Lab Class Protocol-Design

P2P-Overlay, Part IV


P2P-Protokol, Version 0.2

BGP

Extending the P2P Node Software by adding Path-Vector Routing:

- Manage Routing Table
- Best-Path Selection
- Update Forwarding Table using Routing Info
- Communicate Routing Changes
**P2P-Protokol, Version 0.2**

**BGP**

- **New message type:**

  ```plaintext
  LOCALTRANSPORT P2P/0.2\r\n  Application: BGP\r\n  Content-Length: 39\r\n  \r\n  ANNOUNCE viper:2000
  boa:1200,mudsnake:2000,viper:2000\r\n  ```

- **Only Neighbour-to-Neighbour, so:**
  **No FOR/FROM/TTL**
**P2P-Protokol, Version 0.2**

**BGP**

- **Application-ID:** `Application: BGP`
- **BGP-Announcements in Body:**
  - New/Changed best Routes: `ANNOUNCE`
  - Loss of last Route: `WITHDRAW`
  - Error Messages: `NOTIFICATION`
- Can contain multiple lines
Message Contents:

- **ANNOUNCE**: have new best path to destination
  
  `ANNOUNCE <dest> <as path>`

- **WITHDRAW**: lost last path to destination
  
  `WITHDRAW <dest>`

- **NOTIFICATION**: protocol error
  
  `NOTIFICATION <error string>`
**P2P-Protokol, Version 0.2**

**BGP**

- **BGP Table:**
  - Contains multiple routes to reachable destinations
  - Max. one route per (neighbour, dest)
  - Nodes report only best (=used) routes
  - One route per dest is best
  - Best routes are fed into Forwarding Table (destination, next hop)
**P2P-Protokol, Version 0.2**

* BGP

- Routes:
  - `<destination> _ <AS path>`

- AS Path:
  - `<Node-ID> ("," <Node-ID>)`*

- first (left) node of path is neighbour
- last (right) node is originator (=dest)
Initialization of BGP Table:

- Table is empty

New neighbour:

1. insert route to new neighbour
   - dest: neighbour
   - as-path: neighbour
   - neighbour: neighbour
   - check best routes (see below)

2. send ANNOUNCE messages for all our best routes to new neighbour, with our own Node-ID prepended as first entry (path prepending)
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BGP

- Receiving ANNOUNCE messages:
  - do loop check: is our Node-ID already in AS-Path?
    - If yes ignore!!!
  - temp. remember best route to dest
  - Route with same (dest, neighbour) already there?
    - If yes: replace, unmark BEST
    - else: insert
  - check best routes (see below)
P2P-Protokol, Version 0.2

BGP

- Receiving WITHDRAW message
  - temp. remember best route
  - delete route with given destination and nexthop equal to sender of WITHDRAW
  - check best routes (see below)
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BGP

- Check best routes (per destination!):
  - search best route for dest
  - new best route different from the old one?
    - mark new route as best, unmark old
    - update entry in forwarding table
    - broadcast ANNOUNCE
Check best route (cont'd)

- no route found, but had one before deleting (temp. remembered!)
  - remove entry in forwarding table
  - broadcast WITHDRAW
P2P-Protokol, Version 0.2

BGP

- When using BGP:
  - Do **not** use autolearning to change Forwarding Table!!
Organizational

- This assignment spreads over two semester weeks, due January 15th, 2007
- Next tutorial January 15th, 2007
- **BUT** Next group discussion on January 7th, covering 8th assignment
Ansonsten:

- Frohe Weihnachten und nen guten Rutsch ins Neue Jahr! Erholt Euch gut!