

Mininet @ Stanford

Brian O'Connor

Te-Yuan Huang

Vimal Jeyakumar

Bob Lantz

Where Mininet is used

- Introduction to Computer Networking
 - CS144
 - In-class exercises
 - Demos
 - Assignment Platform
 - Online MOOC
 - Assignment Platform
- Advanced Topics in Networking (CS244)
 - Assignments
- Graduate Student Research

Introduction to Computer Networking

- In-class exercises
 - Bufferbloat
- Demos
 - DHCP Attack
 - BGP Spoofing
- Assignment Platform (replaced VNS)
 - Static IP Router
 - NAT
 - (Simple OSPF Router)

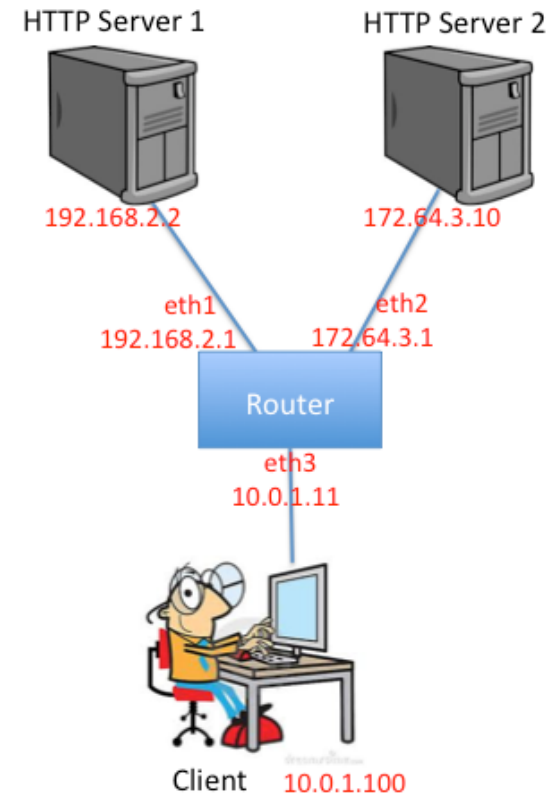
Assignment Platform

Assignment

- Build a simple router that handles TCP, UDP, & ICMP

Environment

- Mininet topology provided to emulate webservers and tie in students' code
- Standalone VM for online students
- EC2 for Stanford course

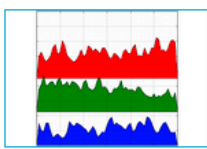




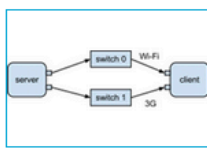
CS244 Spring '12: Advanced Topics in Networking

Assignment

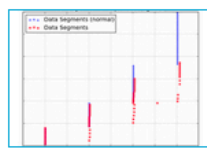
- Pick a paper
- Reproduce a key result, or challenge it (with data)
- You have:
 - \$100 EC2 credit,
 - 3 weeks, and
 - must use Mininet



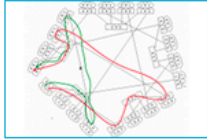
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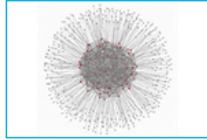
Multipath TCP over WiFi and 3G links



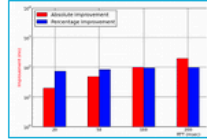
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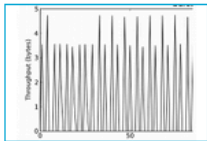
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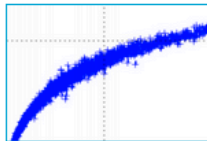
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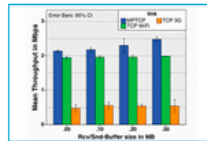
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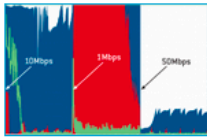
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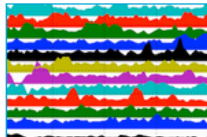
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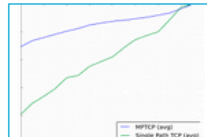
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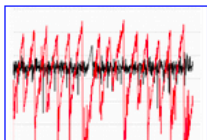
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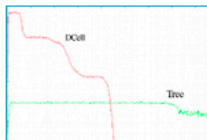
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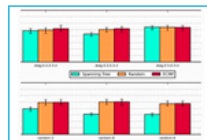
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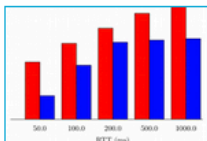
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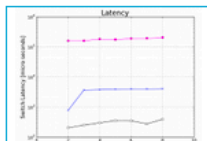
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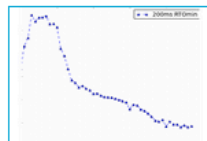
Hedera



Increasing TCP's Initial Congestion Window



HULL: High Bandwidth, Ultra Low Latency



TCP Incast Collapse

Wide range of projects:
transport protocols, data center
topologies, and queueing.

CoDel

HULL

MPTCP Wireless

Outcast

Jellyfish

DCTCP

Incast

Flow Completion Time

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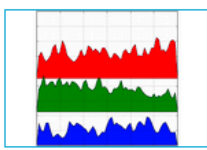
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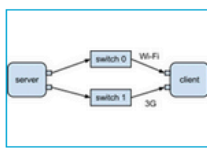
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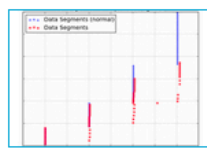
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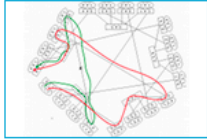
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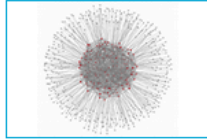
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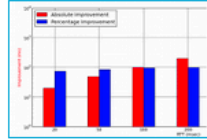
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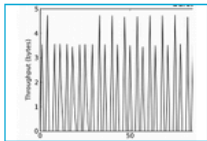
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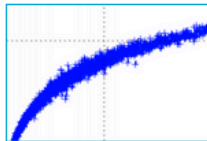
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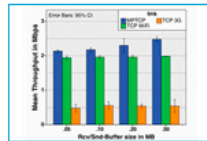
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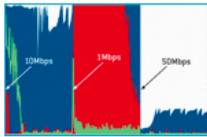
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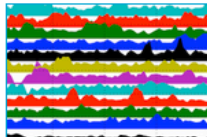
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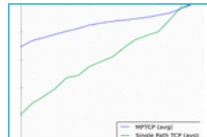
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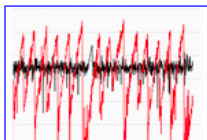
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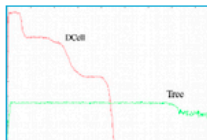
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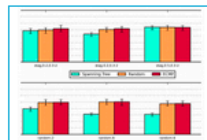
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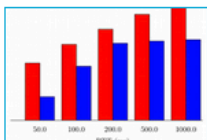
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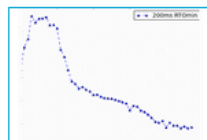
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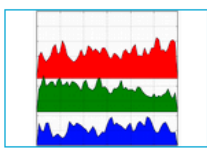
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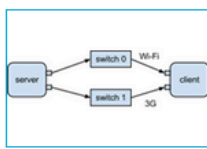
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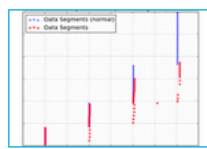
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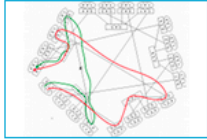
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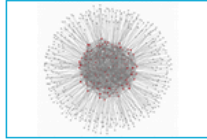
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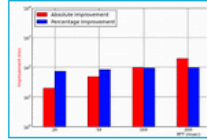
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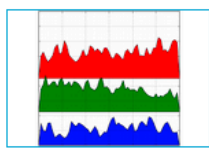


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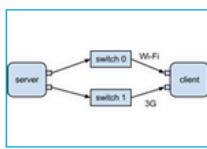


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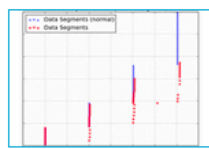




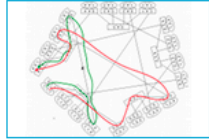
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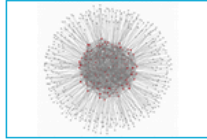
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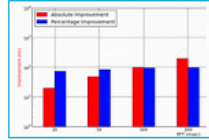
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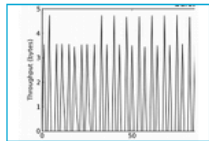
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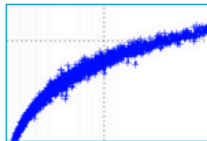
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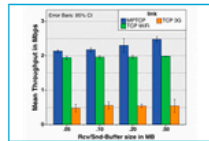
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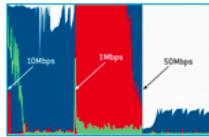
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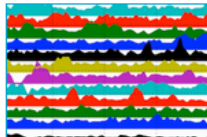
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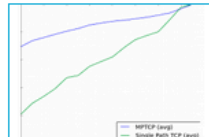
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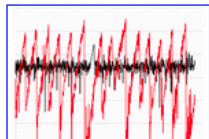
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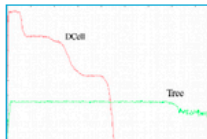
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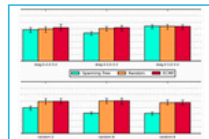
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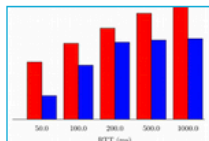
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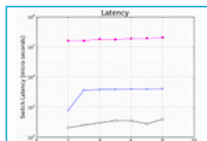
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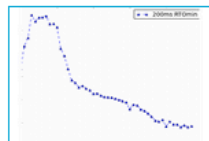
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16 replicated, 4 with extra results

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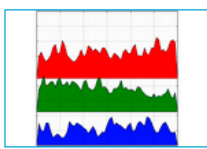
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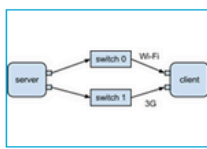
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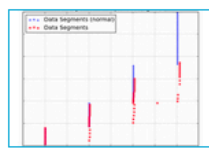
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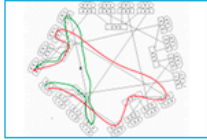
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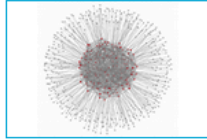
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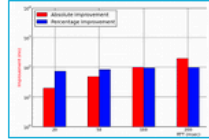
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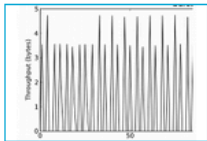
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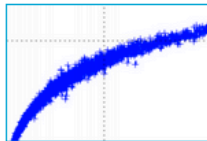
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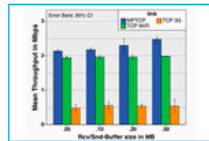
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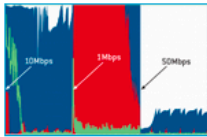
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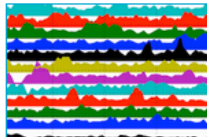
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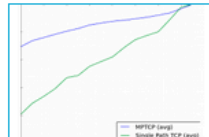
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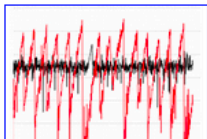
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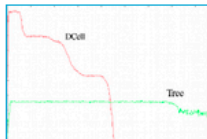
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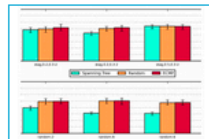
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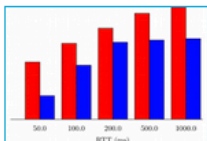
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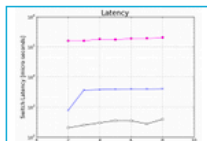
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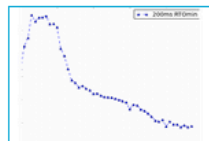
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RED

Results

2013

48 students, 24 projects

18 replicated, 3 partially replicated,

3 failed to replicate

Mosh

Jellyfish

TCP Rate Reduction

TCP Initial Window

TCP Fast Open

Video Streaming Rate

Switch Scheduling *

pFabric

Scaling Consistent Updates

TCP Pacing

DCell

Low Rate TCP DoS Attack

DCTCP

MPTCP

Hedera

Alfa

2014

31 students, 16 projects

12 replicated, 3 partially replicated,

1 failed to replicate

Sprout

Jellyfish

TCP Fast Open

Mosh

Bro Network

MPTCP

Misbehaving TCP receivers

Flow Completion Time

Video Streaming Rate

MPTCP Wireless

Dcell

TCP Initial Congestion Window

<http://reproducingnetworkresearch.wordpress.com/>

REPRODUCING NETWORK RESEARCH

network systems experiments made accessible, runnable, and reproducible

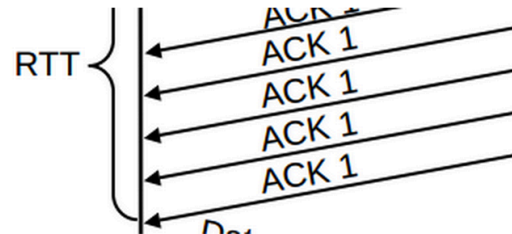
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**Can network systems
research papers be
replicated?**

This blog details stories from [Stanford CS244](#) students and researchers anywhere who have been inspired to share their research, largely using the [Mininet-HiFi network emulator](#) on [EC2](#) instances.

For more details, check out the [Projects](#) gallery, the [About](#) page, or [Contribute](#).

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CS244 '14: TCP CONGESTION CONTROL WITH A MISBEHAVING RECEIVER

June 5, 2014

by rileyclint

2 Comments

★★★★★ 2 Votes

TCP Congestion Control with a Misbehaving Receiver Clint Riley (clintr@) Gavilan Galloway (gavilan@) Introduction Much of the Internet was constructed with a benevolent world in mind. The goal was to [...]



CS244 '14: SPROUT

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Questions?

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 - *Assignments*
- *Graduate Student Research*