Multihop, Long-Distance, 802.11 Networks
Network Design Goals

• Low cost ($400 radio equipment per link)
• High Throughput (5Mbps)
• Low Loss
• Low Delay (voice/video)
• Scalable
• Reliable
• Maintainable
Inefficiency of 802.11 Protocol in Long-Distance, Point-to-Point Networks [Raman et. al. 2004]

• Interference of Relay using 1 Channel
• 802.11 Time Slot Reservation Wastes Bandwidth
Inefficiency of 802.11 Protocol in Long-Distance, Point-to-Point Networks [Raman et. al. 2004]

- If 802.11 timeslot reservation disabled, Can Simultaneously Transmit using Same Channel
Inefficiency of 802.11 Protocol in Long-Distance, Point-to-Point Networks [Raman et. al. 2004]

- If 802.11 timeslot reservation disabled, Can Simultaneously Receive using Same Channel
STDMA provides better bandwidth

- Algorithm of Raman et al., in simulation, gives maximum throughput for bipartite networks if traffic same in both directions
- With 1 channel, cannot send more than $\frac{1}{2}$ bandwidth in one direction
Additional Channels

• With more than one channel, can send full bandwidth in one direction.

• For Multilink Relays:
Current Research Questions

• How to allocate limited channels (frequency) and set STDMA rates?
• How to improve TCP performance over such a network?
• What types of rate guarantees are possible?

Evaluation Using:
--Channel Emulation
--Experimental Data from Berkeley Testbed and Deployments