00:01:01 arp=enabled
     interface=ether1 vrid=1 priority=255 interval=1 preemption-mode=yes
     authentication=none password="" on-backup="" on-master=""
[admin@MikroTik] ip vrrp>
```

Note that the instance is active at once. This is because it has the priority of 255. The instance would wait in backup mode for a new master election process to complete in its favour before assuming the master role otherwise. This also means that there must not be other VRRP routers with the maximal priority

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] interface vrrp> add interface=local priority=255
[admin@MikroTik] interface vrrp> print
Flags: X - disabled, I - invalid, R - running, M - master, B - backup
0   RM name="vrrp1" mtu=1500 mac-address=00:00:5E:00:01:01 arp=enabled
    interface=local vrid=1 priority=255 interval=1 preemption-mode=yes
    authentication=none password="" on-backup="" on-master=""
[admin@MikroTik] interface vrrp>
```

Next the IP address should be added to this VRRP instance

```
[admin@MikroTik] ip address> add address=192.168.1.1/24 interface=vrrp1
[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   192.168.1.1/24    192.168.1.0     192.168.1.255   vrrp1
[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] interface vrrp> add interface=local
[admin@MikroTik] ip vrrp> print
Flags: X - disabled, I - invalid, R - running, M - master, B - backup
0   B name="vrrp1" mtu=1500 mac-address=00:00:5E:00:01:01 arp=enabled
    interface=local vrid=1 priority=100 interval=1 preemption-mode=yes
    authentication=none password="" on-backup="" on-master=""
[admin@MikroTik] interface vrrp>
```

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

```
[admin@MikroTik] ip address> add address=192.168.1.1/24 interface=vrrp1
```

Testing fail over

Now, when we will disconnect the master router, the backup one will switch to the master state after a few seconds:

```
[admin@MikroTik] interface vrrp> print
Flags: X - disabled, I - invalid, R - running, M - master, B - backup
0   RM name="vrrp1" mtu=1500 mac-address=00:00:5E:00:01:01 arp=enabled
    interface=local vrid=1 priority=100 interval=1 preemption-mode=yes
    authentication=none password="" on-backup="" on-master=""
[admin@MikroTik] interface vrrp>
```