

NetViews: Real Time Visualization of Internet Path Dynamics for Network Management

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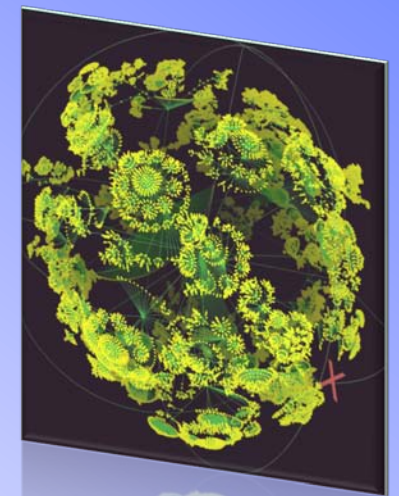
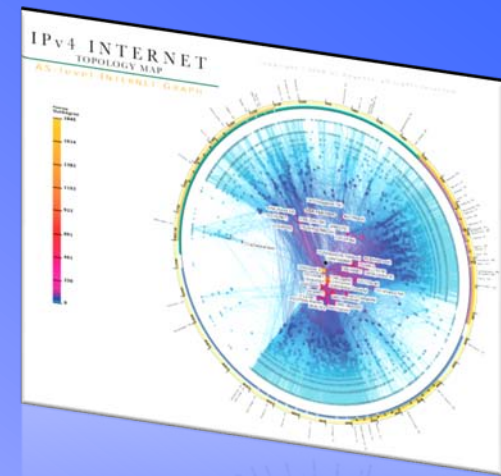
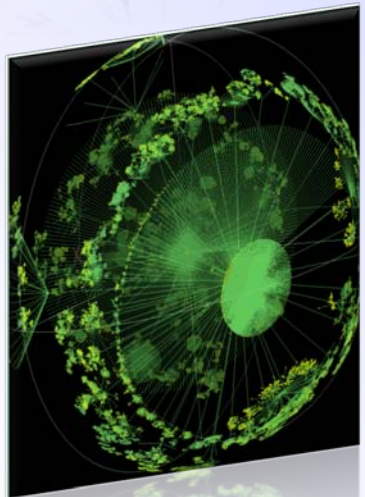
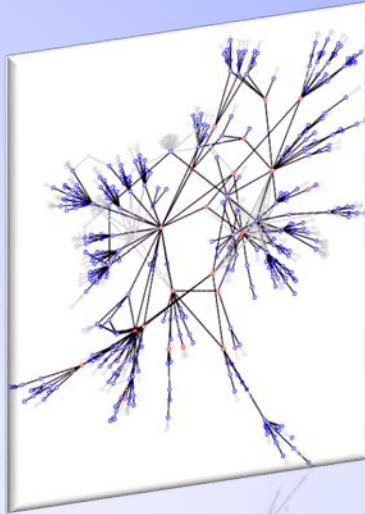
Computer Science Department

University of Memphis

Internet Topology mapping and visualization attempts to graphically represent Internet Architecture.

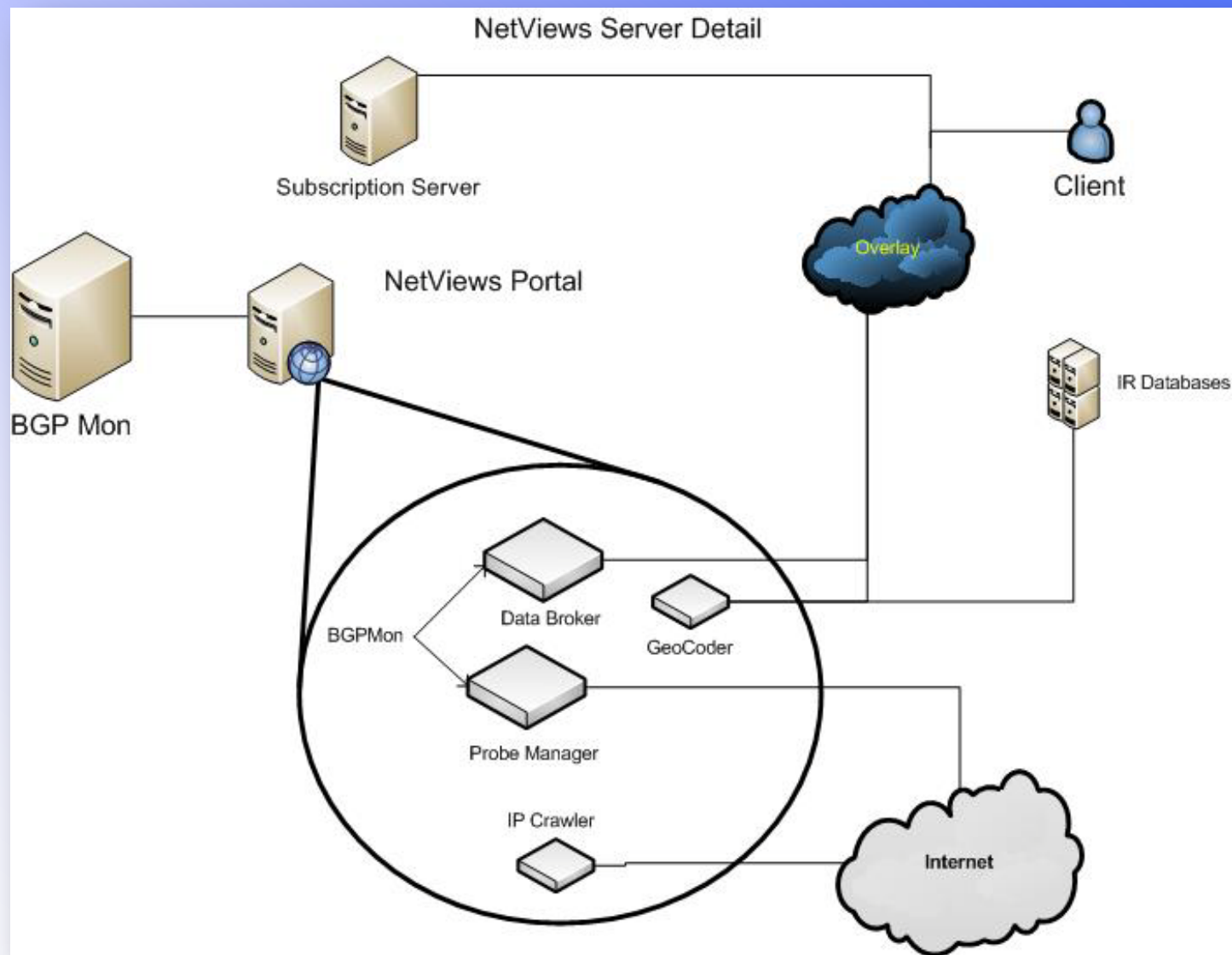
Why visualize Internet topology in real-time?

- **Monitor reachability of a network.**
- **Identify anomalous de-peerings.**
- **Identify route hijacking & misconfigurations quickly.**

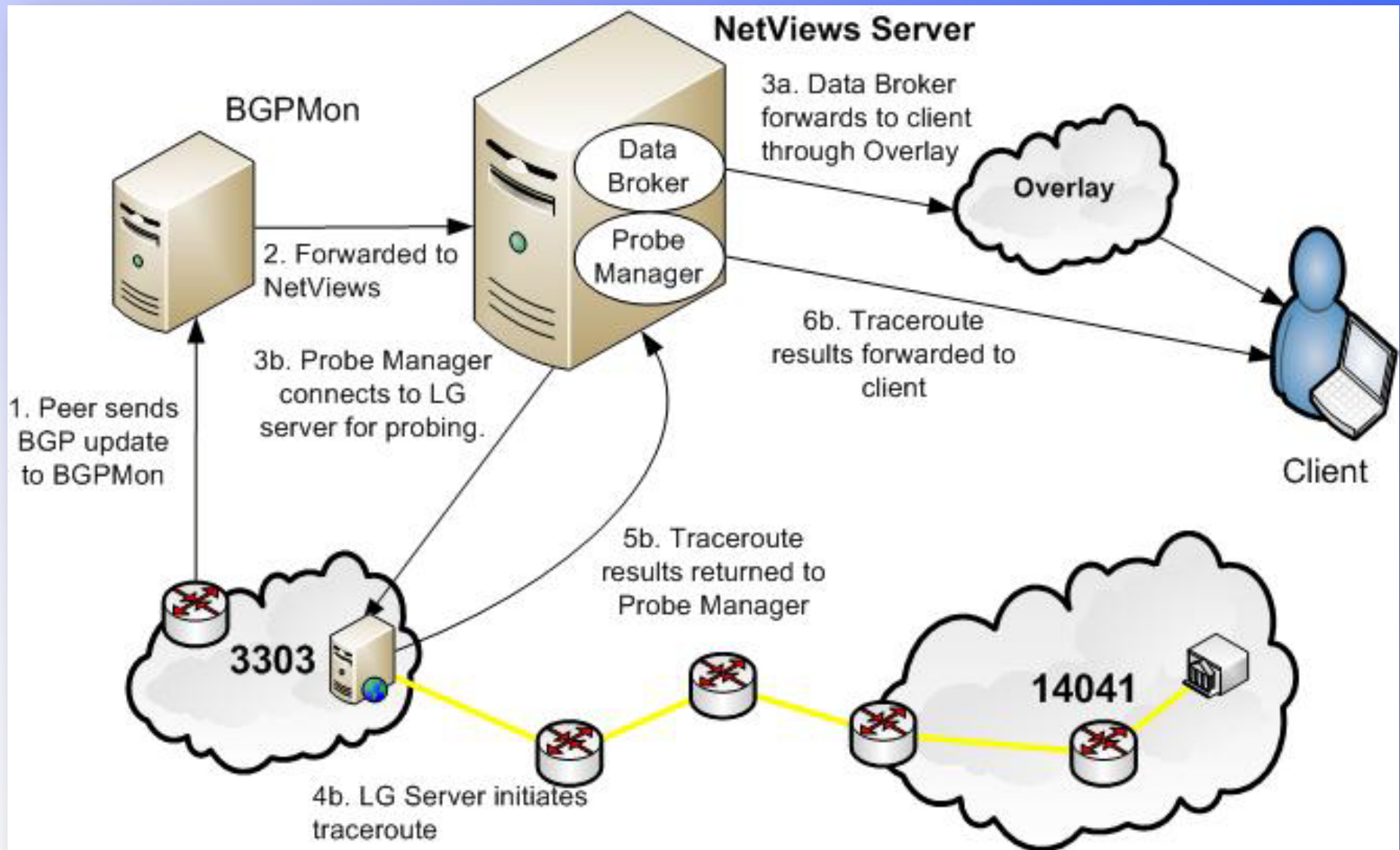


- We have been developing the next-generation routing monitoring software for high data completeness, integrity, scalability and accessibility.
 - BGPMon – Real time light weight BGP monitor with over 70 peers.
 - NetViews – Visualizes both control plane paths (via BGP updates) and forwarding paths (via active probing).

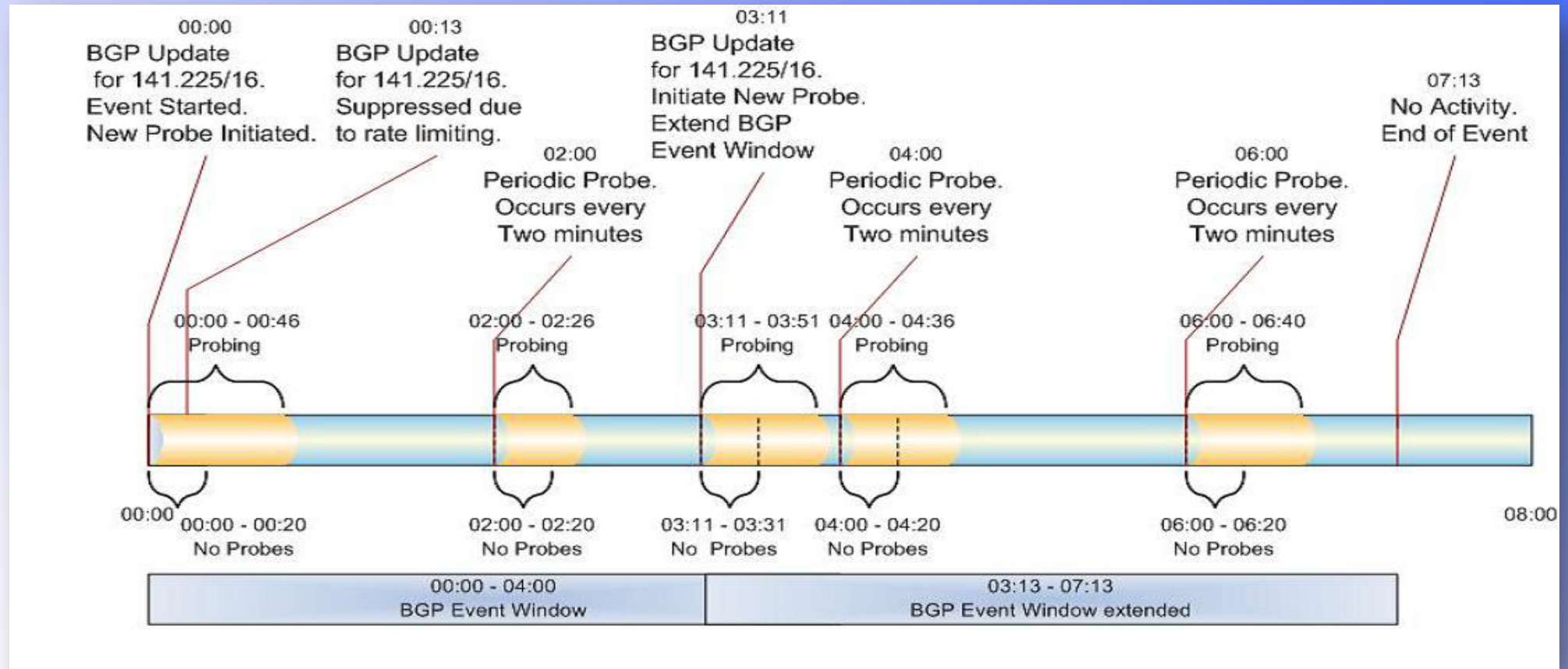
Route Monitoring Setup



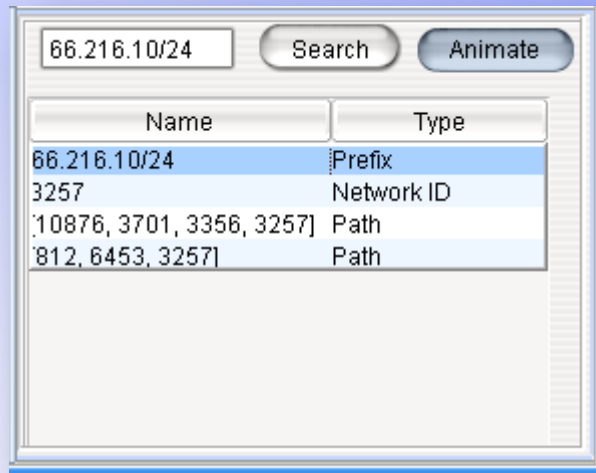
Server Component Interaction



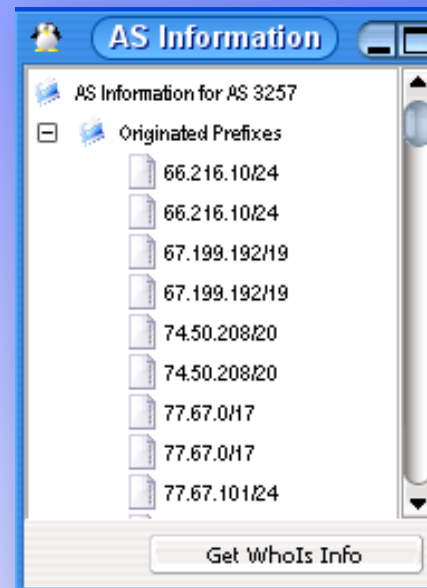
BGP Event Timeline



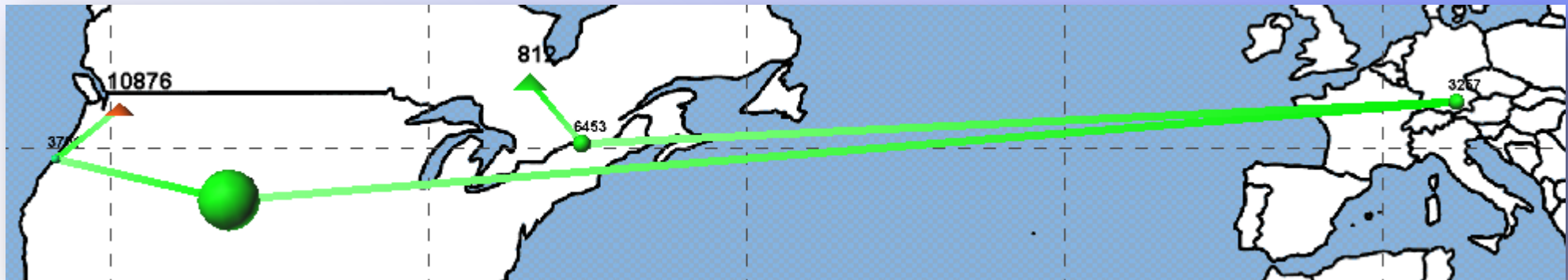
Browsing and Searching



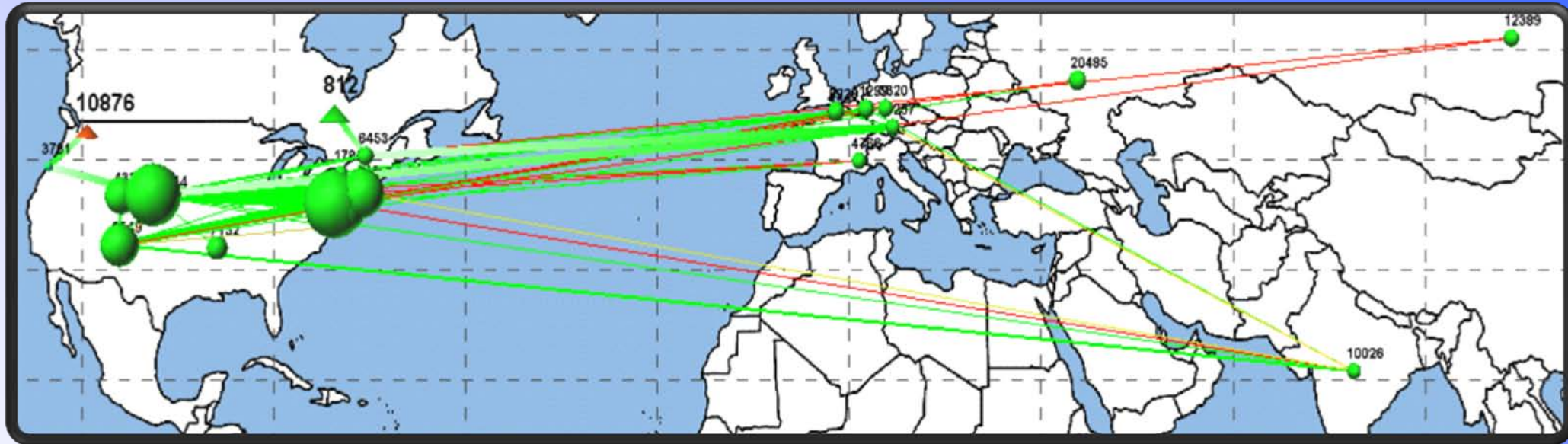
Prefixes and ASN's can be quickly searched.



Prefixes can be browsed from AS also.



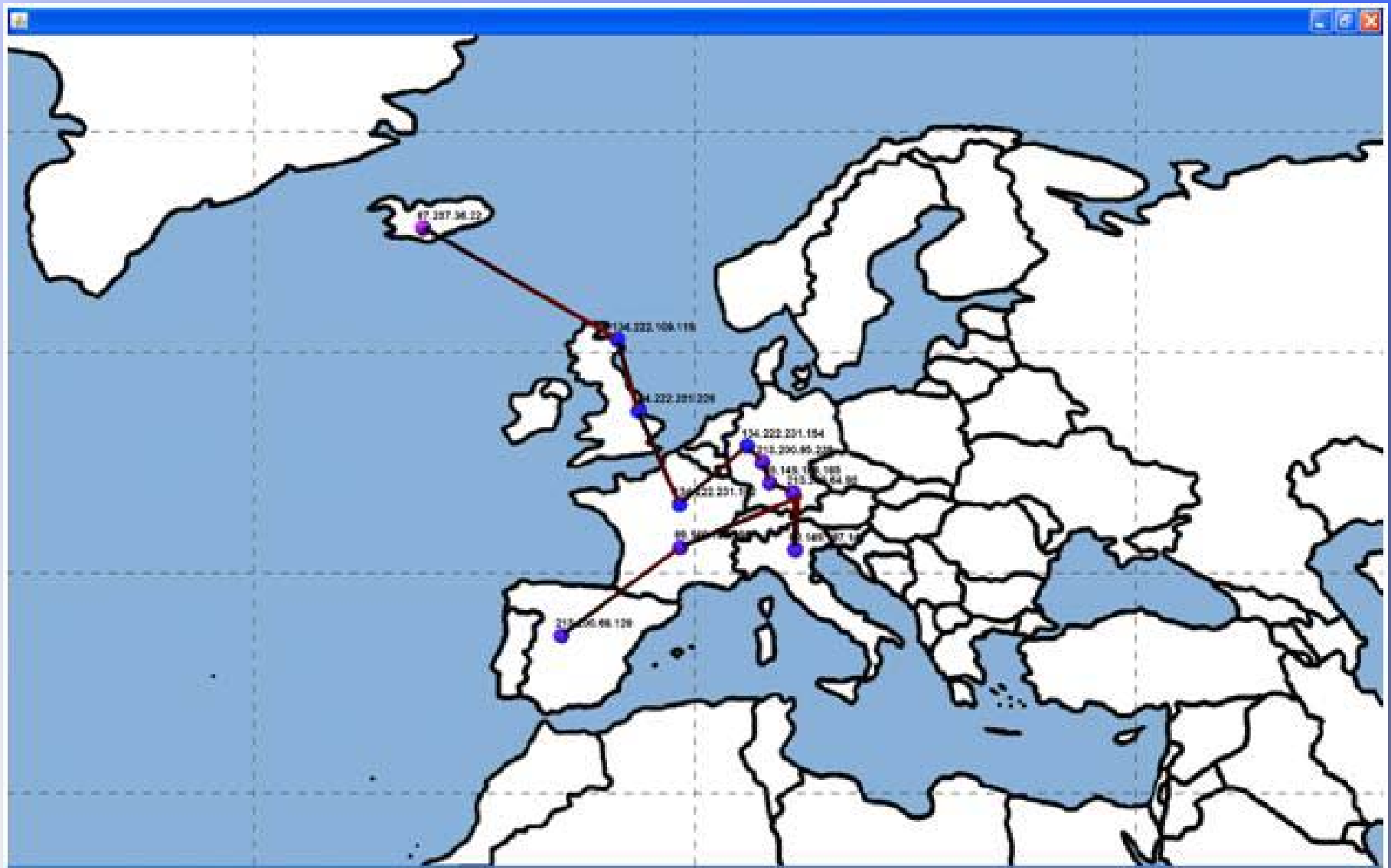
Path of 66.216.10/24 for each peer vantage point.



Internet backbone with associated links between backbone networks are viewable. Visualization is based on degree of neighbors of each AS.



Forwarding Paths



- **Features**
 - Real time Visualization of control plane paths
 - Status of forwarding paths during route change events.
- **Future Work**
 - Correlate forwarding and routing dynamics in order to create a classification model for Internet paths.
 - Add scalability by having clients run traceroute jobs in a P2P fashion.
 - Give client users the ability to communicate with each other.

Acknowledgements



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WHERE DISCOVERIES BEGIN

BGP Monitoring System



Netsec Group, Colorado State University

UCLA

University of Memphis

University of Oregon Routeviews