Lecture 8:
L2 in the Data Center

CSE 222A: Computer Communication Networks

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Thanks: Jennifer Rexford

Lecture 8 Overview

- Pop quiz
- Project discussion
- PortLand paper discussion
- Overview of optical technology

Comparing L2/L3

Features \ Architectures	Ethernet Bridging	IP Routing
Ease of configuration	👍	👎
Optimality in addressing	👍	👎
Host mobility	👍	👎
Path efficiency	👎	👍
Load distribution	👎	👍
Convergence speed	👎	👍
Tolerance to loop	👎	👍

Potential solution: VLANs

- Scope broadcast traffic
- Simplify access control policies
- Decentralize network management
- Enable host mobility

Problem: Limited Granularity

- Limited number of VLANs
  - Placing multiple groups in the same VLAN
  - Reusing limited VLANs
- Limited number of hosts per VLAN
  - Divide a large group into multiple VLANs
- One VLAN per access port
  - Supporting VLANs on the end host
  - Supporting multiple groups at the router

Complex Configuration

- Host address assignment
  - Wasting IP addresses
  - Complex host address assignment
  - E.g., doesn't work with Wednesday's idea

- Spanning tree computation
  - Limitation of automated trunk configuration
  - Enabling extra links to survive failures
  - Distributing load over the root bridges

PortLand Discussion

- What are the challenges?
- How might you address them?
- What does PortLand do?
- What's left?

The Case for Optics

- **Electrical Packet Switch**
- $400/port
- 10 Gb/s fixed rate
- 12 W/port
- Requires transceivers
- Per-packet switching
- For bursty, uniform traffic

- **Optical Circuit Switch**
- $400/port
- Rate free
- 240 mW/port
- No transceivers
- 1-ms switching time
- For stable, pair-wise traffic

For Next Class…

- Read and review Helios paper
- Work on project proposals
  - Details available on Project page in course Website