

# Campus Bandwidth Management Experience, Plans

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# Agenda

- Definitions
- Goals
- Motivation
- Experience
  - History
  - Present
- Plans

# Definitions

## ● QoS

- Agreements on how to manage different classes of traffic

## ● Traffic Engineering

- Treating different traffic types differently as they transit network switches, routers

# Goals

- Network Managers should be lazy.
  - Minimal hands on.
  - Emphasize passive over active.
- Support University priorities
  - Research, teaching, administration
  - Other supported organizations/activity
  - Incidental personal use
  - Whatever else is Legal

# Motivation – Why worry?

- *Ubiquitous H.323 videoconferencing*
  - *teaching, meetings*
- *Some VoIP*
- *Control of bandwidth hog(s) {P2P}*
- *Some high bandwidth Apps*

# Experience: History

## ● Approach

- Video -- Special rooms, H.320
- P2P -- Monitoring and administrative action
- More Switched Bandwidth

## ● Results

- Too much work, not enough results
- Trailing new tech

# Experience: Present

## ● Approach

- Video -- Upgrades driven by testing
  - Jaalam's apparanet
- P2P -- Bottlenecks and appliances
  - Packeteer
  - Sitara
  - LARTC {experiment only}

## ● Results

- Complaint driven
- Not enough granularity

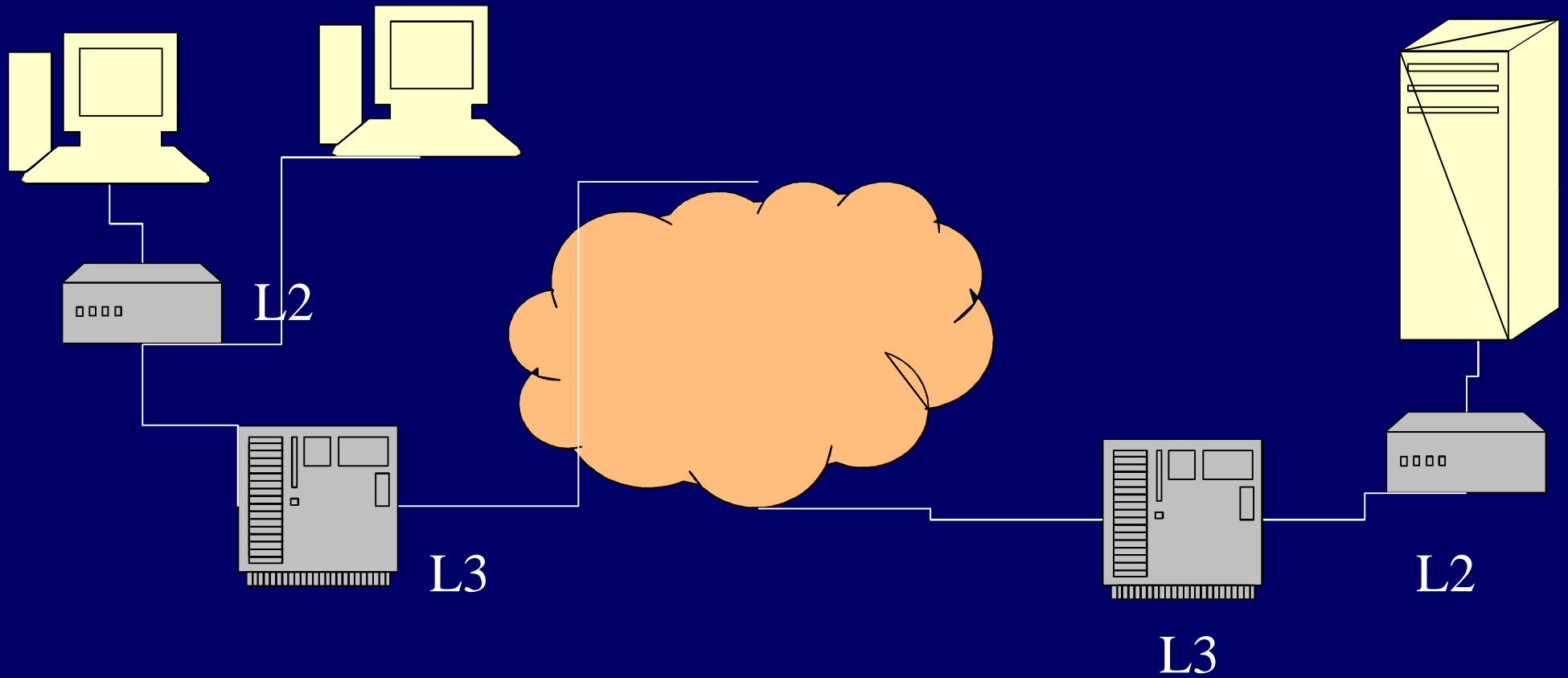
# Plans

- Architect T.E. into entire network
  - Incremental deployment
- Local rules for inside campus (TOS/802.1p)
- S.E.E.D. (Service Enabled Edge Devices)
- Mapping to standards at border (DSCP)
- Static mapping, working towards dynamic

# Bandwidth Ain't Enough

- Need Layer 2, 3 integrated scheme
  - Microcongestion ...
- Whole path treatment
  - Vs end-to-end
- Management tools not there

# The Whole Path



# Device Rules



# Device Rules (cont)

## ● Classify/Mark

- Sort by TCP/UDP port, IP address, MAC address, VLAN, DSCP, TOS, 802.1p/Q
- Rewrite DSCP, TOS, 802.1p (optionally)

## ● Rate Limit

## ● Queue

- Priority Queue
- WFQ

# Queue Effects

## Eight

- 7 – network control
- 6
- 5 – voice
- 4 – video
- 3
- 2 – “normal” ?
- 1
- 0 – “catfish traffic”

## Four

- ⑩ 7/6
- ⑩ 5/4
- ⑩ 3/2
- ⑩ 1/0

## Two

- ⑩ High
- ⑩ Low

# Management

- Trust end–devices?
  - Don't trust users!
- Static rules aren't sufficient
- Current approach for dynamic rules
  - Wrap applications with special code
  - 802.1x?

# Summary

Plug 'n' Pray

But learning opportunities abound!

# Traffic Engineering

©Traffic Engineering entails that aspect of network engineering which is concerned with the design, provisioning, and tuning of operational internet networks. It applies business goals, technology and scientific principles to the measurement, modeling, characterization, and control of internet traffic, and the application of such knowledge and techniques to achieve specific service and performance objectives, including the reliable and expeditious movement of traffic through the network, the efficient utilization of network resources, and the planning of network capacity.” IETF TE Working Group