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STEROID OPENFLOW SERVICE

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REAL WORLD USE CASE

- Researchers analyze huge amounts of data
  - Can only store limited amounts at a time, locally
  - Need quick access to data sets
- Why should a geneticist have to worry about networking?
  - Transferring data should be a simple process
  - Wget, curl, ftp, web browser, etc.

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SO WHAT IS THE PROBLEM?

- Poor throughput
  - Current TCP congestion and flow control algorithms do not fill pipe
  - Gets worse as delay-bandwidth product increases
- Complex configurations/applications
  - Proprietary data transfer techniques, protocols
  - Parallel TCP based applications

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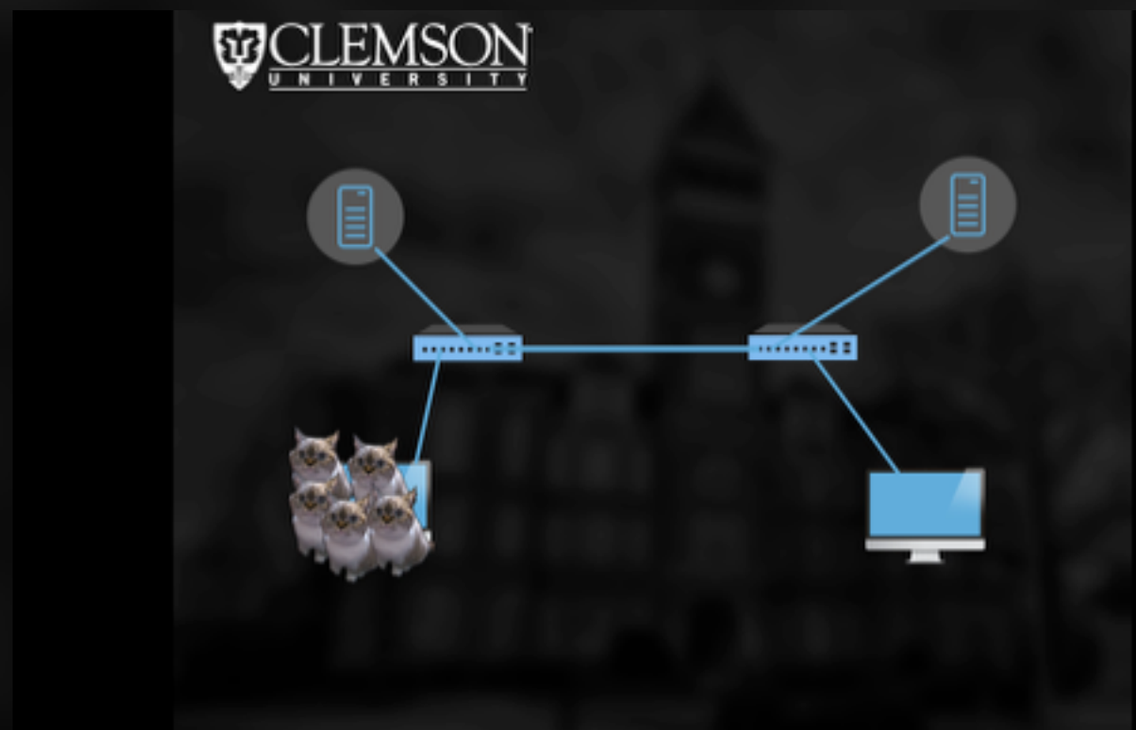
SO WHAT DO YOU DO?

YOU COME TO US!

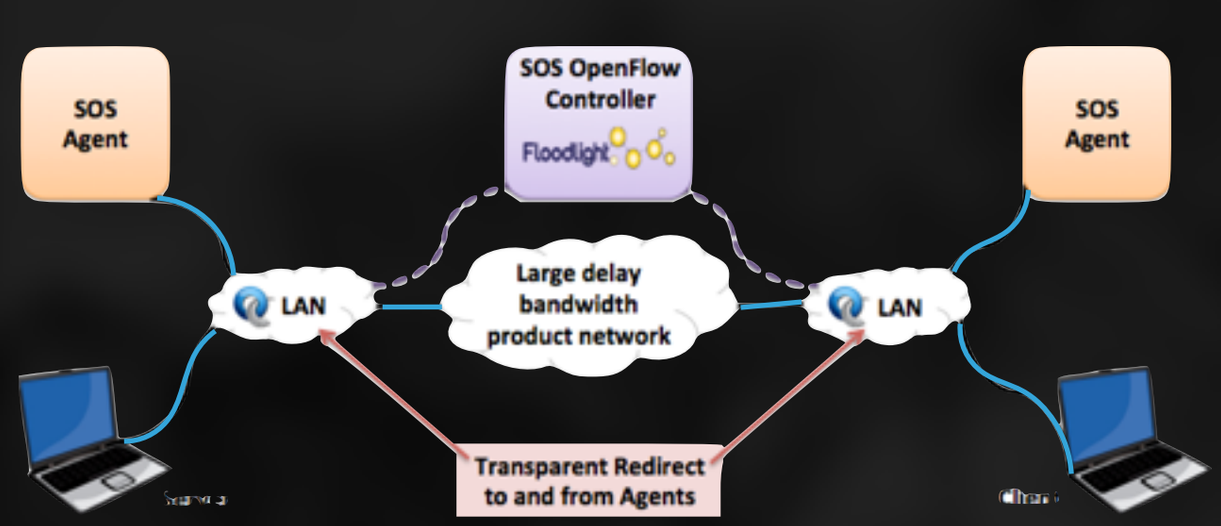
SOS SOLUTION

- Use multiple TCP connections to increase throughput
  - Leverages known benefits of parallel TCP
- Abstract everything away into a network service
  - Uses SDN to create **transparency**
- Provides a scalable architecture



SOS ARCHITECTURE

- Agents
  - Persistent C program
  - Handles all parallel TCP connections
- OpenFlow Switches
  - Performs packet matches, redirections, and rewrites
- Controller
  - Orchestrates SOS connections
  - Communicates with agents
- Clients and Servers
  - Unmodified – nonGMO
  - Unaware of SOS presence



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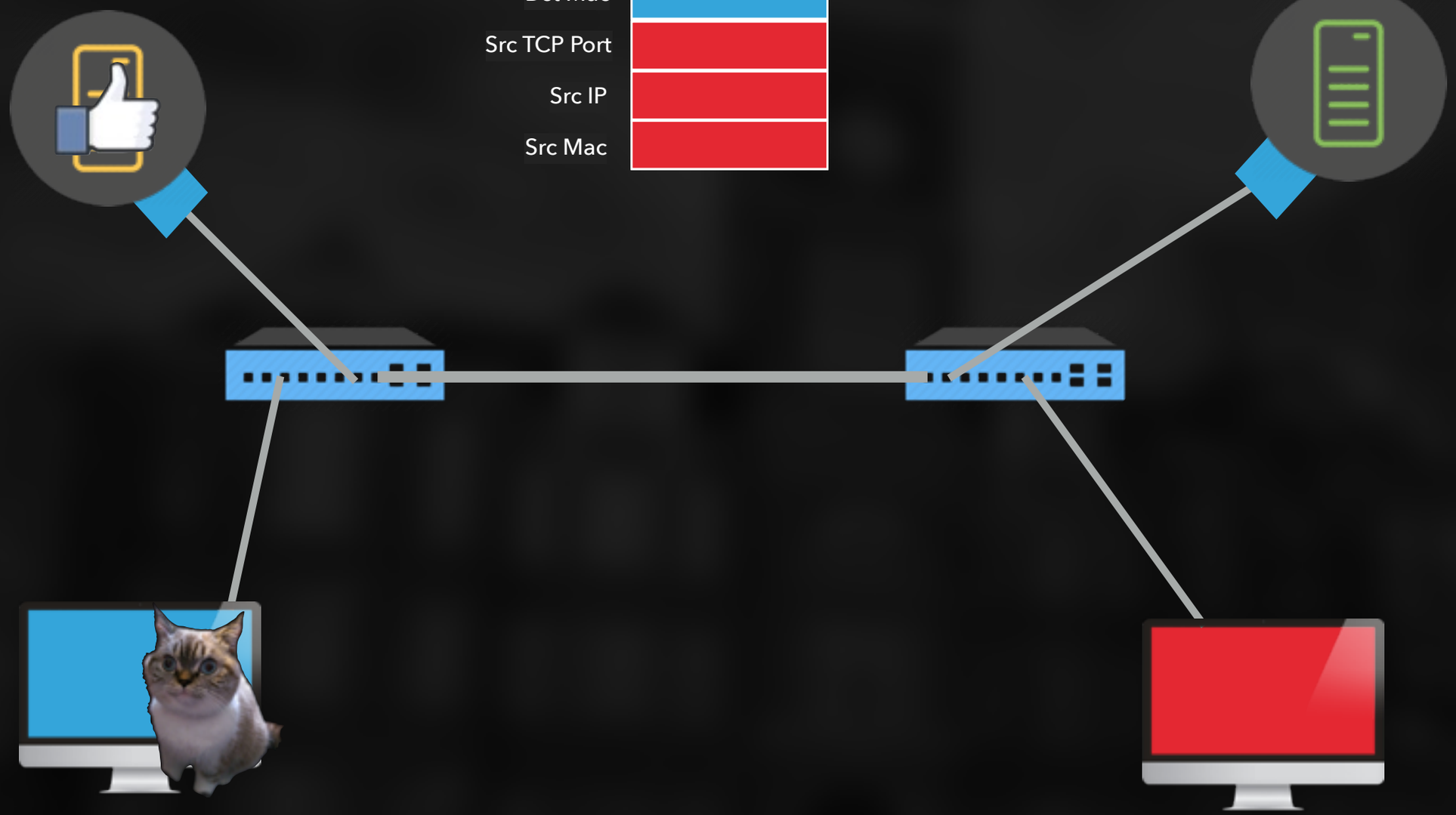
Dst TCP Port
Dst IP
Dst Mac
Src TCP Port
Src IP
Src Mac



SERVER

CLIENT

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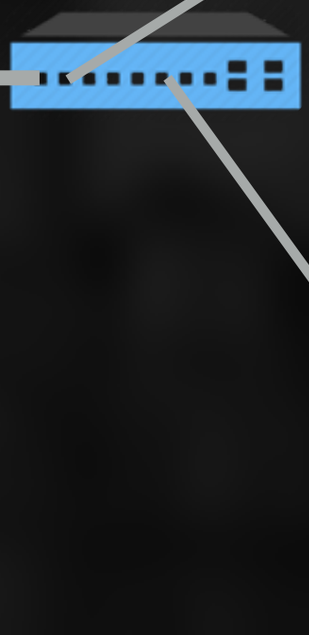
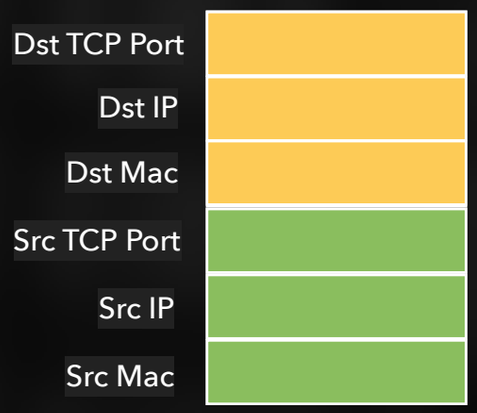


SERVER



CLIENT

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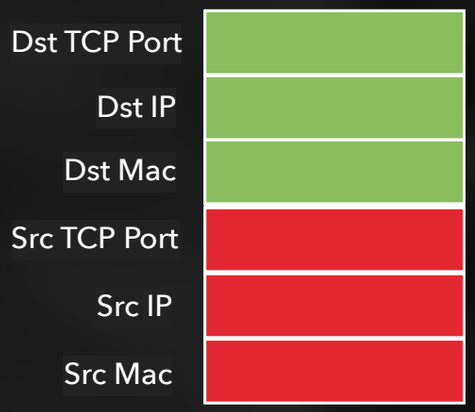

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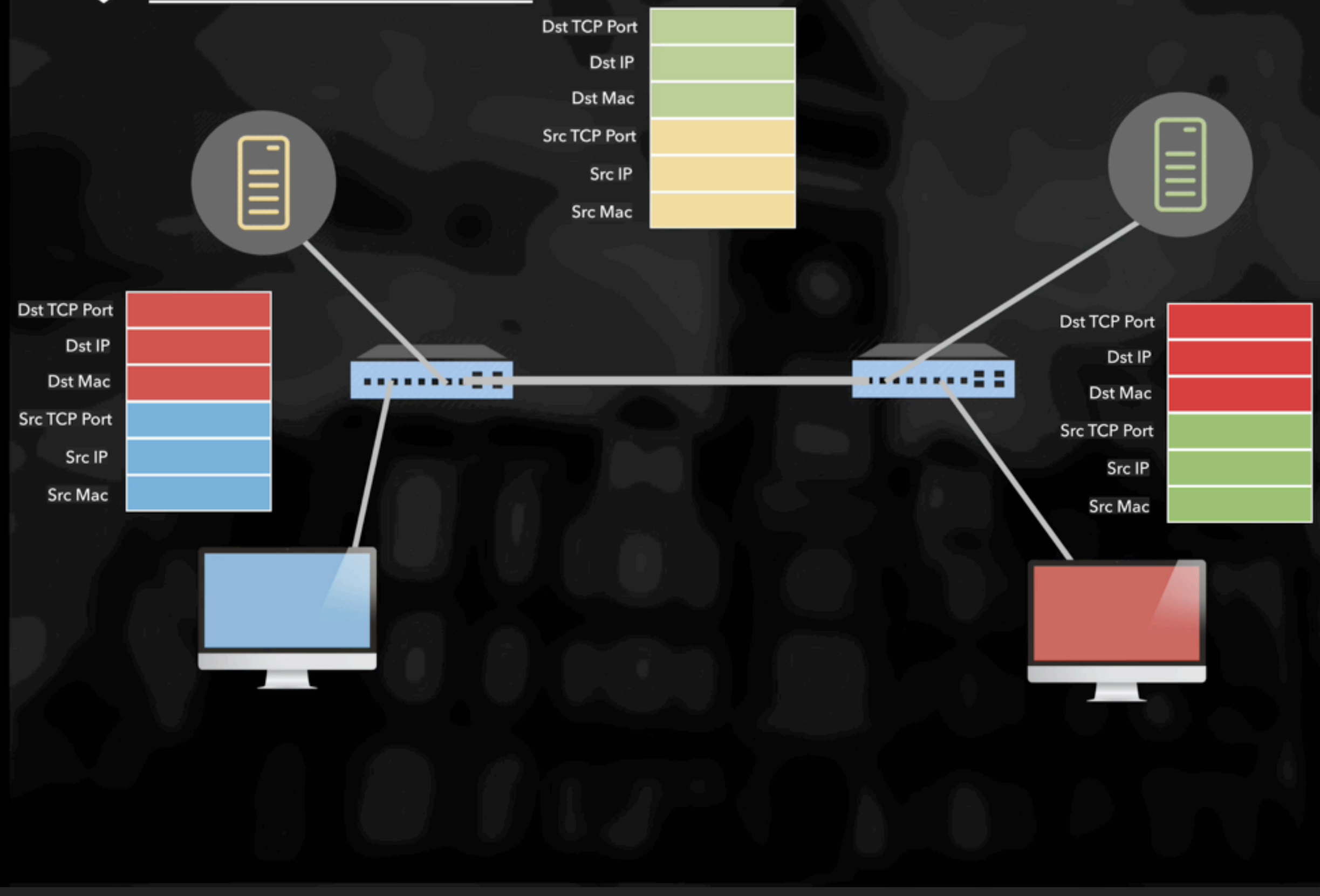

CLEMSON-UTAH LINK RESULTS

- 10 Gbps limited AL2S link

- Without SOS – 180 Mbps (~2% utilization)
- With SOS – 5.3 Gbps (~53% utilization)

- Bottleneck seen on Utah agent cpu

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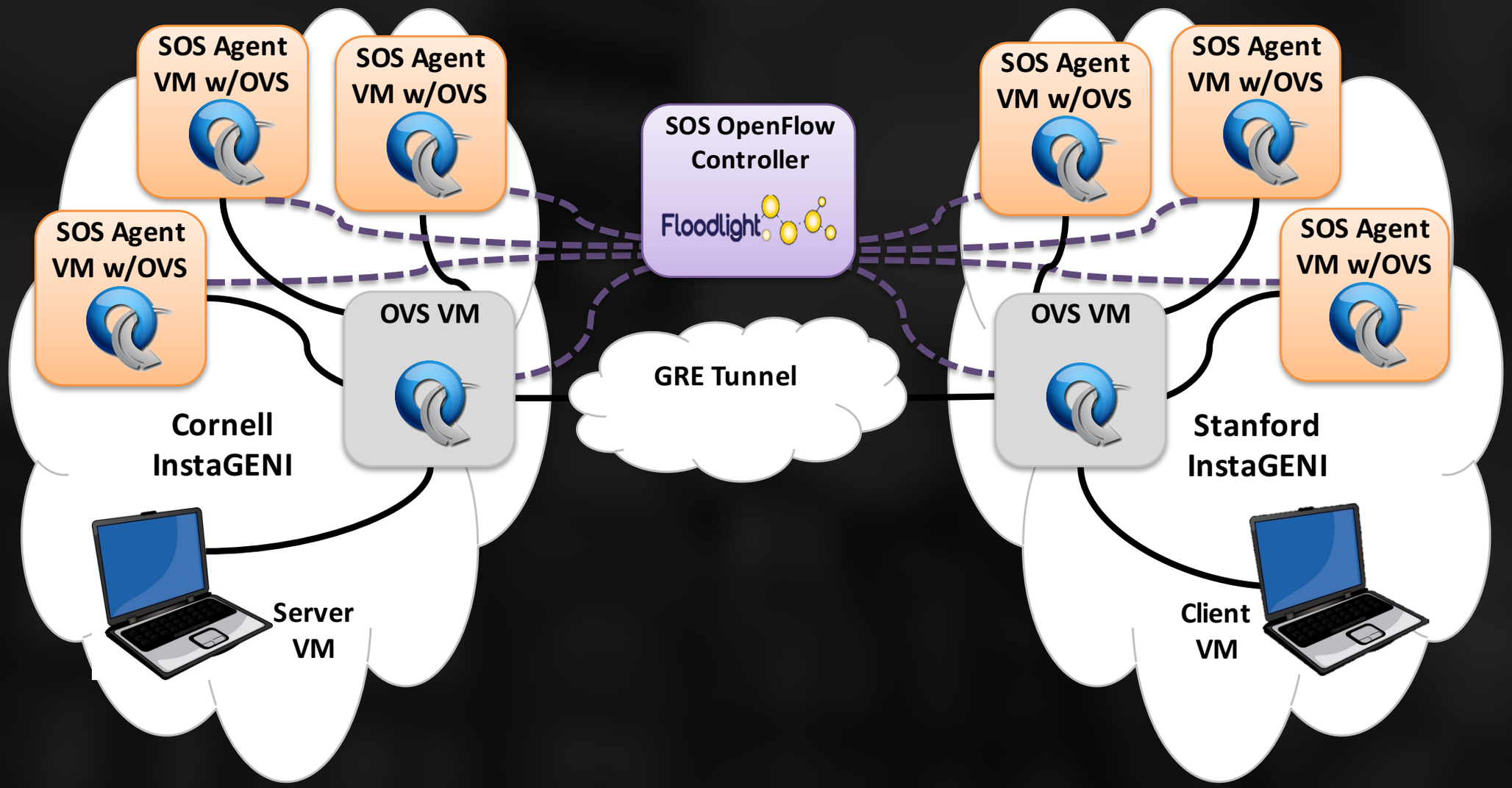
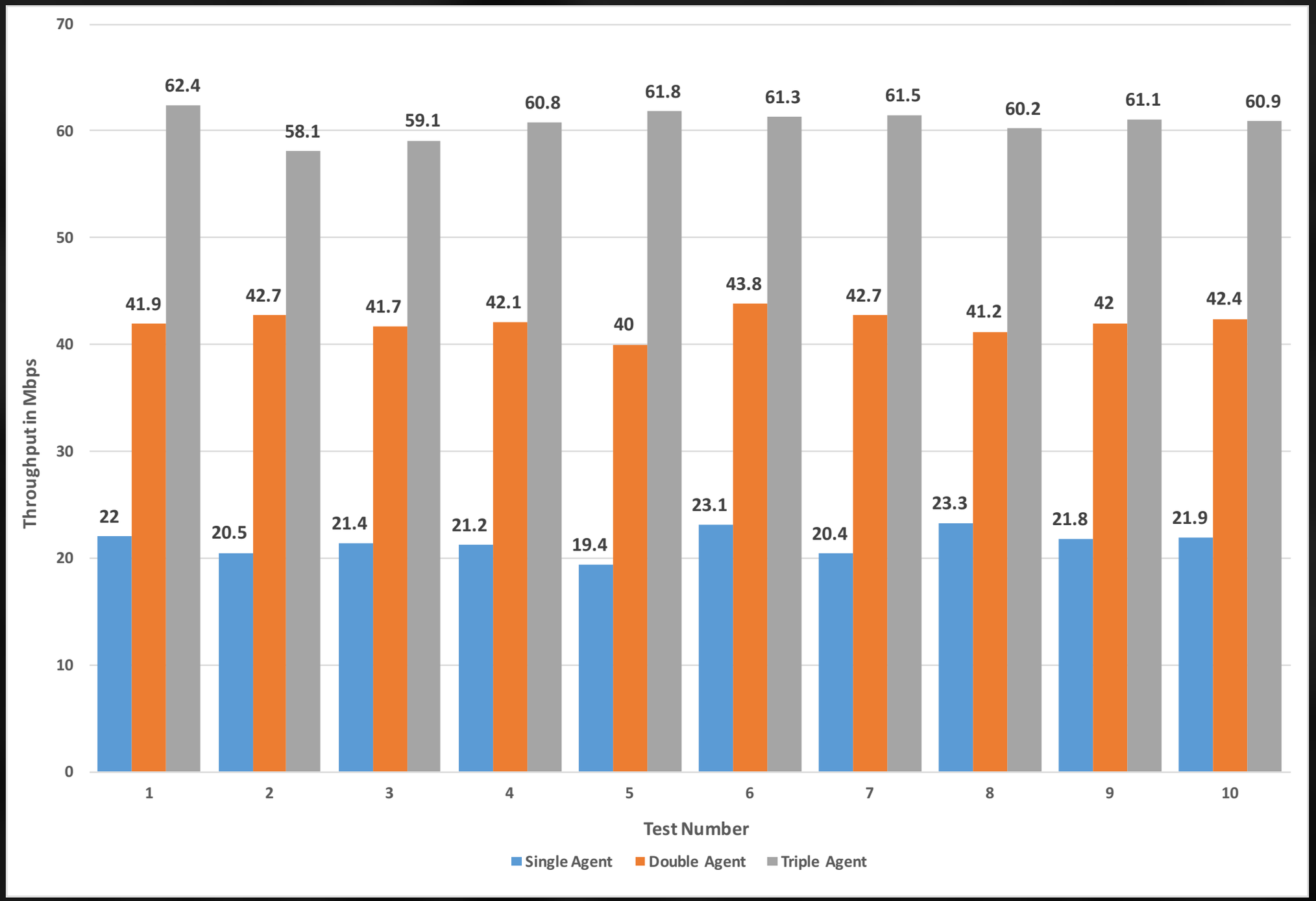
GENI RESULTS



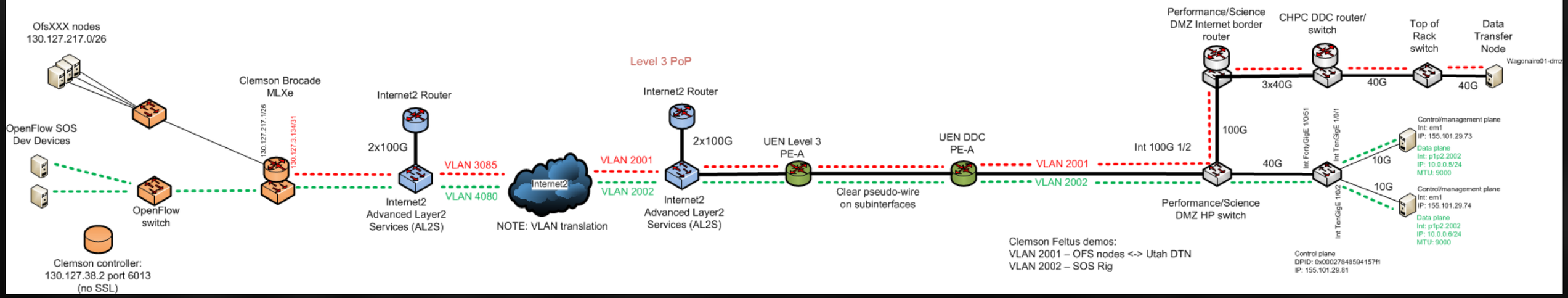
GENI SCALABILITY RESULTS CONT.



DEMO

Clemson and Utah Genomic Transfer Test Environments

Environment 1: Dedicated circuit between production facilities
Environment 2: OpenFlow SOS Testbed
Apr 2015



FUTURE WORK

- Evaluate scalability on CloudLab
- Deploy SOS as a network service for use by laparoscopic surgeons