Configuring VRRP with CLI

This section provides information to configure VRRP using the command line interface.

Topics in this section include:

VRRP Configuration Overview

Configuring VRRP policies and configuring VRRP instances on interfaces and router interfaces is optional. The basic owner and non-owner VRRP configurations on an IES or router interface must specify the **backup** *ip-address* parameter.

VRRP helps eliminate the single point of failure in a routed environment by using virtual router IP address shared between two or more routers connecting the common domain. VRRP provides dynamic fail over of the forwarding responsibility if the master becomes unavailable.

The VRRP implementation allows one master per IP subnet. All other VRRP instances in the same domain must be in backup mode.

Preconfiguration Requirements

VRRP policies:

- VRRP policies must be configured before they can be applied to an interface or IES or VPRN VRRP instance. VRRP policies are configured in the **config>vrrp** context.

Configuring VRRP on an IES or VPRN service interface:

- The service customer account must be created prior to configuring an IES or VPRN VRRP instance.
- The interface address must be specified in the both the owner and non-owner IES, VPRN or router interface instances.

Basic VRRP Configurations

Configure VRRP parameters in the following contexts:

VRRP Policy

Configuring and applying VRRP policies are optional. There are no default VRRP policies. Each policy must be explicitly defined. A VRRP configuration must include the following:

- Policy ID
- Define at least one of the following priority events:
  → Port down
  → LAG port down
  → Host unreachable
  → Route unknown

The following example displays a sample configuration of a VRRP policy.

```
A:SR2>config>vrrp>policy# info
----------------------------------------------
            delta-in-use-limit 50
            priority-event
                port-down 4/1/2
                    hold-set 43200
                    priority 100 delta
                exit
                port-down 4/1/3
                    priority 200 explicit
                exit
                lag-port-down 1
                    number-down 3
                        priority 50 explicit
                    exit
                exit
                host-unreachable 10.10.24.4
                    drop-count 25
                exit
                route-unknown 10.10.0.0/32
                  priority 50 delta
                  protocol bgp
                exit
            exit
----------------------------------------------
```

VRRP IES Service Parameters

VRRP parameters are configured within an IES service with two contexts, owner or non-owner. The status is specified when the VRRP configuration is created. When configured as owner, the virtual router instance owns the backup IP addresses. All other virtual router instances participating in this message domain must have the same **vrid** configured and cannot be configured as owner.

For IPv4, up to 4 virtual routers IDs (vrid) can be configured on an IES service interface. Each virtual router instance can manage up to 16 backup IP addresses. For IPv6, only one virtual router instance can be configured on an IES service interface.

VRRP parameters configured within an IES service must include the following:

- VRID
- Backup IP address(es)

The following example displays a sample configuration of a IES service owner and non-owner VRRP configurations.

```
A:SR2>config>service>ies# info
----------------------------------------------
        interface "tuesday" create
            address 10.10.36.2/24
            sap 7/1/1.2.2 create
            vrrp 19 owner
                backup 10.10.36.2
                authentication-key "testabc"
            exit
        exit
        interface "testing" create
            address 10.10.10.16/24
            sap 1/1/55:0 create
            vrrp 12
                backup 10.10.10.15
                policy 1
                authentication-key "testabc"
            exit
        exit
        no shutdown
----------------------------------------------
A:SR2>config>service>ies#
```

Configure VRRP for IPv6

The following output shows a VRRP for IPV6 configuration example. The interface must be configured first.

```
*A:nlt7750-3>config>router>router-advert# info
----------------------------------------------
            interface "DSC-101-Application"
                use-virtual-mac
                no shutdown
            exit
...
----------------------------------------------
*A:nlt7750-3>config>router>router-advert#


*A:nlt7750-3>config>service>ies# info
----------------------------------------------
            description "VLAN 921 for DSC-101 Application"
            interface "DSC-101-Application" create
                address 10.152.2.220/28
                vrrp 217
                    backup 10.152.2.222
                    priority 254
                    ping-reply
                exit
                ipv6
                    address FD10:D68F:1:221::FFFD/64
                    link-local-address FE80::D68F:1:221:FFFD preferred
                    vrrp 219
                        backup FE80::D68F:1:221:FFFF
                        priority 254
                        ping-reply
                    exit
                exit
                sap ccag-1.a:921 create
                    description "cross connect to VPLS 921"
                exit
            exit
            no shutdown
----------------------------------------------
*A:nlt7750-3>config>service>ies#
```

VRRP Router Interface Parameters

VRRP parameters are configured on a router interface with two contexts, owner or non-owner. The status is specified when the VRRP configuration is created. When configured as owner, the virtual router instance owns the backed up IP addresses. All other virtual router instances participating in this message domain must have the same vrid configured and cannot be configured as owner.

For IPv4, up to 4 virtual routers IDs (vrid) can be configured on a router interface. Each virtual router instance can manage up to 16 backup IP addresses. For IPv6, only one virtual router instance can be configured on a router interface.

VRRP parameters configured on a router interface must include the following:

- VRID
- Backup IP address(es)

The following example displays a sample configuration of a router interface owner and non-owner VRRP configurations.

```
A:SR4>config>router# info
#----------------------------------------
echo "IP Configuration "
#----------------------------------------
        interface "system"
            address 10.10.0.4/32
        exit
        interface "test1"
            address 10.10.14.1/24
            secondary 10.10.16.1/24
            secondary 10.10.17.1/24
            secondary 10.10.18.1/24
        exit
        interface "test2"
            address 10.10.10.23/24
            vrrp 1 owner
                backup 10.10.10.23
                authentication-key "testabc"
            exit
        exit
#----------------------------------------
A:SR4>config>router#
```

Common Configuration Tasks

This section provides a brief overview of the tasks that must be performed to configure VRRP and provides the CLI commands.

VRRP parameters are defined under a service interface or a router interface context. An IP address must be assigned to each IP interface. Only one IP address can be associated with an IP interface but several secondary IP addresses also be associated.

Owner and non-owner configurations must include the following parameters:

- All participating routers in a VRRP instance must be configured with the same *vrid*.
- All participating *non-owner* routers can specify up to 16 backup IP addresses (IP addresses the master is representing). The *owner* configuration must include at least one backup IP address.
- For IPv6, all participating routers must be configured with the same link-local backup address (the one configured for the owner instance.)

Other owner and non-owner configurations include the following optional commands:

- authentication-key
- MAC
- message-interval

In addition to the common parameters, the following *non-owner* commands can be configured:

- master-int-inherit
- priority
- policy
- ping-reply
- preempt
- telnet-reply
- ssh-reply (IPv4 only)
- [no] shutdown

Creating Interface Parameters

If you have multiple subnets configured on an Ethernet interface, you can configure VRRP on each subnet.

The following displays an IP interface configuration example:

```
A:SR1>config>router# info
#----------------------------------------
echo "IP Configuration "
#----------------------------------------
        interface "system"
            address 10.10.0.1/32
        exit
        interface "testA"
            address 123.123.123.123/24
        exit
        interface "testB"
            address 10.10.14.1/24
            secondary 10.10.16.1/24
            secondary 10.10.17.1/24
            secondary 10.10.18.1/24
        exit
        router-id 10.10.0.1
#----------------------------------------
A:SR1>config>router#
```

Configuring VRRP Policy Components

The following displays a VRRP policy configuration example:

```
A:SR1>config>vrrp# info
----------------------------------------------
        policy 1
            delta-in-use-limit 50
            priority-event
                port-down 1/1/2
                    hold-set 43200
                    priority 100 delta
                exit
                route-unknown 0.0.0.0/0
                    protocol isis
                exit
            exit
        exit
----------------------------------------------
A:SR1>config>vrrp#
```

Configuring Service VRRP Parameters

VRRP parameters can be configured on an interface in aservice to provide virtual default router support which allows traffic to be routed without relying on a single router in case of failure. VRRP can be configured the following ways:

- Non-Owner VRRP Example on page 338
- Owner Service VRRP on page 339

Non-Owner VRRP Example

The following displays a basic non-owner VRRP configuration example:

```
A:SR2>config>service>ies# info
---------------------------------------------
...
            interface "testing" create
                address 10.10.10.16/24
                sap 1/1/55:0 create
                vrrp 12
                    backup 10.10.10.15
                    policy 1
                    authentication-key "testabc"
                exit
            exit
            no shutdown
---------------------------------------------
A:SR2>config>service>ies#
```

Owner Service VRRP

The following displays the owner VRRP configuration example:

```
A:SR4>config>router# info
#----------------------------------------
echo "IP Configuration "
#----------------------------------------
...
        interface "test2"
            address 10.10.10.23/24
            vrrp 1 owner
                backup 10.10.10.23
                authentication-key "testabc"
            exit
        exit
#----------------------------------------
A:SR4>config>router#
```

Configuring Router Interface VRRP Parameters

VRRP parameters can be configured on an interface in an interface to provide virtual default router support which allows traffic to be routed without relying on a single router in case of failure.

VRRP can be configured the following ways:

- Router Interface VRRP Non-Owner on page 340

Router Interface VRRP Non-Owner

The following displays a non-owner interface VRRP configuration example:

```
A:SR2>config># info
#----------------------------------------
    interface "if-test"
            address 10.20.30.40/24
            secondary 10.10.50.1/24
            secondary 10.10.60.1/24
            secondary 10.10.70.1/24
            vrrp 1
                backup 10.10.50.2
                backup 10.10.60.2
                backup 10.10.70.2
                backup 10.20.30.41
                ping-reply
                telnet-reply
                authentication-key "testabc"
            exit
        exit
#----------------------------------------
A:SR2>config>#
```

Router Interface VRRP Owner

The following displays router interface owner VRRP configuration example:

```
A:SR2>config>router# info
#----------------------------------------
    interface "vrrpowner"
            address 10.10.10.23/24
            vrrp 1 owner
                backup 10.10.10.23
                authentication-key "testabc"
            exit
        exit
#----------------------------------------
A:SR2>config>router#
```

VRRP Configuration Management Tasks

This section discusses the following VRRP configuration management tasks:

Modifying a VRRP Policy

To access a specific VRRP policy, you must specify the policy ID. To display a list of VRRP policies, use the `show vrrp policy` command.

The following example displays the modified VRRP policy configuration:

```
A:SR2>config>vrrp>policy# info
----------------------------------------------
            delta-in-use-limit 50
            priority-event
                port-down 1/1/2
                    hold-set 43200
                    priority 100 delta
                exit
                port-down 1/1/3
                    priority 200 explicit
                exit
                host-unreachable 10.10.24.4
                    drop-count 25
                exit
            exit
----------------------------------------------
A:SR2>config>vrrp>policy#
```

Deleting a VRRP Policy

Policies are only applied to non-owner VRRP instances. A VRRP policy cannot be deleted if it is applied to an interface or to an IES service. Each instance in which the policy is applied must be deleted.

The `Applied` column in the following example displays whether or not the VRRP policies are applied to an entity.

```
A:SR2#
===============================================================================
VRRP Policies
===============================================================================
Policy   Current            Current     Current     Delta      Applied
Id       Priority & Effect  Explicit    Delta Sum   Limit
-------------------------------------------------------------------------------
1        200 Explicit       200         100         50         Yes
15       254                None        None        1          No
32       100                None        None        1          No
===============================================================================
A:SR2#
```

Modifying Service and Interface VRRP Parameters

Modifying Non-Owner Parameters

Once a VRRP instance is created as non-owner, it cannot be modified to the `owner` state. The `vrid` must be deleted and then recreated with the `owner` keyword to invoke IP address ownership.

Modifying Owner Parameters

Once a VRRP instance is created as `owner`, it cannot be modified to the non-owner state. The `vrid` must be deleted and then recreated *without* the `owner` keyword to remove IP address ownership.

Entering the `owner` keyword is optional when entering the `vrid` for modification purposes.

Deleting VRRP on an Interface or Service

The *vrid* does not need to be shutdown to remove the virtual router instance from an interface or service.

Example:
```
config>router#interface
config>router# interface if-test
config>router>if# shutdown
config>router>if# exit
config>router# no interface if-test
config>router#
```

The following example displays the command usage to delete a VRRP instance from an interface or IES service:

Example:
```
config>service#ies 10
config>service>ies# interface "test"
config>service>ies>if# vrrp 1
config>service>ies>if>vrrp# shutdown
config>service>ies>if>vrrp# exit
config>service>ies>if# no vrrp 1
config>service>ies>if# exit all
```