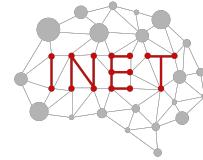


TECHNISCHE UNIVERSITÄT BERLIN

Fakultät IV – Elektrotechnik und Informatik
Fachgebiet INET
Prof. Dr. Stefan Schmid



6th Assignment Network Protocols and Architectures, WS 25/26

Question 1: (5 + 10 + 10 + 10 + 20 + 20 + 15 = 100 points) BGP experiment

In this experiment we are going to investigate routes towards the Charles Darwin University in Australia. The target host will be the webserver of the university front page `www.cdu.edu.au` with the IP address `138.80.162.69`.

- (a) To which AS does this IP belong? State the **number** and **name** of the AS.

Hint: use a lookup service like <https://asn.cymru.com/> to obtain AS numbers and names.

Our vantage point is a route server `route-server.ip.tdc.net` located in Denmark. This route server is part of AS3292 which is a large backbone network spanning routers in many parts of the world. *Alternatively, you can use another route server; see <http://www.routeservers.org/> for login details.*

Now connect to the route server `route-server.ip.tdc.net` using `telnet`. The login is `rviews` and the password is `Rviews`. This server provides a Juniper JUNOS shell with the possibility to explore BGP routes from there to any IP address in the world.

Please carefully read through the welcome message. After the login you will see some city names where some of the BGP routers of AS3292 are located.

Check possible routes towards `www.cdu.edu.au`. To achieve that, enter the following command at the prompt:

```
rviews@route-server.ip.tdc.net> show route 138.80.162.69
```

- (b) From the output of the above command, please copy **only the Active Route** to your solution.
Do not include alternative routes.
- (c) What **prefix** has been announced by the network of `www.cdu.edu.au`?
- (d) From **which router** has this route been learned? In **which city** is the router located?
- (e) State the **AS path** towards `www.cdu.edu.au` and the corresponding **AS names**.

Hint 1: The so-called AS path begins with 3292 and ends with the AS from (a). Also, the AS path may contain identical consecutive ASes, see AS path prepending for more information.

Hint 2: You can find out AS names using the same lookup service <https://asn.cymru.com/>.

Next, from the route server we perform a traceroute towards `www.cdu.edu.au`:

```
rviews@route-server.ip.tdc.net> traceroute 138.80.162.69
```

Please turn!

- (f) **Visualize the result of traceroute** in a drawing with each AS as a dashed ellipse, routers as small circles and links as lines. Include the **IP addresses** and **AS numbers** as well as the **location information** that you may guess from the routers name.

Hints:

- Depending on the state of the networks along the route, traceroute may not reach the destination network.
- “ham”, “ams”, ... represent city names. “ham” is equivalent to Hamburg. Abbreviations for city names in DNS names of routers are often chosen according to airport codes¹.
- Instead of using the complete IP address scheme, you can also use a prefix, e.g., 188.1.0.0/16 and label the router with the remainig part of the IP address, e.g., 33.81, 144.221, and 145.137.
- You can use geolocation databases like <http://www.iplocation.net/> in addition. (This information might not be always accurate!)

- (g) Compare the traceroute from the route server with the route below, originating at TU Berlin towards www.cdu.edu.au. What is **similar** to the traceroute you did from the public route server, and what is **different**? Please analyze **specific aspects**, instead of just stating which hops are different: E.g., through what kinds of ASes and geographic locations does the packet travel?

```
traceroute to www.cdu.edu.au (138.80.162.69), 64 hops max, 40 byte packets
 1 sn2-028128.gate.tu-berlin.de (141.23.28.129)  1.378 ms  0.660 ms  0.777 ms
 2 enc-end.gate.tu-berlin.de (130.149.127.229)  0.583 ms  0.552 ms  0.502 ms
 3 * * *
 4 192.86.163.220 (192.86.163.220)  2.004 ms  1.904 ms  2.166 ms
 5 * * *
 6 * * *
 7 * * *
 8 cr-tub3-if6-1-11-1-3001.x-win.dfn.de (188.1.235.241)  1.311 ms  1.178 ms  1.263 ms
 9 pr-hws3-iflag6-0.x-win.dfn.de (188.1.144.226)  11.057 ms  11.082 ms  11.280 ms
10 dfn-gw.rt1.ham.de.geant.net (62.40.125.170)  11.476 ms  11.440 ms  11.522 ms
11 lag-2-0.rt0.ham.de.geant.net (62.40.98.7)  11.278 ms  11.366 ms  11.356 ms
12 lag-9-0.rt0.ams.nl.geant.net (62.40.98.66)  17.927 ms  17.883 ms  17.841 ms
13 lag-4-0.rt0.lon.uk.geant.net (62.40.98.23)  22.619 ms  23.285 ms  23.027 ms
14 ae3-0.mx1.lon.uk.geant.net (62.40.98.61)  22.568 ms  23.095 ms  23.346 ms
15 138.44.226.6 (138.44.226.6)  186.863 ms  186.623 ms  186.487 ms
16 xe-0-1-0.pe1.mlnr.nt.aarnet.net.au (113.197.14.148)  290.983 ms  290.644 ms  290.573 ms
17 138.44.208.34 (138.44.208.34)  290.971 ms  290.994 ms  290.990 ms
18 fgtcasfw2.routing.cdu.edu.au (138.80.0.250)  290.670 ms  292.230 ms  291.501 ms
19 cbl2c1core1.routing.cdu.edu.au (138.80.5.105)  290.776 ms  290.925 ms  290.986 ms
20 * * *
21 www.cdu.edu.au (138.80.162.69)  290.946 ms  290.906 ms  290.854 ms
```

- (h) Comment on (at least two) **possible reasons for the observed differences**. Explain in your own words, using full sentences.

Due Date: Sunday, 30.11.2025, 23:59 pm

- Upload your solutions as a PDF (**no MS Office or OpenOffice files**) via ISIS:
<https://isis.tu-berlin.de/course/view.php?id=44909>
- Submit in groups of 4 and put the names and Student ID numbers (Matrikelnummer) of **all** your group members on your solution!
- Only one student per group needs to upload the solution.

¹http://en.wikipedia.org/wiki/List_of_airports_by_IATA_code