

Extending Ethernet's Capabilities in the Data Center

Cisco® Data Center Ethernet is an architecture based on a collection of open standard Ethernet extensions to improve and expand Ethernet networking and management capabilities in the data center. It helps ensure delivery over lossless fabrics, I/O consolidation onto a unified fabric, and increased bisectional bandwidth with multipathing at Layer 2. Each element of the Cisco Data Center Ethernet architecture enriches Cisco Data Center 3.0 and creates a robust Ethernet infrastructure to meet data center requirements now and in the future. Table 1 highlights the components of the Cisco Data Center Ethernet architecture.

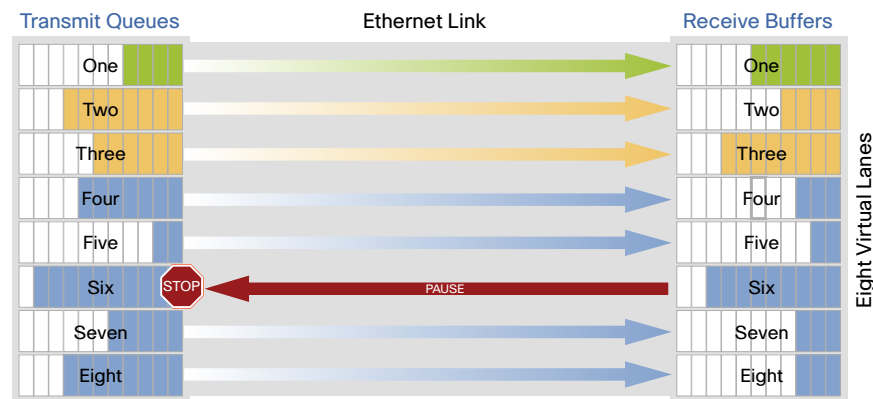
Table 1. Cisco Data Center Ethernet Features and Benefits

Feature	Benefit
Priority-based Flow Control (PFC)	Provides capability to manage bursty, single traffic source on a multi-protocol link
Enhanced Transmission Selection (ETS)	Enables bandwidth management between traffic types for multiprotocol links
Data Center Bridging Exchange (DCBX) Protocol	Allows autoexchange of Ethernet parameters between switches and endpoints
Congestion Notification	Addresses the problem of sustained congestion by moving corrective action to the network edge
Layer 2 Multipathing (L2MP)	Utilizes full bisectional bandwidth of Layer 2 topologies
Lossless Service	Helps ensure guaranteed delivery service for applications that require it

Priority-based Flow Control

Priority-based Flow Control (PFC) enables Pause based on user priorities or classes of service. A physical link divided into eight virtual links (Figure 1) with PFC provides the capability to use Pause on a single virtual link without affecting traffic on the other virtual links. Enabling Pause on a per-user-priority basis allows administrators to create lossless links for traffic requiring no-drop service, such as Fibre Channel over Ethernet (FCoE), while retaining packet-drop congestion management for IP traffic.

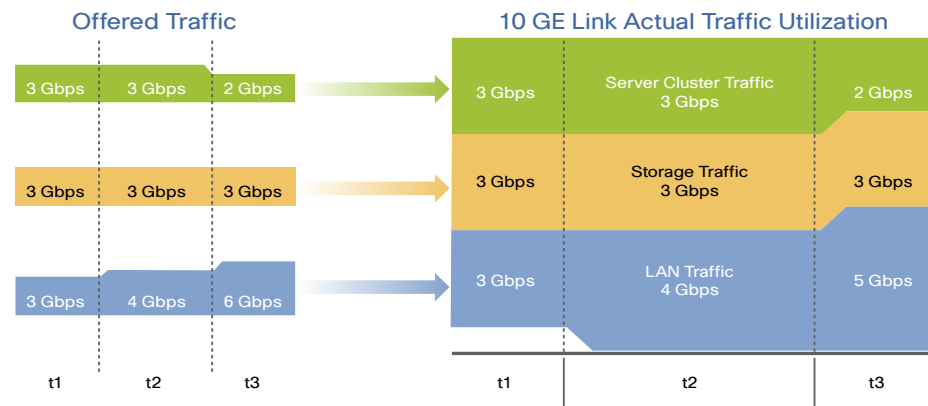
Figure 1. Priority-based Flow Control



Enhanced Transmission Selection

Enhanced Transmission Selection (ETS) enables optimal bandwidth management of virtual links. Figure 2 illustrates 10 Gigabit Ethernet traffic utilization of three traffic classes with different priorities. Each class is assigned a specified bandwidth percentage. In time slot t3, the LAN traffic can use the spare bandwidth available.

Figure 2. Enhanced Transmission Selection



Unified I/O

Data Center Ethernet supports the concept of running multiple traffic types (LAN, SAN, Server Cluster traffic, etc.) on a single network while preserving respective traffic treatments. A consolidated I/O link, or unified I/O, can deliver multiprotocol traffic to a unified fabric on a single cable. Cisco Unified Fabric is a single, multipurpose Ethernet transport that can transmit LAN and SAN traffic across a common interface and switch fabric, preserving differentiated classes of service.

Data Center Bridging Exchange Protocol

Data Center Bridging Exchange (DCBX) Protocol allows autoexchange of Ethernet parameters and discovery functions between switches and endpoints (Figure 3). DCBX capabilities include:

- Data Center Ethernet peer discovery
- Mismatched configuration detection
- Data Center Ethernet link configuration of peers

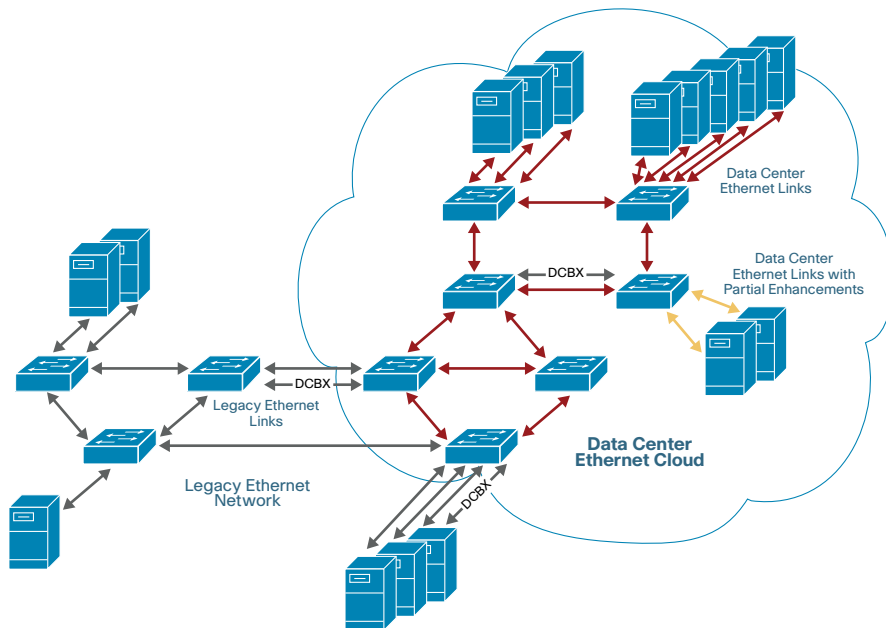


Figure 3. DCBX

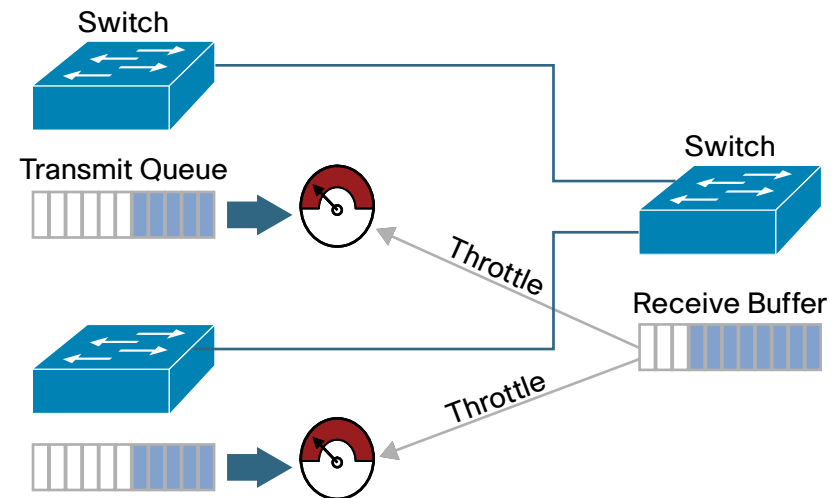
Layer 2 Multipathing

Layer 2 Multipathing is an Ethernet enhancement that increases bisectional bandwidth by enabling multiple parallel paths between nodes and load balancing traffic where alternative paths exist.

Congestion Notification

Congestion Notification is a Layer 2 traffic management system that pushes congestion to the edge of the network by notifying rate limiters to shape the traffic causing congestion. This approach maintains the integrity of the network's core and affects only the parts of the network causing the congestion.

Figure 4. Congestion Notification



Fibre Channel over Ethernet

Fibre Channel over Ethernet (FCoE) transports native Fibre Channel frames over Ethernet with existing Fibre Channel management modes intact. A prerequisite for FCoE is a lossless underlying network fabric. FCoE benefits from several of the Cisco Data Center Ethernet extensions to manage congestion, handle bursts of traffic, and support multiple flows on the same cable to achieve unified I/O.

For More Information

Cisco Data Center Ethernet: <http://www.cisco.com/go/dce>.