

1. Exploring traceroute with Wireshark

Traceroute is a program, which allows us to explore networks. It is a helpful tool especially in the network monitoring context, because we can identify intermediate nodes along the path and the round trip time to each.

Capture the network traffic of a `traceroute` to `www.thesimpsons.com`. Note that the command is called `tracert` in Windows and `traceroute` in Linux.

- (a) Examine the packets in Wireshark and explain the functionality of traceroute based on packet header information.
- (b) Why does it not work to traceroute for `http://www.thesimpsons.com`?

2. Static vs. Dynamic Routing

Discuss the advantages and disadvantages of static and dynamic routing.

3. Routing Protocol Types

Classify the different routing approaches. Consider aspects like maintenance, scope, and information distribution.

4. Routing Metrics

List metrics that can be used by routing protocols. Discuss suitable application scenarios where these metrics could be used.

5. Exploring packet traveling with Traceroute

We want to explore which paths a packet travel from the source to its destination based on traceroute. Perform a `traceroute` to the following destinations from the institute PC to `www.epost.de` and `www.bvg.de`.

- (a) Which IP interfaces do the packets travel?
- (b) Which heuristics can you apply to reveal that packets crosses multiple cities?
- (c) Does the packets of your traces cross multiple cities? If yes, which one?
- (d) Map the captured IP addresses to IP prefixes and origin ASes using `http://whois.cymru.com/cgi`. Which ASes are traversed?
- (e) Read `http://www.pam2010.ethz.ch/papers/full-length/10.pdf` and discuss briefly the limitations of traceroute in inferring AS paths by using traceroute.

6. Policy Routing

What is policy routing and why is it necessary in today's networks? Have a look at the book *Policy Routing With Linux - Online Edition* by Matthew G. Marsh.

7. IPv5

There is IPv4 and IPv6 but what happened to IPv5!?