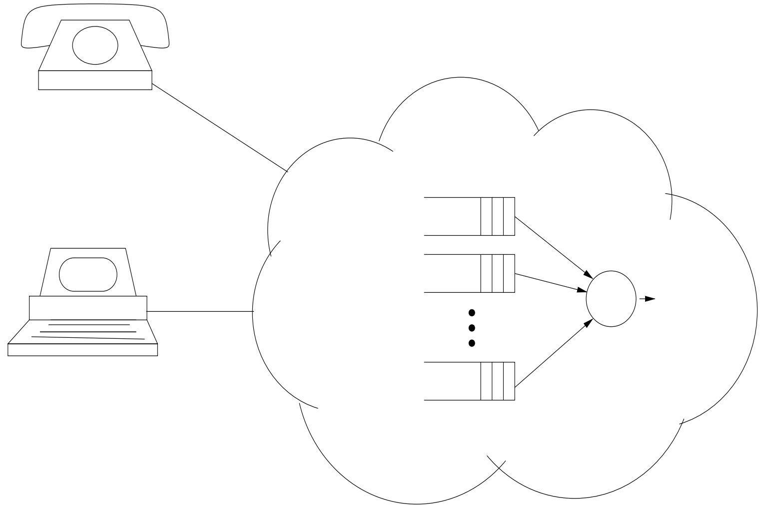
# Implementing IP Telephony With Priority Services

Peter Marbach
CCSR, University of Cambridge

- Priority Services
  - Providing Quality-of-Service
  - IP Telephony





- Priority Levels: $1, ..., N$
- Different Levels of QoS
- Price: $u_i$ per submitted packet

$$u_i < u_k, \qquad i < k$$

- Meet QoS Requirements at Lowest Price

## Questions

- Equilibrium?
- Level of Congestion?
- Pricing?



## Model

- Non-Cooperative Users
- Net Benefit for User

  Net Benefit = (Utility) - (Cost)

- "Networking Game"

  Equilibrium ?

## Results: Single Link Case

- Equilibrium Exists
- Users Choose Priority According to QoS
- Pricing for Congestion Control

$$P_d(i^*) \leq 1 - \frac{u_{i^*}}{u_{i^*+1}}$$



## Example

- $u_{i^*+1} = 2u_{i^*}$
- $P_t(i^*) = \frac{1}{3}$
- Expected Price Per Packet: $3u_{i^*}$
- Result:

$$P_t(i) \geq \frac{u_{i^*}}{u_{i^*+1}}$$

**Future Work**

- Network Case
- User-Strategies
- Experiments