

DLSw Version 2 (RFC 2166) Questions and Answers

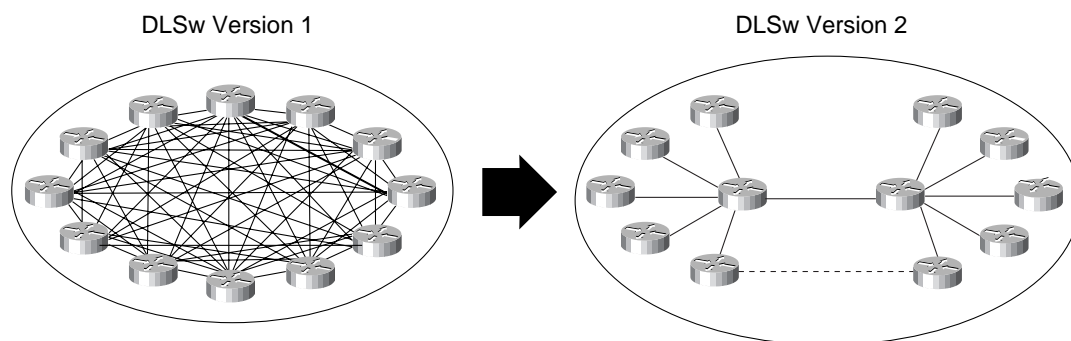
Q. What are the key functions in the DLSw Version 2 (RFC 2166) standard?

A. DLSw Version 2 added enhancements over the DLSw Version 1 (RFC 1795) standard to address scalability for fully meshed networks (networks requiring branch-to-branch connectivity). In the Version 1 standard, full mesh connectivity required all peers to have configured peer connections to every other peer. Every broadcast search to locate destination SNA or NetBIOS resources resulted in an explorer frame being transmitted to every other peer. In a fully meshed network of 50 sites, a single branch router required 49 peer connections. Hence, each explorer had to be replicated 49 times and sent over the same link 49 times!

Several enhancements in the Version 2 standard address this problem, as illustrated in Figure D-1. These enhancements are:

- A multicast technique to ensure that each broadcast results in only a single explorer over every link
- DLSw peer-on-demand, which allows explorers to be forwarded to routers without requiring remote peer connections to be configured in advance
- UDP unicast, which eliminates TCP retransmission of explorers and UI frames that may occur during periods of congestion, ensuring that steady-state data traffic has as much bandwidth as possible

Figure D-1 Comparison of DLSw Version 1 and Version 2



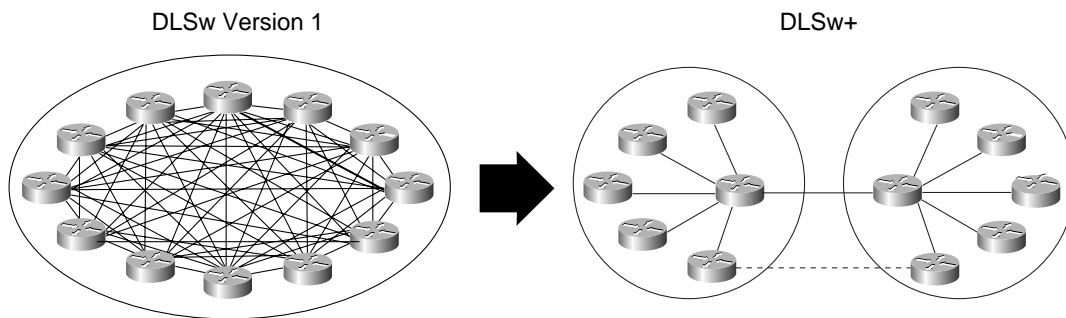
Q. The DLSw Version 2 enhancements sound a great deal like some of the plus features of Cisco DLSw+. What are the differences?

A. The Version 2 standard addresses the same problems addressed by some of the plus features (in fact, the AIW scalability work group that resulted in DLSw Version 2 began after Cisco presented the DLSw plus features to the AIW committee).

DLSw+ border peer functionality, shown in Figure D-2, addresses these problems in the following ways:

- DLSw+ uses peer groups and border peers to ensure that each broadcast results in only a single explorer over every link. The DLSw+ border peer function does not require running an IP multicast protocol as is the case with Version 2.
- DLSw+ allows explorers to be forwarded to routers without requiring a peer connection in advance. Upon finding a resource off a particular peer, DLSw+ supports the peer-on-demand feature, which allows two peers to dynamically establish peer connections without any prior configuration.

Figure D-2 Comparison of DLSw Version 1 and DLSw+



Q. In which Cisco IOS release did Cisco implement support for the Version 2 standard?

A. DLSw Version 2 is supported in Cisco IOS Release 11.3 and higher.

Q. Does Cisco DLSw+ support UDP unicast?

A. Cisco supports UDP unicast in DLSw+ and DLSw Version 2.

Q. Does Cisco DLSw+ support IP multicast?

A. The IP multicast function defined in the DLSw+ Version 2 standard (and supported by Cisco Version 2 support) provides functionality similar to the Cisco border peer and peer-on-demand functionality. However, multicast cannot be used in conjunction with DLSw+ border peer caching. The DLSw multicast feature should only be enabled in a Cisco router if Version 2 interoperability between Cisco and non-Cisco DLSw routers is required (and the non-Cisco routers support DLSw Version 2).

Q. Can a DLSw+ router interoperate with another router that supports the DLSw Version 2 standard?

A. Cisco support for the DLSw Version 2 standard is fully RFC 2166 compliant as specified by AIW. The only purpose for Cisco DLSw Version 2 support is to allow Cisco routers to interoperate with other non-Cisco routers that are fully compliant with the DLSw RFC standards only (1795 and 2166). Cisco DLSw+ should always be used when there are Cisco routers on both ends of a DLSw peer connection.



Q. What are the advantages of using DLSw+ now that an enhanced DLSw RFC-compliant standard is available that addresses scalability issues?

A. DLSw+ has offered a number of features that were additions to the base Version 1 RFC standard for a considerable period of time now. These features included not only border peers and peer-on-demand capabilities, but also load balancing, backup peers, dynamic peers, SNA DDR, and support for CiscoWorks Blue Maps and SNA View.

Border peer caching minimizes broadcasts by having border peers cache entries for NetBIOS servers and SNA resources. In this way, when a resource has been found on behalf of one branch router, all subsequent branch requests for that resource are forwarded directly to the correct router, greatly reducing broadcast traffic for frequently accessed resources. By contrast, the Version 2 standard does not include this feature and instead forwards every single explorer to all sites every time a different branch router needs to find a resource. The Version 2 standard uses a multicast technique to ensure that each search results in a single explorer request over *every* link. The DLSw+ enhancement takes advantage of the border peer cache to ensure that only the first search request results in an explorer over every link. Each subsequent search results in a single explorer request over a *single* link.

DLSw+ also supports UDP unicast, a feature adopted by Cisco DLSw+ from the Version 2 standard that allows non-data traffic to be transported in unicast UDP frames instead of TCP frames. During periods of congestion, explorer and UI frames would selectively be dropped rather than data frames (DLSw Version 1 retransmitted all frame types including explorer and UI frames, aggravating congestion situations). UDP unicast minimized the impact of explorers and UI frames on mission-critical data traffic.

SNA COS to IP ToS mapping with DLSw+ can prioritize (using various Cisco queuing algorithms such as custom and weighted fair queuing) between SNA and NetBIOS, or within SNA by LOCADDR or by MAC or SAP pair (known as SAP prioritization) when transporting SNA traffic over a DLSw+ backbone. In the case of routers running Cisco SNASw and DLSw+ combined, APPN COS transmission priority is mapped to IP precedence bits automatically without requiring any router configuration.

SDLC to LLC2 for PU 4/5 allows PU 4/5 devices to connect over DLSw+ even if one is connected over SDLC. This is key in SNA Network Interconnect (SNI) environments that are being migrated to a CIP at one end but still require a FEP at the other end for SNI (PU 4/5 to PU 5 connection).

DLSw+ backup peer support provides the capability for one DLSw+ peer to be configured as a backup for another peer. When the primary peer becomes unavailable, the backup automatically takes over (after three failed keepalive attempts). Fallback to the primary can also be enabled to occur automatically (configuration commands provide control over when fallback occurs).

MIB enhancements enable the plus features of DLSw+ to be managed using the CiscoWorks Blue products, Maps and SNA View. In addition, new traps included in DLSw+ alert network management stations of peer or circuit failures.

Q. Why is the multicast feature of the DLSw Version 2 standard not turned on by default in Cisco routers?

A. The Version 2 standard still has a scalability limit that Cisco addresses optimally with DLSw+ border peer caching. With the DLSw Version 2 multicast technique, if 200 branch routers need to access the same server or SNA device, there will be 200 multicasts (IP multicast explorers). DLSw+ border peers support caching, so that only the first request from the first branch router is broadcast. Subsequent searches from different routers are unicast to the correct router. Furthermore, most SNA customers do not implement IP multicast, because the current scalability technique (DLSw+ border peers) does not require multicast to eliminate unnecessary broadcast duplication.

