Bialystok University of Technology

Faculty of Electrical Engineering

Course name:
Computer Networks

Course code: IS-FEE-10082S

Laboratory classes manual guide

Laboratory exercise no: **4**

Subject of the laboratory exercise:

Configuration and testing of static routing in a multi-segment network

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1. General characteristics of the exercise

The routing process in a TCP/IP network consists of forwarding IP packets and selecting a route through which these packets are sent. In the case of static routing, this route is permanently established in the process of configuring network devices (especially routers). This solution ensures high stability of network operation, simple configuration and a high level of security, but it is quite troublesome in the case of frequent changes to the network structure. Therefore, static routing is mainly used in the case of not very complex network architectures and in selected fragments of more extensive structures.

The objectives of this exercise are:
- familiarization with the principles and methods of configuring static routing in a TCP/IP network,
- learning how to monitor the routing process in routers,
- analysis of the created route in the IP network from the point of view of the end network station.

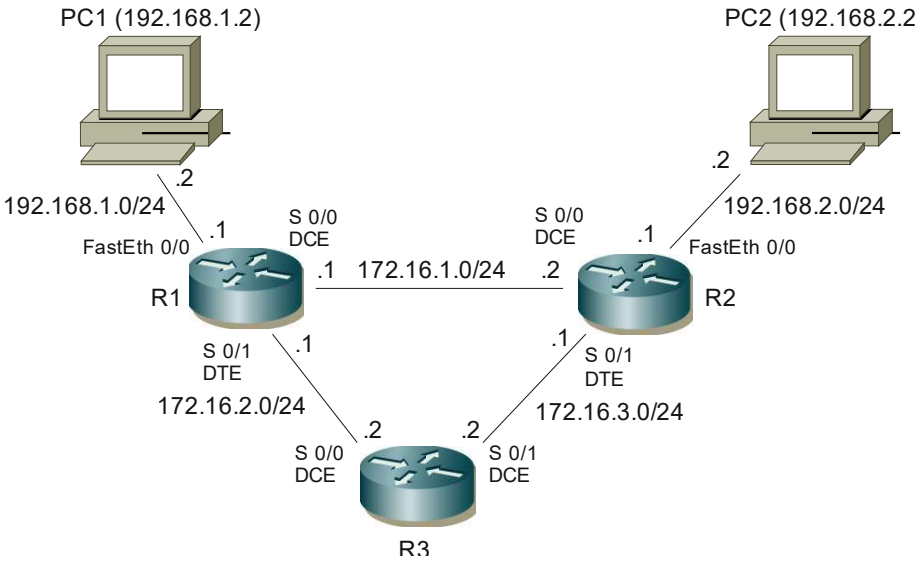
2. Preparation for classes

Before starting the exercise, you should read the following materials:
- This entire manual
- Basic information about routing in IP networks, e.g. **Pages 439-448 from „CCENT-ICND1 Exam Certification Guide.pdf"**

The above-mentioned information is the **minimum** theoretical knowledge necessary to start and properly complete the exercise.

4. Laboratory exercise plan

1. Connect the **R1**, **R2**, **R3** routers and the **PC1** and **PC2** stations according to the diagram below.



2. Set the appropriate names on each router (**R1**, **R2** and **R3**).
3. Configure the IP addresses of the Ethernet interfaces of router **R1** *(FastEth 0/0*) and station **PC1** so that they work within the IP network 192.168.1.0/24.
4. Configure the IP addresses of the Ethernet interfaces of router **R2** *(FastEth 0/0*) and station **PC2** so that they work within the IP network 192.168.2.0/24.
5. After configuring the interfaces mentioned in the previous points, check whether they work correctly (e.g. using the **sh ip int brief**, **ping** commands).
6. Configure the serial connection between routers **R1** and **R2** (*Serial 0/0* interfaces) and check whether it works properly.
7. Configure static routing between the networks attached to the Ethernet interfaces of routers R1 and R2. View and interpret the contents of the routing table in these routers.
8. On **PC1**, check the route to **PC2** (e.g. using **tracert** tool) and vice versa (from **PC2** to **PC1**).
9. Configure the serial connections between routers **R1** and **R3** and between **R2** and **R3** according to the figure above and check whether they work properly.
10. Modify and complete the static routing set in step 7 so that the route from **PC1** to **PC2** goes through routers **R1** and R2, and from PC2 to **PC1** through routers **R2**, **R3**, and **R1**.
11. Using the traceroute tool, confirm compliance of the obtained routes with the assumptions given in point 10.
12. Display and interpret the contents of the routing table on configured routers.
13. Determine how many static entries would need to be entered to ensure correct communication with the network with address 192.168.3.0/24 connected to the Ethernet interface on router **R3**.

Exercise report

The report should include a diagram of the assembled network system, listings of the commands performed, a description of the activities performed at individual points, as well as your own conclusions and observations made during the exercise.

5. Health and safety requirements

According to the rules specified in the first class and confirmed by students held. Appropriate health and safety regulations are also posted in the laboratory room.

6. References

1. Wendell Odom: CCNA 200-301 Official Cert Guide, Volume 1 and 2. Cisco Press, 2019.
2. Dooley K., Brown I.: Cisco IOS Cookbook. O'Reilly Media, Second Edition, 2006.
3. Cisco technical documentation for 2600XM routers (available in the lab and at www.cisco.com).