

# IP/MPLS

## **The New CopperNET IP/MPLS Network**

**INTERNET PROTOCOL/MULTI-PROTOCOL LABEL SWITCHING NETWORK**

August 12, 2010  
Authored by: TKL

**CopperNET**  
Solutions

# IP/MPLS

---

## The New CopperNET IP/MPLS Network

### What is IP/MPLS?

An IP/MPLS network is simply a packet-switched network that uses the Internet Protocol (TCP/IP) enhanced with the Multi-protocol label switching (MPLS) standard. Pure IP networks use *best-effort* delivery. This means that when traffic is sent through a network, the path travelled by the data is determined mainly by using the destination address and using this address to mark a path to the point where the traffic should be delivered. The result of this is that:

- Traffic delivery times cannot be guaranteed since the data can travel along different routes to get to the same destination
  - Traffic can travel along certain paths based on availability, cost, congestion or latency (delay)
- The application that generates the traffic is left to determine whether all the traffic has arrived and handle all traffic related issues.
  - It is possible for traffic to arrive in a different order from that in which it was sent. Thus the application simply uses header information which includes the source, destination, number and size of the data packets to determine if everything has arrived
  - Applications request for a retransmission from the sender in the event that the data received is erroneous.
- In some delay-sensitive applications e.g. video or voice, traffic conditions on the network can rapidly lead to degradation and poor quality of service

The MPLS set of protocols operates above the IP protocols and was introduced to guarantee delivery of traffic, reduce network delay and guarantee quality of service whilst still operating in an IP environment. The standard works as follows:

- Traffic is no longer delivered by using the destination address. It is instead labelled at source and based on the label given to the traffic; it will take a pre-specified path on the network.
  - This replaces best-effort delivery of the IP network. A data packet with a specific label will take a specific path. It is therefore guaranteed to arrive at a specific cost and time so long as the specified path is available
  - The other advantage of this is that even when the first specified path is not available, an alternative path can also be specified in advance, making it possible for the network to be self-healing and increasing quality of service and availability
- Additionally, since traffic is labelled at the source, it can be identified as delay-sensitive traffic and prioritised over and above other traffic

- Thus voice and video traffic can be given travel paths with the least delay and the best redundancy
- This results in further enhanced quality of service

The IP/MPLS standard thus enables a network service provider to guarantee network latency and quality of service to its customers and from that provide Service Level Agreements (SLA) to those clients it places on the IP/MPLS network.

## MPLS VPN Terminology RFC 2547

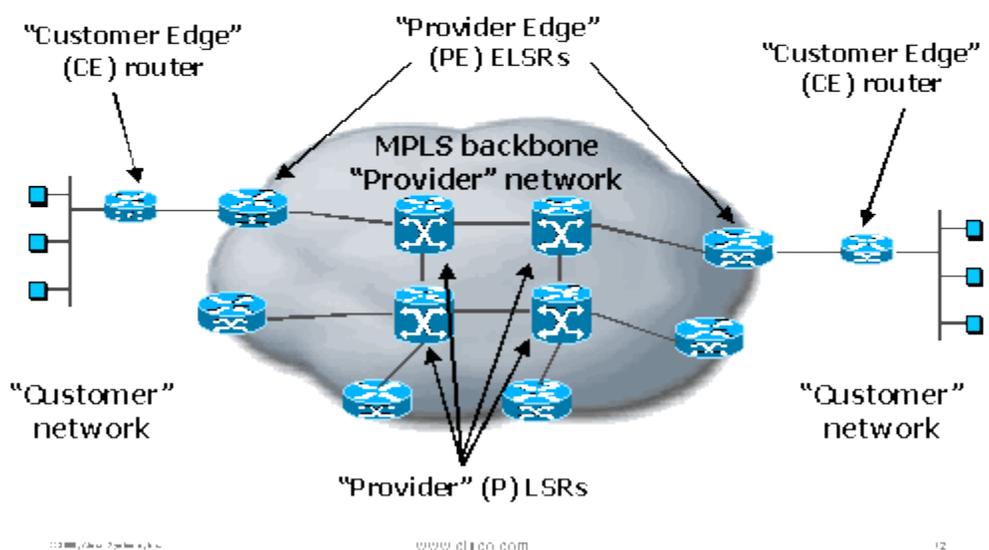


FIGURE 1: TYPICAL IP/MPLS NETWORK (PICTURE COURTESY CISCO SYSTEMS)

### Network Coverage, Capacity & Performance

The CopperNET IP/MPLS network covers the entire line of rail and uses a fibre optic cable based backbone with fibre and Broadband Wireless Access (BWA) last mile solutions. Away from the line of rail the MPLS network covers all the provincial centres and all but 5 of the 72 Zambian towns. The distribution network is based on microwave radio technology with BWA last mile access.

The network can deliver up to **50Mbps last-mile access capacity** and up to **155Mbps network distribution capacity** for each customer

The network has minimal latency with a guarantee of 70ms end – end latency between the furthest points in the network and 98.5% availability excluding downtime associated with scheduled maintenance.

Network support is 24-hours delivered via a network operations centre with specified response and resolutions times governed by rules under an SLA and with penalties for failure to adhere to the agreed standards.

## Who Needs an MPLS VPN network

All organisations with multiple operations in different physical and geographical locations and who wish to share network resources between these locations need to deploy MPLS VPN solutions.

Such organisations like banks, government institutions and multinational operations need to embrace the MPLS standard so that they can lower costs, increase efficiency and share valuable resources.

Even smaller organisations that need to access information from remote locations can use VPN technology. Organisations like political parties and religious groupings e.g. churches can also benefit from such technology to assist them in coordination their various activities.

Radio and Television broadcast networks could also benefit from the MPLS VPN technology which would enable them send transmissions to different locations without losing sound and/or video quality and reaching a wider audience even in areas in which they have no presence.

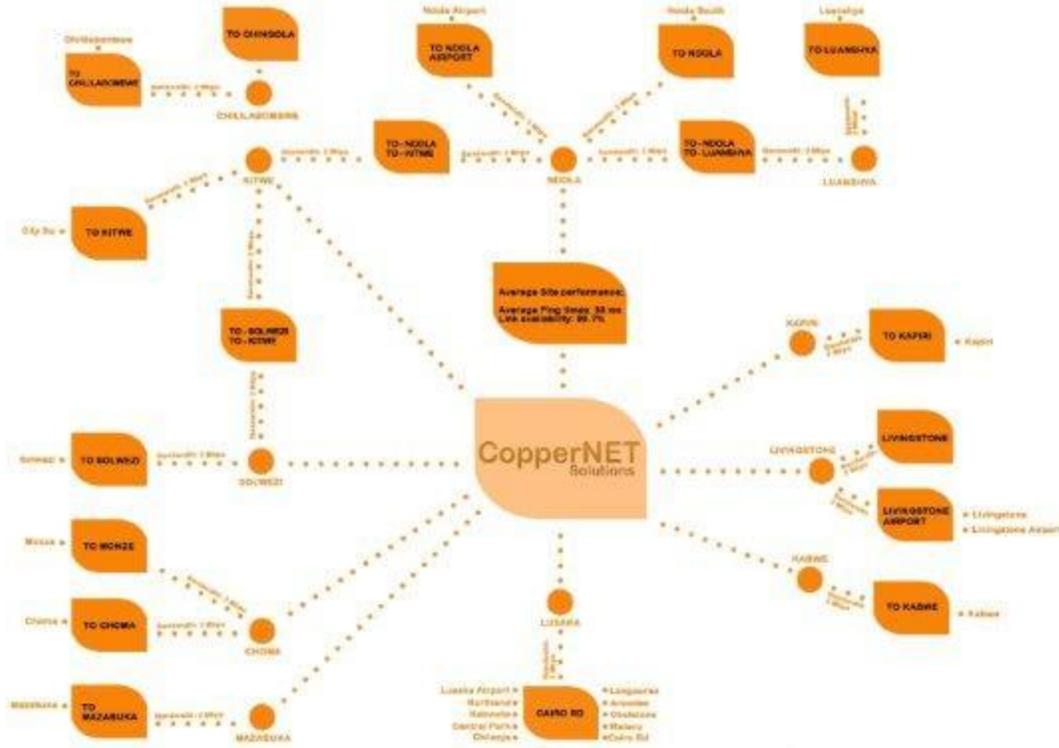
## How Can Organisations use the MPLS VPN technology

An organisation can link their offices together and pass traffic on the network as follows:

- Voice traffic saving money on calls to external network by calling within their own network
- Video traffic which they can use to hold meetings with multiple persons in different locations or even conduct interviews with people from other areas
- Share a resource like access to the accounting, payroll, inventory management and sales systems removing the need to install multiple servers all over the place
- Implement disaster recovery procedures in such a way that if the business is disrupted in one area it is still operational in other areas
- Introduce new applications like video surveillance or retransmit TV and Radio broadcasts
- Link network equipment like Bank ATM, printers, POS terminals and surveillance cameras together

# MPLS Network

## New. Advanced. Expanded.



We realise that customer's internet and network utilisation needs are evolving.

In response we have invested US\$ 1.7m to build you a new country-wide high capacity IP/MPLS network, now you can get your voice, data, or video streaming across your network, with high reliability, availability, and quality of service.

CopperNET's new IP/MPLS network, meeting your connectivity needs today and in the future.

**CopperNET**  
Solutions

 Inventing the future.  
[www.coppernet.zm](http://www.coppernet.zm)