COMPUTER NETWORKS

LAB 1

MODELING A SIMPLE NETWORK

Instructors

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PREREQUISITES

1. Computer Networking: A Top-Down Approach, 7th ed., J.F. Kurose and K.W. Ross (Chapter 1 and Chapter 2)

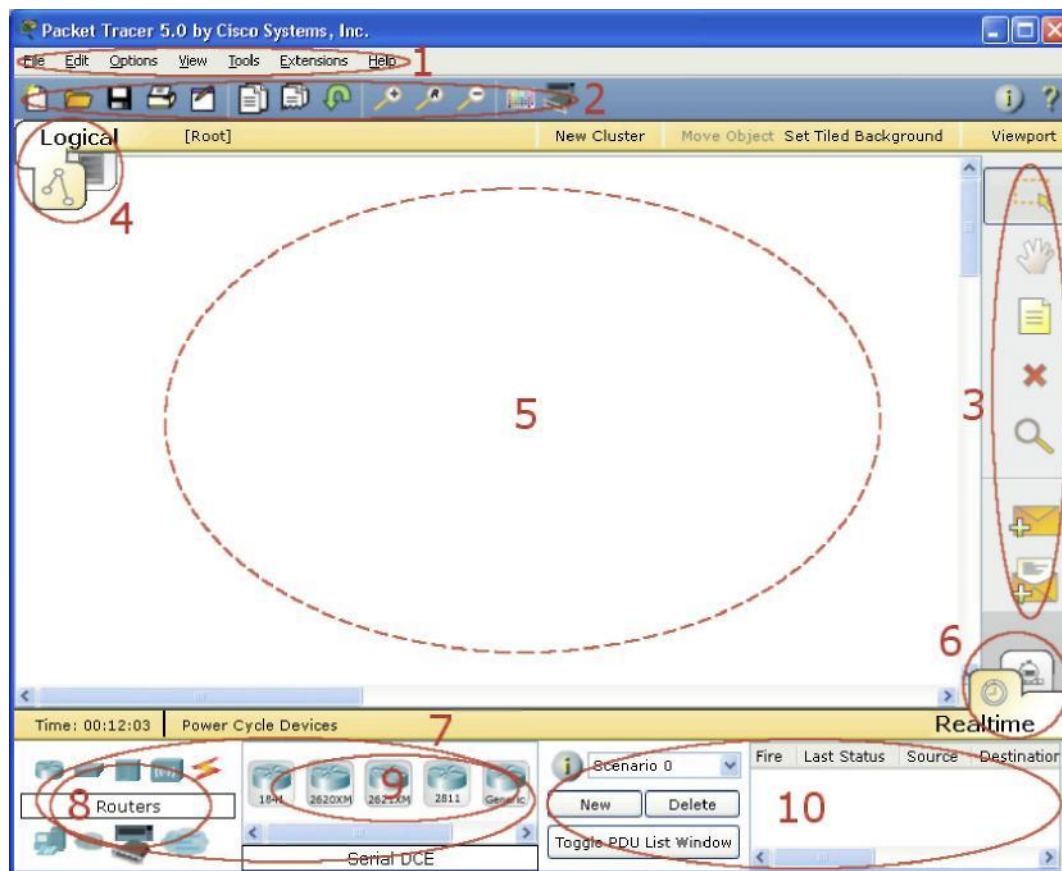REPORT

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<p style="text-align:center">Theoretical part</p>

To start Cisco Packet Tracer, you must call the executable file (.exe) with PacketTracer

General view of the program:

The workspace of the program window consists of the following elements:

1. Menu Bar-a Panel that contains the menu File, Edit, Options, View, Tools, Extensions, Help.
2. the Main Tool Bar contains graphic images of shortcuts for accessing the File, Edit, View, and Tools menu commands, as well as the Network Information button.
3. Common Tools Bar-a Panel that provides access to the most used tools of the program: Select, Move Layout, Place Note, Delete, Inspect, Add Simple PDU and Add Complex PDU.

4. Logical/Physical Workspace and Navigation Bar-a Panel that allows you to switch the workspace: physical or logical, and also allows you to move between cluster levels.
5. Workspace - the Area where the network is created, the simulation is monitored, and various information and statistics are viewed.
6. Realtime / Simulation Bar-use the bookmarks in this panel to switch between Realtime and Simulation mode. It also contains buttons related to Power Cycle Devices, Play Control buttons, and the Event List switch in Simulation mode.
7. Network Component Box Is the area where devices and connections are selected to be placed in the workspace. It contains the Device-Type Selection area and the Device-Specific Selection area.
8. Device-Type Selection Box-this area contains the available types of devices and connections in Packet Tracer. The Device-Specific Selection area changes depending on the selected device
9. Device-Specific Selection Box-this area is used to select specific devices and connections needed to build in the network workspace.
10. User Created Packet Window-this window manages packets that were created on the network during the scenario simulation.

To create a topology, select a device from the Network Component panel, and then select the device type from the Device-Type Selection panel. After that, click the left mouse button in the workspace field. You can also move the device directly from the Device-Type Selection area, but the default device model will be selected.

To quickly create multiple instances of the same device, hold down the Ctrl key, click on the device in the Device-Specific Selection area, and then release the Ctrl key. After that, you can click several times on the workspace to add copies of the device.
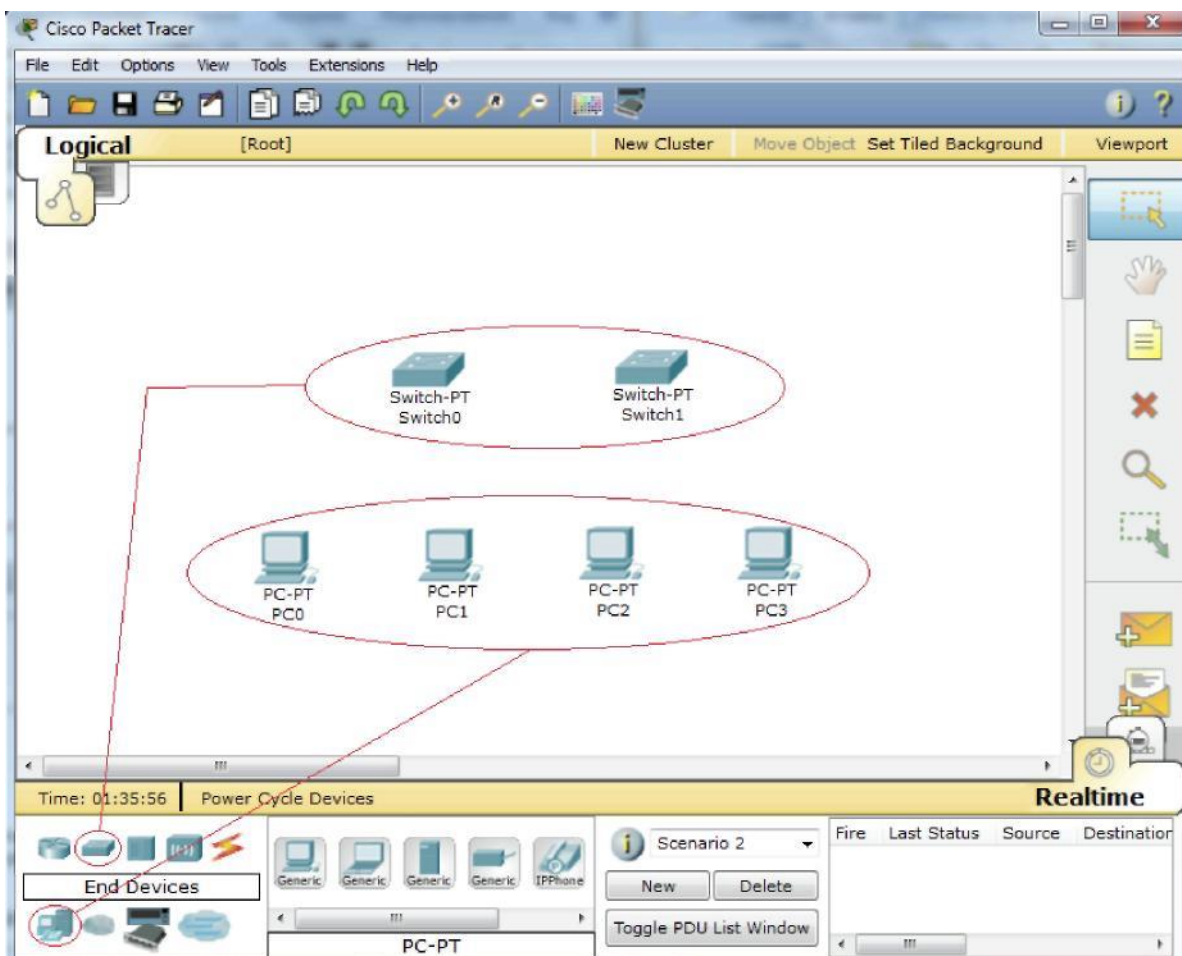
Packet Tracer provides the following types of devices:

- Routers;
- Switches (including bridges);

- Hubs and repeaters;
- End devices-PCs, servers, printers, GP phones;
- Wireless devices: access points and wireless router;
- Other devices - cloud, DSL modem, and cable modem.

Adding the necessary elements to the program workspace

When you add each item the user has the option to give it a name and set the required parameters. To do this, click on the desired element with the left mouse button (LCM) and go to the Config tab in the device dialog box.

The properties dialog box for each element has two tabs:

- Physical-contains the graphical interface of the device and allows you to simulate working with it on the physical level.
- Config-contains all the necessary parameters for configuring the device and has a user-friendly interface.

Also, depending on the device, the properties may have an additional tab to control the operation of the selected element: Desktop (if the destination device is selected) or CLI (if the router is selected) , and so on.

To delete unnecessary devices from the program workspace, use the Delete (Del) button.

We will link the added elements using connecting links. To do this, select the Connections tab from the Network Component Box panel. We will see all possible types of connections between devices. Select the appropriate cable type. The mouse pointer changes to the "connection" cursor (it looks like a connector). Click on the first device and select the appropriate interface to connect to, and then click on the second device, performing the same operation. You can also connect using the Automatically Choose Connection Type (automatically connects items in the network). Select and click on each of the devices that you want to connect. A cable connection will appear between the devices, and indicators at each end will show the connection status (for interfaces that have an indicator).

After creating a network, you need to save it by selecting the File -> Save menu item or the Save icon on the Main Tool Bar. The saved topology file has the *.pkt extension.

Packet Tracer allows us to simulate working with the command-line interface (CLI) of the IOS operating system installed on all Cisco switches and routers.

Once connected to a device, we can work with it as if it were a real device console. The simulator provides support for almost all commands available on real devices.

You can connect switches or routers to the ICS by clicking on the required device and going to the CLI tab in the properties window.

To simulate the operation of the command line on the target device (computer), select the Desktop tab in the properties, and then click the Command Prompt shortcut.

Working with files in the simulator

Packet Tracer allows the user to store the configuration of certain devices, such as routers or switches, in text files. To do this, go to the properties of the required device and click the "Export..." button in the Config tab to export the Startup Config or Running Config configuration. So we get a dialog box for saving the necessary configuration to a file that will have the extension *. txt. Text of the device configuration file running-config.txt (default name) is similar to the text of information received when using the show running-config command on IOS devices.

Note that the configuration of each device is saved in a separate text file. The user can also change the configuration in the saved file manually using a custom text editor. To provide the device with saved or edited settings, click the "Load..." button in the Config tab to load the required Startup Config configuration, or the "Merge..." button to load the Running Config configuration.

Практическая часть

Add 2 Switch-PT switches to the program workspace. By default, they have names - Switch and Switch 1. Add to the working field four computers with the default names RSO, PCI, PC2, RSZ. Connect the devices to an Ethernet network, as shown here:
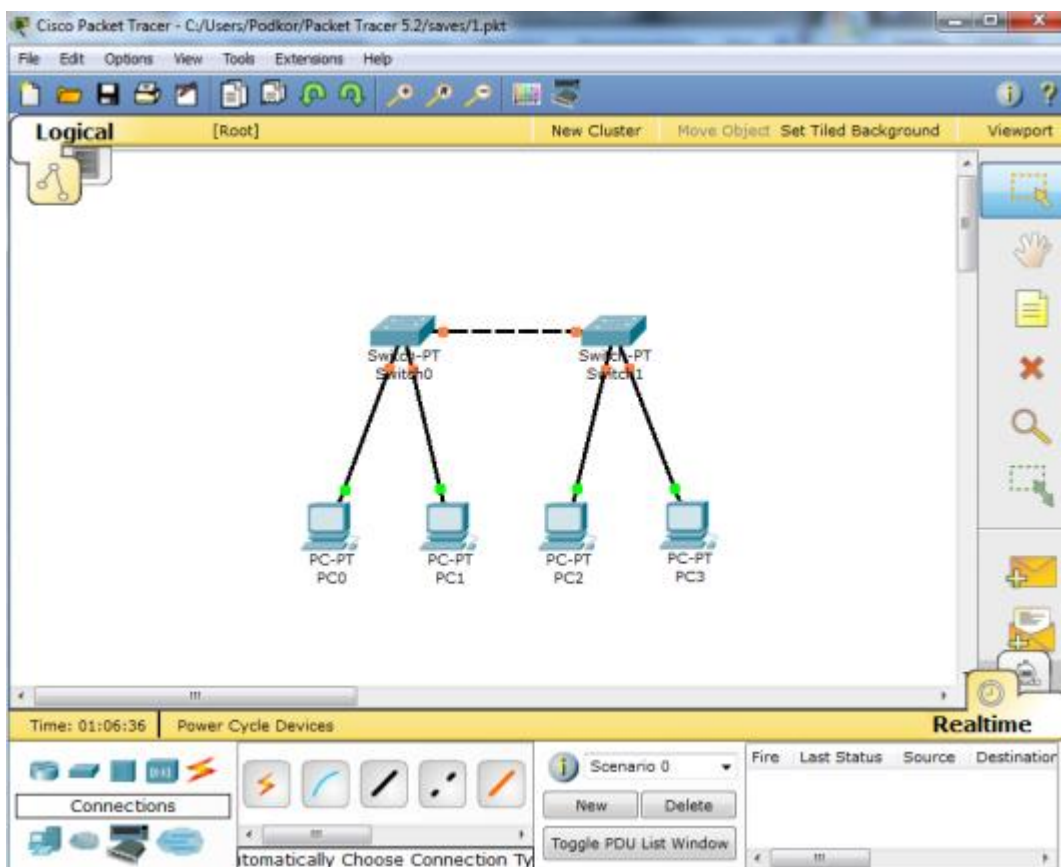
Save the created topology by clicking the Save button (in the File -> Save menu).

Open the properties of the RSO device by clicking on its image. Go to the Desktop tab and simulate run by clicking Command Prompt.

We get a list of commands if we enter "? " and press Enter. To configure the computer, use the ipconfig command from the command line, for example:

ipconfig 192.168.1.2 255.255.255.0

You can also enter the IP address and network mask in the convenient graphical interface of the device. Gateway default gateway-GATEWAY ADDRESSES are NOT IMPORTANT, since the network you are creating does not require routing.
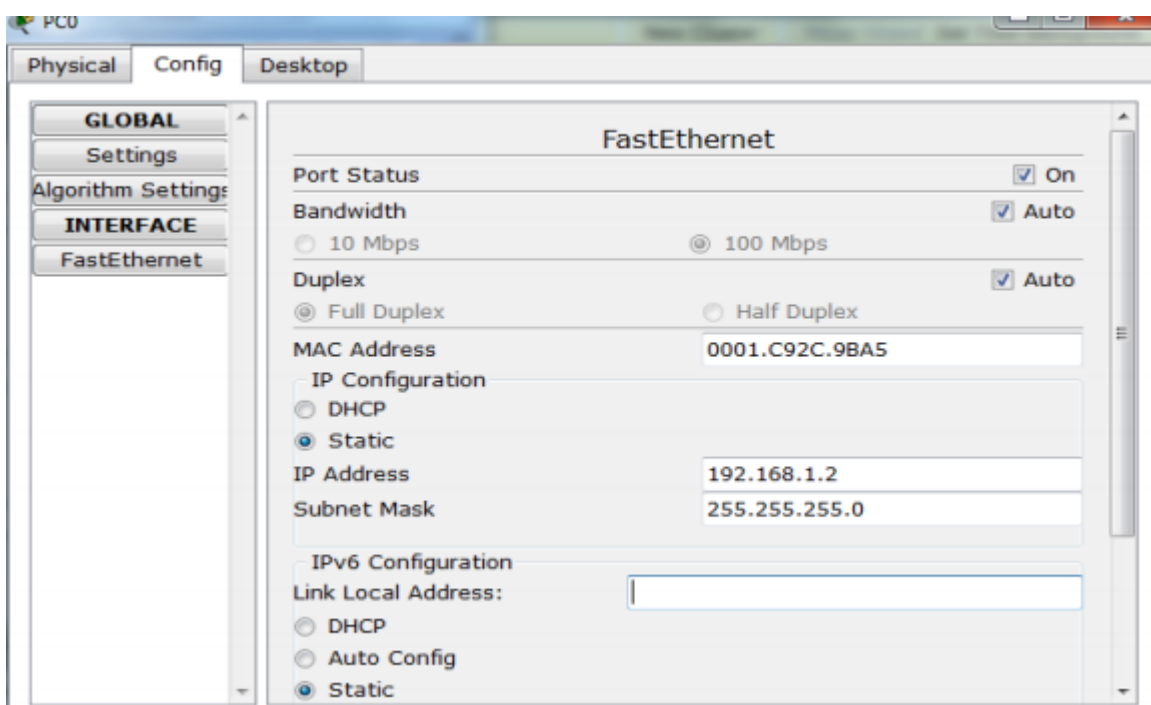

We will configure each host in the same way.

Устройство	IP ADRESS	SUBNET MASK
PCO	192.168.1.2	255.255.255.0
PC1	192.168.1.3	255.255.255.0
PC2	192.168.1.4	255.255.255.0
PC3	192.168.1.5	255.255.255.0

On each computer, view the assigned addresses with the $ipconfig$ command without parameters.

Packet Tracer 5 provides a simulation mode that describes and shows in detail how the Ping utility works. Therefore, you need to switch to this mode by clicking on the icon of the same name in the lower-left corner of the workspace, or by using the Shift+s key

combination. The "modeling Panel" opens, which displays all events related to the ping process execution.
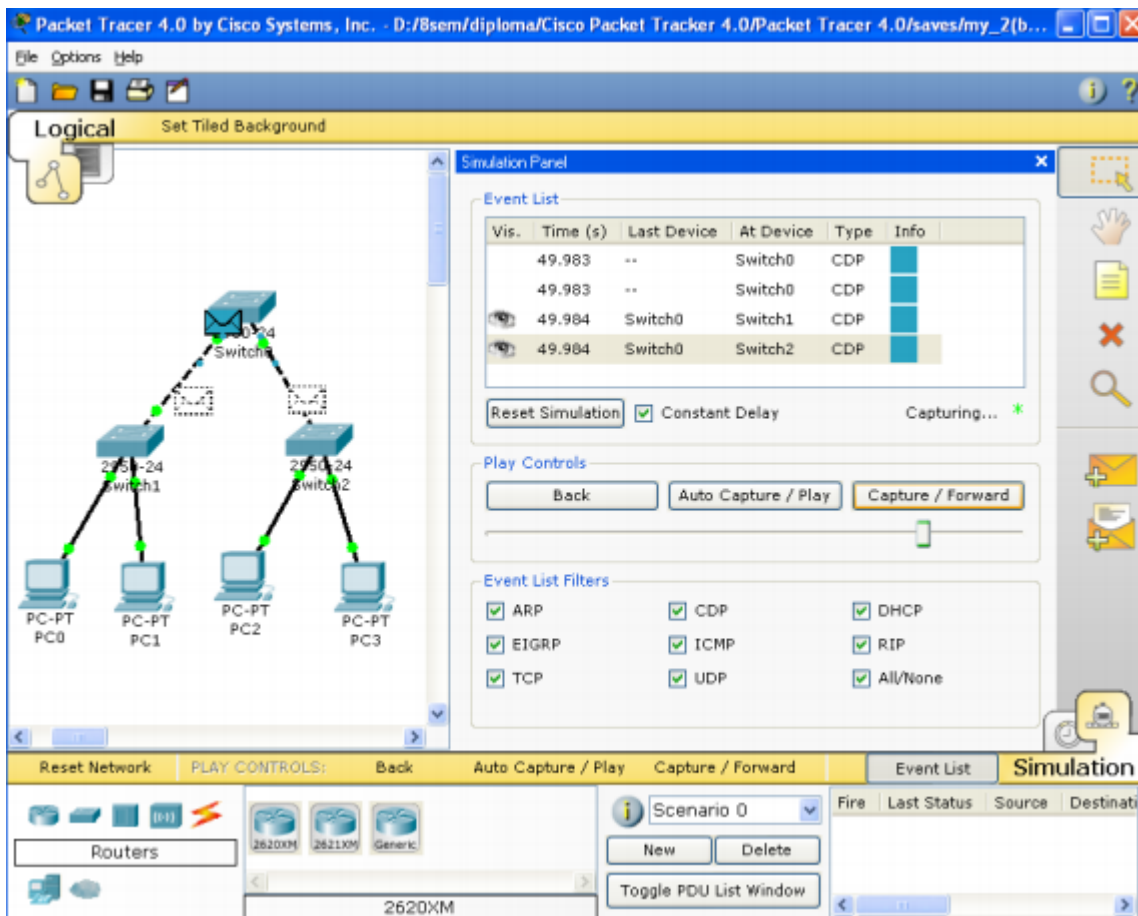
The modeling panel

Now you need to start the ping process again. After starting it, you can move the "modeling Panel" to monitor the sending/receiving of packets on the diagram of the designed network.

The "Automatic" button implies modeling the entire ping process in a single process, while" step-by-Step " allows you to display it step-by-step.

To find out the information that the package contains and its structure, just right-click on the colored square in the "Information" column.

The simulation stops either when the ping process is completed or when the corresponding workstation's Edit window is closed.

If everything is done correctly, we can ping any of any computer. For example, go on the computer PC3 and make *ping* to computer PC0. We should see a ping report similar as here:

However, this is not all the advantages of Packet Tracer: in "simulation Mode" you can not only track the protocols used, but also see which of the seven levels of the OSI model this Protocol is used:
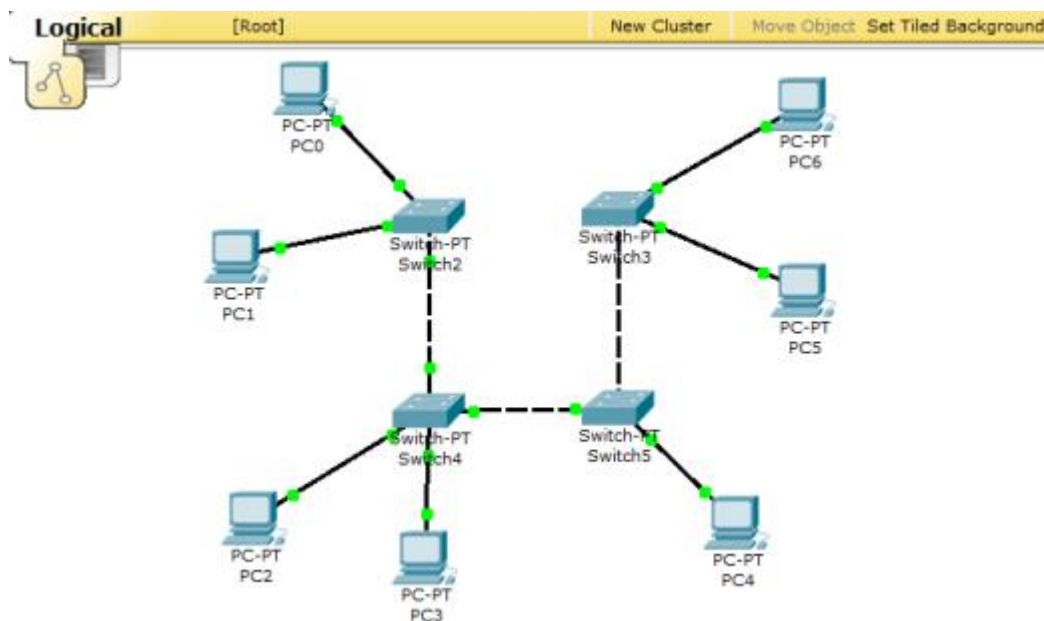
TASK FOR INDEPENDENT WORK:

1. Create a topology in figure

2. Assign addresses to computers, according to option "v". "v" – is your last digit of your HDU ID.

For example, for option 7 (v=7) and PC5 computer, we have IP ADDRESS 70.7.1.5, SUBNET MASK - 255.255.255.0.

| Host	IP ADDRES	SUBNET MASK
PC1	v*10. v.1.1	
PC2	v*10. v.1.2	
PC3	v*10. v.1.3	255.255.255.0
PC4	v*10. v.1.4	
PC5	v*10. v.1.5	
PC6	v*10. v.1.6	

If you have done everything correctly you will be able to ping any computer from any.

3. Run the ping utility, according to the table.

Variant v	Ping from	Ping to	Variant v	Ping from	Ping to
1	PC1	PC6	8	PC6	PC5
2	PC2	PC6	9	PC1	PC6
3	PC3	PC1	0	PC2	PC6
4	PC4	PC2			
5	PC5	PC3			
6	PC6	PC4			
7	PC6	PC5			

4. In" simulation Mode", track the movement of packets and the protocols used

(see figure)
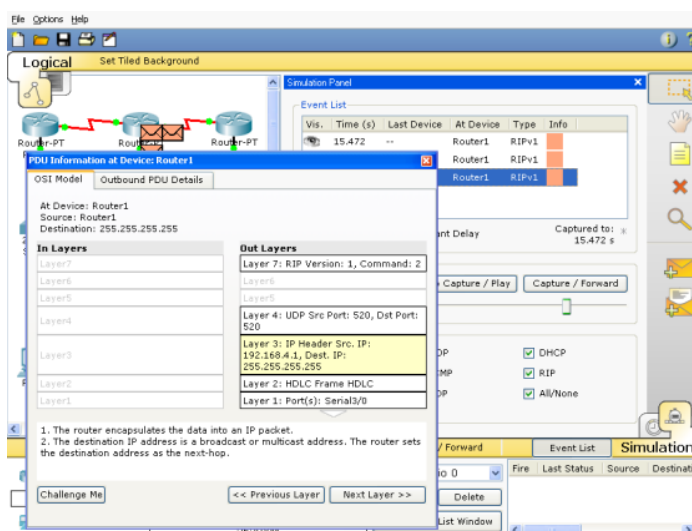
5. Switching to "Simulation Mode" to review and explain the process of data exchange over the ICMP Protocol between devices (by executing the $Ping$ command from one computer to another item. Include a detailed explanation in the report.

6. Make sure that all network objects are reachable using the IP Protocol.

7. Make screenshots and add to report. Write your explanation on item 5.

Answer on the questions:

1. What is difference between hub and switch?
2. What layer of OSI model is used for the switching?
3. Describe the aims of subnet mask?
4. Do we have one subnetwork or 4 (because we have 4 switches)? Explain.
5. What will happen if we will change the address of PC6 to v*10. v.2.6 and make ping-request from PC1 to PC6? Is it successful or not? Explain, please, why?

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