

Tag Switching:

Empowering the Era of the Internet and Intranets

The ever-increasing pervasiveness of the Internet and corporate intranets in the global marketplace has transformed the way the world does business. This paradigm shift defines new requirements for any business that wants to gain a competitive edge. Network infrastructures must evolve to effectively handle Internet and intranet growth and enable advanced revenue-generating and cost-saving network services.

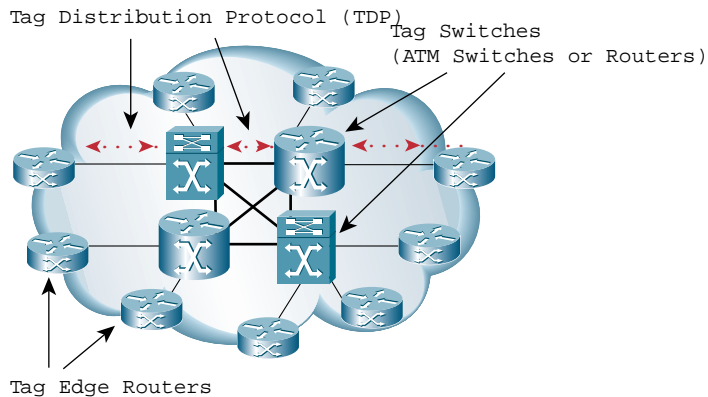
While Internet traffic and the number of users are growing rapidly, IT budgets are increasing only by modest proportions. Internet service providers (ISPs) and enterprises are challenged to scale the performance of their existing network infrastructures with minimal budgets. Tag Switching from Cisco Systems delivers scalability to enhance network capacity and performance while protecting your network investments.



Tag Switching: Evolving Your Network

Cisco IOS™ Tag Switching, a new technology from Cisco Systems, is the ideal solution to meet these challenges. Tag Switching fuses the intelligence of routing with the performance of switching to scale existing networks to meet future growth demands. With this technology, networks can handle more traffic, users, media-rich data, or bandwidth-intensive applications. This approach also means that ISPs and large enterprise networks can enjoy more benefits from the performance of Asynchronous Transfer Mode (ATM) switches like the Cisco StrataCom® BPX® and the LightStream® 1010 to provide Internet and ATM/Frame Relay services on the same platform.

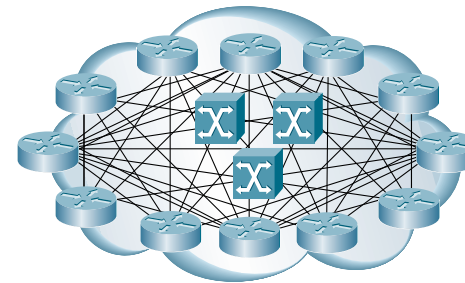
Tag Switching Overview



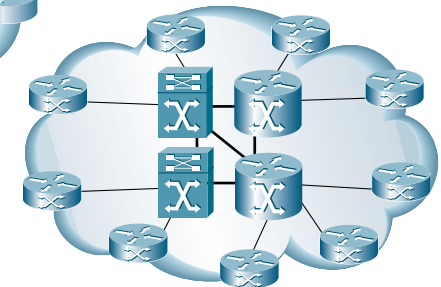
A Tag Switching Internetwork

By “tagging” the first packet in a flow of data, subsequent packets of related data are expedited to the final destination. Request times and router processing are both minimized. Tag Switching uses a form of label swapping across packet or cell-based networks that involves three solution elements:

Without Tag Switching



With Tag Switching

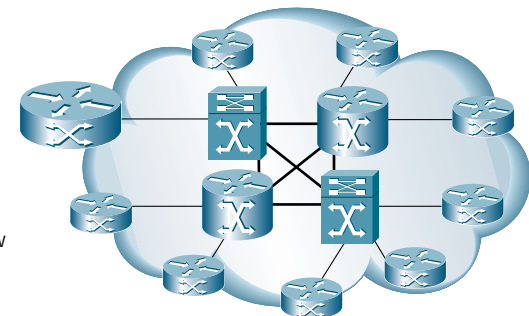


- **Tag edge routers:** Located at the boundaries of a network, edge routers perform network layer services and apply tags to packets. Traffic from multiple sources going to the same destination can share tags, avoiding the label explosion problem of current IP switching implementations.

Tag Edge Router

Tag Bindings

- Per destination prefix
 - Multiple address ranges per tag
 - Specified paths for traffic engineering
- Per QoS class
- Per source/destination flow

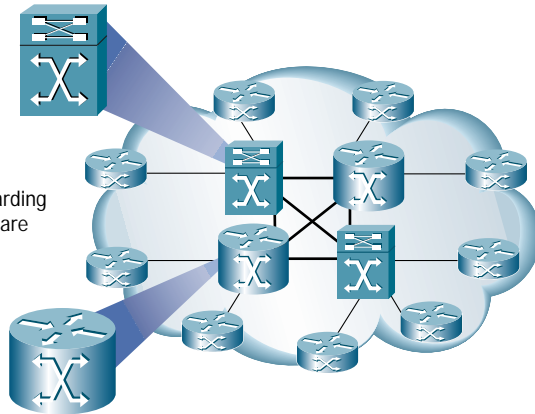


- **Tag switches:** The ATM switches or routers within the network can switch tagged packets based on the tags. These network elements can also support full Layer 3 routing or Layer 2 switching in addition to Tag Switching.

Tag Switches

Switching on Tags

- Simplified lookup on tag
- Tag label swap on forwarding
- Switching done in software or hardware

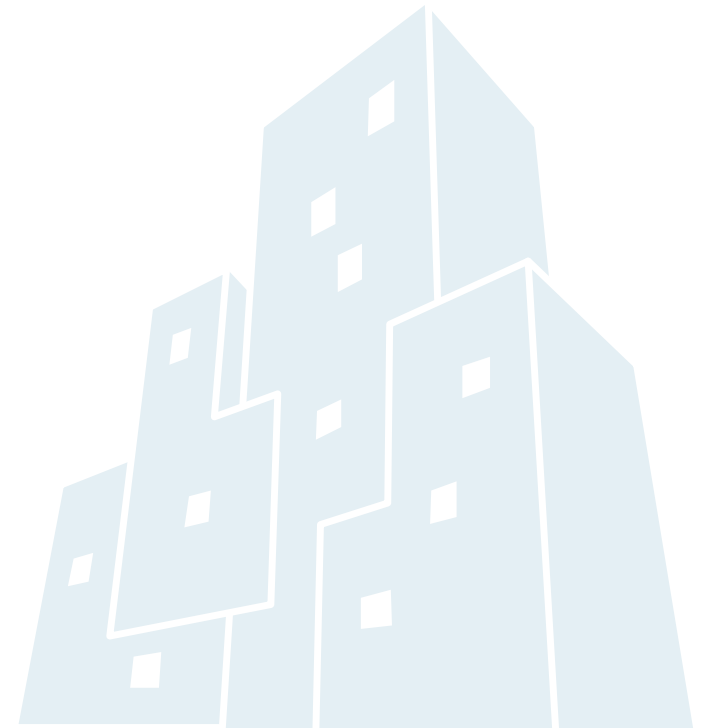


Software-Only Upgrade Expands Service Options

A Cisco IOS software upgrade gains you many Tag Switching benefits. Tag Switching enables enhanced network services such as QoS. Network managers can use QoS as a powerful tool for distinguishing different levels of service among a single user base. By assigning tags to unique services, specialized levels of service can be extended from the Internet into an enterprise network, creating a “Business Class” Internet.

- **Tag Distribution Protocol (TDP):** Coexisting with standard network-layer protocols including routing protocols, TDP distributes tag information between devices in a Tag Switching network. Because TDP decouples tag distribution from the data flows, Tag Switching can be used over a wide variety of media including ATM links, Packet-over-SONET (POS) links, Ethernet, Gigabit Ethernet, and others.

The tagging algorithms used by the tag edge routers provide great flexibility for network managers. Packets can be tagged for a specific destination or tagged to flow along specified routes for balancing loads on network routes. This traditional Layer 2 service can now be implemented on Layer 3 routers using Tag Switching. A third tagging alternative takes advantage of Tag Switching's ability to analyze source, destination, and other Layer 3 information. This fine-grain processing introduces the ability to control quality of service (QoS) for a specific source/destination flow of packets.



For Service Providers

Today, ISPs struggle to scale existing backbone infrastructures for the future and deliver differentiated network services to save costs and generate new revenue streams. ISPs also want to be able to charge premium rates that many customers will pay for special capabilities or levels of service. ISPs can gain competitive advantages from the cost-saving and revenue-generating features of Tag Switching. Tag Switching lets ISPs:

- Seamlessly deliver IP-based network services over high-performance ATM
- Offer differentiated network services, such as QoS, and to subsequently develop and offer a price model for services
- Scale existing network infrastructures to meet future growth requirements
- Protect existing equipment investments with a Cisco IOS software-only upgrade

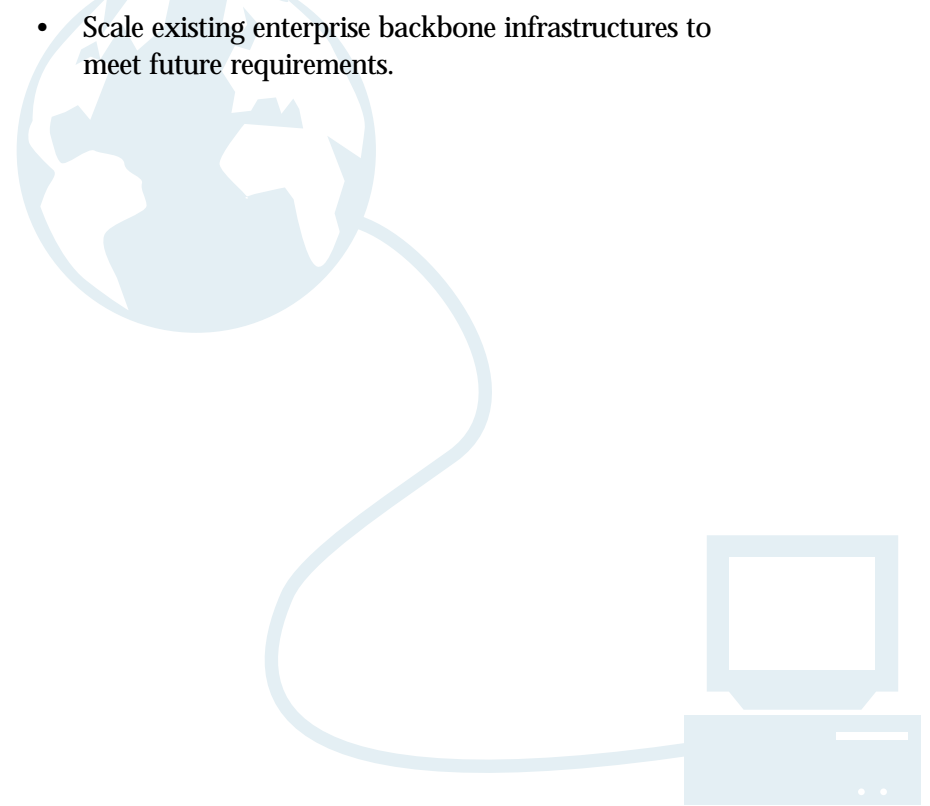
Tag Switching also complements the emerging solutions for accounting and gathering network usage statistics, and it can coexist with security controls for access and resource management. ISPs can deliver true end-to-end services. The software-only upgrade makes Tag Switching easy to deploy and shortens the time to market for the new services that it is inspiring.



For the Enterprise

Large, enterprise backbones immediately benefit from the increased capacity and traffic management provided by Tag Switching. Networks can carry more traffic more efficiently, becoming a competitive asset for the organization. Enterprises can also exploit Tag Switching for their switched router or router backbones to:

- Provide advanced QoS features that ensure network priority for mission-critical traffic
- Seamlessly integrate voice and data networks under one high-speed infrastructure
- Extend Tag-enabled ISP network services to the enterprise
- Optimally use costly WAN bandwidth, providing a more cost-effective environment
- Scale existing enterprise backbone infrastructures to meet future requirements.



Leading the Industry

The worldwide leader in networking for the Internet, Cisco Systems introduces Tag Switching based on proven industry experience. To maximize the effectiveness of Tag Switching, Cisco is committed to the standardization of the architecture. Tag Switching specifications have already been submitted to the IETF for standardization. Please refer to <http://www.cisco.com/tag> for more details on standardization efforts.

