

# Research Methods in computer science

Spring 2017

Lecture 11

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# Agenda

HW5 live grading

Experiments in uncontrolled environments

HW6

Conference Organization Updates

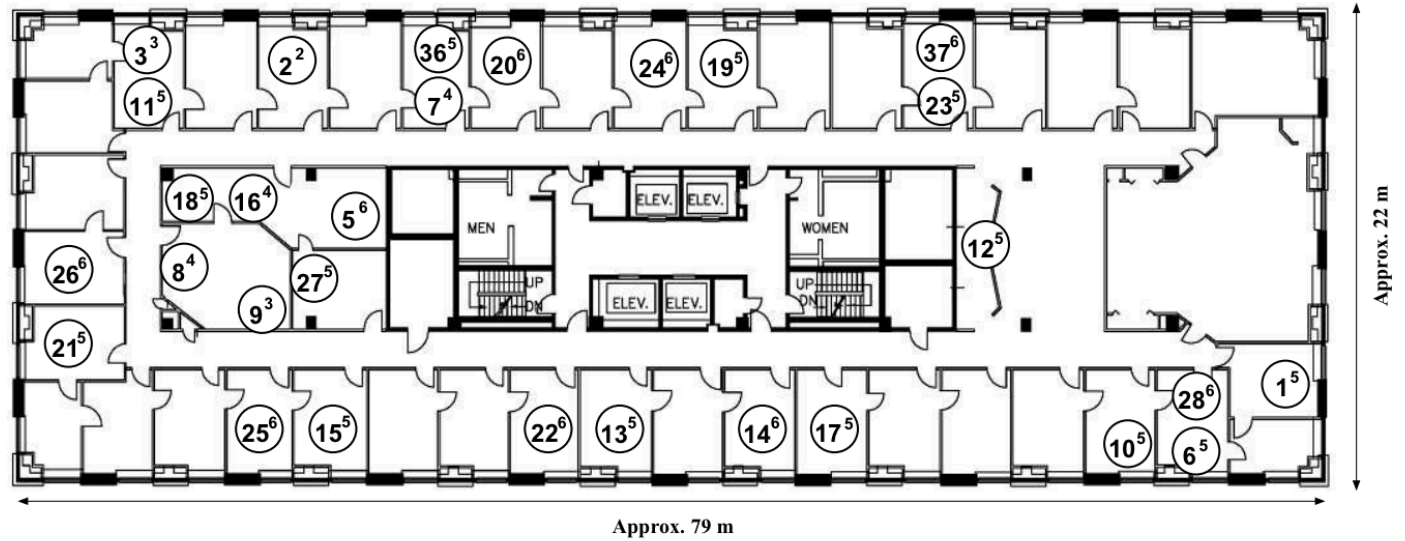
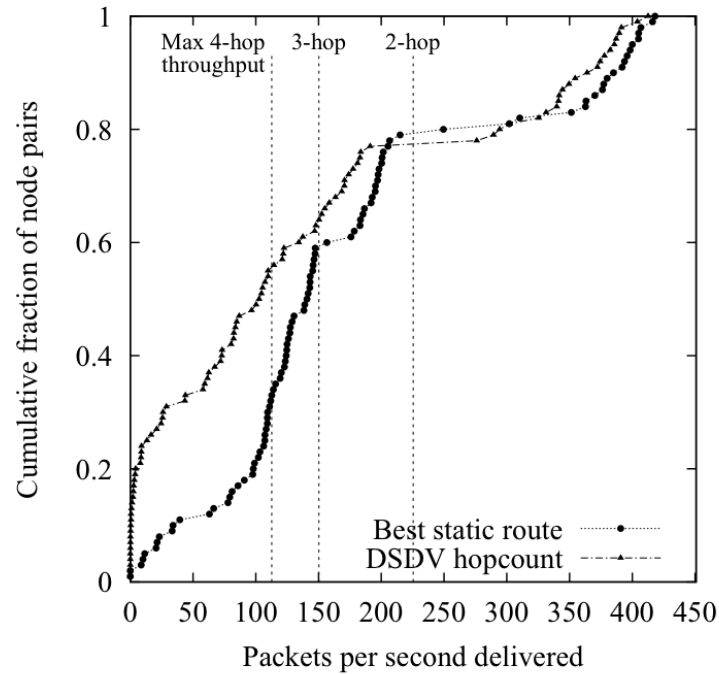


Figure 1: A map of the test-bed. Each circle is a node; the large number is the node ID, and the superscript indicates which floor of the building the node is on.

Decouto 2003



**Figure 2: When using the minimum hop-count metric, DSDV chooses paths with far less throughput than the best available routes. Each line is a throughput CDF for the same 100 randomly selected node pairs. The left curve is the throughput CDF of DSDV with minimum hop-count. The right curve is the CDF of the best throughput between each pair, found by trying a number of promising paths. The dotted vertical lines mark the theoretical maximum throughput of routes of each hop-count.**

# Wireless Experiments Today

## Protocol Comparison Experiments

- Run the new protocol

- Run best-known prior work

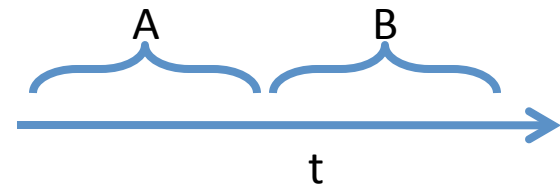
- Compare

## Simulations + Testbed experiments

# Serial Experiments

Run one protocol at a time

Compare the results

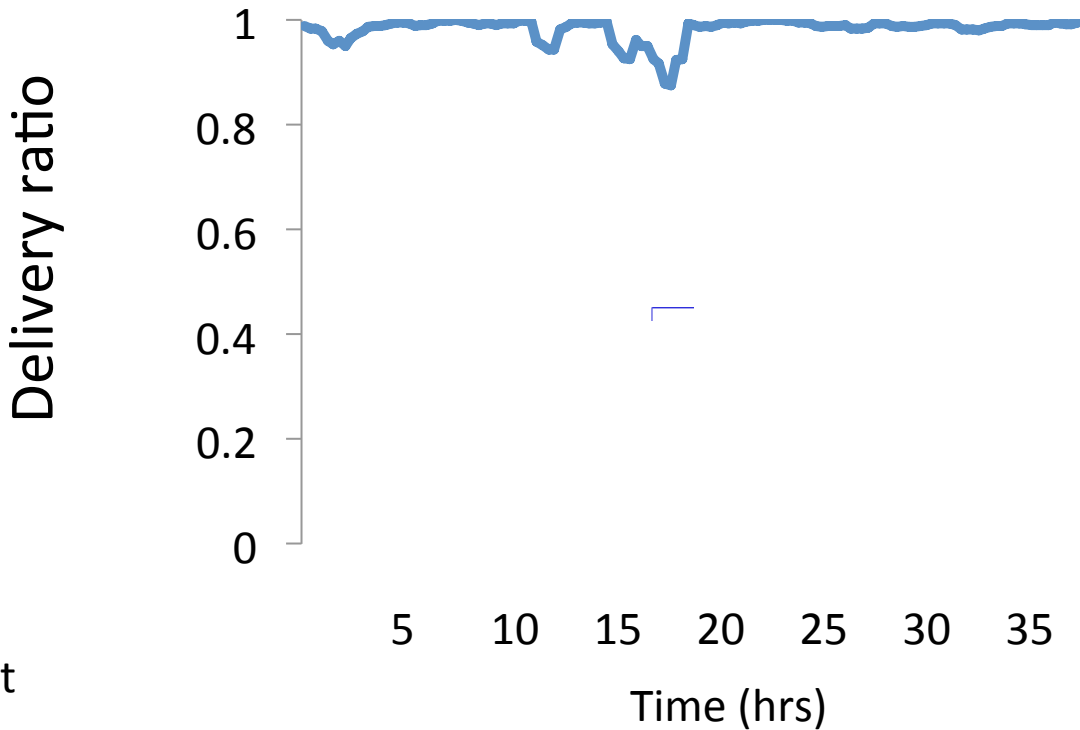


Difficult to distinguish the contribution of these these variables

Environment

Protocol mechanisms

# Repeating Experiments Enough?



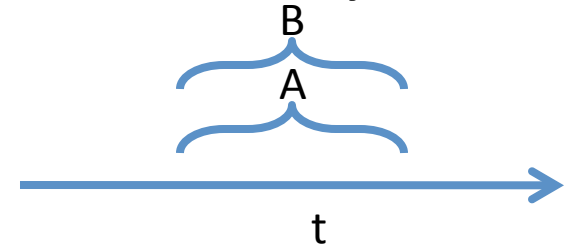
Tutornet

**High delivery ratio across time  
(short experiments can be misleading!)**

# Concurrent Experiments

Run multiple protocols concurrently

Compare the results



## Advantages

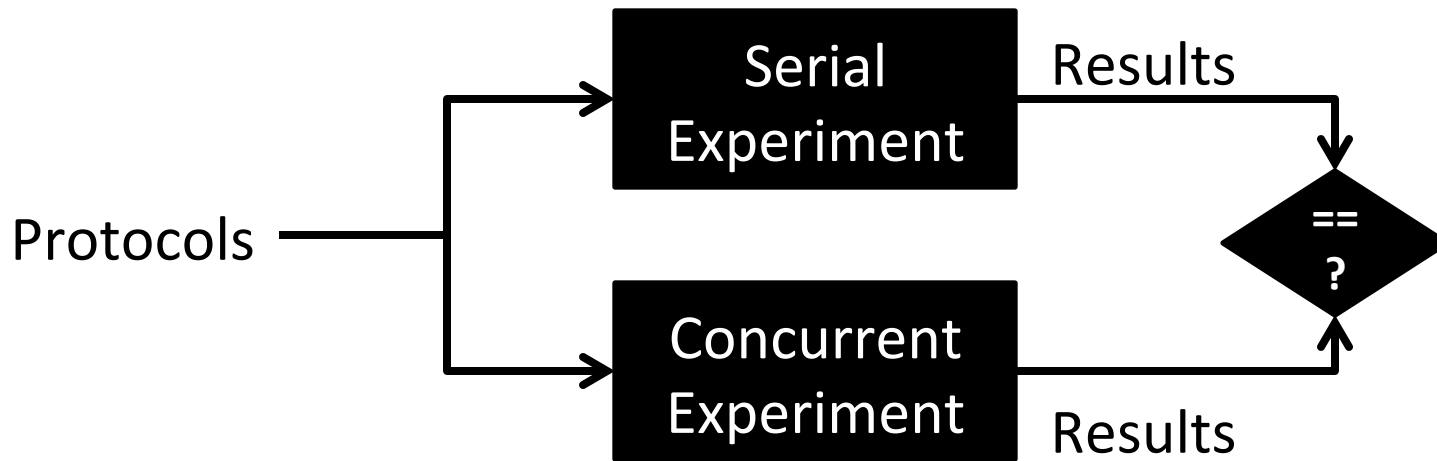
Consistent environment for both the protocols

## Concerns

Contention of different types



# Evaluation Strategy



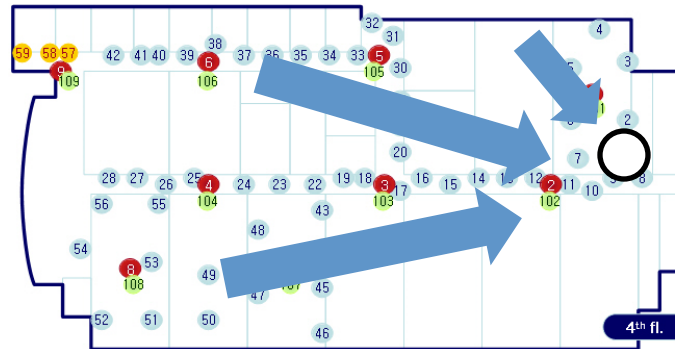
Ideally same conclusions from both methods  
Evaluating methodologies not protocols  
Experiments on Tutornet testbed

# Protocols

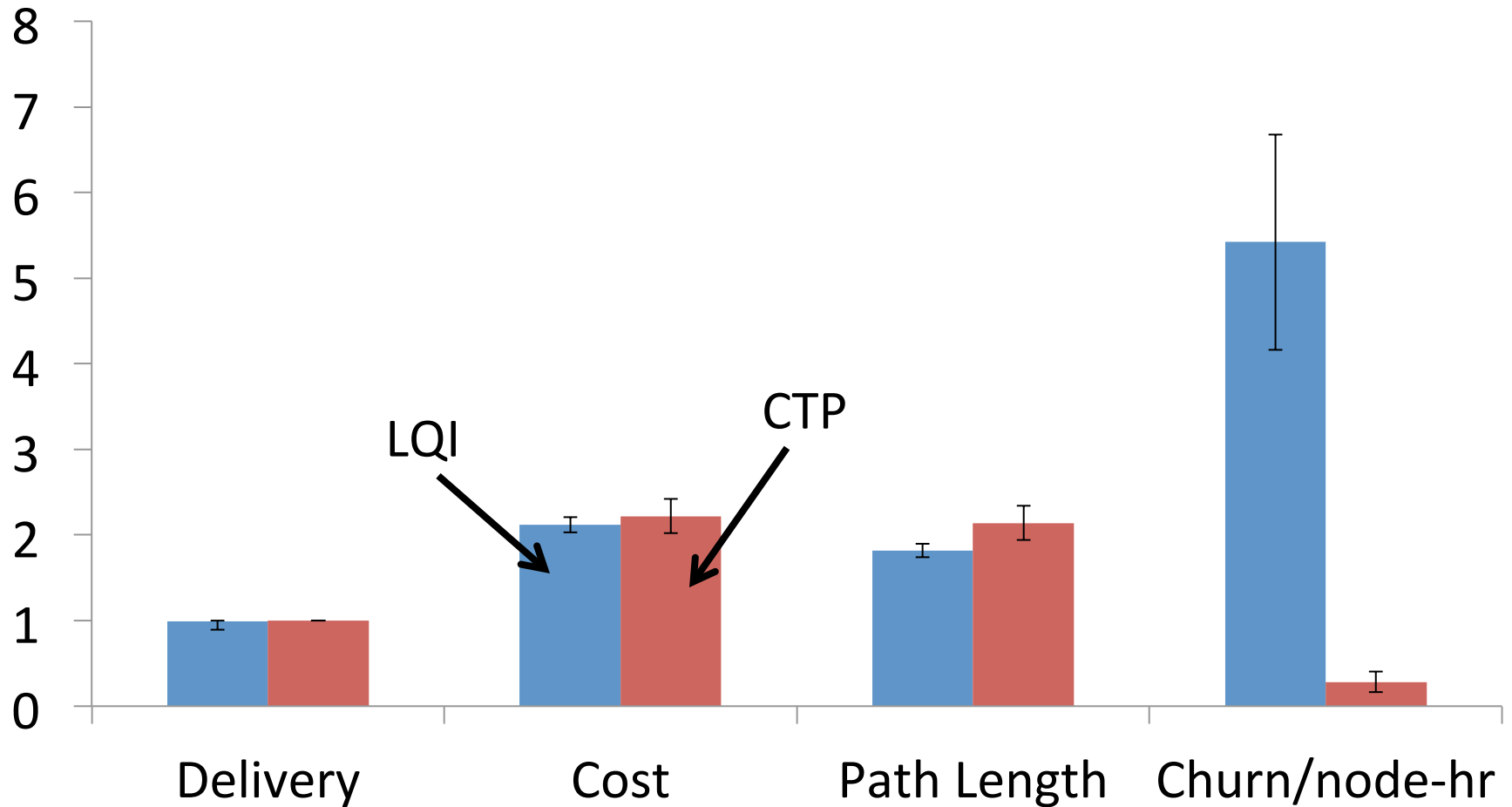
## Collection

CTP [Gnawali 2009]

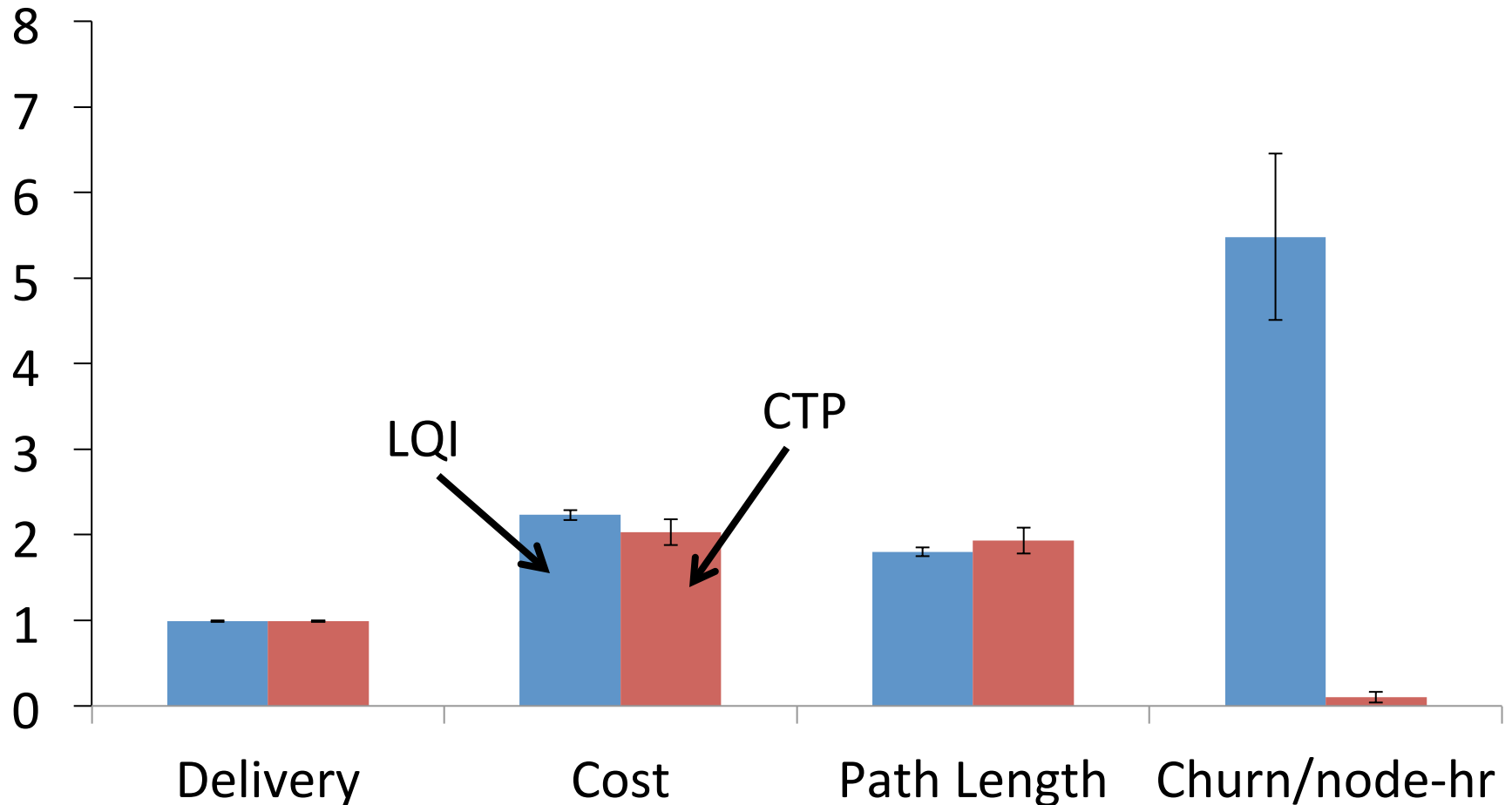
MultihopLQI [TinyOS 2007]  
(LQI)



# Results from Serial CTP vs LQI Experiment on Tutornet

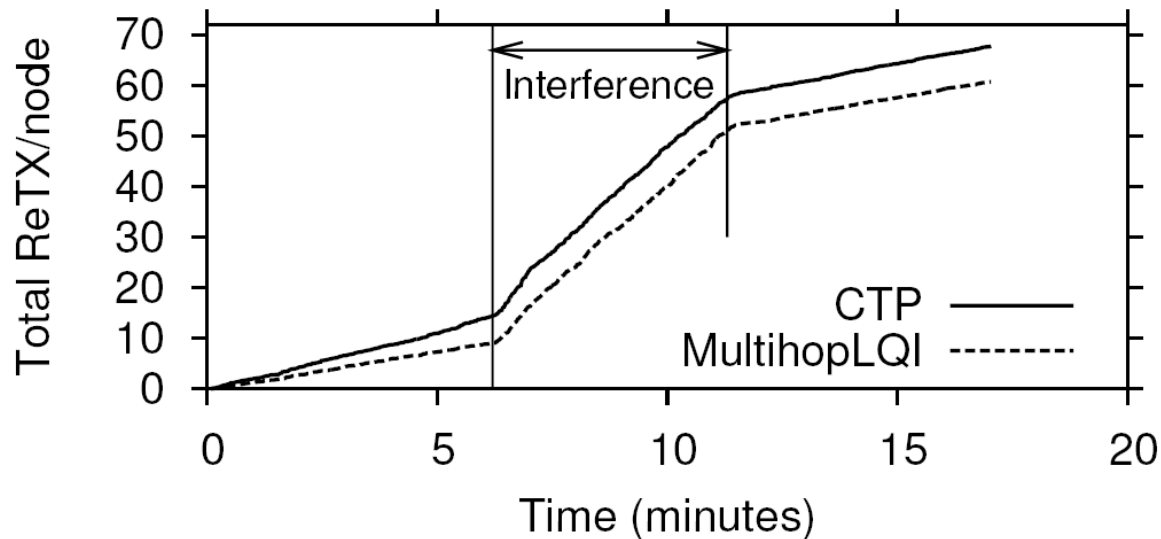


# Results from Concurrent CTP vs LQI Experiment on Tutornet



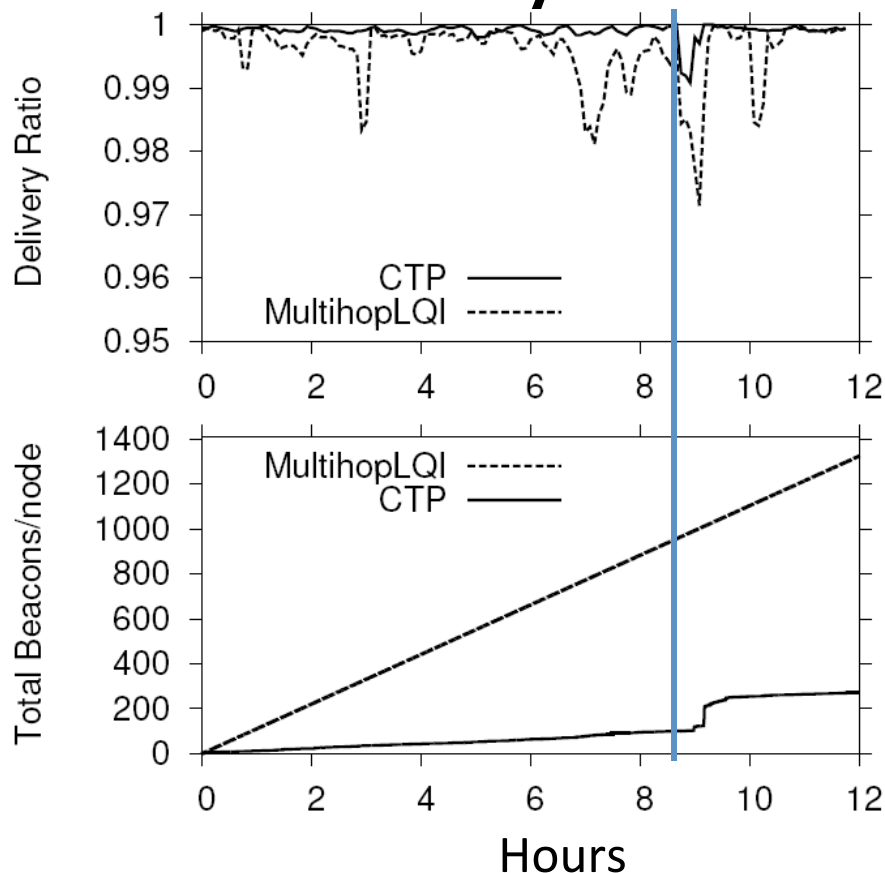
# Putting Concurrent Methodology to Use: Expts. with External Interference

## Engineered Scenario



Both protocols *struggle* in the same environment.

# Putting Concurrent Methodology to Use: Experiments in a Dynamic Network



CTP and LQI react differently to dynamics.

# HW6 – Related Work

Writeup related work. One table and one diagram required. Don't go too far!