



CISCO CATALYST 6500 SERIES SWITCH MEDIA ACCESS CONTROL ADDRESSES & IP REDUNDANCY

INTERNET TECHNOLOGIES DIVISION

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First Hop Redundancy Protocols

- **Hot Standby Routing Protocol (HSRP), Gateway Load Balancing Protocol (GLBP), and Virtual Router Redundancy Protocol (VRRP)**
- **Provides virtual Media Access Control (MAC) and IP addresses that are shared amongst a group of configured routers/switches**
- **When an active device fails, the Standby assumes control of the associated group MAC and IP addresses, so traffic forwarding continues without the knowledge of the end station**
- **For HSRP and VRRP, when ‘n’ gateways are in use, there are n+1 IP and MAC addresses assigned**
- **HSRP pair will reserve vMACs such as 0000.0c07.acXX, where XX = HSRP group number (in hex, 0-255)**
- **VRRP pair will reserve vMACs such as 0000.5e00.01nn, where nn = virtual router id (in hex, 1-255)**
- **HSRP supports “use-bia” – burned in address (VRRP and GLBP don’t)**
- **GLBP reserves 4 vMACs such as 0007.b4yy.yyyy**

yy.yyyy = 24 bits = 6 zero bits, 10 bits that correspond to the GLBP group number, and 8 bits that correspond to the virtual forwarder number

HSRPv2 versus HSRPv1

- **Group numbers were previously restricted to 0-255 – Now extended to allow HSRP group numbers 0-4095**
 - New MAC address range will be used, 0000.0C9F.Fyyy, where yyy = 000-FFF (0-4095)
- **Previously used the 'allrouters' multicast address (224.0.0.2) – Now uses 224.0.0.102 (assigned to HSRP by the IANA)**
- **Millisecond timer values are now advertised and learned by peers**
- **New HSRP version 2 protocol packet format - completely TLV based**
- **Allows for future support of IPv6**
- **HSRP version 2 packet format includes a 6-byte identifier field that is used to uniquely identify the sender of the message**
 - Typically, this field is populated with the interface MAC address
 - Improves troubleshooting network loops and configuration errors
- **A new command will allow changing of the HSRP version on a per-interface level**
 - standby version [1 | 2]
 - HSRP version 2 will not interoperate with HSRP version 1
 - However, different versions can be run on different physical interfaces of the same router
- **First available in 12.3(4)T, coming in 12.2(RLS6)S (Cascades)**
- **Additional information:**
 - www.cisco.com/univercd/cc/td/doc/product/software/ios123/123newft/123t/123t_4/gthsrpv2.htm

Cisco Catalyst 6500 Series HSRP Group Limits

- Policy Feature Card 1 (PFC1) has a S/W limit of 256 unique HSRP groups
- Policy Feature Card 2 (PFC2)-equipped Supervisor Engine (Sup II) has a 16 unique HSRP group ID limit
 - This is due to the hardware design and is not S/W specific
- PFC3-equipped Supervisor Engine (Sup720) have a 256 unique HSRP group ID limit (S/W today) – Limit lifted with intro of HSRP Version 2

Supervisor Engine	Description	Max No. of Unique HSRP Group IDs (system wide)
WS-X6K-SUP1A-MSFC=	Supervisor Engine 1 with PFC1 and MSFC1	256
WS-X6K-S1A-MSFC2=	Supervisor Engine 1 with PFC1 and MSFC2	256
WS-X6K-S2-MSFC2=	Supervisor Engine 2 with PFC2 and MSFC2	16
WS-X6K-S2U-MSFC2=	Supervisor Engine 2 with PFC2 and MSFC2 (with additional DRAM memory)	16
WS-SUP720†	Supervisor Engine 720 with PFC3 and MSFC3	256

†- Includes all Sup720 models

Cisco Catalyst 6500 Series MSFC2 HSRP Details

- **Groups are re-usable**
 - Can use 16 unique group IDs on as many interfaces as necessary**
 - Limit of 16 HSRP groups per interface – usually not an issue**
 - They do share the same HSRP virtual MAC address – ok with per-VLAN MAC address tables**
- **HSRP group IDs do not have to be contiguous**
 - You can pick any 16 group IDs in the allowed group ID range**
 - 0-255 for HSRPv1, 0-4095 for HSRPv2**

Cisco Catalyst 6500 Series / Cisco 7600 Series GLBP Specifics

- **GLBP “reserves” 4 MAC filter entries**
The number of forwarders in the group is limited to 4*
Active Virtual Gateway will ‘allocate’ these to GLBP group members (Virtual Forwarders)
- **There is a restriction on GLBP group number for the MSFC2/PFC2 – Only a single group may be defined**
- **The single group may be reused on all VLAN**
- **GLBP is supported in:**

IOS Release	Switching Product	Group/Forwarder Limits
12.2(17d)SXA and later	C6500 SUP720/MSFC3	1024 / 4
12.2(17d)SXB and later	C6500 SUP2/MSFC2, C7600 SUP2/MSFC2	1 / 4

*** note: 1024 group limit is an arbitrary cap, the protocol design actually allows for 4096; as is the forwarder limit of 4 – the design could allow for up to 16. However, we haven’t seen customer requirements for more.**

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