



Campus Bandwidth Management: *What's the Problem?*

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Agenda

- *What's the problem?* (this welcome talk)
- *The Case for Traffic Shaping At Internet2 Schools* (Joe St. Sauver, U Oregon)
- *QoS Appliances Cause Cancer and Global Warming* (Stanislav Shalunov, Internet2)
- *Internet Bandwidth Management at the University of Pennsylvania* (Deke Kassabian, U Pennsylvania)
- *Bandwidth Management Strategies and Methodologies* (Clark Gaylord, Virginia Tech)
- *NDSU Case Study* (Jim Ross, NDSU)
- *Let the rumble begin!* (panel discussion)

The Problem

Congested campus I1 access circuit

Prohibitive cost of upgrading

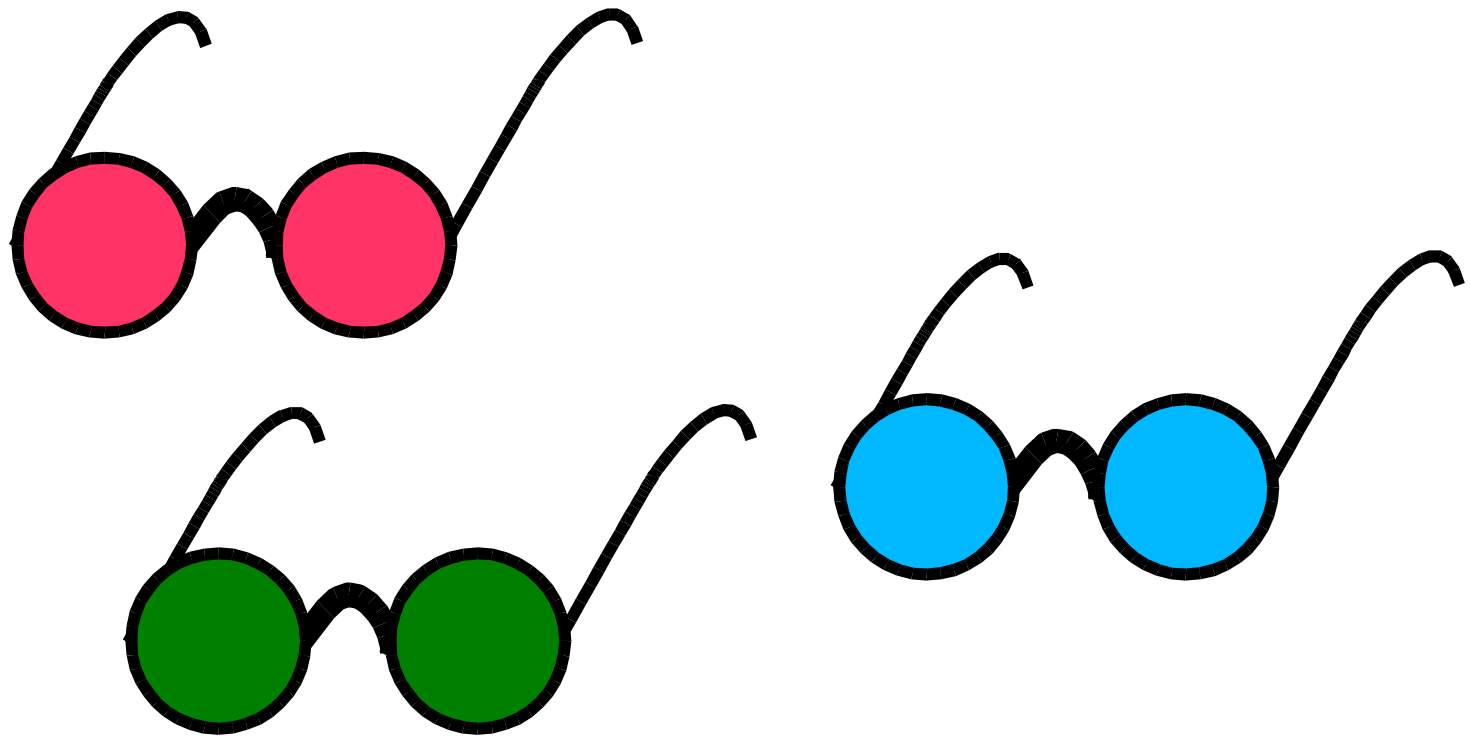
High load from "non-mission" applications

Ordinary users are suffering

Some "solutions" can make matters worse

Problem is Understood Subjectively

Political and social biases color how people and institutions look at the problem



Problem is: Unfair Use

There's only so much capacity and a small number of users are eating far more than their fair share

Possible Remedies:

- Usage quotas
- Trimming or shaping the tail of the usage distribution (e.g., penalty box schemes)

Problem is: Unacceptable Use

A small number of users are abusing the AUP and eating up capacity for non-mission (or even criminal) purposes

Possible Remedies:

- Stricter AUP enforcement
- Stricter DMCA enforcement
- Block or rate-limit "bad" applications
- Rate-limit "bad neighborhoods" (e.g., dorm subnets)

Problem is: Network Needs to Enforce Institutional Priorities

Relative importance of applications needs to be reflected in relative QoS they receive

Possible Remedies:

- Application–level classification and shaping
- Time shifting non–mission load to nighttime (e.g., time–of–day sensitive AUP, filters, or shapers)

Problem is: Market Forces Not Functioning

Our supplier charges by the bit, but our customers pay a flat, "all-you-can-eat" rate

Possible Remedies:

- Charge back so users experience a usage-based price
- Market should bring supply and demand into balance and generate new revenue for upgrades

Need to Understand Costs and Side Effects of Various Solutions

Performance

Advanced services

E2E transparency

Operational burden

Sustainability

Opportunity cost of not upgrading



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