

Configure Service-Side VRRP on Cisco IOS XE Catalyst SD-WAN Edges

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Introduction

This document describes how to Configure Service-Side VRRP on Cisco IOS® XE Catalyst SD-WAN Edges via Feature Templates, Configuration Groups and CLI.

Prerequisites

Requirements

Cisco recommends that you have knowledge of these topics:

- Cisco Catalyst Software-Defined Wide Area Network (SD-WAN)
- Virtual Router Redundancy Protocol (VRRP) basic operation
- Manager Graphic User Interface (GUI)
- Configuration Groups

Components Used

- Cisco IOS® XE Catalyst SD-WAN Edges 17.9.4a
- Cisco Catalyst SD-WAN Manager 20.12.4

The information in this document was created from the devices in a specific lab environment. All of the devices used in this document started with a cleared (default) configuration. If your network is live, ensure that you understand the potential impact of any command.

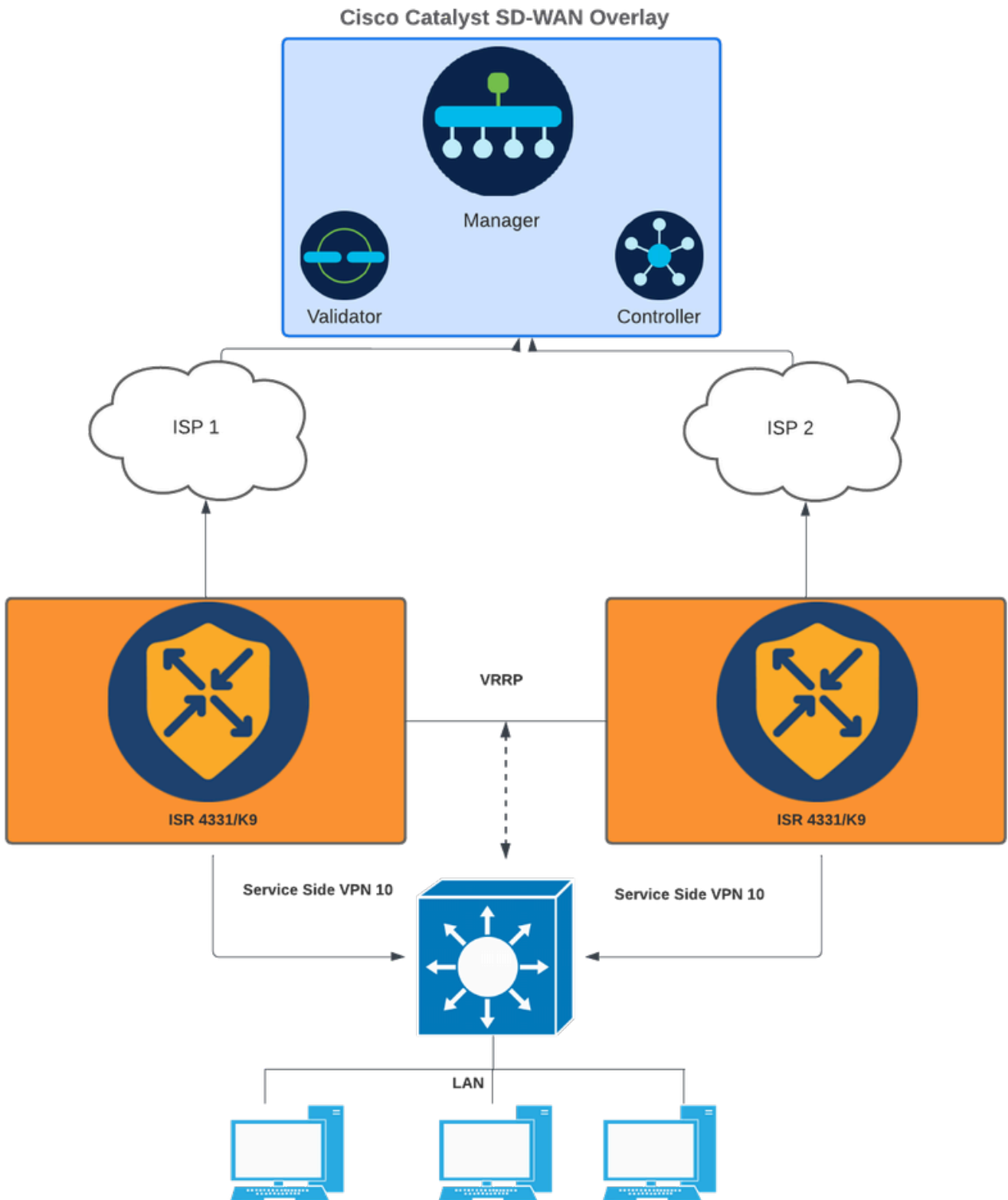
Background Information

The Virtual Router Redundancy Protocol (VRRP) is a LAN-side protocol that provides redundant gateway service for switches and other IP end stations. In the Cisco SD-WAN software, you configure VRRP on an interface, and typically on a subinterface, within a Virtual Private Network (VPN).

VRRP is only supported with service-side VPNs (VPN 0 and 512 do not support VRRP).

Configure

Network Diagram



Configurations

This can be achieved in three ways:

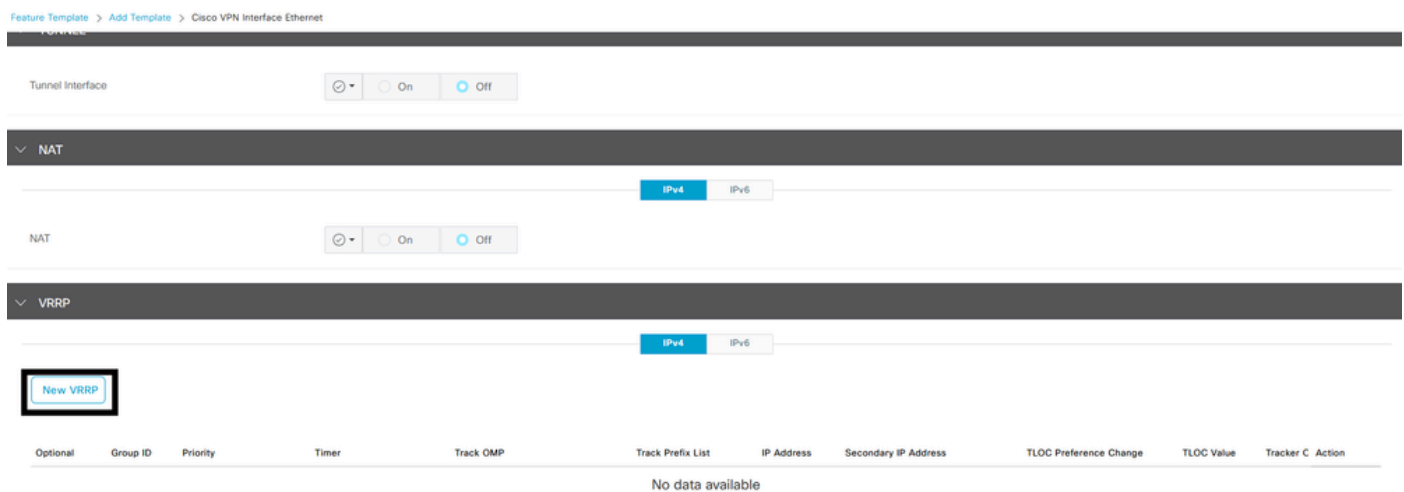
1 - Via Device Feature Templates:

In SD-WAN Manager, navigate to **Configuration > Templates > Feature templates**.

If there is already a feature template created for the service-side interface, search the template name and click **Edit**.

If no feature template was created for the service-side interface, click **Add template**, search for the **device model**, and select **Cisco VPN Interface Ethernet**.

Click **VRRP** tab and **New VRRP**.



VRRP Tab

Configure the VRRP parameters:

Group ID: Range 1 through 255.

Priority: Range: 1 through 254 . Priority level of the router. The router with the highest priority is elected as the primary VRRP router. If two routers have the same priority, the one with the higher IP address is elected as the primary VRRP router.


Timer (milliseconds): Range 100 through 40950 milliseconds. Specify how often the primary VRRP router sends VRRP advertisement messages. If subordinate routers miss three consecutive VRRP advertisements, they elect a new primary VRRP routers. It is recommended to use 1000ms as default value.

Track OMP (optional)

Track Prefix List (optional)

IP Address: Virtual IP Address that must be different that both router interfaces, but in the same subnet (local and peer).

 **Note:** When the timer is 100 ms for the VRRP feature template on Cisco IOS® XE Catalyst SD-WAN devices, the VRRP fails if the traffic is high on LAN interface. It is recommended to setup default

 timer 1000ms or higher.

Feature Template > Add Template > Cisco VPN Interface Ethernet

IPv4 IPv6

New VRRP

Mark as Optional Row 

Group ID	<input type="text" value="1"/>
Priority	<input type="text" value="200"/>
Timer (milliseconds)	<input type="text" value="1000"/>
Track OMP	<input type="radio"/> On <input checked="" type="radio"/> Off
Track Prefix List	<input type="text"/>
IP Address	<input type="text" value="192.168.23.1"/>
VRRP Secondary IP Address (Maximum: 4)	Add
TLOC Preference Change	<input type="radio"/> On <input checked="" type="radio"/> Off
Object Tracker	Add Tracking Object

Add Cancel

VRRP Configuration Example Primary Device

Click **Add** and then **Save**.

Proceed with the same process for the VRRP peer/standby (except for the VRRP priority, all the values must match).

Feature Template > Add Template > Cisco VPN Interface Ethernet

IPv4 IPv6

New VRRP

Mark as Optional Row 

Group ID	<input type="text" value="1"/>
Priority	<input type="text" value="150"/>
Timer (milliseconds)	<input type="text" value="1000"/>
Track OMP	<input type="radio"/> On <input checked="" type="radio"/> Off
Track Prefix List	<input type="text"/>
IP Address	<input type="text" value="192.168.23.1"/>
VRRP Secondary IP Address (Maximum: 4)	Add
TLOC Preference Change	<input type="radio"/> On <input checked="" type="radio"/> Off
Object Tracker	Add Tracking Object

Add Cancel

VRRP Configuration Example Standby Device

Add the VPN Interface Ethernet feature template to the device template under desired Service VPN, and click **Save**.

Screen to push changes to the device appears to complete the process.

CLI equivalent

Primary:

```
interface GigabitEthernet0/0/1
<snipped>
  vrf forwarding 10
  ip address 192.168.23.2 255.255.255.0
  no ip redirects
  ip mtu 1496
  vrrp 1 address-family ipv4
    timers advertise 1000
    priority 200
    vrrpv2
    address 192.168.23.1 primary
  exit-vrrp
arp timeout 1200
end
```

Standby:

```
interface GigabitEthernet0/0/1
<snipped>
  vrf forwarding 10
  ip address 192.168.23.3 255.255.255.0
  no ip redirects
  ip mtu 1496
  vrrp 1 address-family ipv4
    timers advertise 1000
    priority 150
    vrrpv2
    address 192.168.23.1 primary
  exit-vrrp
arp timeout 1200
end
```

2 - Via Configuration Groups:

Navigate to **Configuration > Configuration Groups**.

Navigate to the exist **Configuration Group**, and select **Edit**.

Navigate to **Service Profile** section, and look for the feature LAN interface.

The screenshot displays the Cisco Catalyst SD-WAN Configuration Groups interface. At the top, there is a navigation bar with the Cisco Catalyst SD-WAN logo and a 'Select Resource Group' dropdown. The main heading is 'Configuration - Configuration Groups'. Below this, there is a 'Go Back to Configuration Group list' link. The current configuration group is 'test_vrrp', with an 'Edit' link. A table shows the configuration details: DEVICE SOLUTION (sdwan), MODIFIED BY (Amalios), and LAST UPDATED (Nov 28, 2024 02:08:57). Below the table, there are two tabs: 'Feature Profiles' (selected) and 'Associated Devices'. Under 'Associated Profiles (3)', there are three entries: 'System Profile: test_vrrp_Basic', 'Transport & Management Profile: test_vrrp_WAN', and 'Service Profile: test_vrrp_LAN'. The 'Service Profile: test_vrrp_LAN' entry is highlighted with a black box.

Click **Edit Feature**.

Service Profile: test_vrrp_LAN Shared: 1 Groups Actions

Search Table

Add Feature

Type	Feature Name	Description	Sub-Feature	Actions
VPN	Local_Internet_for_Guests	LAN VPN	-	...
	VPN_Local_Internet_for_Guests_99_Interface	LAN Interface	-	...
Corporate_Users	Corporate_Users	LAN VPN	-	...
	VPN_Corporate_Users_10_Interface	LAN Interface	-	...
Payment_Processing_Network	Payment_Processing_Network	LAN VPN	-	...
	VPN_Payment_Processing_Network_12_Interface	LAN Interface	-	...
Physical_Security_Devices	Physical_Security_Devices	LAN VPN	-	...
	VPN_Physical_Security_Devices_13_Interface	LAN Interface	-	...

[View Details](#)
[Associate Sub Feature](#)
[Add Sub-Feature](#)
[Edit Feature](#)
[Delete Feature](#)

1 Record Items per page: 25 1 - 1 of 1 |< < > >|

Edit Feature Section

In the new tab, click **VRRP** section, and then **Add VRRP IPv4**.

Edit Ethernet Interface Feature

LAN / Service VPN / Ethernet Interface

Name: VPN_Corporate_Users_10_Interface Description: LAN Interface

Associated VPN: Corporate_Users

Basic Configuration NAT **VRRP** ARP ACL/QoS Advanced

IPv4 Settings

VRRP IPv4 (Maximum: 1)

Add VRRP IPv4

Group ID	Priority	Timer	Track OMP	IP Address	VRRP Secondary	Tloc Prefix Change	Tloc Prefix Change Value	Tracking	Action
There is no data.									

> IPv6 Settings

VRRP Section Configuration Groups

Configure the VRRP parameters:

Group ID: Range 1 through 255.


Priority: Range: 1 through 254 . Priority level of the router. The router with the highest priority is elected as the primary VRRP router. If two routers have the same priority, the one with the higher IP address is elected as the primary VRRP router.

Timer (milliseconds): Range 100 through 40950 milliseconds. Specify how often the primary VRRP router sends VRRP advertisement messages. If subordinate routers miss three consecutive VRRP advertisements, they elect a new primary VRRP routers. It is recommended to use 1000ms as default value.

Track OMP (optional)

Track Prefix List (optional)

IP Address: Virtual IP Address that must be different that both router interfaces, but in the same subnet (local and peer).

 **Note:** When the timer is 100 ms for the VRRP feature template on Cisco IOS XE Catalyst SD-WAN devices, the VRRP fails if the traffic is high on LAN interface. It is recommended to setup default timer 1000ms or higher.

Add VRRP IPv4



Group ID*



1

Priority*



200

Timer*



1000

Track OMP*



IP Address*



192.168.23.1

Tloc Prefix Change*



VRRP IP Address Secondary

[Add VRRP IP Address Secondary](#)

VRRP Tracking Object

[Add VRRP Tracking Object](#)

Cancel

Add

VRRP Configuration Example Primary

Then, click **Add** button.

Validate that configuration is added, and click **Save**.

Edit Ethernet Interface Feature



LAN / Service VPN / Ethernet Interface

Name* VPN_Corporate_Users_10_Interface Description LAN Interface

Associated VPN
Corporate_Users

Basic Configuration NAT **VRRP** ARP ACL/QoS Advanced

IPv4 Settings

VRRP IPv4 (1) (Maximum: 1)

Add VRRP IPv4

Group ID	Priority	Timer	Track OMP	IP Address	VRRP Secondary	Tloc Prefix Change	Tloc Prefix Change Value	Tracking	Action
1	200	1000	false	192.168.23.1		false			

> IPv6 Settings

Cancel

Save

Save VRRP Configuration

After that, deploy the changes in the Primary device.

Proceed with the same process for the VRRP peer/standby (except for the VRRP priority, all the values must match).

Add VRRP IPv4

Group ID* <input type="text" value="1"/>	Priority* <input type="text" value="150"/>
Timer* <input type="text" value="1000"/>	Track OMP* <input type="checkbox"/>
IP Address* <input type="text" value="192.168.23.1"/>	Tloc Prefix Change* <input type="checkbox"/>

- VRRP IP Address Secondary
[Add VRRP IP Address Secondary](#)
- VRRP Tracking Object
[Add VRRP Tracking Object](#)

Cancel

VRRP Configuration Example Standby

3 - Via CLI:

CLI Example configuration.

Primary

```
<#root>
```

```
Device#
```

```
config-transaction
```

```
Device (config)#
```

```
interface GigabitEthernet0/0/1
```

```
Device (config-if)#
```

```
vrrp 1 address-family ipv4
```

```
Device (config-if-vrrp)#
```

```
timers advertise 1000
```

```
Device (config-if-vrrp)#
```

```
priority 200
```

```
Device (config-if-vrrp)#
```

```
vrrpv2
```

```
Device (config-if-vrrp)#
```

```
address 192.168.23.1 primary
```

```
Device (config-if-vrrp)#
```

```
commit
```

Standby:

```
<#root>
```

```
Device#
```

```
config-transaction
```

```
Device (config)#
```

```
interface GigabitEthernet0/0/1
```

```
Device (config-if)#
```

```
vrrp 1 address-family ipv4
```

```
Device (config-if-vrrp)#
```

```
timers advertise 1000
```

```
Device (config-if-vrrp)#
```

```
priority 150
```

```
Device (config-if-vrrp)#
```

```
vrrpv2
```

```
Device (config-if-vrrp)#
```

```
address 192.168.23.1 primary
```

```
Device (config-if-vrrp)#
```

```
commit
```

Verify

```
<#root>
```

```
Device#
```

```
show vrrp all
```

```
Vlan10 - Group 1 - Address-Family IPv4
```

```
State is MASTER
```

```
State duration 2 hours 0 mins 49 secs
```

```
Virtual IP address is 192.168.23.1
```

```
Virtual MAC address is 0000.5E00.0164
```

```
Advertisement interval is 1000 msec
```

```
Preemption enabled
```

```
Priority is 200
```

```
Master Router is 192.168.23.2 (local), priority is 200
```

```
Master Advertisement interval is 1000 msec (expires in 256 msec)
```

```
Master Down interval is unknown
```

```
FLAGS: 1/1
```

```
<#root>
```

```
Device#
```

```
show vrrp detail
```

```
Vlan10 - Group 1 - Address-Family IPv4
```

```
State is MASTER
```

```
State duration 2 hours 0 mins 55 secs
```

```
Virtual IP address is 192.168.23.1
```

```
Virtual MAC address is 0000.5E00.0164
```

```
Advertisement interval is 1000 msec
```

```
Preemption enabled
```

```
Priority is 200
```

```
Master Router is 192.168.23.2 (local), priority is 200
```

```
Master Advertisement interval is 1000 msec (expires in 717 msec)
```

Master Down interval is unknown
FLAGS: 1/1
VRRPv3 Advertisements: sent 27392 (errors 0) - rcvd 1220
VRRPv2 Advertisements: sent 27392 (errors 0) - rcvd 4
Group Discarded Packets: 0
VRRPv2 incompatibility: 0
IP Address Owner conflicts: 0
Invalid address count: 0
IP address configuration mismatch : 0
Invalid Advert Interval: 0
Adverts received in Init state: 0
Invalid group other reason: 0
Group State transition:
Init to master: 1 (Last change Mon Nov 27 11:04:00.406)
Init to backup: 3 (Last change Mon Nov 27 15:29:29.265)
Backup to master: 5 (Last change Mon Nov 27 15:29:32.914)
Master to backup: 3 (Last change Mon Nov 27 10:38:15.722)
Master to init: 2 (Last change Mon Nov 27 15:25:12.248)
Backup to init: 1 (Last change Mon Nov 27 10:35:32.215)

<#root>

Device#

show vrrp internal

GroupId:100 AF:IPv4 Interface:Vlan10
ref_cnt:3 flags:0 vrrs_hdl:1
mac_programmed:1 vrrp_mcast_join_v4:1
if_ctx_:0x7F43DE017178
if_oper_state:1
system_ctx_:0x7F43DE029FA0

primary address: 192.168.23.1

operational:1 is_active:1 match_addr:1 compatv2:1

shutdown:0 cfg_shutdown:0 priority:200 cfg_priority:200

state_ctx_:0x7F43DE02A040
hybernation:0 preempt:enabled state_time:2 hours 0 mins 59 secs
preempt_delay:0 secs master_priority:0
ready_to_preempt:90 master_reason:0
timer_ctx_:0x7F43DE02A0B8
master_down_timer:0 msec use_learned_timer:0
master_adv_interval:1000 cfg_adv_interval:1000 master_down_interval:0
comms_ctx_:0x7F43DE02A0F8
v2rtr_valid:1 listen:1
track_ctx_:0x7F43DE02A178
track_count:0 decrement:0 force_shutdown:0

<#root>

Device#

show vrrp statistics

VRRP Global Statistics:

Dropped Packets : 0

VRRP Statistics for Vlan10

Header Discarded Packets: 0

Invalid TTL/Hop Limit: 0

Invalid Checksum: 0

Invalid Version: 0

Invalid Msg Type: 0

Invalid length/Incomplete packet: 0

Invalid group no: 0

Invalid packet other reason: 0

VRRP Statistics for Vlan10 - Group 1 - Address-Family IPv4

State is MASTER

State duration 2 hours 1 mins 3 secs

VRRPv3 Advertisements: sent 27401 (errors 0) - rcvd 1220

VRRPv2 Advertisements: sent 27401 (errors 0) - rcvd 4

Group Discarded Packets: 0

VRRPv2 incompatibility: 0

IP Address Owner conflicts: 0

Invalid address count: 0

IP address configuration mismatch : 0

Invalid Advert Interval: 0

Adverts received in Init state: 0

Invalid group other reason: 0

Group State transition:

Init to master: 1 (Last change Mon Nov 27 11:04:00.406)

Init to backup: 3 (Last change Mon Nov 27 15:29:29.265)

Backup to master: 5 (Last change Mon Nov 27 15:29:32.914)

Master to backup: 3 (Last change Mon Nov 27 10:38:15.722)

Master to init: 2 (Last change Mon Nov 27 15:25:12.248)

Backup to init: 1 (Last change Mon Nov 27 10:35:32.215)

Useful debugs:

<#root>

debug vrrp all detail

<#root>

debug vrrp error

<#root>

debug vrrp packet

<#root>

debug vrrp process

<#root>

debug vrrp state