



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

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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

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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>

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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)

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BGP

- Routes:
 <destination> _ <AS path>
- AS Path:
 <Node-ID> ("," <Node-ID>)*
- first (left) node of path is neighbour
- last (right) node is originator (=dest)

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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)

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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)

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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

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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!