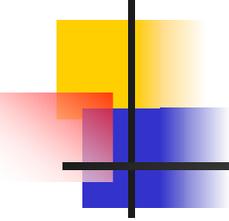


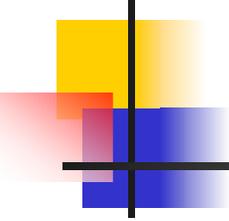
Analysis of BGP Routing Tables

Ayesha Gandhi



Routing Tables

- Routing Tables → Next Hop
- Routing Table Entry:
 - IP Address Prefix
 - Next Hop
- Prefix can range be up to 32 bits
- Updating Techniques:
 - Distance Vector (BGP: Path Vector)
 - Link State

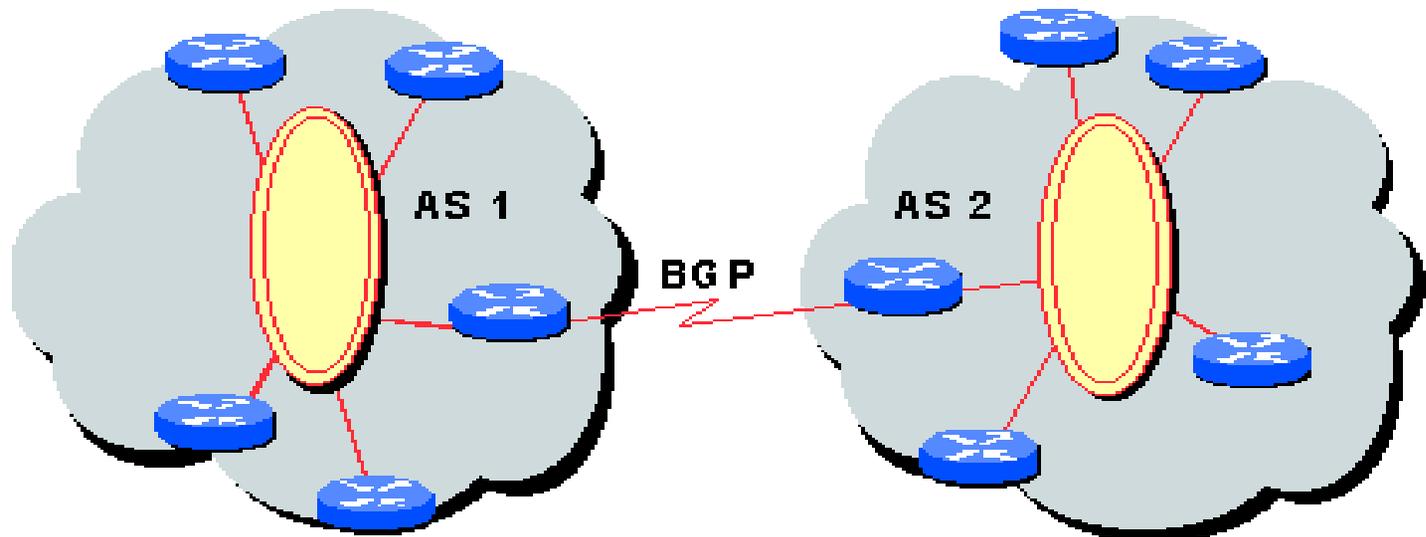


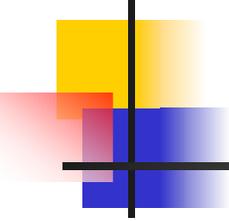
Autonomous Systems

- Internet → Set of Autonomous Systems (AS)
- At the boundary of each AS, border routers exchange reachability information to destination IP address blocks or prefixes in that domain.
- The commonly used protocol for exchanging this information is the Border Gateway Protocol, version 4 (BGP4).

AS's and Border Routers

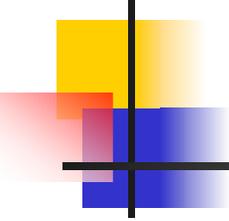
▶ BGP Between AS's





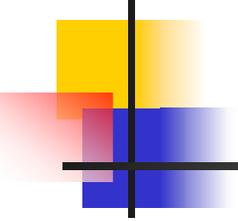
BGP4

- Series of Announcements → Routing Information
- Routing Information → Withdrawals/Updates
- Updates →
 - New Network Attachment
 - Change Network Route to a Destination



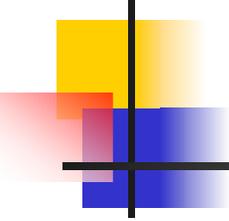
Routing Looking Glass

- It is useful for network operators to see routing views of other networks. A common tool to provide this is the RLG.
- An RLG is a diagnostic tool deployed by a network provider to give a limited view of that provider's internal network state.
- Facilitates the debugging of end-to-end problems without exposing sensitive information.
- Examples
 - Merit
 - IP Plus Looking Glass Server



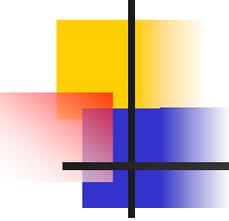
Oregon Route Views Project

- Originally conceived as a tool for Internet operators to obtain real-time information about the global routing system .
- Looking Glass
 - Constrained View
 - No real-time access to routing data.
- A router connects to foreign ASes using a “peering” session.



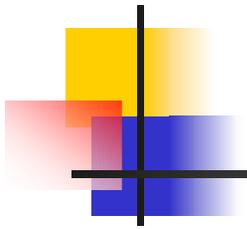
RIPE RIS

- Routing tables for this experiment have been downloaded from the RIPE RIS site.
- RIS GOAL: Collect routing information between ASes and their development over time from default free core of the Internet.
- Uses Remote Route Collectors at different locations around the world and integrates the information into a comprehensive view.
- RIPE uses the same collecting strategy as Route Views, however it peers with different ASes.



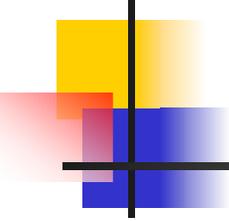
Some other tools

- FlapGraph: plots current instability levels in the BGP tables
- Routetracker: tracks routing announcements over time
- RocketFuel: measure router-level ISP topologies
- For more information visit:<http://www.caida.org/tools/>



Multi-Threaded Routing Toolkit

- The MRT toolkit has been used to build a wide variety of tools.
- MRT has several routing tools. The one that you will be using is : Route_BtoA—Converts binary MRT messages to ASCII.
- You can visit <http://www.mrtd.net> for more information.



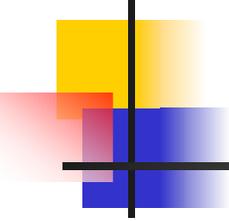
Multi-Threaded Routing Toolkit

- ROUTE_BTOA: Converts binary MRT messages to ASCII.
- Machine-readable output for BGP4 and BGP4+ packets is:

Protocol / Type / PeerIP / PeerAS / Prefix / <update dependant information>

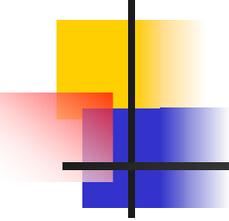
- Update-dependant information :

ASPATH / Origin / NextHop / Local_Pref / MED / Community



Definitions

- **Multi-homed AS:** An AS is multi-homed if it has more than one exit point to the outside networks.
- **Stub AS:** is only connected to one other AS. For routing purposes, it could be regarded as a simple extension of the other AS.
- **Transit AS:** has connections to more than one other AS and allows itself to be used as a conduit for traffic (*transit traffic*) between other AS's. Most large Internet Service Providers are transit AS's.



Analyzing Data

- Analyze the routing tables to get the following:
- Growth of the routing table.
- Increase in the number of /24s
- Change in the number of class A, B and C prefixes announced.
- Change in number of the announced multi-homed stub ASes.