Lab 8: Mesh Networks with Babel

50.012 Networks

Hand-out: November 24
eDimension hand-in: December 1, 5pm

1   Objectives

- Lets try Ad-Hoc mode again this time

- Explore *mesh* networks with Babel

- Note: a permanent BabelNet ad-hoc network should be available in the lab for the next week

2   Experiments

2.1   Set up your machine

- Disconnect from the wired network, if you are connected, using the network-manager applet in the top right

- Install the script from eDimension folder: `bash install.sh`

2.2   Babel

- Babel is a loop-avoiding, distance-vector routing protocol for IPv6 and IPv4

- Its underlying mechanics are explained here:

  - `http://www.pps.univ-paris-diderot.fr/~jch/software/babel/babel-20140311.pdf`

- Babel will enable multi-hop routing on top of our ad-hoc network

- You should have `babeld` and `babelweb` installed on your lab machine

  - you can get them from `https://github.com/jech/babeld` and `https://github.com/kerneis/babelweb` otherwise
  - or use the install script

- Please connect to the `AdHoc` ad-hoc network

- Start Babel: `sudo babeld -g 33123 -D wlan0`

- Use wireshark with `babel` filter to look at exchanged traffic

  - Which network-layer protocol is used?

- What types of messages do you see? What are they probably used for?

- Check your routes using `route -n`, do you see the routes introduced by babel?

2.3 Babelweb

- Babelweb is a visualization interface for the local Babeld client

- `babelweb` should start the local server

- Use a browser to visit `localhost:8080`

    – You should be greeted by babelweb

- Try to answer the following questions:

    – What are the neighbours listed?
    – What are the routes listed? What does installed mean probably
    – What are the redistributed routes?

2.4 Announcing your Own Routes

- Using Babeld, you can announce other networks that are connected to your machine (similar to an AS and BGP announcements)

- So far, probably one redistributed route is listed, so only one subnet is known

- To change that choose an arbitrary subnet that you want to claim is connected to your eth0 interface

- Assign an IP address in that subnet (X.Y.Z.Q) to your eth0: `sudo ifconfig eth0 X.Y.Z.Q netmask 255.255.255.0 up`

- Now kill babeld `sudo killall babeld` and restart it with:

    – sudo babeld -g 33123 -C 'redistribute if eth0 metric 128' eth0 -D wlan0

    – The eth0 route should now be redistributed

- Check babelweb to see if your route is appearing in the redistributed routes

    – See if you can find the announcement in the wireshark traffic
    – Ask someone else in your Babel ad-hoc network to ping your eth0's IP

3 What to Hand in

3.1 eDimension submission:

Please provide a writeup (in PDF format with your name) that includes the following information:

- Were you able to set up the small ad-hoc network at the start?

– What can you observe in the ad-hoc join traffic in wireshark?

- Why could we need a protocol like babel in addition to 802.11 ad-hoc mode?

- Which layer is babel operating in?

- Which network layer protocol does babel use?

- In babelweb, could you find out the following?

    – What are the neighbours listed?
    – What are the routes listed? What does installed mean probably
    – What are the redistributed routes?

- Which prefix (subnet) did you choose to announce? Could other people ping your eth0 interface in that network?

3.2 Checkoff:

- No checkoff required if you submitted your reply sheet