Lecture 32

CS625: Advanced Computer Networks
Fall 2003

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http://www.cse.iitk.ac.in/users/braman/courses/cs625-fall2003/outline.html

Topics for today

- Multi-Protocol Label Switching (MPLS)
- Traffic Engineering
- *Scribe for today?*

Circuit Switching versus Packet Switching

- Circuit switching:
  - Per-connection state ==> limits to scaling
- Packet switching:
  - Destination-based routing
  - Can it be fast enough?
- Multi-Protocol Label Switching:
  - Combine benefits of both
  - Circuit switching within an ISP, IP-based packet switching across ISPs (roughly)

Motivation for MPLS

- Traffic Engineering: management of traffic within a network (within an ISP)
- Destination-based forwarding ==> TE is difficult
- TE should be independent of link layer
- MPLS layer between layer-2 and layer-3

MPLS Basics

- MPLS does label switching
- Each IP-flow is assigned a label
  - Definition of flow is flexible
- Label-Switched Path (LSP) setup between *ingress* and *egress*
- Each router forwards based on label

Label-Switched Path (LSP)

Ingress

Egress
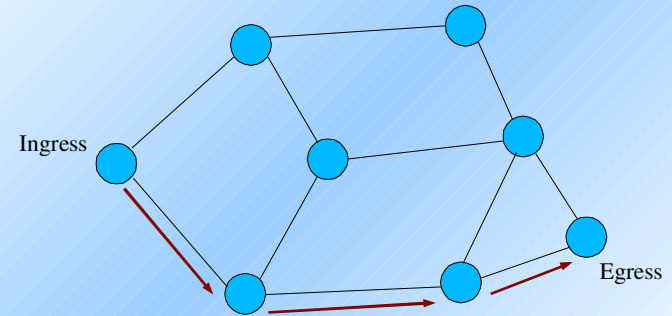
MPLS Header and Packet Format

Label (20 bits)	CoS (3)	S	TTL (8 bits)

L2 Header	MPLS Header	L3 Header	L3 Data

L2 Header	MPLS Header	MPLS Header	L3 Header	L3 Data

Some Terms...

- Forwarding Equivalence Class (FEC)
- Label Switching Router (LSR)
- Label Distribution Protocol (LDP)
  - Label request from upstream to downstream
  - Label mapping from downstream to upstream
- Constraint-based Routing (CR)
- Path pinning
- LSP protection/recovery

Fault Tolerance

Ingress

Egress

Local recovery versus End-to-end recovery