BGP Connectivity for Virtual Networks

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Emerging Network Infrastructure

- Network Virtualization

- Cloud Computing
Cloud Services and Virtual Networks are at the Rudimentary Stage

- Virtual topologies inside the cloud
  - Need for fast resource allocation algorithms
  - Need for flexible topology mapping and resource description languages

- External connectivity
  - Need for a greater user control
  - Need for flexible interconnects

BGP Multiplexing for Virtual Networks, by V.V., Y.M., & N.F. @ GaTech
Virtual Networks Need Connectivity

- Strawman solution: manual topology creation and NAT
  - No customization
  - No ingress/egress control
Instead: Appearance of Direct Connectivity

Cloud/Virtualization Infrastructure

- Network 1
- Network 2
- Network 3

America
- AT&T
- Sprint

Europe
- BT
- Sky
Challenges for Direct Connectivity

• Lack of stability
  – Virtual networks come and go
  – ISPs are unwilling to keep configuring BGP sessions
  – Virtual network users need to negotiate with multiple ISPs

• Lack of control
  – Cloud provider need more control for accounting
Solution: “BGP Mux”
Design Requirements

- **Session transparency**
  - User thinks it connects to an ISP
- **Session stability**
  - Fluctuating user sessions are not observed by ISP
- **Update transparency**
  - Updates are passed unmodified.
  - No best route selection
- **Isolation**
  - No route leaking between the ISPs
- **Scalability**

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Implementation: BGP Views

AS1

External IP

BGP-Mux Server

BGP Instance

BGP-View – AS1

BGP-View – AS2

IP1

IP2

Network1

Network2
Demo