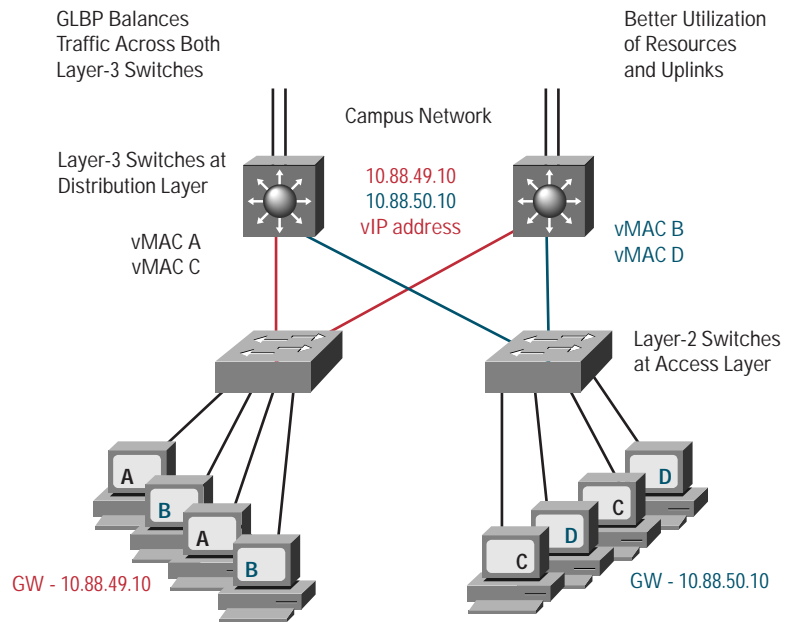


Gateway Load Balancing Protocol

IP redundancy is a key component of high availability strategy for any network, and a critical component in delivering reliable data, voice, and video integration. Its objective is to protect against first-hop router failure when a source host cannot dynamically learn the IP address of an alternate first-hop router.

Existing solutions for first-hop redundancy require extra configuration to efficiently use networking resources and bandwidth. Gateway Load Balancing Protocol (GLBP) provides transparent failover at the first-hop IP router, while optimizing resource usage, and minimizing configuration.

Figure 1
 GLBP in a Campus Network





Benefits

GLBP delivers improvements that include the following:

- *First-Hop Redundancy*
GLBP allows traffic from a single common subnet to go through multiple redundant gateways while using a single virtual IP address. It provides the same level of first-hop failure recovery capability as provided by Hot Standby Routing Protocol (HSRP) and Virtual Router Redundancy Protocol (VRRP).

- *Reduced administrative burden*
It is possible to achieve similar performance without GLBP, but that requires supporting multiple client gateway configurations. GLBP eliminates the need to create multiple VLANs or manually divide clients for multiple gateway IP address assignment. With GLBP, all clients on a subnet can be mapped to a single VLAN and a single IP subnet in a wiring closet.

- *Reduced costs*
GLBP does not require a standby router on a dedicated data link, so enterprises no longer incur regular monthly costs for an unused backup data link or the one-time cost for the extra backup router.

This ability to utilize multiple upstream available paths has a direct impact on the return on the investment of network resources. By increasing usable bandwidth, resources are used more efficiently: file transfer times are lowered and productivity is increased.

- *Efficient resource utilization*
GLBP makes it possible for any router in a group to serve as a backup. This eliminates the need for a dedicated backup router since all available routers can support network traffic.

GLBP provides upstream load-sharing by utilizing the redundant up-links simultaneously. It uses link capacity efficiently, thus providing peak-load traffic coverage. By making use of multiple available paths upstream from the routers or Layer 3 switches running GLBP, output queues may also be reduced.

Only a single path is used with HSRP or VRRP, while others are idle, unless multiple groups and gateways are configured. The single path may encounter higher output queue rates during peak times, which leads to lower performance from higher jitter rates. The impact of jitter is lessened and overall performance is increased, because more upstream bandwidth is available and additional upstream paths are used.

GLBP Features

- *Fast Failover*—GLBP failover occurs immediately after the failure in a gateway is detected. Like HSRP, end stations and applications continue as if no failure has occurred.
- *Simple Configuration*—Basic configuration of the protocol is very simple. Configuration is similar to that of HSRP, since many customers are already familiar with it.
- *Low Overhead*—The protocol uses minimal processor and bandwidth resources.
- *Authentication and Security*—The protocol initially implements a very simple authentication scheme. An 8-character string carried in every packet is compared with a configured value, and only packets that match are accepted. MD5 authentication is planned for a future release.



- *Extensibility*—The protocol was designed to be very extensible due to the packet encoding. This allows for future extensions and enables retroactive compatibility with older releases of Cisco IOS Software releases.
- *Flexibility*—Several load-balancing algorithms are available for different network configurations and customer requirements.
- *Multi-device redundancy*—GLBP allows the traffic for a virtual address to be distributed over as many as four devices. If one of the devices fails, the load from that device is automatically shifted to one of the remaining devices.
- *Load Balancing Modes*—Three types of load balancing methods can be configured:
 - *Weighted Load Balancing Algorithm*
The amount of load directed to an Active Virtual Forwarder is dependant upon the weighting value advertised by the gateway containing that Active Virtual Forwarder.
 - *Host Dependant Load Balancing Algorithm*
A host is guaranteed to use the same virtual MAC address as long as that virtual MAC address is participating in the GLBP group
 - *Round Robin Load Balancing Algorithm*
Each Virtual Forwarder MAC address takes turns being included in address resolution replies for the virtual IP address.
- *GLBP Tracking*—GLBP uses Cisco IOS Enhanced Object Tracking, a new software feature. The HSRP interface-tracking feature has been widely deployed and permits the standby router to take over in the event of a failed WAN connection (line-protocol “down”), an event more likely than a router failure.

GLBP with Enhanced Object Tracking allows tracking of objects beyond interface tracking. Table 1 summarizes objects available for tracking. Additional objects for tracking are being considered.

Table 1 Interface Tracking Objects

Object Type	Object Parameter	Description
Interface (or sub-interface)	Line-protocol, IP routing,	Interface line-protocol is backward compatible with HSRP. Other options extend the function to track the IP routing state,
IP Route	Reachability, metric value, metric threshold	For IP route reachability: If the route exists and the metric is accessible, then the state is “up”. IP routing protocol metrics are scaled into a range from 0 to 255. This scaling factor is configurable. For example, the default resolution for EIGRP is 2560. Therefore, a change in the metric of 2560 will correspond to a change of 1 in the scaled range. The following protocol metrics may be tracked: connected, static, RIP, IGRP, EIGRP, OSPF, and ISIS.

Platforms and Availability

GLBP is supported on the following hardware platforms:

- Cisco 2600 Series Routers
- Cisco 3620 Router
- Cisco 3640 Router
- Cisco 7200 Series Routers
- Cisco 7500 Series Router
- Cisco C6MSFC

Cisco IOS Software is packaged in feature sets that support specific platforms. To get updated information regarding platform support for this feature, please visit Cisco Feature Navigator at:

<http://www.cisco.com/go/fn>

This application dynamically updates the list of supported platforms as new platform support is added for the feature.

Summary

Cisco IOS Software contains many features specifically designed to make the network more resilient and, therefore, increase the availability of access to the applications important to your business. GLBP provides an easy to configure, first-hop, Layer 3 redundancy service which shares the network load over multiple devices and upstream paths. The result is better performance, lower administrative costs, and higher return on your network investment.



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