Note: Parts in grey color are mandatory for remote labs

Task 1 - Establish a console connection with the selected Cisco device (router / switch) [2.1.4.7]

Part for doing at home

- Install and start the Packet Tracer. Download it from e-portal or directly from Cisco Networking Academy

- Create the lab basic topology using the required components. The proposed devices are:

  - router Cisco 2811
  - switch Cisco 2960
  - PC computers
  - console cable, straight through cables

Add two serial interfaces to the router WIC-2T.

Try to reproduce the topology referring to the below picture:

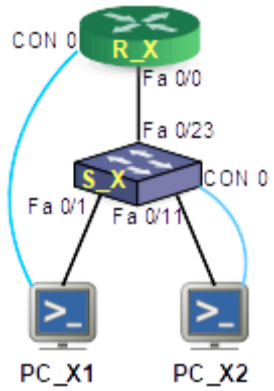


Figure 1 - Base topology of a single laboratory group.

Connections configured in the base topology:

PC_X1 NIC (Cisco) port connected with a straight cable to S_X Fa0/1 port.
PC_X1 Serial COM 1 port connected by console cable to R_X Console port (CON 0).
PC_X2 NIC (Cisco) port connected with a straight cable to S_X Fa0/11 port.
PC_X2 Serial COM 1 port connected by console cable to S_X Console port (CON 0).
R_X Fa 0/0 port connected with a straight cable to S_X Fa 0/23 port.

- Configure the correct names of the devices X corresponds to group number.

- Establish a connection using a program that emulates a text terminal (hyperterminal, putty, teraterm, ...) with Cisco devices (router and switch).

In Packet Tracer environment open the PC Desktop Tab, select Terminal icon and check the connection parameters. Then open the terminal I verify the connection.

Use the information contained in the exercise [2.1.4.7]
The following password is valid in the laboratory (use them if required):

normal user

console and terminals vty (telnet)
password: cisco

advanced user - enable

password: class

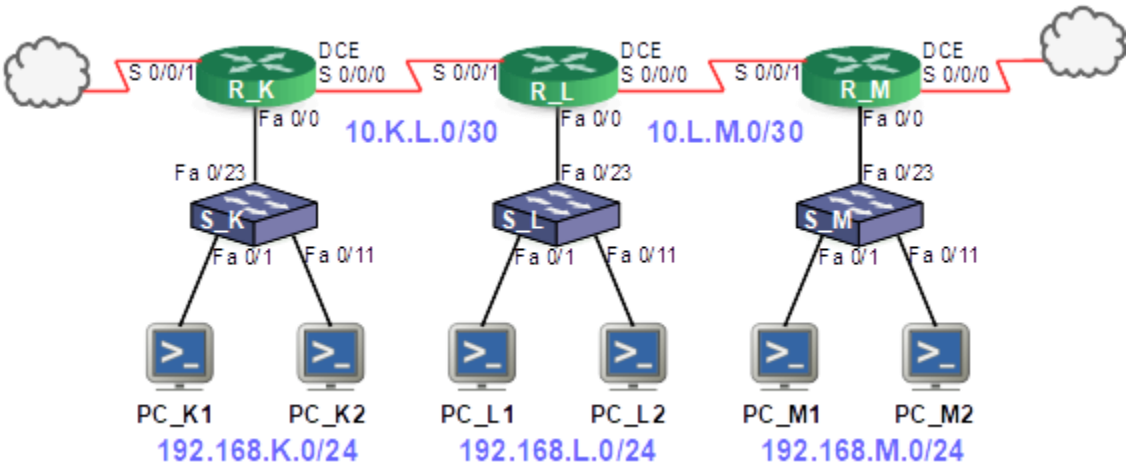
Task 2 - Basic configuration of the Cisco router.

Points: 1

Create the complex topology with three connected basic topologies.

To the main group topology connect two additional topologies of the left and right neighbor.

Try to reproduce the topology referring to the below picture, Configure the correct names of the devices corresponding to the group number.



Use the main schema of the lab topology to figure out your neighbors' numbers.

K – correspond to the left group number.

L – correspond to the group number.

M – correspond to the right group number.

Exercise base on supplementary Cisco Academy instruction. Follow the modifications given below.

- Familiarize yourself with the CLI interface.
- Check different levels of configuration (user, privileged user, interface, console, terminals, ...).
- Familiarize yourself with keyboard shortcuts.
- Familiarize yourself with the hint and help system (buttons: ? and TAB).

- Delete the startup configuration saved in the nvram memory.

```
R_X> enable
Password: class
R_X # erase startup-config
```

- Reset the router (do not remember the current configuration).

```
R_X #reload
```

- When restarting again, do not enter the setup setup program.

```
Would you like to enter the configuration dialog? [yes / no]: no <ENTER>
Would you like to terminate autoinstall? [yes]: yes <ENTER> or <ENTER>
```

- Configure the router name.

Set the router's name to: R_X

X - stands for the group number.

```
Router> enable
Router # configure terminal
Router (config) #hostname R_X
R_X (config) #exit
R_X #
```

- Configure the message of the day (MOTD).

```
R_X (config) #banner motd # A supervised system. Access only to authorized
   users #
```

- Configure the access password.

```
enable password (unencrypted) - class,

R_X # configure terminal
R_X (config) #enable password class
R_X (config) #
```

Do not encrypt passwords. Explicit password display protects against any possible typo. Do not use the enable secret command.

```
R_X (config) #enable secret class
console password - cisco,

R_X (config) #line console 0
R_X (config-line) #password cisco
R_X (config-line) #login
R_X (config-line) #exit
R_X (config) #
terminal password - cisco,

R_X (config) #line vty 0 4
```

```
R_X (config-line) #password cisco
R_X (config-line) #login
R_X (config-line) #exit
R_X (config) #
```

- Configure LAN interfaces (description, IP address, mask, "lift" interface).

Before configuring, check the type and number of the interface. You can use the show running-config command to do this.

Use the following IP addresses:

Ethernet / FastEthernet A - 192.168.X.X0 / 24

Ethernet / FastEthernet B - 192.168.100 + X.X0 / 24

... (the same scheme for other interfaces)

```
R_X(config)#interface Ethernet A
R_X(config-if)#description Connection to LAN_X
R_X(config-if)#ip address 192.168.X.X0 255.255.255.0
R_X(config-if)#no shutdown
R_X(config-if)#exit
R_X(config)#

R_X (config) #interface Ethernet B
...
```

- Configure WAN (serial) interfaces (description, IP address, mask, clock, activate interface).

Before configuring, it is necessary to check the type and number of the interface. You can use the show running-config command to do this.

Next, we check to which interface we have the cables connected. It is recommended to check the physical connections and signatures on the router. Routers are cabled with a null-modem connection.

In a null-modem connection, one cable end is DCE type and the other is DTE type.

The DCE cable is terminated with a female plug and the DTE cable with a male plug. Cables may have descriptions, but it is often difficult to see which cable is DCE type, and which DTE.

The following command can be checked remotely whether the cable is connected to the given interface and what type it is:

```
R_X # show controllers Serial {0/0/0}
```

On serial interfaces with a DCE cable we need to set the timing of the transmission synchronization clock. At the laboratory, we set the speed of 128000 as standard.

To configure serial interfaces use the following IP addresses:

WAN1 - Serial C - 10. L.M.1 / 24 for DCE

WAN2 - Serial D - 10.K.L.2 / 24 for DTE

WAN3 - Serial E - 10. L.N.1 / 24 for DCE

... (the same scheme for other interfaces)

X, L - stands for the group number.

K - means the Router number of the previous group (DCE is set on the serial interface of the router).

M - means the Router number of the next group (on the serial interface of the router we do not set the clock - DTE).

Routers in the laboratory are connected in two loops. The connection configuration method is compatible with the clock pointer movement:

R_1 (DCE) -> (DTE) R_2 (DCE) -> (DTE) R_3 (DCE) -> (DTE) R_4 (DCE) -> (DTE) R_1

R_1 (DCE) -> (DTE) R_6

R_6 (DCE) -> (DTE) R_7 (DCE) -> (DTE) R_8 (DCE) -> (DTE) R_9 (DCE) -> (DTE) R_10 (DCE) -> (DTE) R_6

Example for group 1, where the router is connected to routers of three other groups:

- R_2 router on the right - WAN1 Serial 0/0/0 - 10.1.2.1, DCE clock rate 128000;
- on the left router R_4 - WAN2 Serial 0/0/1 - 10.4.1.2, DTE;
- vertical router R_6 - WAN3 Serial 0/3/0 - 10.1.6.1, DCE clock rate 128000.

```
R_X(config)#interface Serial 0/0/0
R_X(config-if)#description Connection to R_Y
R_X(config-if)#ip address 10.L.M.1 255.255.255.0
R_X(config-if)#clock rate 128000
R_X(config-if)#no shutdown
R_X(config-if)#exit
R_X(config)#interface Serial 0/0/1 (or Serial 0/1/0)
R_X(config-if)#description Connection to R_K
R_X(config-if)#ip address 10.K.L.2 255.255.255.0
R_X(config-if)#no shutdown
R_X(config-if)#exit
```

- Compare the configurations in RAM and NVRAM.

```
R_X # show running-config
R_X # show startup-config
```

- Save the configurations in nvram.

```
R_X # copy running-config startup-config
```

- Compare the configurations in RAM and NVRAM.

Task 3 - Basic configuration of the Cisco switch.

Points: 1

Following the modifications given below.

- Familiarize yourself with the CLI interface.
- Check different levels of configuration (user, privileged user, interface, console, terminals, ...).
- Familiarize yourself with keyboard shortcuts.
- Familiarize yourself with the hint and help system (#command?).

- Delete the startup configuration saved in the nvram memory.

On the switch, the startup configuration is saved in text files in the flash memory named config.text and private-config.text. If the switch has no configuration, then these files should not exist.

```
S_X>enable
Password: class
S_X#erase startup-config
```

- Delete VLAN configurations stored in the flash memory in the vlan.dat file.

Earlier, you can list flash memory content with the `dir` command. The vlan.dat file exists when VLANs were created on the switch.

```
S_X#delete vlan.dat
```

- Reset the switch (do not remember the current configuration).

```
S_X#reload
```

- When restarting again, do not enter the setup setup program.

```
Would you like to enter the configuration dialog? [yes / no]: no <ENTER>
Would you like to terminate autoinstall? [yes]: yes <ENTER>
```

- Configure the name of the switch.

Set the switch name to: S_X

X - stands for the group number.

```
Switch>enable
Switch#configure terminal
Switch(config)#hostname S_X
S_X(config)#exit
S_X#
```

- Configure the message of the day (MOTD).

```
S_X(config)#banner motd #A supervised system. Access only to authorized users#
```

- Configure the access password.

enable password (unencrypted) - class,

```
S_X#configure terminal
S_X(config)#enable password class
S_X(config)#
```

We do not encrypt passwords. Explicit password display protects against any possible typo and another group's recovery. We do not use the enable secret command.

~~S_X (config) #enable secret class~~

console password - cisco,

```
S_X(config)#line console 0
S_X(config-line)#password cisco
S_X(config-line)#login
S_X(config-line)#exit
S_X(config)#
```

terminal password - cisco,

```
S_X(config)#line vty 0 15
S_X(config-line)#password cisco
S_X(config-line)#login
S_X(config-line)#exit
S_X(config)#
```

- Configure the VLAN management interface (description - management VLAN, IP address, mask, activate interface).

Use VLAN 1 to configure the IP address.

Use the following IP addresses for VLAN 1: 192.168.X.X9 mask 255.255.255.0

We configure the IP address of the Switch by assigning it to the so-called Management VLAN. By default, this is VLAN 1, to which all switch ports are assigned.

```
S_X#configure terminal
S_X(config)#interface VLAN 1
S_X(config-if)#description VLAN Manager
S_X(config-if)#ip address 192.168.X.X9 255.255.255.0
S_X(config-if)#no shutdown
```

- Configure descriptions of connected interfaces (PC1, PC2, R_X).

The actual interface numbers to which the PC1, PC2, and R_X devices are connected are to be substituted for variables A, B, C.

```
S_X(config)#interface FastEthernet 0/1
S_X(config-if)#description Connection to PC1
S_X(config)#interface FastEthernet 0/11
S_X(config-if)#description Connection to PC2
S_X(config)#interface FastEthernet 0/23
S_X(config-if)#description Connection to R_X
S_X(config-if)#exit
S_X(config)#
```

- Compare the configurations in RAM and NVRAM.

```
R_X#show running-config
R_X#show startup-config
```

- Remember configurations in nvram.

```
R_X#copy running-config startup-config
```

- Compare the configurations in RAM and NVRAM.

Task 4 - Configuration management on the switch and Cisco router.

Points:1

1. Archiving switch configuration to a text file.

Execute the exercise by following the modifications given below.

- catch the switch configuration to the text terminal's log file,

In Packet Tracer select and copy the `show run` output from the console window.

- Save the created configuration on your PC (e.g. c:\cisco\users\name.name_S_X_config.txt),
- open the created file with Wordpad and delete unnecessary entries (residuals after holding the screen scroll -more- etc)
- then in the edited file change the name of the device to **S_X_log** (X stands for the number of the switch),
- delete the startup configuration of the device, then reset the device, **do not save the configuration during reload process**.
- reproduce the current configuration of the device (**running-config**) by pasting the contents of the saved file with the configuration into the terminal.

2. Archiving the configuration of the router on the TFTP server.

In the exercise, use the SolarWinds tftp server.

When using Packet Tracer use build in PC TFTP Server.

- connect a PC with a configurable device. The port corresponding to the computer on the lower patch panel should be connected with a cable with a configurable device,
- configure the PC to work in the network, according to the address assigned to the device being configured.
- start and configure the tftp server:

* the default working directory can be changed to c:\cisco\tftp,
* the server should allow sending and receiving files and has no restrictions on allowed IP addresses,
* the server should listen to all or a selected network card,
* SolarWinds server must be started in the configuration with the start button,

- remember the created configuration on the TFTP server under the name: R_X_config.txt,
- change the device name in the stored configuration to **R_X_tftp**

When using Packet Tracer it is impossible to edit the file on TFTP server. Change the host name to R_X_tftp before sending the configuration to tftp server.

```
R_X (config)#hostname R_X_tftp
```

- delete configurations from NVRAM memory,
- copy the changed configuration from the TFTP server into the **NVRAM memory**,
- display current configuration (running-config) and start-up configuration (startup-config), display differences.

In the exercise, use the commands:

```
R_X#copy running-config tftp - copying the current configuration to the tftp
   server,
```

```
R_X#copy tftp startup-config - copy configuration from tftp server to nvram
   memory.
```