Interconnection Technologies

Routing III
Interdomain routing

- Routing domains are independently funded
- Routing domains do not trust each other
- Routing domains may have different policies
- Static routing
- EGP – first interdomain routing protocol
- BGP – current path vector routing protocol
Border gateway protocol (BGP)

- Current version 4 standardized in RFC 1771
- Runs over TCP
- Sequence of AS numbers comprises path
- Select route based on preferences of path(s)
- Can edit path in route advertisements
- Can selectively advertise paths/routes
- E–BGP versus I–BGP
BGP attributes

• Describe routes in BGP updates
• Confusing descriptions
  • e.g. Well known attributes must be supported
  • e.g. Mandatory must be present in the update
• Examples
  • AS path
  • Community
  • Unreachable
Confederations

- Group of ASs that appear as a single AS
- A form of aggregation
- May simplify routing policies
  - e.g. Don’t go through confederation X rather than specifying each AS in the confederation
- Sub-optimal routing may result
  - Multiple ASs in a path vector appear as a loop
Message types

- Open
  - First message when neighbors come up
- Update
  - Contains routing information
- Notification
  - Final message just before link is disconnected
- Keepalive
  - Reassures reachability in absence of updates
Route dampening

- Routes that oscillate ripple through Internet
  - Consumes CPU and causes instability
- Unstable (flapping) routes are penalized
  - For some period of time route is suppressed
  - Suppression time can increase to a maximum
  - Supression of routes results in lost connectivity
- Bigger/important netblocks dampen slowly
Sample Cisco BGP configuration

Router bgp 12345
  bgp log-neighbor-changes
  network 128.160.0.0 mask 255.255.0.0
  neighbor 36.5.1.1 remote-as 54321
  neighbor 36.5.1.1 description E-BGP peer with XYZ corp.
  neighbor 36.5.1.1 password as54321password
  neighbor 36.5.1.1 version 4
  neighbor 36.5.1.1 prefix-list invalid in
  neighbor 36.5.1.1 prefix-list announce out

  ip prefix-list invalid seq 10 deny 0.0.0.0/8 le 32
  ip prefix-list invalid seq 20 deny 10.0.0.0/8 le 32
  ip prefix-list invalid seq 30 deny 127.0.0.0/8 le 32
  ...

  ip prefix-list announce seq 10 permit 128.160.0.0/16
  ip prefix-list announce seq 20 deny 0.0.0.0/0 le 32