Pioneer in 2004: Improving TCP performance by adding awareness of wireless link errors
Introduction

- TCP in wireless situation
- Past Research
- Our approach
Outline of the seminar

- Wireless – advantages/disadvantages
- TCP – slow start/congestion avoidance mechanism
- Performance of TCP in wireless situation
- Past Research
- Our approach
- Plans for next semester
Wireless – advantages / disadvantages

- Connection
- Performance (speed)
- Reliability
- Quality Influence
- Security/Privacy (why end to end solution)
TCP – Slow start/Congestion avoidance mechanism

- Slow Start – what is it, how it works?
- Congestion avoidance mechanism – what is it? Why is it needed?
Performance of TCP in wireless situation

- Wireless disadvantage and effect on TCP (default behaviour of TCP)
- TCP can not differentiate between loss and congestion
- Waste of available bandwidth
Previous Approach

- End to End solutions (such as Freeze TCP)
- Split Connection (such as Indirect TCP, M-TCP)
- Proxy Connection (such as Snoop TCP, WTCP)
More Closely Related Approach

- A-TCP
  - Cross layer feedback solution
  - Uses Connection/disconnection events from network card and the RTO
  - Deals with loss due to hand-off issues, but not bit errors.
Info on Our Approach

- Also a cross layer feedback solution (end to end as well)
- Involves using Wireless Extension by Jean Tourrilhes, changing TCP source code/Network card device drivers and using iotcl calls
Wireless Extension

- Developed by Jean Tourrilhes
- An extension to the current Linux networking interface
- Allow configuring/accessing network cards in a standard way through a standard API
- Tools Available(/proc/net/wireless)
Ioctl calls, TCP/Network source code

- Ioctl is a kernel system call
  - A usual method to set/get parameters from the network device

- TCP source code
  - Time out function - RTO, cwnd

- Network card source code
  - Retransmission function
Our approach

- Cross layer solution
- Use retransmission signal and quality of the link directly from the network card
- Wireless Sender based (only need to change the code in the wireless sender)
- Two different usage so far
Our approach – Diagram of how it works

**First usage**

<table>
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<tr>
<th>TCP</th>
<th>802.11</th>
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**Second usage**

- ACK loss due to bad channel
- TCP acks
- Keep cwnd same
- .11 acks
- D

RTO

Increase
Limitation of our Approach

- Works only in network configuration like this: Wired network – Wireless host
- Does not work for: Wireless host – Wired network – Wireless host
- Only deals with loss due to bit error from bad transmission
- Possibility of combining with solutions dealing with hands-off issues such as Freeze TCP, ATCP
Plan for next semester

- Resource needed (by week 14 this semester)
  - Labtop with Redhat 9 and a wireless lan card
  - Wireless access point
- Schedule for my thesis