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| Image result for cisco backgroun |
| Gateway Load Balancing Protocol (GLBP)Derek Liu |
| Periods 0,3,4  Mr. Mason & Mr. Hansen  CCNP Lab 6 |

**Implementing GLBP (2 routers)***Derek Liu*

Purpose

This lab was done as a recognition of the importance of redundancy. Protocol such as GLBP are helpful in cases when a route goes down and another route is used it place of it while it is getting fixed.

Background Information

While we only configured routers, typically considered a layer 3 device, GLBP or gateway load balancing protocol is a layer 2 protocol. The protocol helps support redundancy in network and also allows for load balancing. Redundancy is especially important in networks because it provides backup systems and alternative paths for network packets to continue to traverse a network in the case any part of a complex network fails. This means that even if one part of the network fails, end users won’t be significantly affected and can continue to access the network.

Redundancy is achieved by having multiple routers share a single virtual IP address and network packets are distributed evenly among these routers (this can be confirmed with a traceroute). This virtual IP address is used as the default gateway for end devices. In the case of a route failing, the AVG or active virtual gateway continues to provide networking connectivity. If the AVG fails, the router with the second highest priority will be designated the AVG (default is 100 and must be manually changed). However, if multiple routers have the same priority, the router with the IP address of the greatest value will be designated the AVG.

GLBP can be used in conjunction with layer 3 routing protocols such as OSPF, BGP, and EIGRP to provide load balancing across networks.

Other redundancy protocols exist with different capabilities such as hot standby router protocol (HSRP), virtual router redundancy protocol (VRRP), multiple spanning tree protocol (MSTP), link aggregation control protocol (LACP), and equal cost multi-path routing protocol (ECMP).

Lab Summary

In this lab, we set up a small network consisting of two routers, two switches, and two end devices. The goal of the lab was to set up a topology that could support and run GLBP. GLBP functionality was confirmed by sending a continuous ping from pc0 to pc1 and then physically detaching one of the interface connected to the AVG. In the case that GLBP is functioning properly, the pings should request timeout and then reconnect shortly.

Lab Commands

**(bolded comments are not part of the commands used and are just comments)**

glbp 1 ip 10.0.0.254 **set ip address of virtual gateway.**

glbp 1 priority 120 **set priority of the route**

glbp 1 preempt **ensure most capable router is AVG.**

Network Diagrams with IP

Diagram

Description automatically generated

Configurations

***Pings (ipv4):***

C:\Users\user>ping 10.0.0.1

Pinging 10.0.0.1 with 32 bytes of data:

Reply from 10.0.0.1: bytes=32 time<1ms TTL=255

Reply from 10.0.0.1: bytes=32 time<1ms TTL=255

Reply from 10.0.0.1: bytes=32 time<1ms TTL=255

Reply from 10.0.0.1: bytes=32 time<1ms TTL=255

Ping statistics for 10.0.0.1:

Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),

Approximate round trip times in milli-seconds:

Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\Users\user>ping 10.0.0.2

Pinging 10.0.0.2 with 32 bytes of data:

Reply from 10.0.0.2: bytes=32 time<1ms TTL=255

Reply from 10.0.0.2: bytes=32 time<1ms TTL=255

Reply from 10.0.0.2: bytes=32 time<1ms TTL=255

Reply from 10.0.0.2: bytes=32 time<1ms TTL=255

Ping statistics for 10.0.0.2:

Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),

Approximate round trip times in milli-seconds:

Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\Users\user>ping 10.0.0.254

Pinging 10.0.0.254 with 32 bytes of data:

Reply from 10.0.0.254: bytes=32 time<1ms TTL=255

Reply from 10.0.0.254: bytes=32 time<1ms TTL=255

Reply from 10.0.0.254: bytes=32 time<1ms TTL=255

Reply from 10.0.0.254: bytes=32 time<1ms TTL=255

Ping statistics for 10.0.0.254:

Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),

Approximate round trip times in milli-seconds:

Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\Users\user>ping 10.0.1.254

Pinging 10.0.1.254 with 32 bytes of data:

Reply from 10.0.1.254: bytes=32 time<1ms TTL=255

Reply from 10.0.1.254: bytes=32 time<1ms TTL=255

Reply from 10.0.1.254: bytes=32 time<1ms TTL=255

Reply from 10.0.1.254: bytes=32 time=1ms TTL=255

Ping statistics for 10.0.1.254:

Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),

Approximate round trip times in milli-seconds:

Minimum = 0ms, Maximum = 1ms, Average = 0ms

C:\Users\user>ping 10.0.1.1

Pinging 10.0.1.1 with 32 bytes of data:

Reply from 10.0.1.1: bytes=32 time<1ms TTL=255

Reply from 10.0.1.1: bytes=32 time<1ms TTL=255

Reply from 10.0.1.1: bytes=32 time<1ms TTL=255

Reply from 10.0.1.1: bytes=32 time<1ms TTL=255

Ping statistics for 10.0.1.1:

Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),

Approximate round trip times in milli-seconds:

Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\Users\user>ping 10.0.1.2

Pinging 10.0.1.2 with 32 bytes of data:

Reply from 10.0.1.2: bytes=32 time<1ms TTL=255

Reply from 10.0.1.2: bytes=32 time<1ms TTL=255

Reply from 10.0.1.2: bytes=32 time<1ms TTL=255

Reply from 10.0.1.2: bytes=32 time<1ms TTL=255

Ping statistics for 10.0.1.2:

Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),

Approximate round trip times in milli-seconds:

Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\Users\user>ping 10.0.1.10

Pinging 10.0.1.10 with 32 bytes of data:

Reply from 10.0.1.10: bytes=32 time<1ms TTL=127

Reply from 10.0.1.10: bytes=32 time<1ms TTL=127

Reply from 10.0.1.10: bytes=32 time<1ms TTL=127

Reply from 10.0.1.10: bytes=32 time<1ms TTL=127

Ping statistics for 10.0.1.10:

Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),

Approximate round trip times in milli-seconds:

Minimum = 0ms, Maximum = 0ms, Average = 0ms

***Ip routes:***

GLBP Active:

R1#show glbp active

GigabitEthernet0/0/0 - Group 2

State is Active

1 state change, last state change 00:05:53

Virtual IP address is 10.0.1.254

Hello time 3 sec, hold time 10 sec

Next hello sent in 2.432 secs

Redirect time 600 sec, forwarder time-out 14400 sec

Preemption enabled, min delay 0 sec

Active is local

Standby is 10.0.1.2, priority 120 (expires in 8.000 sec)

Priority 150 (configured)

Weighting 100 (default 100), thresholds: lower 1, upper 100

Load balancing: round-robin

Group members:

00f8.2c7f.7190 (10.0.1.2)

b4a8.b947.8e40 (10.0.1.1) local

There are 2 forwarders (1 active)

Forwarder 1

State is Active

1 state change, last state change 00:05:41

MAC address is 0007.b400.0201 (default)

Owner ID is b4a8.b947.8e40

Redirection enabled

Preemption enabled, min delay 30 sec

Active is local, weighting 100

Arp replies sent: 5

Forwarder 2

State is Listen

MAC address is 0007.b400.0202 (learnt)

Owner ID is 00f8.2c7f.7190

Redirection enabled, 598.016 sec remaining (maximum 600 sec)

Time to live: 14398.016 sec (maximum 14400 sec)

Preemption enabled, min delay 30 sec

Active is 10.0.1.2 (primary), weighting 100 (expires in 9.056 sec)

Arp replies sent: 3

GLBP standby:

R1#show glbp standby

GigabitEthernet0/0/1 - Group 1

State is Standby

1 state change, last state change 00:10:42

Virtual IP address is 10.0.0.254

Hello time 3 sec, hold time 10 sec

Next hello sent in 0.864 secs

Redirect time 600 sec, forwarder time-out 14400 sec

Preemption enabled, min delay 0 sec

Active is 10.0.0.2, priority 120 (expires in 9.088 sec)

Standby is local

Priority 120 (configured)

Weighting 100 (default 100), thresholds: lower 1, upper 100

Load balancing: round-robin

Group members:

00f8.2c7f.7191 (10.0.0.2)

b4a8.b947.8e41 (10.0.0.1) local

There are 2 forwarders (1 active)

Forwarder 1

State is Listen

MAC address is 0007.b400.0101 (learnt)

Owner ID is 00f8.2c7f.7191

Time to live: 14397.728 sec (maximum 14400 sec)

Preemption enabled, min delay 30 sec

Active is 10.0.0.2 (primary), weighting 100 (expires in 9.696 sec)

Forwarder 2

State is Active

1 state change, last state change 00:10:45

MAC address is 0007.b400.0102 (default)

Owner ID is b4a8.b947.8e41

Preemption enabled, min delay 30 sec

Active is local, weighting 100

R1:

10.0.0.0/8 is variably subnetted, 4 subnets, 2 masks

C 10.0.0.0/24 is directly connected, GigabitEthernet0/0/1

L 10.0.0.1/32 is directly connected, GigabitEthernet0/0/1

C 10.0.1.0/24 is directly connected, GigabitEthernet0/0/0

L 10.0.1.1/32 is directly connected, GigabitEthernet0/0/0

R2:

10.0.0.0/8 is variably subnetted, 4 subnets, 2 masks

C 10.0.0.0/24 is directly connected, GigabitEthernet0/0/1

L 10.0.0.2/32 is directly connected, GigabitEthernet0/0/1

C 10.0.1.0/24 is directly connected, GigabitEthernet0/0/0

L 10.0.1.2/32 is directly connected, GigabitEthernet0/0/0

***Router 1 Config:***

hostname R1

boot-start-marker

boot-end-marker

vrf definition Mgmt-intf

address-family ipv4

exit-address-family

address-family ipv6

exit-address-family

no aaa new-model

subscriber templating

multilink bundle-name authenticated

license udi pid ISR4321/K9 sn FDO214421CF

spanning-tree extend system-id

redundancy

mode none

vlan internal allocation policy ascending

interface GigabitEthernet0/0/0

ip address 10.0.1.1 255.255.255.0

negotiation auto

glbp 2 ip 10.0.1.254

glbp 2 priority 150

glbp 2 preempt

interface GigabitEthernet0/0/1

ip address 10.0.0.1 255.255.255.0

negotiation auto

glbp 1 ip 10.0.0.254

glbp 1 priority 120

glbp 1 preempt

interface Serial0/1/0

no ip address

!

interface Serial0/1/1

no ip address

interface GigabitEthernet0

vrf forwarding Mgmt-intf

no ip address

negotiation auto

interface Vlan1

no ip address

ip forward-protocol nd

no ip http server

no ip http secure-server

ip tftp source-interface GigabitEthernet0

control-plane

line con 0

stopbits 1

line aux 0

stopbits 1

line vty 0 4

login

end

***Router 2 Config:***

hostname R2

boot-start-marker

boot-end-marker

vrf definition Mgmt-intf

address-family ipv4

exit-address-family

address-family ipv6

exit-address-family

no aaa new-model

subscriber templating

multilink bundle-name authenticated

license udi pid ISR4321/K9 sn FDO211216BL

spanning-tree extend system-id

redundancy

mode none

vlan internal allocation policy ascending

interface GigabitEthernet0/0/0

ip address 10.0.1.2 255.255.255.0

negotiation auto

glbp 2 ip 10.0.1.254

glbp 2 priority 120

glbp 2 preempt

interface GigabitEthernet0/0/1

ip address 10.0.0.2 255.255.255.0

negotiation auto

glbp 1 ip 10.0.0.254

glbp 1 priority 120

glbp 1 preempt

interface Serial0/1/0

no ip address

interface Serial0/1/1

no ip address

interface GigabitEthernet0

vrf forwarding Mgmt-intf

no ip address

negotiation auto

interface Vlan1

no ip address

ip forward-protocol nd

no ip http server

no ip http secure-server

ip tftp source-interface GigabitEthernet0

control-plane

line con 0

stopbits 1

line aux 0

stopbits 1

line vty 0 4

login

end

Problems

No problems. Designed the topology, set it up on a rack, and got it working within 20 minutes.

Conclusion

While the lab was short and not very complex, the importance of redundancy especially when working with network administration is significant. This lab explores the usage of GLBP, but other redundancy protocol exists and can be implemented based on the context of the topology and network at hand. We didn’t run into any problems in setting up GLBP in this small network since the configurations were very straightforward. I do not believe this takes away from the lab since being able to establish redundancy shouldn’t be complex.