

# Networking and Diffuse Computing

---

John Mitchell

Intro to:

Kostas Anagnostakis

Bjorn Knutsson

# Networking topics

---

## ◆ Congestion control

### ➡ How well does TCP work?

- Measure and analyze current network
- How can we do better?
  - Current Internet, Gigabit, Satellite, Wireless

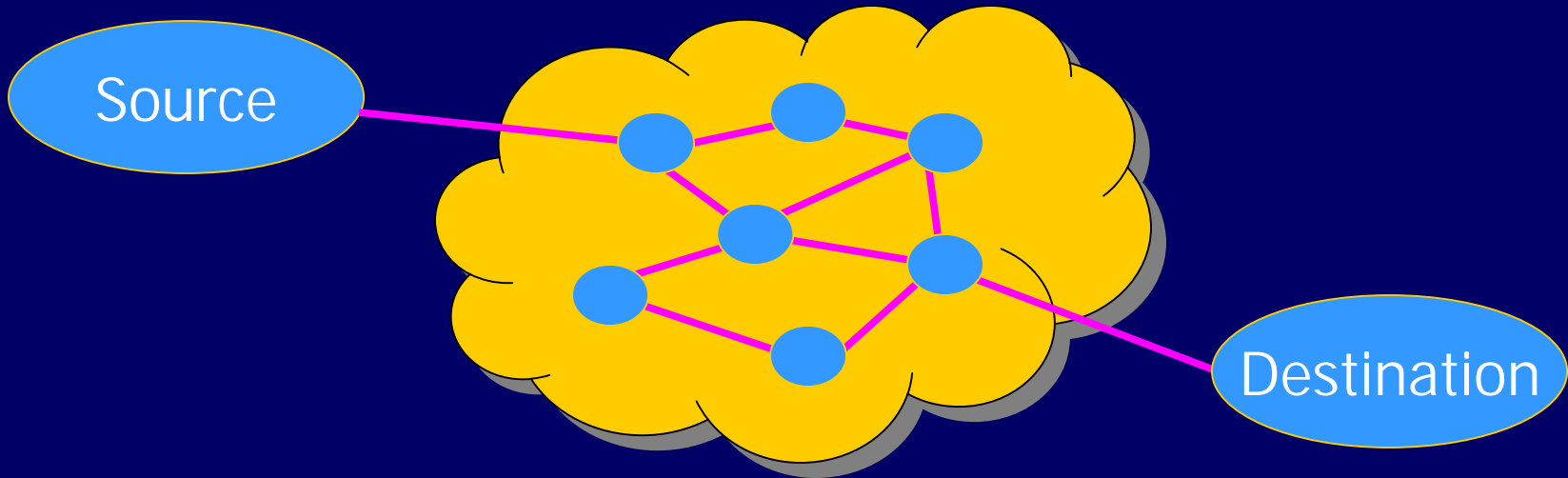
## ◆ Interdomain routing

- Analysis and market mechanisms for BGP

## ◆ Applications and network demands

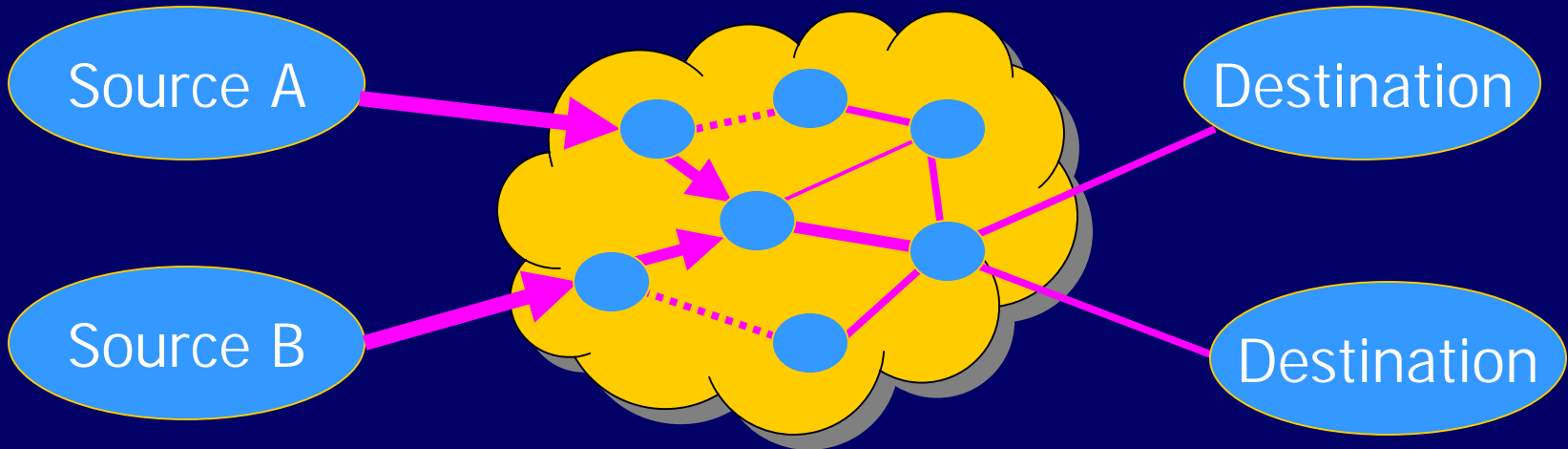
### ➡ Server transcoding to reach small devices

# Network flow control



- ◆ IP provides routing
- ◆ TCP provides packet delivery, flow control
  - Destination acknowledges packets by seq number
  - Lost packets are resent
  - Loss => congestion; transmission rate reduces

# Interaction between transmissions



## ◆ Contention

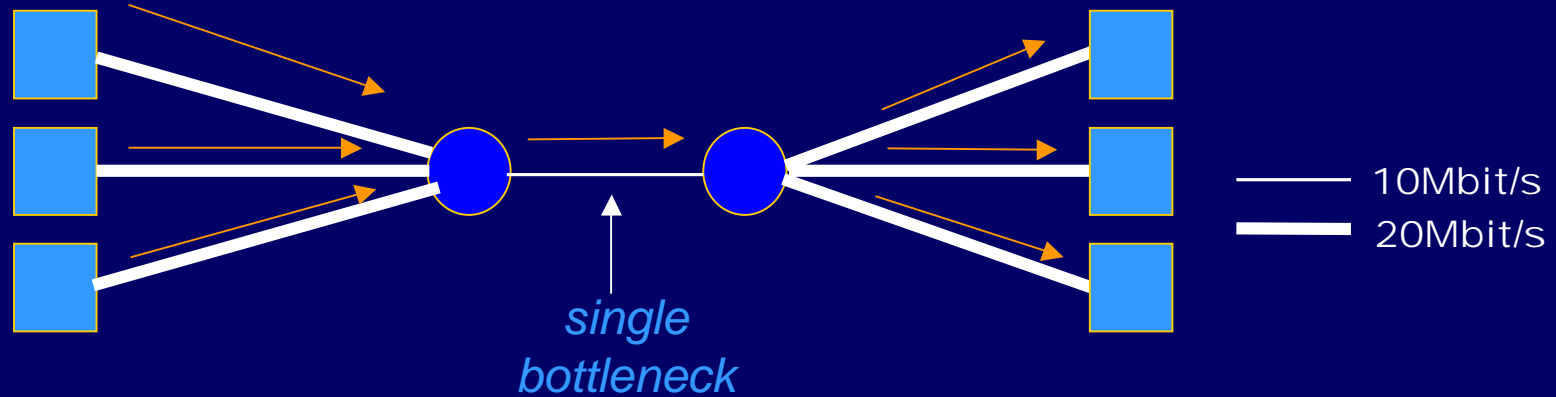
- Alice backs off; Bob cheats, gets better results

## ◆ Optimal flow rates

- Paths may share bottleneck (bottlenecks?)

# Kostas: Network congestion

## ◆ Standard view: simple barbell topology



## ◆ Test view by measuring Internet

## ◆ Determine implications on modeling, simulation, and protocol design

# Diffuse Applications

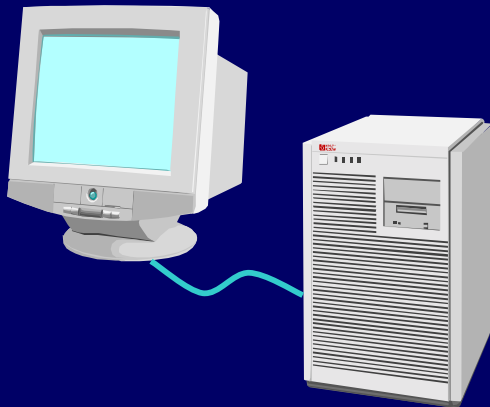
---

- ◆ Distributed
- ◆ Loosely coupled
- ◆ Autonomously administered ("Peer-to-peer")
- ◆ Heterogeneous devices
- ◆ Problems of scale

Diffuse applications impose new networking requirements  
Diffuse computing techniques may solve network problems

# Example: Images to small devices

## Broadband



# Example: Images to small devices

Broadband

Dial-up





# Next two talks

---

## ◆ Kostas Anagnostakis

- Empirical study of network congestion
- New model of path interaction

## ◆ Bjorn Knutsson

- Example diffuse computing service
- Image delivery to small devices
- Server transcoding