

# 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:

```
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

## P2P-Protokol, Version 0.2

### BGP

- 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)

## ***P2P-Protokol, Version 0.2*** **BGP**

- 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)

## ***P2P-Protokol, Version 0.2*** **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 next hop equal to sender of WITHDRAW
  - check best routes (see below)

## ***P2P-Protokol, Version 0.2*** **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

## ***P2P-Protokol, Version 0.2*** **BGP**

- 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!