

MPLS VPN Simulation Using MP-iBGP

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Abstract

As Internet traffic continues to increase, companies are demanding greater speeds and better services to disseminate information to their customers, partners and employees. In order to provide reliable services and to support a variety of secure communications among a wide range of locations, Multiprotocol Label Switching Virtual Private Network (MPLS VPN) has been introduced.

MPLS is an emerging technology that aims to address many of the existing issues associated with packet forwarding in today's internetworking environment. Whereas, VPN provides secure private connections through public infrastructure amongst multiple locations. MPLS-based VPN provides isolation, security, simplified routing, easier provisioning as well as scalability. Multiprotocol Internal Border Gateway Protocol (MP-iBGP) has been used to advertise VPN routes across the MPLS VPN backbone due to its capability of handling a large number of routes.

The aim of this project is to study and simulate the MPLS VPN architecture. Several MPLS VPN components are developed to enable the simulation of MPLS VPN architecture. The simulator supports three most widely used MPLS VPN topologies, namely the Intranet topology, the Intranet and Extranet Integration topology and the Central Service topology.

The simulation of MPLS VPN using MP-iBGP has proven that the MPLS VPN architecture is able to provide better scalability, easy provisioning, QoS and security. The simulator will benefit the service providers in configuring a MPLS VPN network environment. Service providers can use the simulator to study and measure the correctness of different types of topologies related to MPLS-VPN.

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Abbreviations

ABR	Available Bit Rate
API	Application Programming Interface
ASN	Autonomous System Number
ATM	Asynchronous Transfer Mode
BGP	Border Gateway Protocol
BTE	Broadband Terminal Equipment
CBR	Constant Bit Rate
CE	Customer Edge
CEF	Cisco Express Forwarding
DSL	Digital Subscriber Line
EIGRP	Enhanced Interior Gateway Routing Protocol
FEC	Forwarding Equivalence Class
GRE	Generic Routing Encryption
GUI	Graphical User Interface
IGP	Interior Gateway Protocol
IS-IS	Intermediate System
IP	Internet Protocol
IPSec	Internet Protocol Security Encryption
ISP	Internet Service Provider
L2F	Layer 2 Forwarding
L2TP	Layer 2 Transport Protocol
LAN	Local Area Network
LDP	Label Distribution Protocol
LSA	Link-State Advertisement
LSP	Label Switch Path
LSR	Label Switch Router
MP-iBGP	Multiprotocol Internal Border Gateway Protocol
MPLS	Multiprotocol Label Switching
NAT	Network Address Translation
OPSF	Open Shortest Path First

PE	Provider Edge
PHP	Penultimate Hop Popping
QoS	Quality of Service
RD	Route Distinguisher
RRR	Routing with Resource Reservation
RT	Route Target
SLA	Service Level Agreement
SOO	Site of Origin
TOS	Type of Service
TTL	Time-To-Live
VBR	Variable Bit Rate
VCI	Virtual Channel Identifier
VPDN	Virtual Private Dialup Network
VPI	Virtual Path Identifier
VPN	Virtual Private Network
VRFs	Virtual Routing Forwarding
WAN	Wide Area Network