


## A Selective Retransmission Protocol for Multimedia on the Internet

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### Applications: Text-Based vs. Multimedia

- Text
  - Strict loss constraints
  - Minimal timing constraints
- Multimedia
  - Forgiving to loss
  - Requires timing constraints




### Protocols: TCP vs. UDP

- TCP
  - No loss
  - Retransmits all lost messages
  - Potentially large latency
- UDP
  - Potentially unbounded loss
  - Does no retransmission
  - Minimal latency
- Neither is what you want!




### Our Solution: A Selective Retransmission Protocol

- Balances the extremes of TCP and UDP
- Tradeoff between loss and latency
- Retransmits a percentage of lost packets
  - If end-to-end delay is large, may accept loss
  - If end-to-end delay is small, may always request retransmission
  - If loss rate is very high, may request retransmission
- How to decide?

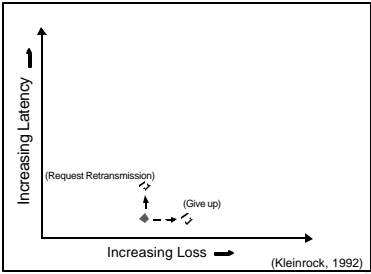



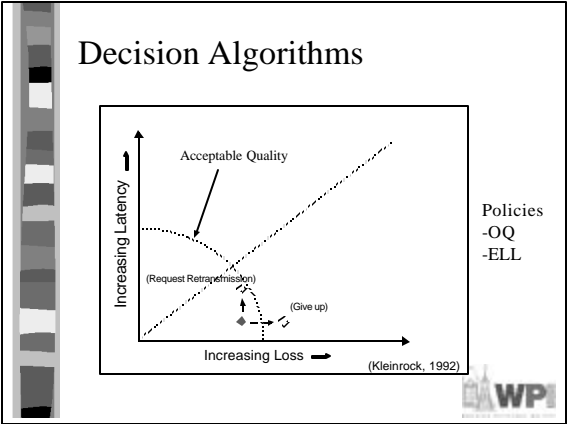
### Groupwork

- Measure of loss
- Measure of latency
- Packet is lost
- ... Do you request retransmission?
- Consider:
  - Quiet WAN, interactive audio
  - LAN, broadcast video
  - Lossy MAN, interactive audio



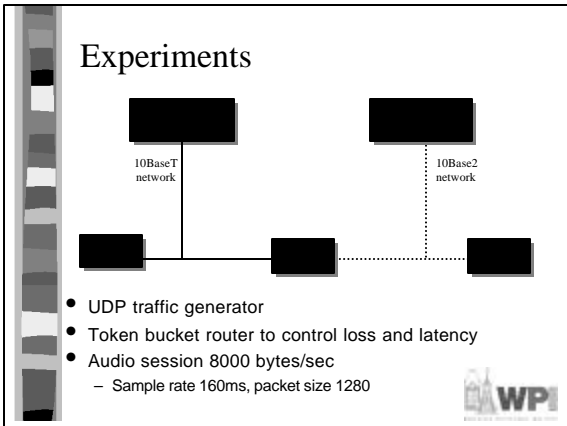
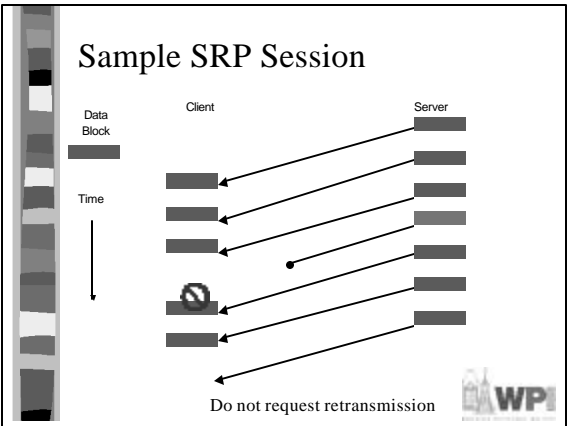
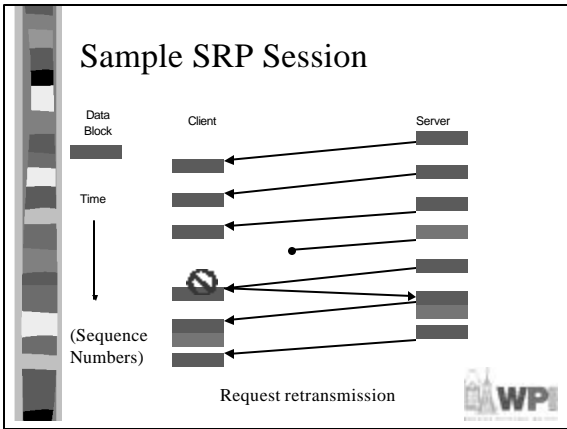
### Decision Algorithms

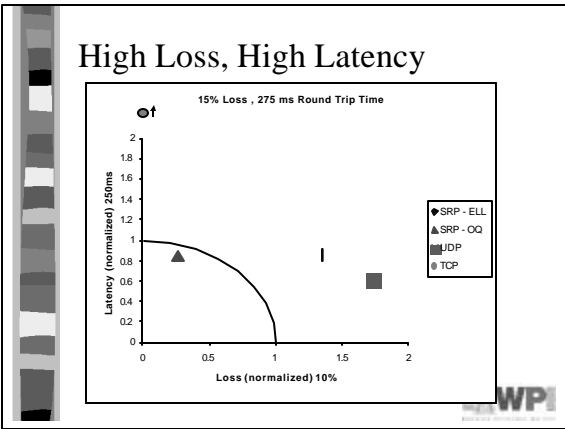
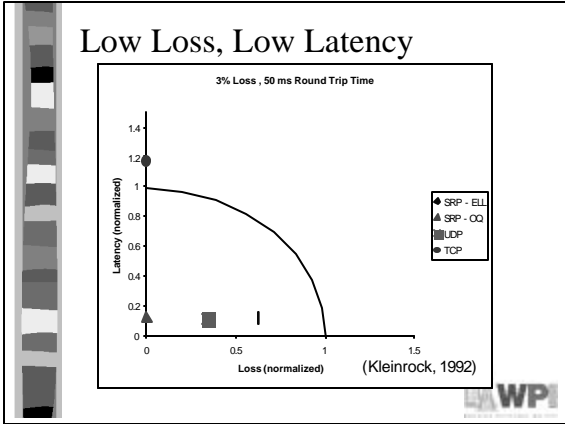
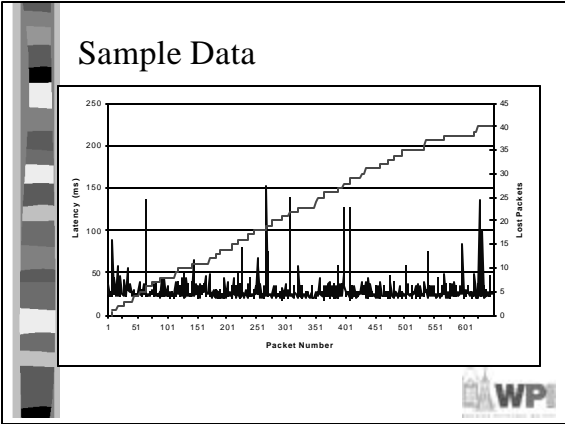





- ### Approach
- Implement SRP and “application”
  - Setup “WAN” test-bed
  - Run “application” over
    - TCP - No loss - Low latency
    - UDP - Medium loss - Medium latency
    - SRP - High loss - High latency
  - Measure “Quality”
  - Analyze Results

- ### Implementation of SRP
- Application layer client/server protocol
    - No “kernel hacking” (yet)
    - Built on top of UDP
  - Measure loss and latency
    - Use to decide when to request retransmission
  - Decision algorithm modular
    - Equal Loss Latency (ELL)
    - Optimum Quality (OQ)





### Conclusions

- TCP and UDP provide extremes
  - Not what Multimedia wants
- SRP can provide a balance
- Tuning of SRP depends upon
  - Application
  - Measure of "quality"
  - Measurement of network (loss, RTT)

WPI

### Future Work

- Repair (FEC)
- Congestion control
- Loss detection (timeout)
- Additional decision algorithms
- Multicast

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### Evaluation of Science?

- Category of Paper
- Science Evaluation (1-10)?
- Space devoted to Experiments?

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