



Assignment 1 (Routing)

Building Computer Networks (BCN)

IT Security

As of: 20. March 2025

Instructions:

Deliveries (eCampus submission):

- **1 person** assignment
- 1 final version of your **CML Lab**
- **1 lab report** (PDF!) as documentation that answers all the analyzing tasks
- Please use our template for lab reports provided on eCampus!

Document all necessary configuration steps and prove their effectiveness (e.g. using "show"-commands). Also answer all theoretical tasks; do not forget to include your sources.

1) Preparations

- a) Configure hostnames of devices according to the network plan
- b) Configure IPv4 and IPv6 addresses of devices according to the network plan
- c) Disable DNS name resolution on the routers (no `ip domain-lookup`)

2) RIPv2

- a) Enable RIPv2 on all connected/attached networks
- b) Disable automatic route summarization
- c) Check connectivity, e.g. ping/traceroute between hosts of East and West

3) RIPv6

- a) Configure IPv6 addresses according to network plan
- b) Enable RIP for IPv6 on all routers
(NOTE: always use "process1" as the identifier for the IPv6 routing process)
- c) Check connectivity, e.g. ping/traceroute between hosts of East and West

4) Propagate default routes

- a) Configure static routes for both IPv4 and IPv6 to the "Internet" (next hops `199.1.1.65/30` and `2001:DB8:ACAD:1::1/127` respectively).
(NOTE: configure next-hop static routes, i.e. use the next hop address as destination and not the outgoing interface)
- b) Include those default routes in the dynamic routing process for both, RIPv2 and RIPv6
- c) Verify that clients located in East and West branches are able to reach the Internet.

5) Harden your RIP topology

- a) Ensure that RIPv2 updates are sent out on point-to-point links only!

6) Analysis of RIP (**Lab report**)

- a) Analyze and record the routing tables of routers RHQ0 and REast1
 - a. How many routes were learned?
- b) What is the administrative distance of RIP? Where can you find this value on the router?
- c) How could you reduce the size of the routing tables?
- d) Which timers does RIP utilize?
- e) How can the current values of these timers be displayed?
- f) Do some research on how to harden RIPv2
 - a. Ensure that RIPv2 updates are sent out only on point-to-point links only

7) OSPFv2

- a) **Additionally** activate OSPF Area 0 on:
 - RHQ0
 - The uplinks of REast1 and RWest1 to RHQ0
- b) Propagate the default route pointing to the Internet via OSPF.
- c) Verify that the default route is now learned via OSPF, on router REast1.
(Hint: All routers that only speak RIP will lose the default gateway route)

8) Analysis OSPFv2 (**Lab report**)

- a) Analyze the routing table of the routers RHQ0 and REast1. Which protocol is used to populate the entries in the routing table now?
- b) Analyze the OSPF topology table and the neighbor table of RHQ0 and REast1.

9) OSPFv3

- a) **Additionally** activate OSPF for IPv6 (OSPFv3) Area 0 on:
 - RHQ0
 - The uplinks of REast1 and RWest1 to RHQ0
- b) Propagate the default route pointing to the Internet via OSPFv3.
- c) Verify that the default route is now learned via OSPFv3, on router REast1.

10) Analysis OSPFv3 (**Lab report**)

- a) Analyze the routing table of the routers RHQ0 and REast1. Which protocol is used to populate the entries in the routing table now?

11) Multiarea OSPF Dual Stack and Route Redistribution

- a) Disable RIPv2 and RIPv6 on all routers in the West region & RHQ0
- b) Propagate the default route pointing to the Internet via RIP & RIPv6 on REast1
- c) Activate OSPF for IPv4 and IPv6 as follows:
 - Area 1: RWest1 – RWest2
 - Area 2: RWest1 – RWest3
- d) Redistribute RIP routes into OSPF on router REast1 with the following parameters:
 - Metric Type 1
 - Metric 100

12) Analysis Multiarea OSPF Dual Stack and Route Redistribution (**Lab report**)

- a) Analyze the changes in the routing tables of RHQ0, RWest2 and RWest3.

13) Multiarea OSPF Dual Stack – Stub & Totally Stub Area

- a) Convert Area 1 to a “Stub Area” and Area 2 to a “Totally Stub Area”.

14) Analysis Multiarea OSPF Dual Stack – Stub & Totally Stub Area (**Lab report**)

- a) Analyze the routing tables of RWest2 and RWest3. What's the difference? Which entries have changed and why?

15) Harden your OSPF topology

- a) Authenticate the OSPFv2 routing updates.
- b) Ensure that OSPFv2 and v3 updates are sent out on point-to-point links only!

