Controlling Real Cloud Experiments, from BGP to the Server (and Back) with PEERING
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What is the PEERING Platform?
A testbed that provides researchers control over an Autonomous System (AS) with the ability to send/receive traffic and routes on the (real) Internet.

Available Resources and Capabilities
• Originate advertisements from eight ASes
• IPv4 and IPv6 address space
• 900+ peers at 12 points of presence (PoPs)
• Ability to run arbitrary client code and send/receive arbitrary traffic from within PEERING address space

New Functionality
• Federated with CloudLab, for research coupling cloud/data-center experiments with Internet route control (like Espresso/Edge Fabric, SIGCOMM’17)
• Backbone connectivity between PoPs at CloudLab locations and additional universities
  ○ Selectively advertise prefixes to specific PoPs and to specific peers at those PoPs across the backbone
  ○ Direct traffic to specific peer at remote PoP
• Support for new types of experiments, including emulating various components of cloud provider networks (e.g. traffic engineering, load balancing, anycast, etc.)

Demo Scenario
By manipulating routing, the experiment is able to direct inbound and outbound traffic towards different PEERING PoPs
• An experiment using the PEERING client software is configured as a web server in the Clemson Datacenter and receives BGP tables from each PoP
• The experiment advertises its network, 184.164.230.0/24, to Clemson so all traffic to the server enters at Clemson
• A host on the Internet requests data from the server, generating ~7Mbps of traffic

Shifting Traffic
• The server decides to shift the traffic away from the Clemson PoP (for example, for TE, load balancing, congestion, etc.)
• PEERING’s backbone gives the server paths to the host’s network through UW & Utah
• The server shifts the traffic to the host to exit via PEERING’s UW PoP
• The server then advertises its network out of the Utah PoP and withdraws it from the Clemson PoP
• All traffic to the server now enters at Utah