

The Need for Data Center Interconnect

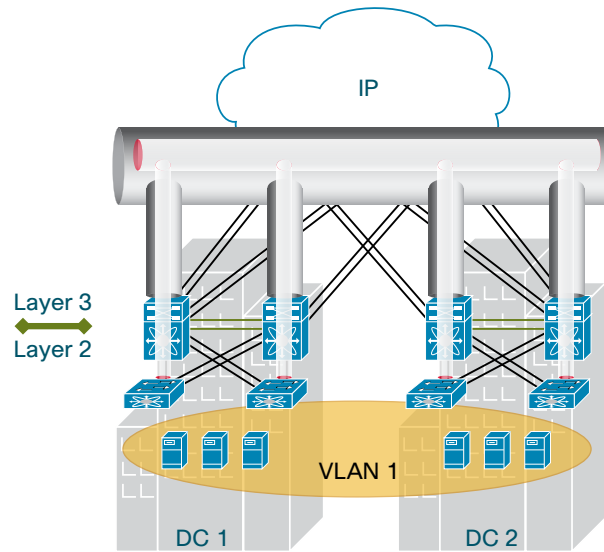
In today's data-centric world, data centers have become the core of businesses and organizations everywhere. Server virtualization and clustering solutions are helping customers achieve increased business agility, resiliency, and efficiency in the data center. As customers deploy multiple geographically disparate data centers, they are looking for simplified network solutions to extend virtualization and cluster domains beyond a single data center to enable transparent workload mobility between data centers, get the most from compute resources across all data centers, and help ensure business continuity by geographically distributing applications and resources.

Introducing Overlay Transport Virtualization

A critical network design requirement for deployment of distributed virtualization and cluster technologies is having all servers in the same Layer 2 VLAN. Meeting this requirement means extending VLANs over Layer 3 networks, but current solutions introduce operational and resiliency challenges.

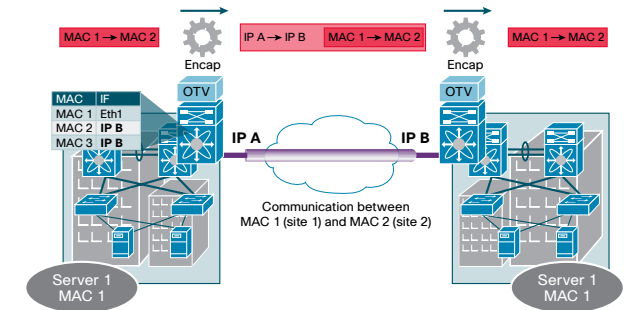
To address these challenges, Cisco has developed a new data center interconnect (DCI) solution, Cisco® Overlay Transport Virtualization (OTV), on our preeminent data center switches, the Cisco Nexus® 7000 Series Switches. OTV is a new industry solution, providing customers with an innovative yet simple means of extending Layer 2 networks over Layer 3 networks for both intra- and inter-data center applications without the operational complexities of existing interconnect solutions (Figure 1).

Figure 1 OTV: Transparent Workload Mobility Across Any Data Center Anywhere



OTV can be thought of as MAC-address routing, in which destinations are MAC addresses, and next hops are IP addresses. OTV simply maps MAC address destinations to IP next hops that are reachable through the network cloud. Traffic destined for a particular MAC address is encapsulated in IP and carried through the IP cloud to its MAC-address routing next hop. The rich information in the MAC-address routing protocol enables Layer 2 connectivity over Layer 3 networks based on MAC-address destinations while still preserving most of the scalability, resiliency, multipathing, and failure-isolation characteristics of a Layer 3 connection (Figure 2).

Figure 2 How OTV Works



Main OTV Benefits

- No effect on existing network design: OTV is IP encapsulated and can therefore use any core capable of forwarding IP traffic. Implementing OTV does not require new or complex protocols or a network redesign; it simply overlays over the existing network.
- Simplified operations: Single-touch configuration simplifies addition and removal of sites. To add a new data center to the OTV overlay, simply configure the edge device at the new data center, and it automatically establishes OTV connectivity to all other data centers in the overlay domain. No configuration is required in the data center that is already part of the OTV domain.
- Single protocol with no add-ons: No complex add-ons are required to establish multihoming, loop prevention, load balancing, or multipathing. All these critical yet complex functions are designed into OTV and are automatically activated in the background when OTV is configured.



- Failure isolation and site independence: OTV does not rely on traffic flooding to propagate reachability information for MAC addresses. Flooding of unknown traffic is suppressed by OTV. Address Resolution Protocol (ARP) traffic is forwarded only in a controlled manner, and broadcasts can be forwarded based on specific policies. Spanning tree Bridge Protocol Data Units (BPDUs) are not forwarded. The result is failure containment: failure in one data center does not propagate to other data centers.
- Optimal bandwidth utilization resiliency and scalability: OTV increases the utilization of all available bandwidth between data centers. It automatically uses multihoming and any multipathing that is available in the network core. Typically, to enable such load balancing, networks have to be configured with loop detection and suppression mechanisms. With OTV, all necessary mechanisms are built in and automatically activated; no additional configuration is required.
- Scalability: Since OTV does not create nailed up tunnels, the only state maintained is that of a MAC address routing table. As in any packet switched model, no hard state is maintained, significantly increasing scalability over existing DCI solutions.

Why Cisco?

Cisco offers innovative products and solutions together with a broad range of services programs to accelerate customer success, delivered through a combination of people, processes, tools, and partners, resulting in high levels of customer satisfaction. Cisco continues to lead the industry with innovative new solutions and technologies like OTV that are the product of years of experience. With OTV, Cisco is introducing next-generation technology that will shape the new standards of the future.