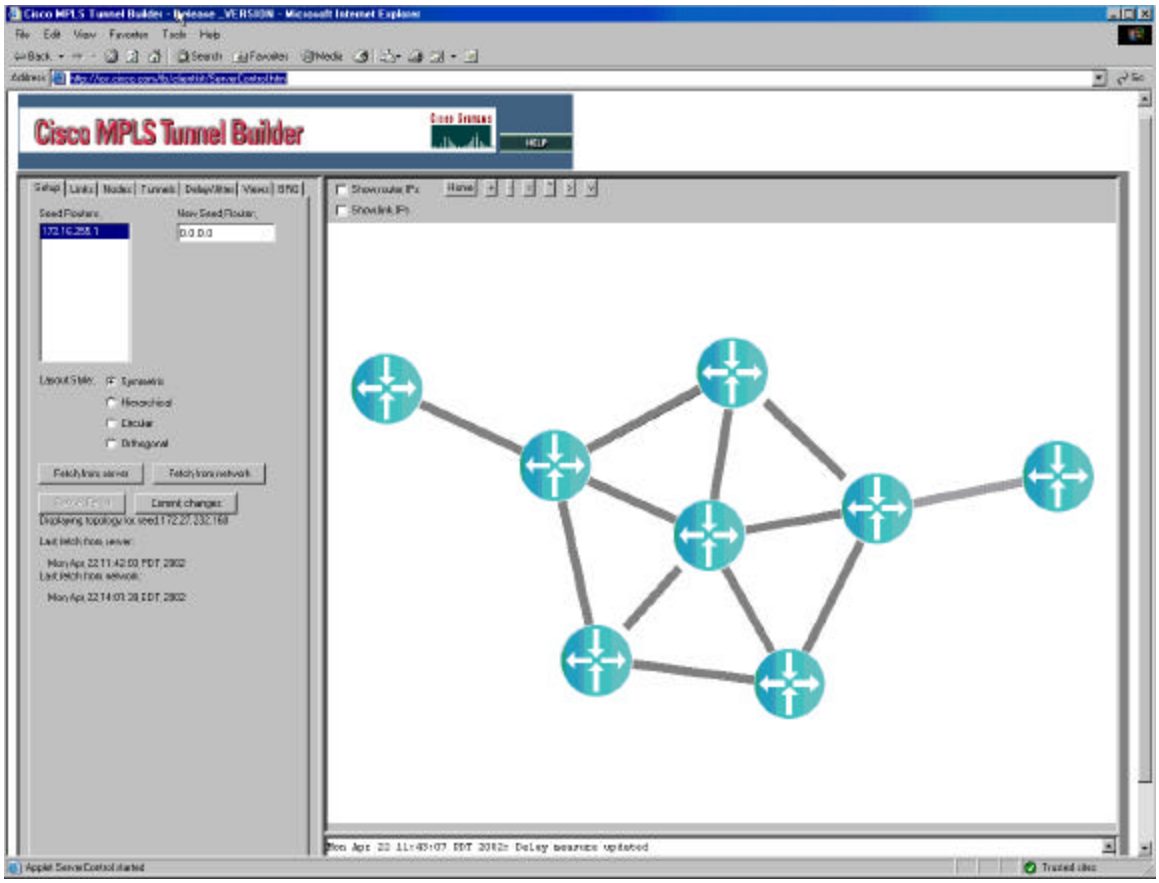
Application Brief

Cisco MPLS Tunnel Builder

Objective and Audience

Cisco MPLS Tunnel Builder is a Web-based graphical application that simplifies visualization, configuration and management of MPLS tunnels on a network using MPLS Traffic Engineering (TE). Without the use of a management tool, the complexities of a large network can limit the benefits obtained from the implementation of MPLS TE. Configuring and managing a large number of MPLS tunnels using the Command Line Interface (CLI) becomes tedious and error prone. Furthermore, the CLI on an individual MPLS TE node generally provides only partial information about nodes and links. The operator is forced to interact with multiple devices separately to produce a complete solution.

Conversely, Cisco MPLS Tunnel Builder provides an integrated graphical interface in which individual nodes and links can be configured and monitored within the context of a complete end-to-end topology. Cisco MPLS Tunnel Builder integrates the configuration of the different Cisco MPLS TE features (e.g. Auto-Route, Auto-Bandwidth, DiffServ-Aware Traffic Engineering, Fast Re-Route, etc) on a single management tool.



MPLS TE plays a key role for many Service Providers as a technology that can optimize next-generation MPLS networks and improve their resiliency. MPLS TE was initially introduced to maximize overall network utilization by avoiding over-utilization of some portions of the network while others remained under-utilized. However, it has been further enhanced to provide sub-second recovery during network failures.

These enhancements, in addition to the integration with QoS functionality, enable Service Providers to offer new services (e.g. voice trunking, virtual-leased lines, etc) that are difficult to implement on an IP network. Cisco Tunnel Builder facilitates the deployment and management of these new services.

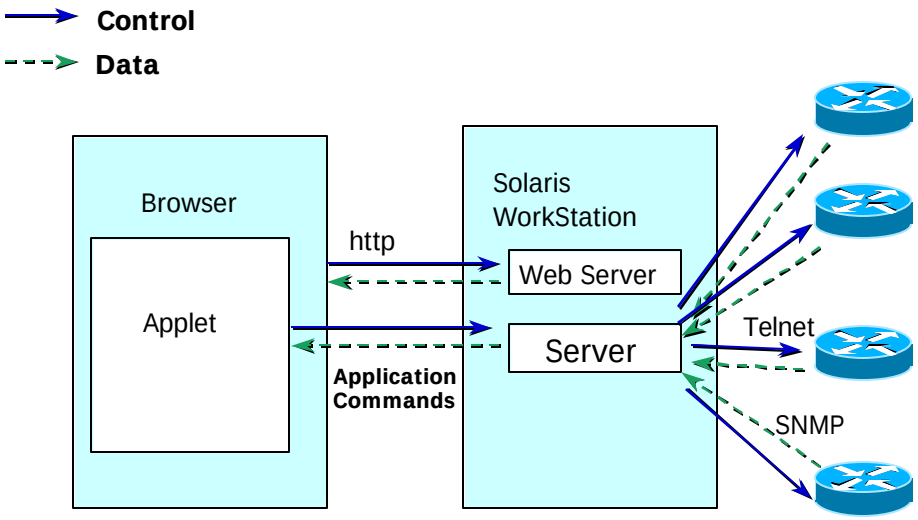
Besides Service Providers, large enterprises and government agencies are likely to benefit from this technology. Their networks often face similar challenges, and in many cases they truly operate as Service Providers for divisions of their organizations.

Tunnel Builder Overview

Cisco MPLS Tunnel Builder is based on a simple client-server architecture.

On the client side, a Java Applet provides the graphical interface to the user and acts a front-end for the server software that interacts with the MPLS TE network directly. The Java Applet is accessed using a Web browser. The client and server communicate via HTTP and a separate TCP session (port 7271 by default).

On the server side, there are two server applications running: a HTTP server and the Cisco MPLS Tunnel Builder server. The HTTP server handles the HTTP communication with the client brower. Facing the client, the Cisco MPLS Tunnel Builder server receives application commands and sends results from and to the client respectively via the TCP session. Facing the MPLS TE network, the Cisco MPLS Tunnel Builder server communicates with the MPLS TE nodes via telnet and SNMP. The telnet connection is used to configure and collect state information from the MPLS TE nodes. SNMP is used to capture trap information generated by the MPLS TE nodes when links or MPLS tunnels change of state.



Cisco Tunnel Builder can discover, configure, and monitor links, nodes, and tunnels in an MPLS TE-enabled network. Initially, the user only needs to identify a seed router that the Tunnel Builder server can use to discover all nodes and links. This discovery process results in a graphical topology that helps to visualize the network.

Once the network topology has been discovered, separate panels are provided for monitoring and configuring MPLS TE parameters on individual links, nodes and tunnels. The link panel

displays the bandwidth pool and attribute configuration of each link. These values can be modified on the same panel for both ends of the link. The node panel displays the Cisco IOS Software release, all interfaces on the node, and their MPLS TE state (not configured, running, etc.), static routes and global Auto-Bandwidth parameters.

The node panel can be used to modify these Auto-Bandwidth parameters and define static routes that can route traffic into MPLS tunnels. The tunnel panel provides detailed information on the parameters associated with the tunnel (e.g. bandwidth, pool, priority, explicit route, etc.). This panel can be used to modify existing tunnels and configure new primary or backup tunnels. The panel will also provide a byte and packet counters for existing tunnels.

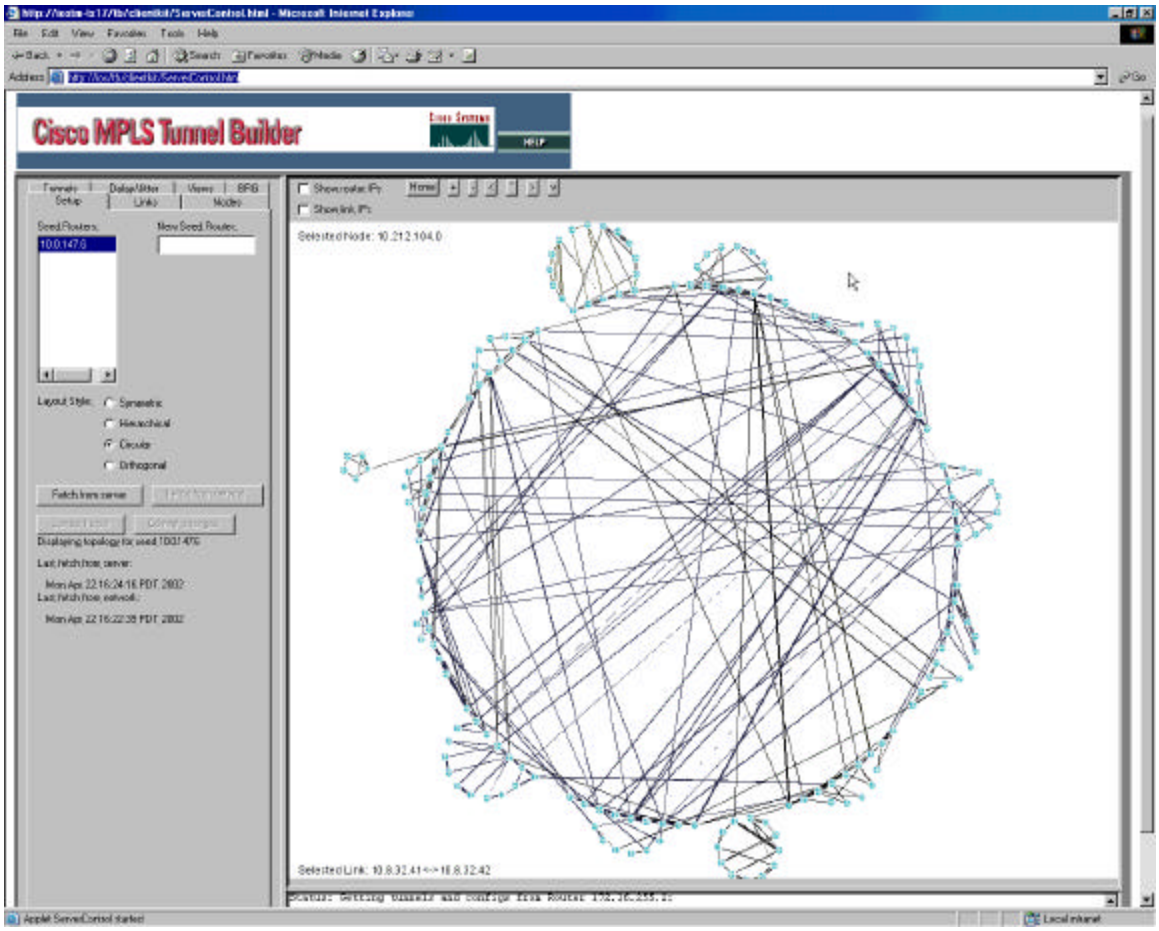
Additionally, Cisco Tunnel Builder provides functionality to monitor, in real-time, the health of the MPLS TE network. For this purpose, the delay and jitter panel can be used to measure in real time the delay and jitter between any two nodes in the network. Finally, the views panel can be used to monitor SNMP traps generated by tunnels or interfaces that change state (up or down) and to visualize tunnel counts, available bandwidth, and utilization levels for different thresholds.

Cisco MPLS Tunnel Builder Applications

Fully-Meshed MPLS TE Deployment

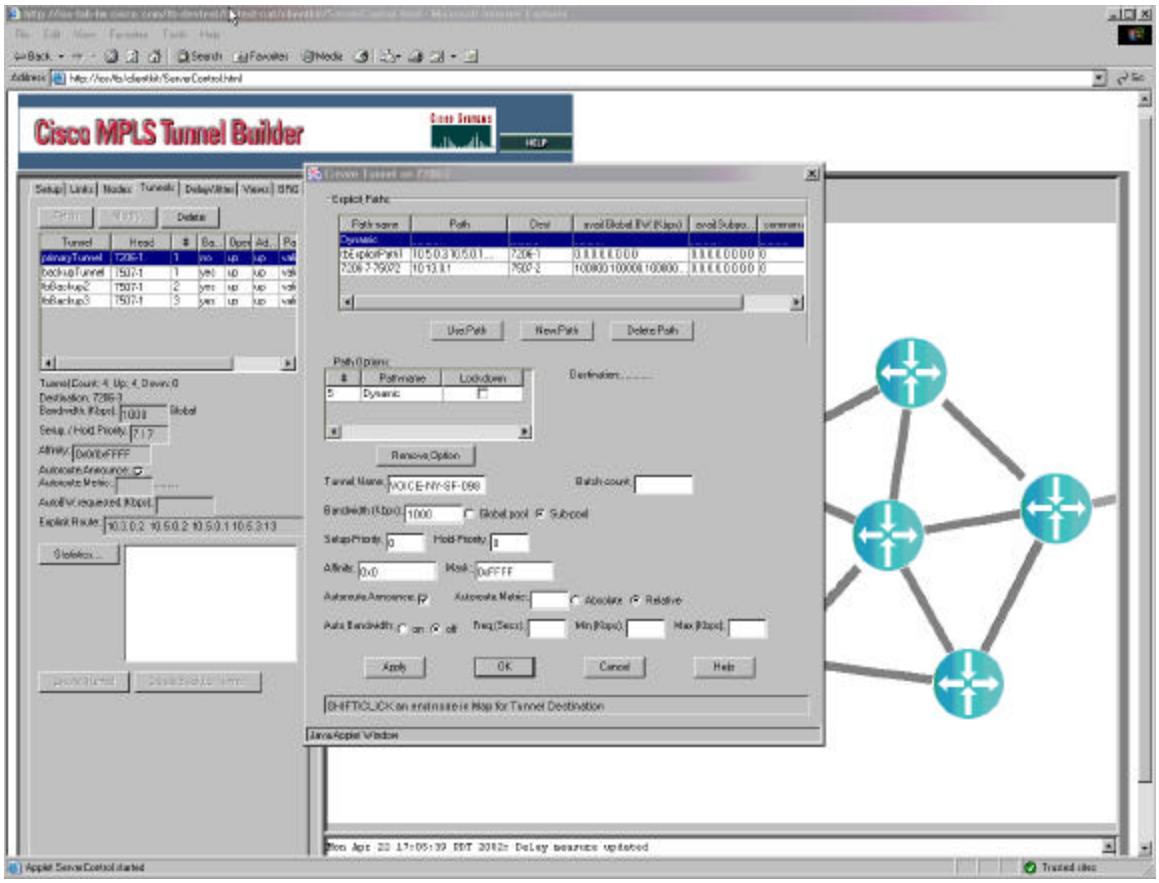
MPLS TE networks commonly implement a full mesh topology of MPLS tunnels on top of a partial mesh of physical links. In this approach, all traffic is routed through the backbone on an MPLS tunnel. Tunnels are built between POPs and can be resized periodically to increase or decrease aggregate network capacity between two locations.

The main motivation for this approach is the optimization of network resources. Cisco MPLS Tunnel Builder can be used for visualizing the large number of tunnels that result from implementing a full mesh. Without a visualization tool, monitoring and modifying individual links, nodes or tunnels can be extremely cumbersome in this scenario. In addition, new tunnels can be easily created through point-and-click operations on the network topology.



Voice Trunking using MPLS TE

Cisco MPLS Tunnel Builder can be used to simplify the configuration and monitoring of voice trunks through an MPLS network. Cisco MPLS TE makes possible the implementation of guaranteed-bandwidth services that require tight point-to-point Service Level Agreements (SLAs). These services make use of MPLS TE, DiffServ-Aware Traffic Engineering and Fast Re-Route (FRR). Cisco MPLS Tunnel Builder provides a single graphical interface that can be used to configure the features required to implement voice trunking. Additionally, Tunnel Builder provides real-time measurement of delay and jitter that is critical in determining the quality characteristics of the network to provide voice services between two points.



Reference Documents

Deploying Guaranteed Bandwidth Services with MPLS
http://www.cisco.com/warp/public/732/Tech/mpls/docs/deploying_gb_white_paper_final.pdf

Advanced Topics in MPLS-TE Deployment
http://www.cisco.com/warp/public/cc/pd/iosw/prodlit/mwglp_wp.htm

Voice Trunking and Toll-Bypass Trunking Using Cisco MPLS DiffServ-Aware Traffic Engineering
http://www.cisco.com/cpropart/salestools/cc/pd/iosw/prodlit/mpvoc_wp.htm

Virtual Leased Line Services Using Cisco MPLS DiffServ-Aware Traffic Engineering
http://www.cisco.com/cpropart/salestools/cc/pd/iosw/prodlit/msdvl_wp.htm

RFC 2702 - Requirements for Traffic Engineering Over MPLS
http://www.ietf.org/rfc/rfc2702.txt

RFC 3209 - RSVP-TE: Extensions to RSVP for LSP Tunnels
http://www.ietf.org/rfc/rfc3209.txt

Requirements for support of Diff-Serv-aware MPLS Traffic Engineering
http://www.ietf.org/internet-drafts/draft-ietf-tewg-diff-te-reqts-04.txt

Protocol extensions for support of Diff-Serv-aware MPLS Traffic Engineering
http://www.ietf.org/internet-drafts/draft-lefaucheur-diff-te-proto-01.txt

Fast Reroute Extensions to RSVP-TE for LSP Tunnels

http://www.ietf.org/internet-drafts/draft-ietf-mpls-rsvp-lsp-fastreroute-00.txt