Leveraging OpenFlow for Resource Placement of Virtual Desktops

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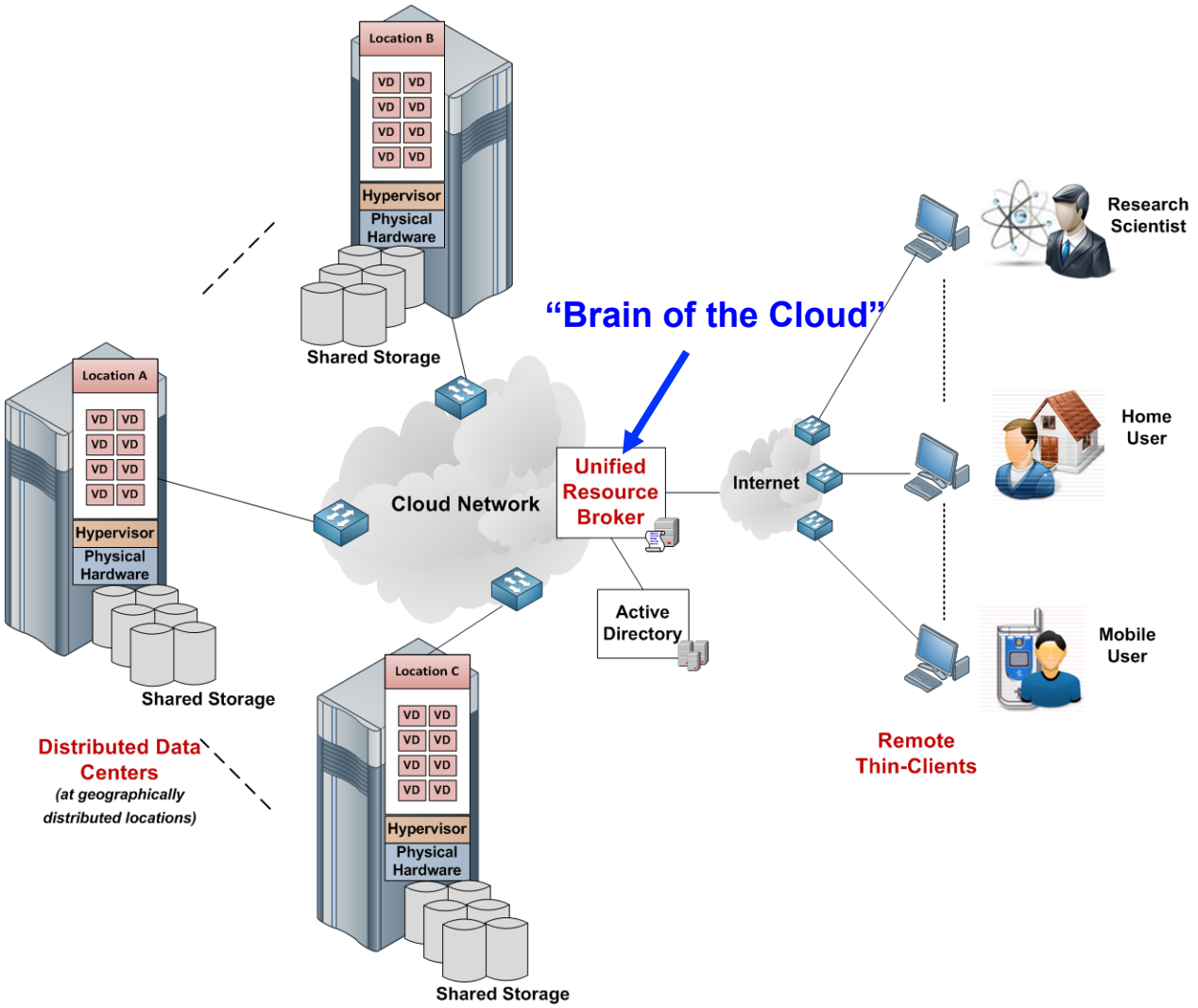
GEC15 Plenary Session Talk
October 2012

Topics of Discussion

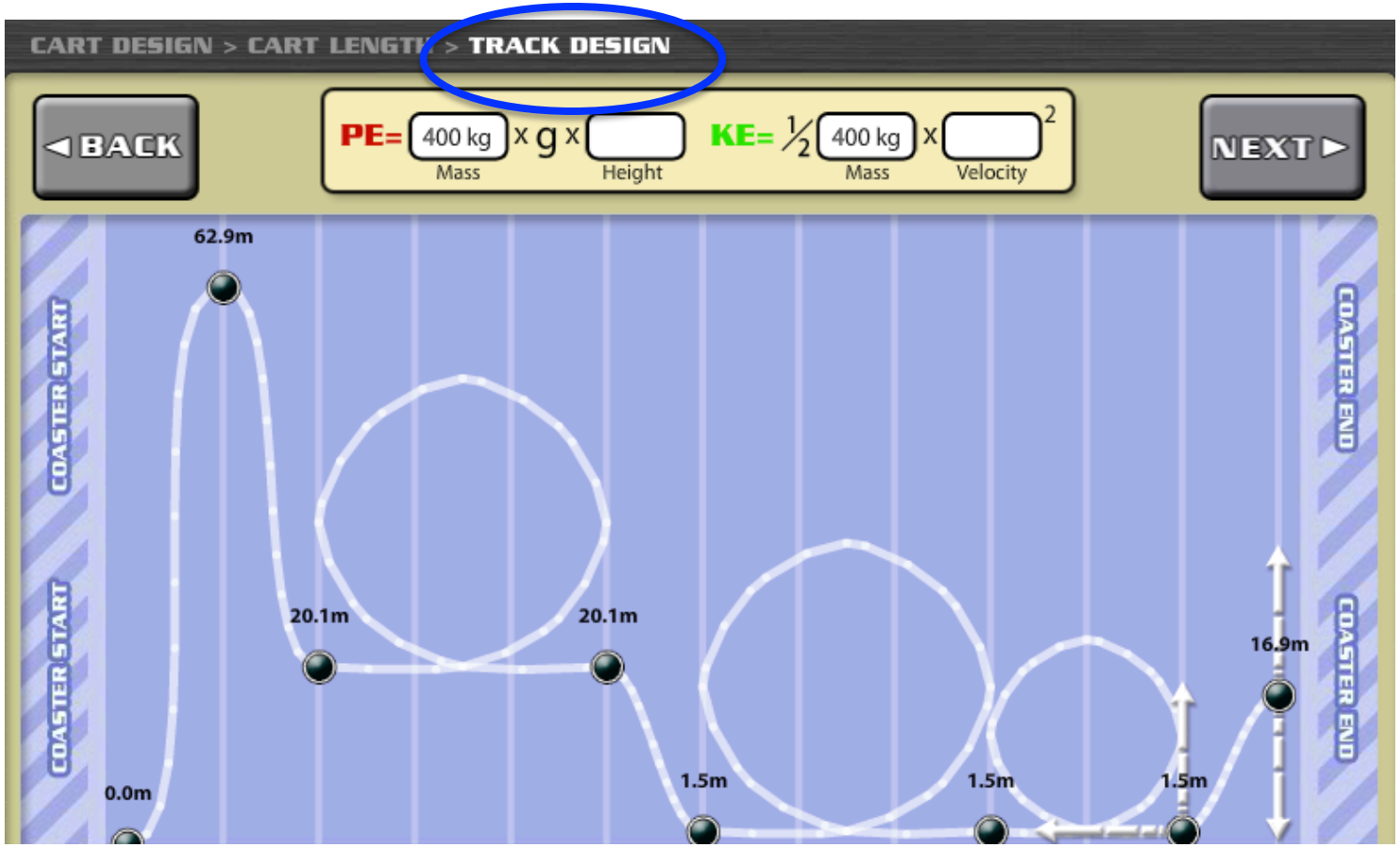
- VDCloud-GENI Experiment Context
- 'VDC-Sim': Virtual Desktop Cloud Simulator
  - Research use cases
  - Education use cases
- VDCloud Experiment Demonstration
  - GENI Slice setup
  - OpenFlow integration
  - VDC-Sim results 'with' and 'without' load balancing

Virtual Desktop Clouds (DaaS)



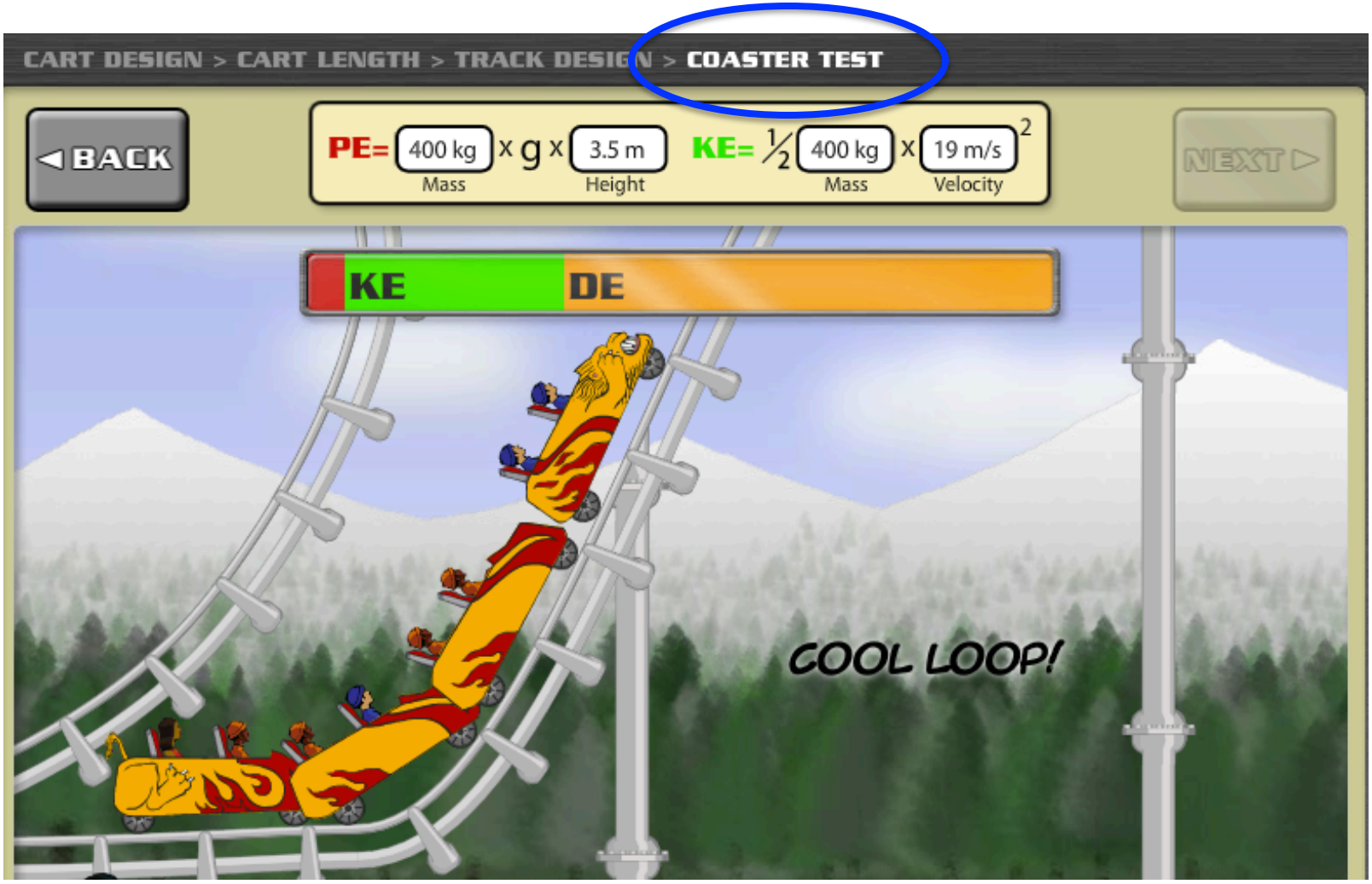
Roller Coaster Track Design

- Understand energy transfer (potential to kinetic)
  - Build cool coasters, study tsunamis – similar science
- Optimal design: hills, bigger loops, more cars, safe stop



Credit: National Geographic, The Jason Project

Roller Coaster Test

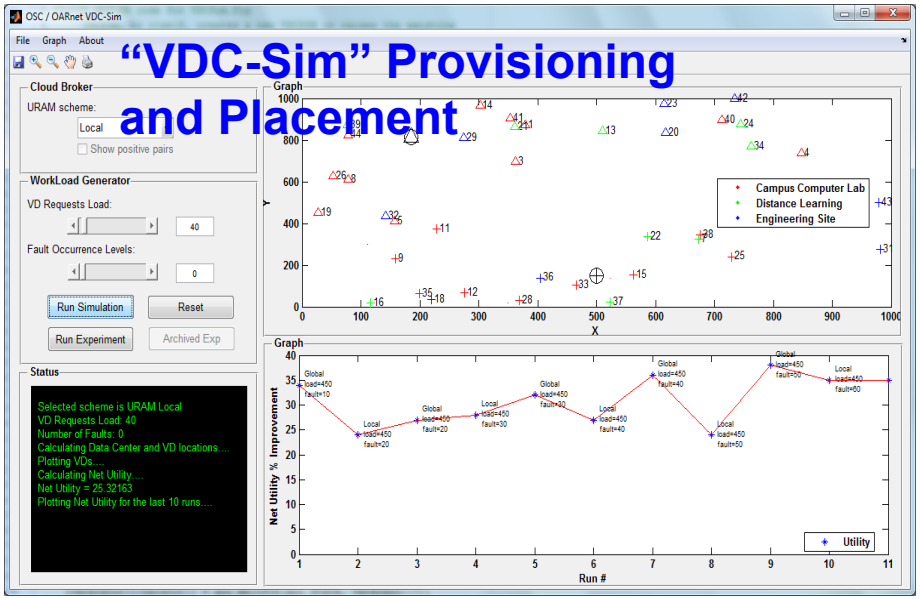


Roller Coaster Performance

Resource Allocation
Net-utility

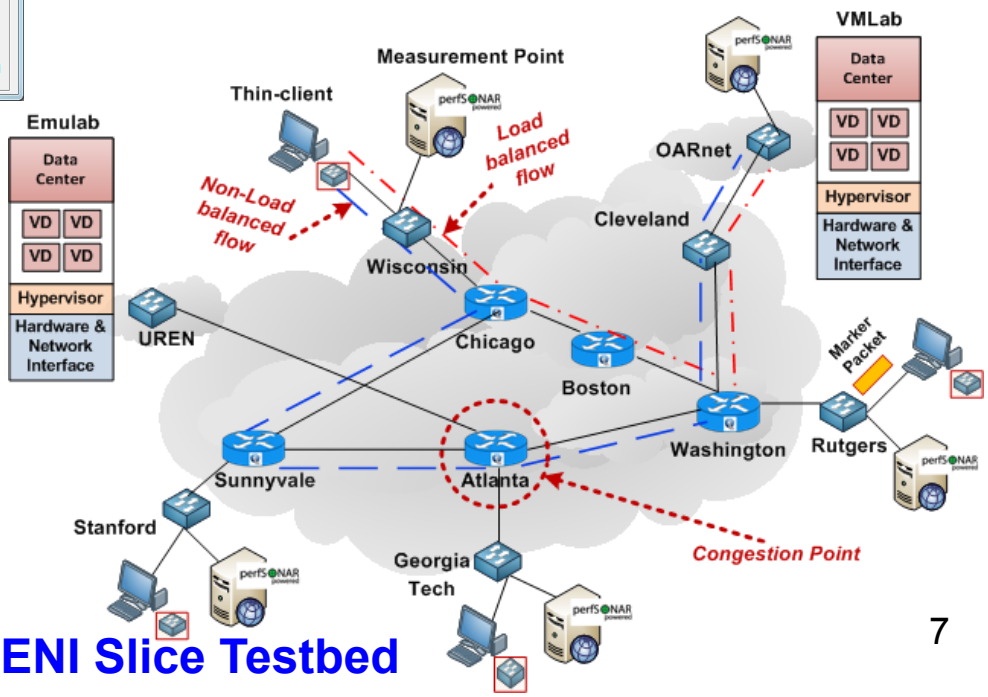
User
Experience

VMLab-GENI Experiment Context



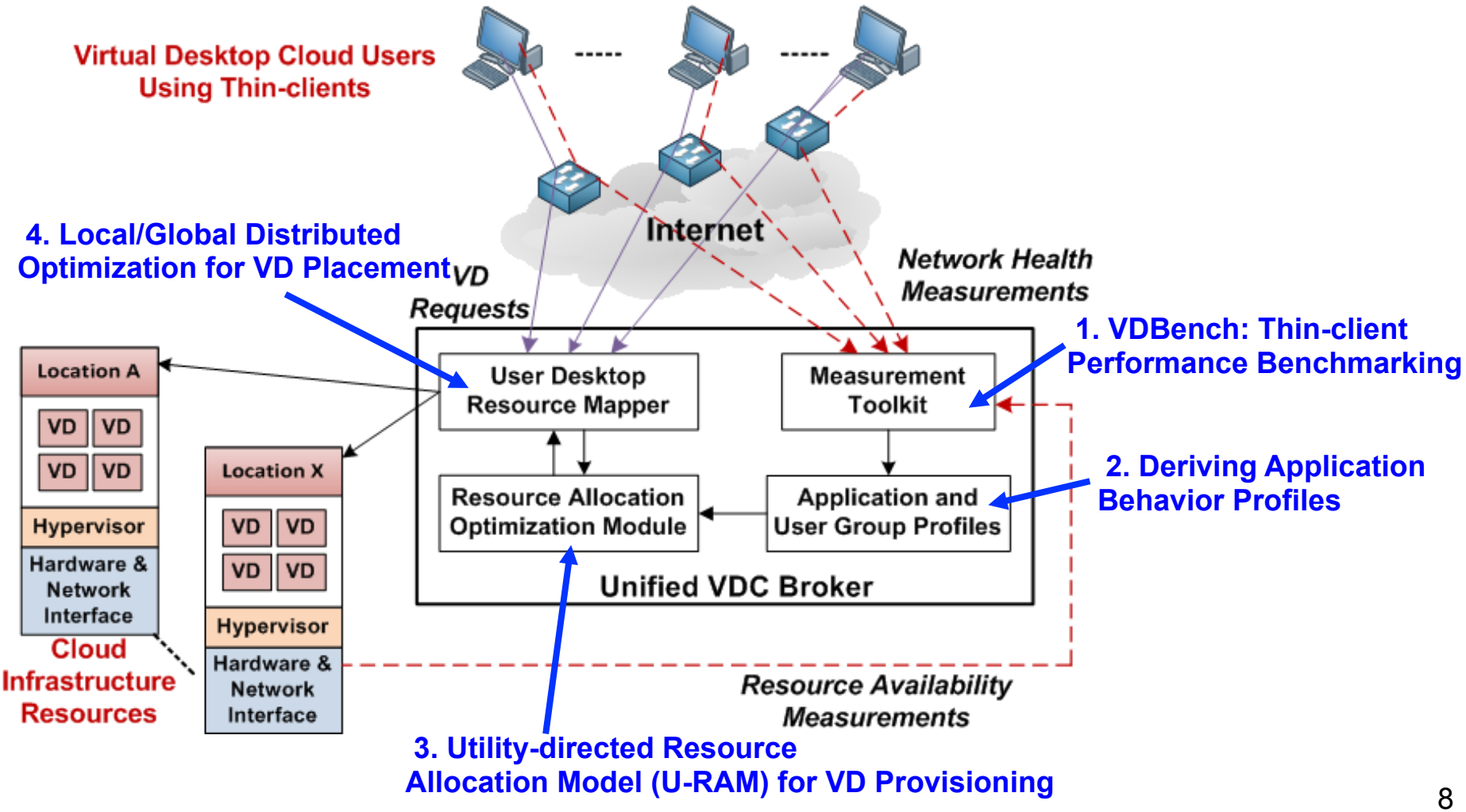
"VDC-Sim" Provisioning and Placement

- *VDC-Sim → GENI*
  - *Design & Development →*
    Validation and design tuning
  - *Large-scale simulations →*
    Cloud deployment experiments



GENI Slice Testbed

VDC Research "Big Picture"

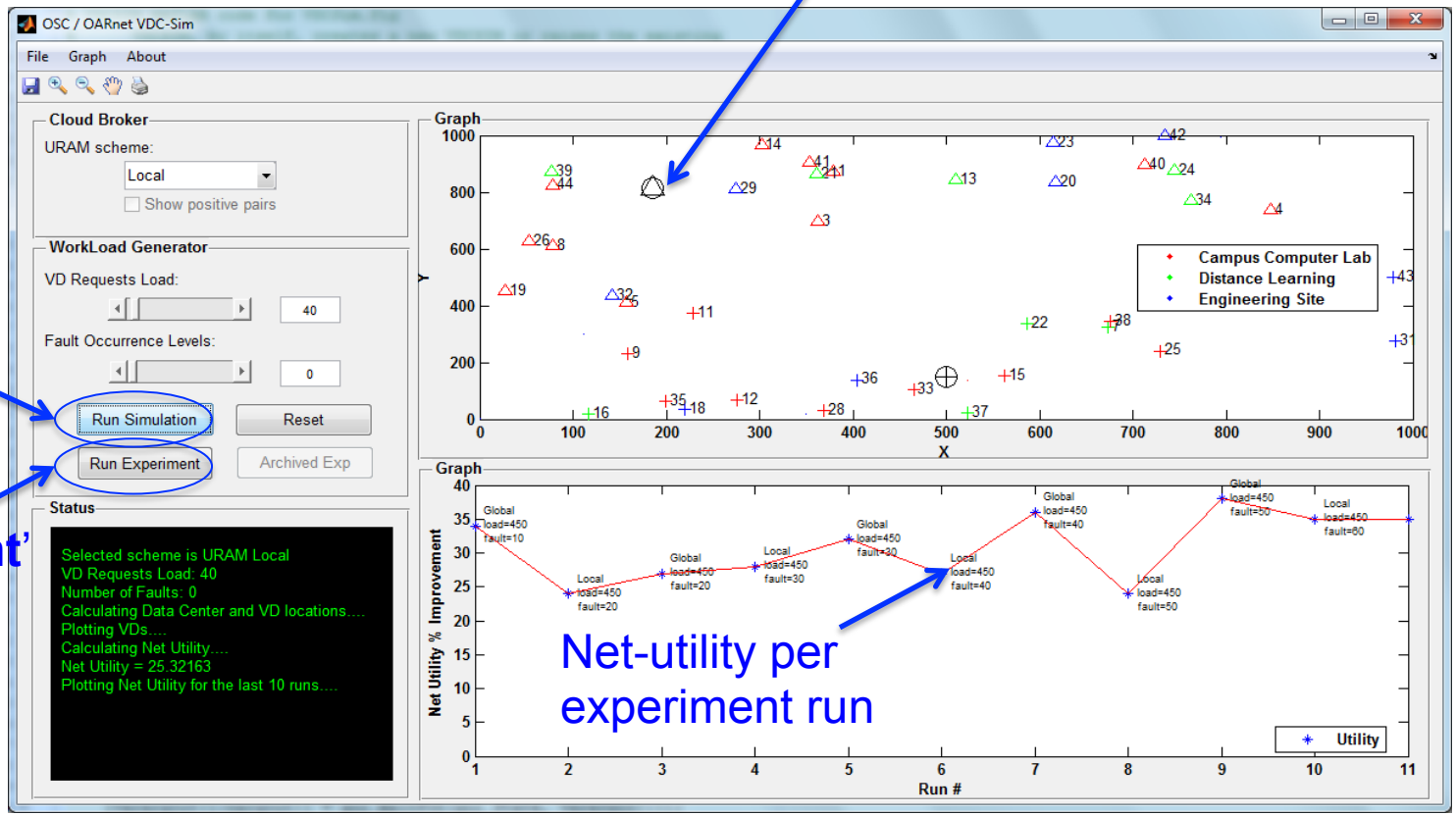


VDC-Sim Features

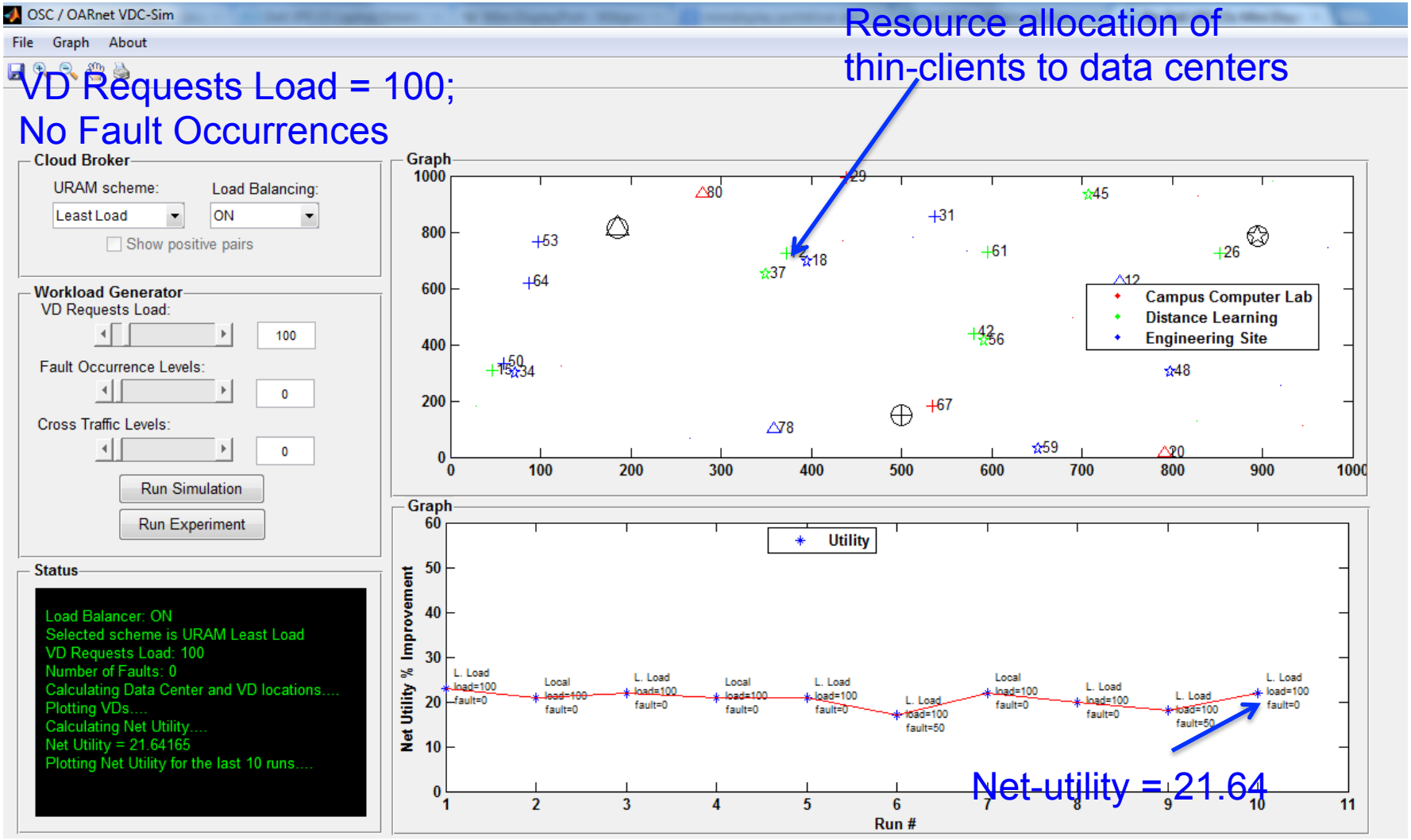
Resource allocation of thin-clients to data centers

'Run Simulation' *(Offline)*

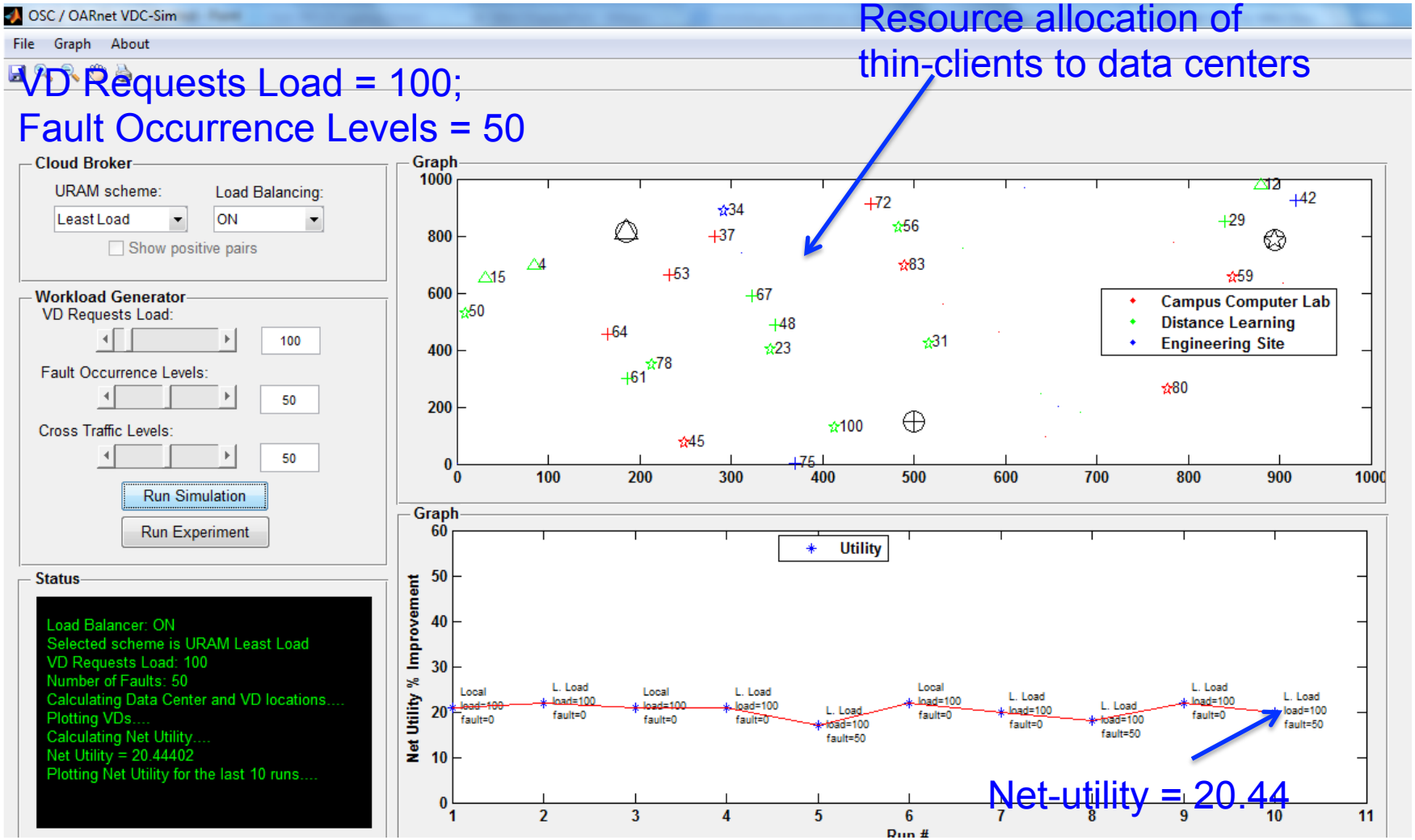
'Run Experiment' *(In GENI)*



VDC-Sim Demo-1



VDC-Sim Demo-2

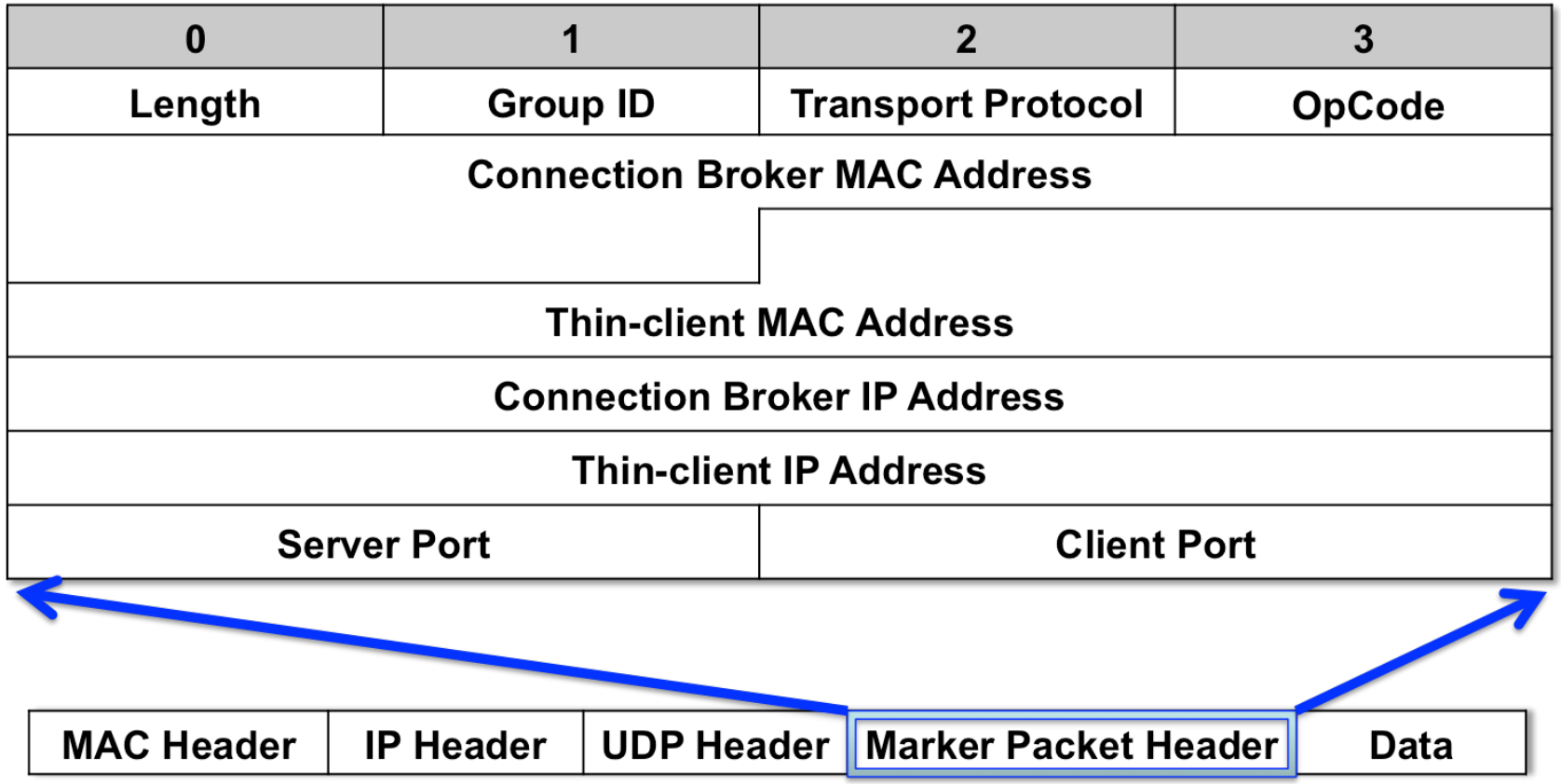


Use Cases

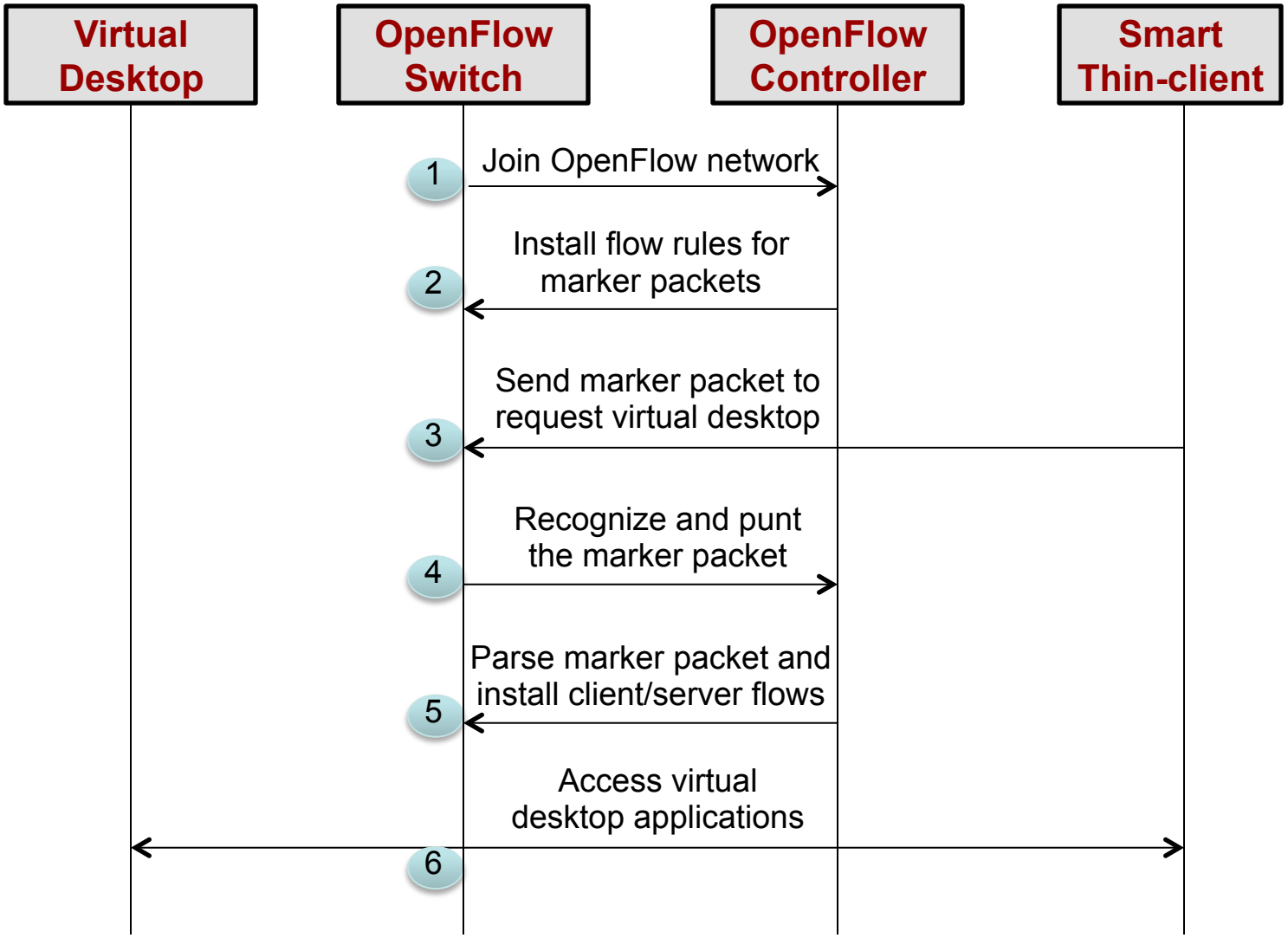
- Research
  - Plug-in new provisioning and placement schemes
  - Study cloud dynamics to see how they affect net-utility

- Education
  - Explore server-side adaptation
    - E.g., write a macro script to reduce user interaction round-trips for control actions during network health bottlenecks
  - Explore client-side adaptation
    - E.g., select thin-client encodings that delivers best QoE for different user groups – *knowledge worker* vs. *designer/artist*

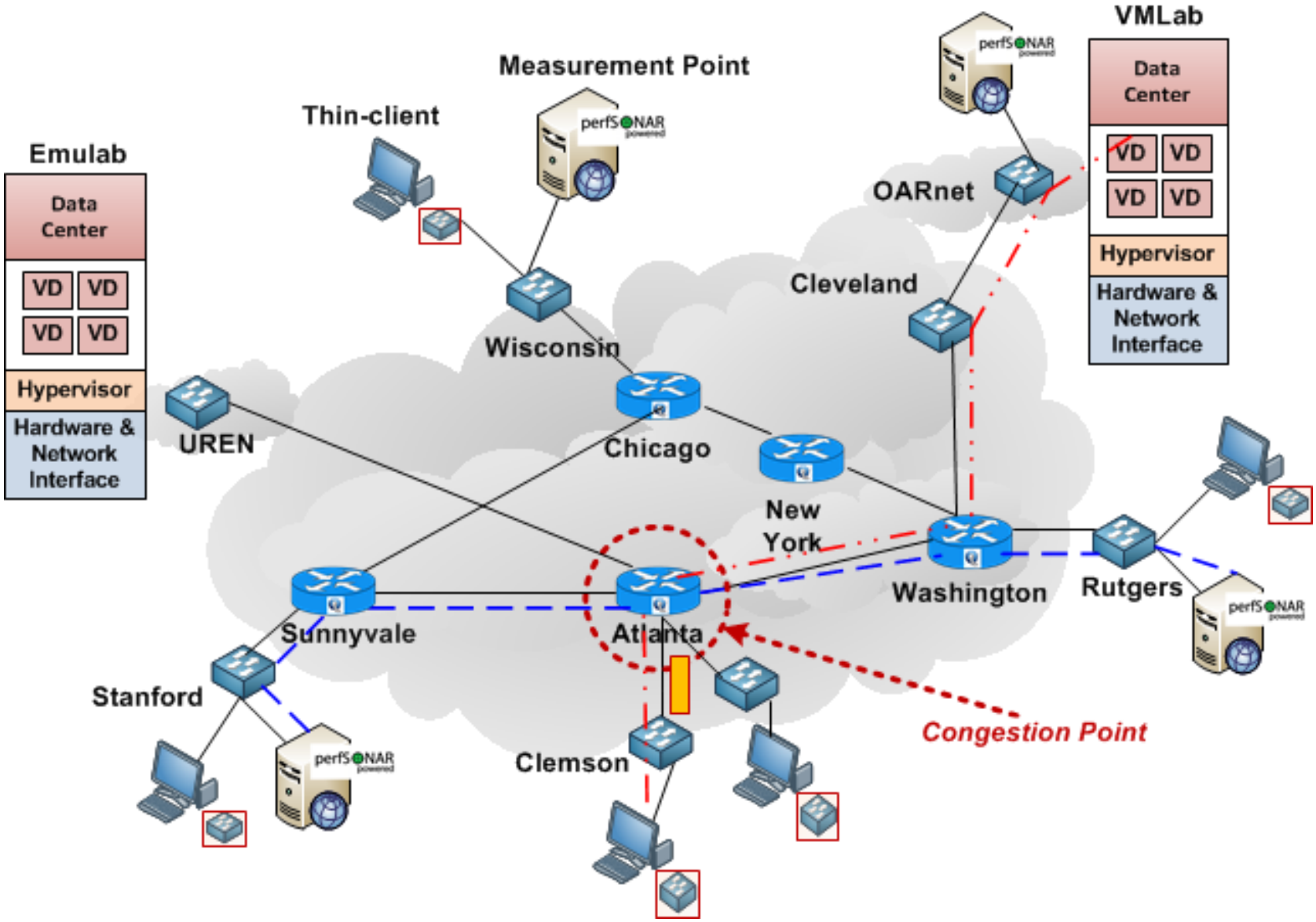
Marker Packet Header Format



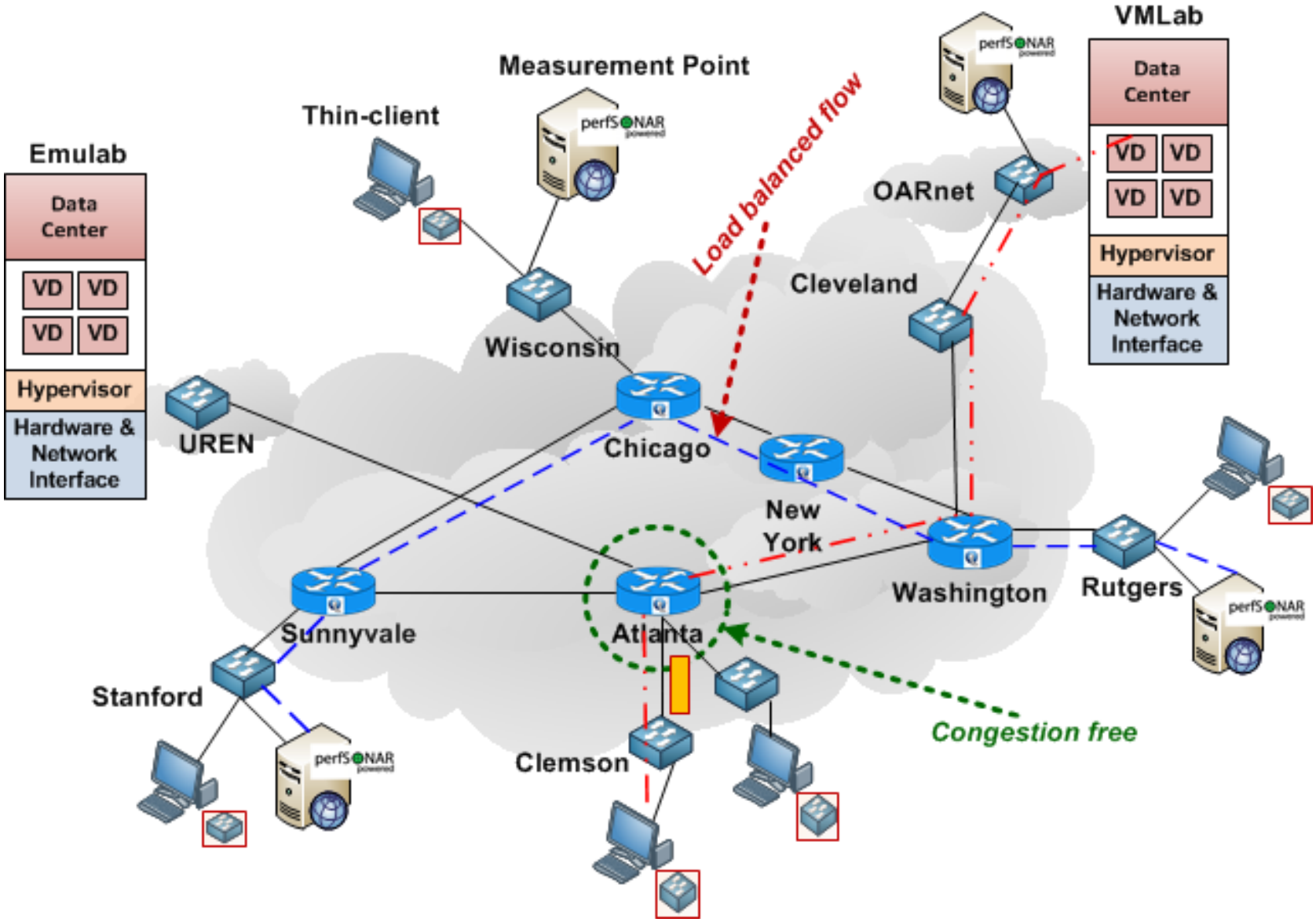
Flow Setup Sequence Diagram



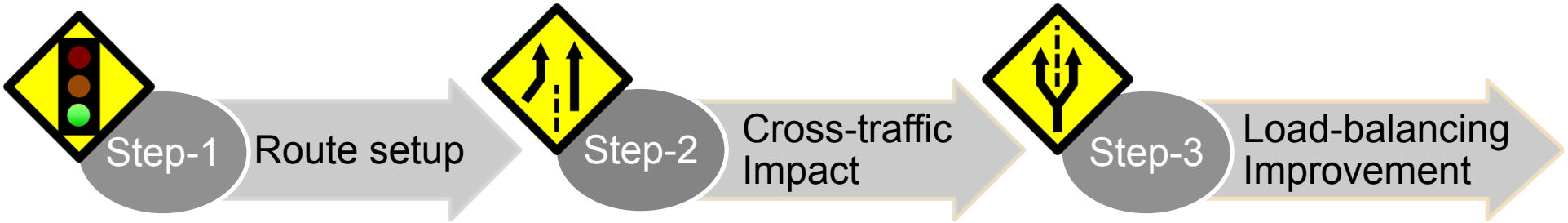
VDCloud Experiment w/o Load-Balancing



VDCloud Experiment w/ Load-Balancing



Demonstration



OpenFlow Switch	Client	In Port	Out Port
ATLA	PG46	20	52
ATLA	PG47	20	52

OpenFlow Switch	Client	In Port	Out Port
SUNNW	PG48	50	51
SUNNW	PG49	50	51
ATLANTA	PG46	52	52
ATLANTA	PG47	52	52
ATLANTA	PG46	20	52
ATLANTA	PG47	20	52

OpenFlow Switch	Client	In Port	Out Port
ATLANTA	PG46	20	52
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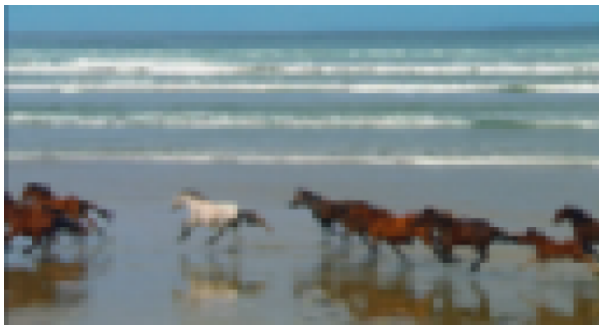
SUNNW	PG48	50	52
SUNNW	PG49	50	52

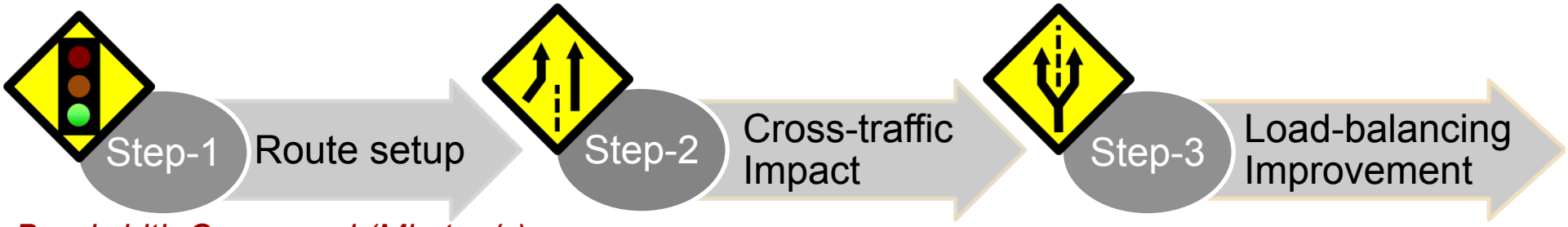
Video runs smooth, GUI applications are responsive



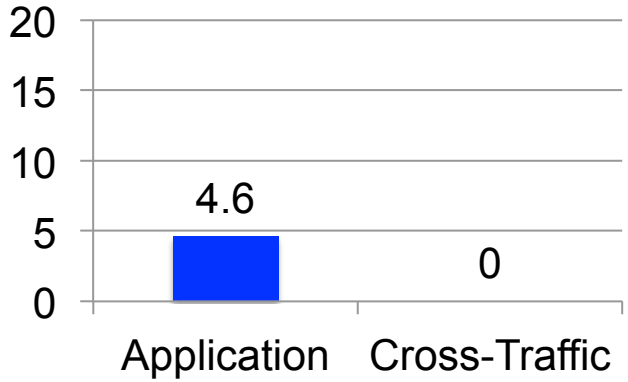
Video freezes, disconnects, GUI applications are not responsive

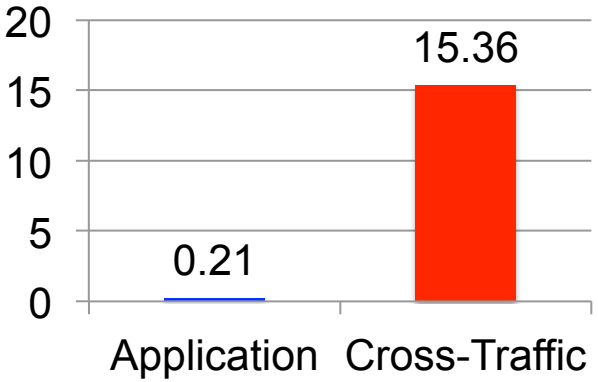
Video runs smooth, GUI applications are responsive

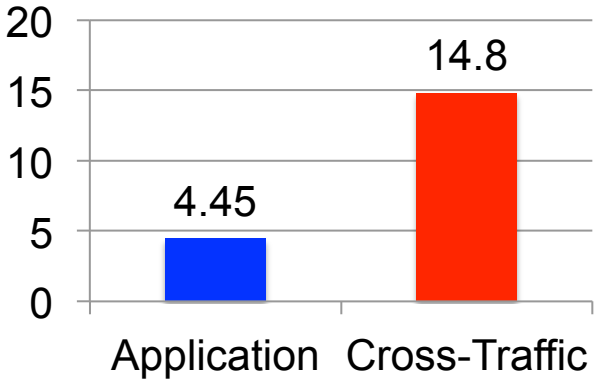
Demonstration



Bandwidth Consumed (Mbytes/s)







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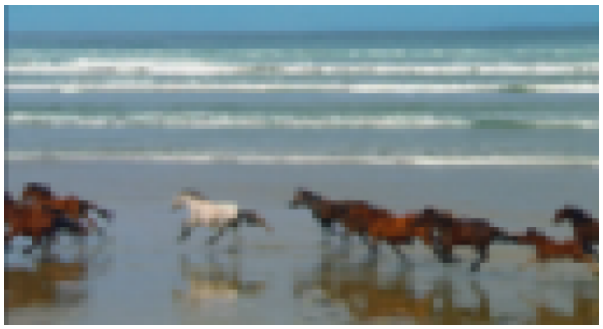

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Thank you for your attention!