MPLS - A WAN routing technique

Author	Date	Revision
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Related product (if any):	N/A
Description:	Describes Multiprotocol Label Switching (MPLS) and how it works.
Notes:	Need perquisite knowledge of the OSI Model, network switching, network routing, EGPs and IGPs, OSPF, IS-IS, and BGP.
Files Needed:	N/A

Information:	**What is MPLS?** Multiprotocol label switching (MPLS) is a technique for speeding up network connections developed in the 1990s. Normally the public Internet forwards packets from one router to another, but MPLS sends packets along a predetermined network path. This ideally results in less time spend deciding where to forward each packet, since each packet takes the same path every time. Another way of looking at this is that MPLS defines different network paths instead of a series of intermediary destinations--routers. MPLS is considered to operate as OSI layer 2.5, so below the network layer (layer 3) and above the data link layer (layer 2). **How does MPLS work?** Normally anything sent from one network to another is divided up into smaller pieces called packets instead of getting sent all at once. For these packets to reach their intended destination each router hop must reference and maintain a routing table until the packet reaches the same network as its destination IP address. This approach works well in most cases, since most of the Internet runs using IP addresses and routing tables, but some organizations want their data to travel fast over paths they can directly control. The path a packet takes under the routing method can be different each time, but with MPLS packets take the same path each time. The way this is done in a network that uses MPLS is that each packet is assigned a **forwarding equivalence class (FEC)**. The network paths that packets can take are called **label-switched paths (LSP)**. A packet's class (FEC) determines which path (LSP) the packet will be assigned to. Packets with the same FEC will follow the same LSP. Each packet can contain one or more labels, and all labels are contained in an MPLS header, which is added on top of all of the other headers attached to a packet. FECs are labeled within each packet's labels. Routers do not examine the other headers; meaning, they can essentially ignore the IP header entirely. Instead, they examine the packet's label and direct the right packet to the right LSP. Because MPLS-supporting routers only need to see the MPLS labels attached to a packet, MPLS can work with any protocol, hence the name. It doesn't matter how the rest of the packet is formatted as long as the router can read the MPLS labels at the front of the packet. So for instance, you can have traffic routed via BGP be encapsulated within an MPLS header.

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