The Peerian Journal
Open Access | Peer Reviewed
Volume 31, June, 2024
ISSN (E): 2788-0303
Website: www.peerianjournal.com
Email: editor@peerianjournal.com

Designing Of Computer Network In Cisco Packet Tracer Software

R.G.Rakhimov[1], A.A.Juraev[2]
[1]Associate professor of the department of "Information technologies", PhD, Namangan institute of Engineering and Technology 160115, Namangan, Uzbekistan. E-mail: rgrakhimov@gmail.com, Tel: +99890-499-99-29
[2]Student of group 27-ATT-20, Namangan Engineering-Construction Institute, 160103, Namangan, Uzbekistan. E-mail: axrorbekjorayev2603@gmail.com, Tel: +99888-250-79-97

Abstract. This article presents the Cisco Packet Tracer software interface and its capabilities, the tasks of existing devices in the software interface and their analysis, the creation of a computer network project "Building №1 of the Namangan Engineering-Construction Institute" using this software, and the classification of costs for the project. Designing a network with the help of this program provides many conveniences to users, including time saving, low cost, and low labor consumption.
Keywords: *Cisco Packet Tracer, Ethernet, switch, HUB, Wi-Fi, modem, network cables, server, IP address.*

INTRODUCTION

After computers were created by humanity, it was very soon discovered that independent devices could not fully realize their potential capabilities. In addition, people understood the need to create a new approach to the processes of information processing, transmission and storage, as well as to the environment in which humanity can combine all its information resources. This concept was the first step in creating systems in which almost every citizen of the planet exists today.

Today, local and global computer networks perform many functions, but the main thing is to combine all the information collected by humanity and give it access at any time and from anywhere in the world. The Association, which was influenced by local and global computer networks and continues at the same time, made it possible to create a system that allows large Information Media to work with incredible speed and provide access to almost any data volume.

MAIN PART

Cisco Packet Tracker software interface and its capabilities

Cisco Packet Tracer software is developed by Cisco and is recommended for use in studying telecommunications networks and network equipment. Based on the Packet Tracer software, it is possible to create a network topology from various Cisco routers and switches, workstations and network connections such as Ethernet, Serial, ISDN, Frame Relay. The functions of the simulator can be suitable both for training and for work, as well as for configuring the network at the planning stage.

Cisco Packet Tracer software interface and working window view below:

The Peerian Journal
Open Access | Peer Reviewed
Volume 31, June, 2024
ISSN (E): 2788-0303
Website: www.peerianjournal.com
Email: editor@peerianjournal.com

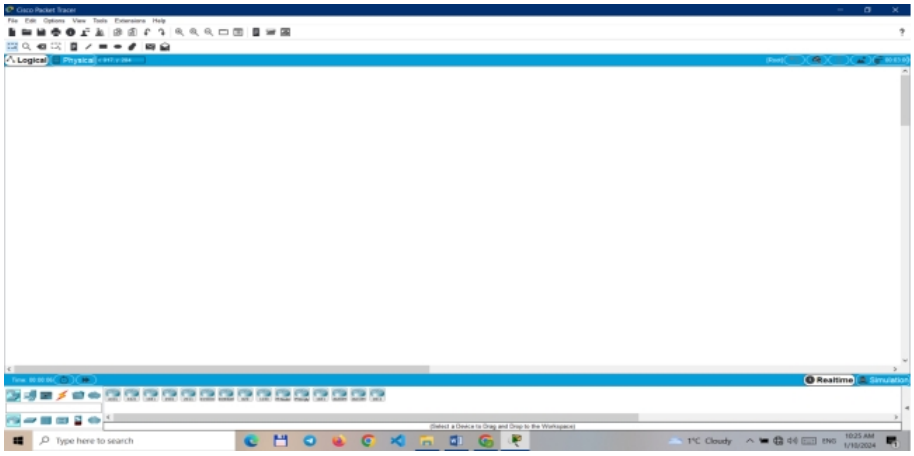


Fig.1.

At the top of the window is the name of the program (Cisco Packet Tracer), the header section containing the name of the file that stores the computer network model, as well as the window resizing, compacting or closing it.

The standard control buttons are located and they are below:

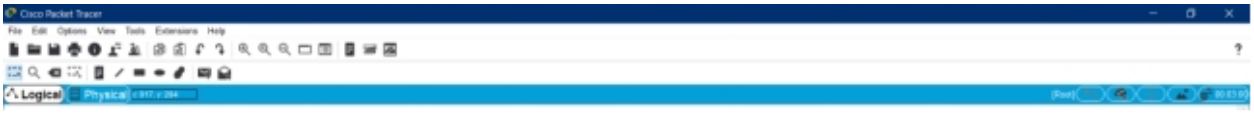


Fig.2

At the top of the header is the main menu bar, which contains the subs menu sections:

The File menu includes the save and open file commands describing the network topology;

The Edit menu underlay contains commands that allow you to edit the image in the working area;

Options menu underlay serves for working area Settings;

The View menu subsystem consists of user interface parameter setting commands;

The Tools menu subsystem consists of commands that allow you to create an additional model of devices;

Extensions under the menu allows you to ensure that utilities are allowed;

The Help menu subsystem consists of commands that allow you to refer to a reference, view training materials, or view the current version of the Cisco Packet Tracer program.

Below the menu bar is the top uskinas bar.

The first line of buttons located on the top equipment panel Cisco Packet Tracer program consists of tabs made up of the most commonly used commands of the main menu bar:

New-creating a new model;

Open-model file loading;

Save-save model to file;

Print model from printer;

Activity Wizard-creating a model simplification instruction;

The Peerian Journal
Open Access | Peer Reviewed
Volume 31, June, 2024 ISSN (E): 2788-0303
Website: www.peerianjournal.com Email: editor@peerianjournal.com

Copy-copy the specified part of the model to the clipboard;
Paste-putting the information in the buffer in the model window;
Undoing the last modification to the Undo-model;
Undo-undo to restore the undo modification;
Zoom in-image zoom;
Zoom Reset-Reset the initial size of the image;
Zoom Out-shrink image;
Drawing Palette - coloring the drawn elements of the model;
Custom Devices Dialog-calling dasdtur, which creates the user interface of the device model;
The second row of the upper equipment panel housed the following devices:
Logical Physical-change the working Field Mode;
Root Back-shrink and expand cluster button;
New Cluster-button to merge devices into one group (cluster) ;
Move Objects-push an object in a cluster;
Set Tided Background-wallpaper selection button

Functions of existing devices in the Cisco Packet Tracer software interface and their analysis.

Cisco Packet Tracer is a network emulator created by Cisco. This program allows you to build networks on different equipment in optional topologies, supporting different protocols. The Cisco Packet Tracer software solution allows you to simulate the work of various network devices: routers, switches, wireless hotspots, personal computers, network printers, IP phones, etc. Working with an interactive simulator allows you to set up a real network of tens and even hundreds of devices. The settings, in turn, depend on the types of devices: some can be configured using the commands of the Cisco IOS operating system, others through a graphical web interface, and others through the operating system command line or graphic menus.

Routers

Fig.3.

Routers are used to search for the optimal route of data transmission based on special routing algorithms, such as selecting a route (route) with the lowest number of transit nodes. There are 3 classes of routers they are below. Upper class routers are called Trunk routers. The productivity of routers in this variety will be the highest. With them, the trunk networks of enterprises or the global network of any God can be formed. With the help of trunk routers, the processing of several 100 thousand packets per second is carried out, and a few millions per second. Middle class routers are understood as routers designed for regional sections. With them,

The Peerian Journal
Open Access | Peer Reviewed
Volume 31, June, 2024
ISSN (E): 2788-0303
Website: www.peerianjournal.com
Email: editor@peerianjournal.com

the connection of regional sections with the Central, that is, the trunk network is carried out. These routers are relatively simplified variants of upper-class routers. Lower-class routers are routers designed for long-distance officers. With them, the connection of not very large offices with the enterprise network is carried out. Such routers are designed to operate over channels with little speed, including connecting ports over telephone networks.

Fig.4.

Switchs

Fig.5.

Switches are devices that run on the link layer of the OSI model and are designed to combine multiple nodes in one or more network segments. The Switch transmits packets based on the internal table switching table, so traffic only goes to the MAC address to which it is intended and is not duplicated in all ports.

Fig.6.

HUB

The Peerian Journal
Open Access | Peer Reviewed
Volume 31, June, 2024
ISSN (E): 2788-0303
Website: www.peerianjournal.com
Email: editor@peerianjournal.com

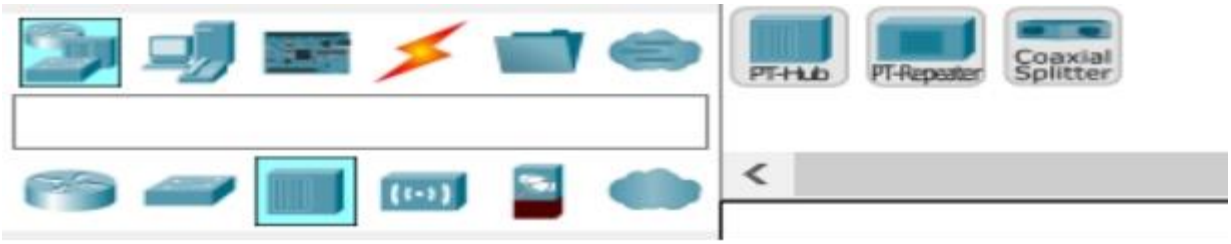


Fig.7.

The advantage of a concentrator over a commutator lies only in the fact that its ports are capable of amplifying the signal, and the cost is low. But after the number of connecting devices in the local network exceeds 8, the concentrator causes a decrease in the speed of operation of the network. Another major drawback is that the concentrator (hub) duplicates the packet received in one port to all other ports.

Wireless devices

Fig.8.

Wireless Wi-Fi technologies and their based networks. Includes wireless access points. Wireless access point. In local area network construction, there may be cases where a wireless access point device will be necessary. For example:

The local network was organized through a switch, but there are devices that must be connected to the local network via the Wi-Fi standard;

The local network is connected to the internet through such a mashrutizer that there is no possibility of wireless connection to this router;

The local network is connected to the internet via a modem that does not have a wireless connection;

The local network is connected to the internet through such a router that the router is able to connect the local network devices via the Wi-Fi standard, but it is necessary to enlarge the scope of the Wi-Fi area that the router is forming. In all of the points listed above, a wireless hotspot device is used.

Communication lines

The Peerian Journal
Open Access | Peer Reviewed
Volume 31, June, 2024
ISSN (E): 2788-0303
Website: www.peerianjournal.com
Email: editor@peerianjournal.com

Fig.9.

These network cable components can create a number of network loihas in the Cisco Packet Tracer program. The tariffs on our cables will be as low.

Fig.10.

Provides a console connection between routers and switches and computers. In order to work with a computer, certain requirements must be met for a console session. Both sides must have the same baud rate, each side must have 7 bits of data (8 bits), the parity must be the same, there must be 1 or 2 stop bits, and no 'data flow can be any for both parties.

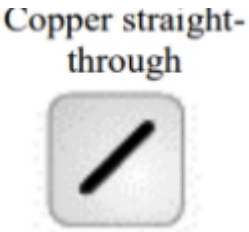


Fig.11

This type of copper cable provides a standard Ethernet environment for connecting devices operating at different levels of the OSI model (for example, hub - router, switch - PC, router - hub). The cable can be connected to the following types of ports: 10 Mbit / s (Ethernet), 100 Mbit / s (Fast Ethernet) and 1000 Mbit / s (Gigabit Ethernet).

Fig.12.

The Peerian Journal
Open Access | Peer Reviewed
Volume 31, June, 2024
ISSN (E): 2788-0303
Website: www.peerianjournal.com
Email: editor@peerianjournal.com

Connection According to the OSI model, a copper Ethernet medium is used to connect devices operating at the same level (for example, HUB - HUB, PC - PC, PC printer). The cable can be connected to the following types of ports: 10 Mbit / s (Ethernet), 100 Mbit / s (Fast Ethernet) and 1000 Mbit / s (Gigabit Ethernet).

Fig.13.

Fiber optic cable is used to connect optical ports (100 Mbit/s or 1000 Mbit/s).

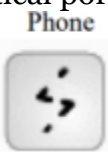


Fig.14.

A telephone cable can be connected between devices with modem ports. An example of a modem connection is to connect a computer to the Internet through a telephone line using a modem.

Fig.15.

A coaxial cable is used between coaxial ports, such as cable modem ports.

Fig.16.

This type of connection is often used to establish WAN connections. Then the cable is connected to the WAN ports of the devices. If this connection type is selected, one device performs the function of DCE and the other automatically acts as the DTE side. The presence of a clock symbol on the corresponding end of the connection indicates that this end performs the function of DCE.

Devices

Fig.17.

The Peerian Journal
Open Access | Peer Reviewed
Volume 31, June, 2024
ISSN (E): 2788-0303
Website: www.peerianjournal.com
Email: editor@peerianjournal.com

Here are the latest devices, computers, servers, printers, phones and other devices.

Internet emulation

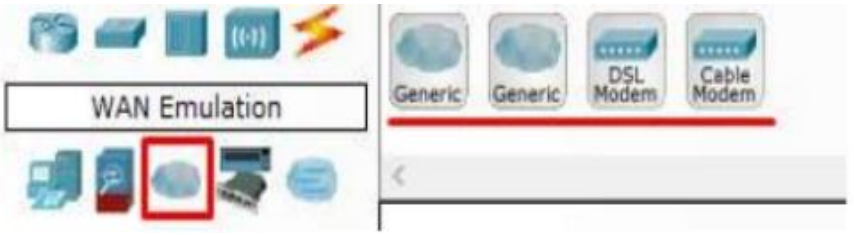


Fig.18.

An example of global network emulation. DSL modem, cloud and more. Cloud for user devices and multi-user work.

Fig.19.

Devices can be assembled independently. You can create optional connections using these devices.

Physical configuration of the equipment.

Install the Cisco 1841 router in the workspace and when we start it, the settings and configuration of the router will open.

Fig.20.

1. The function of turning the router off and on is shown, if the green light is on, then we can know that the router is on, otherwise it is off.
2. On the left, as we can see, the list of modules with which this router can be equipped.

The Peerian Journal
Open Access | Peer Reviewed
Volume 31, June, 2024
ISSN (E): 2788-0303
Website: www.peerianjournal.com
Email: editor@peerianjournal.com

3. There are 2 ports on the router where the module can be inserted. You can install them only after selecting the desired module in number 2 and making sure that the router is turned off.

RESULTS

Creating a computer network project in the Cisco Packet Tracer program.

To perform this task, we will first run Cisco Packet Tracer.
The working window will look like this:

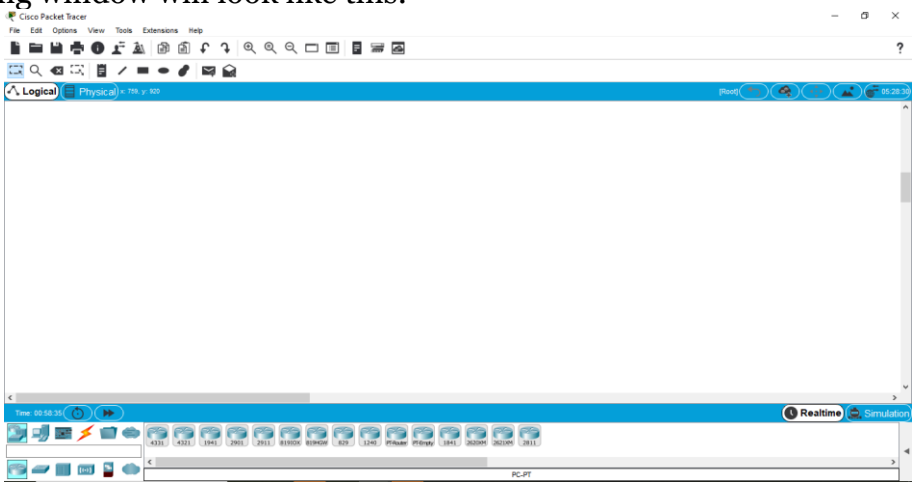


Fig.21.

We draw a drawing of the building we want to design. Since we have 4 floors that are shakily identical, the other 4 floors will be the same. The rest of the floors are hajman small, but they are like that.

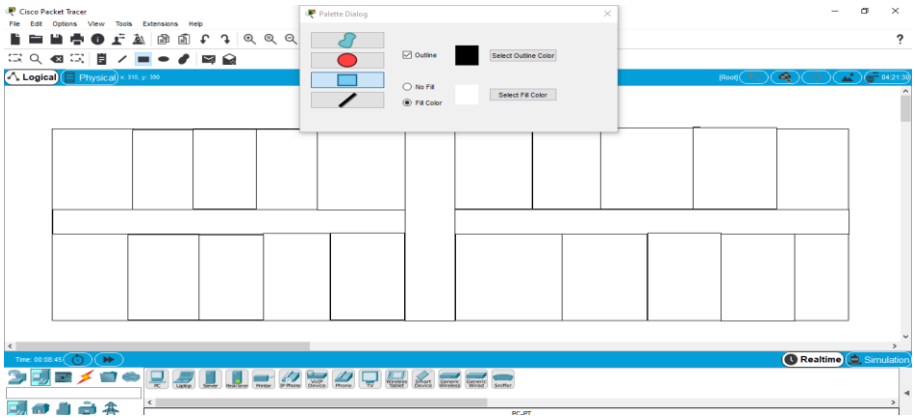


Fig.22.

In the following part, we can place the necessary devices in the rooms.

The Peerian Journal
Open Access | Peer Reviewed
Volume 31, June, 2024
ISSN (E): 2788-0303
Website: www.peerianjournal.com
Email: editor@peerianjournal.com

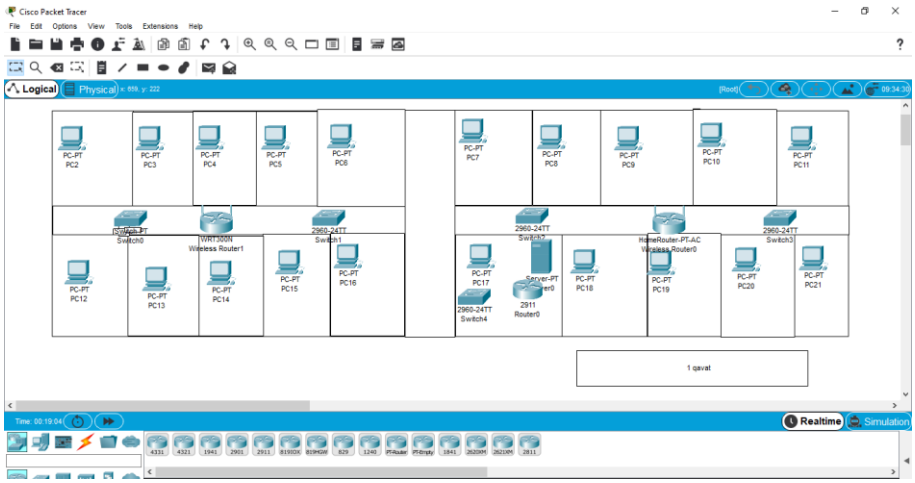
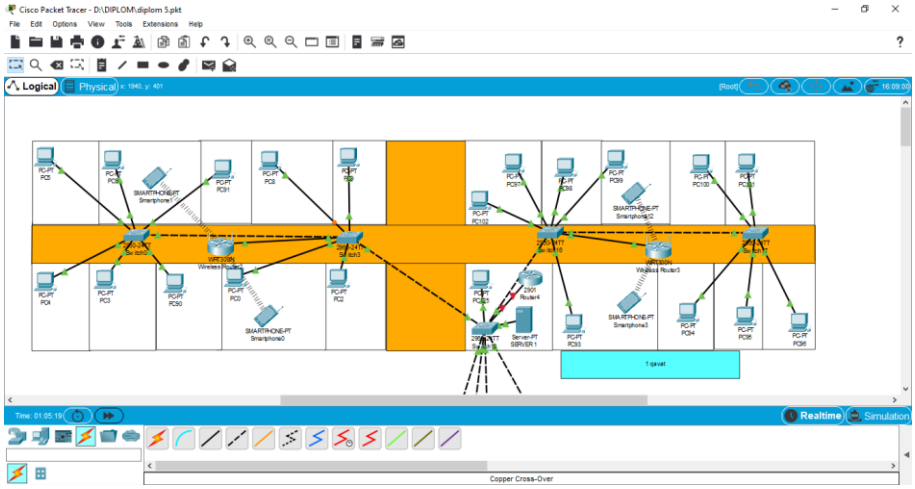


Fig.23.

In the next steps, we connect them through cables (wrap pair) and also give colors for their design.

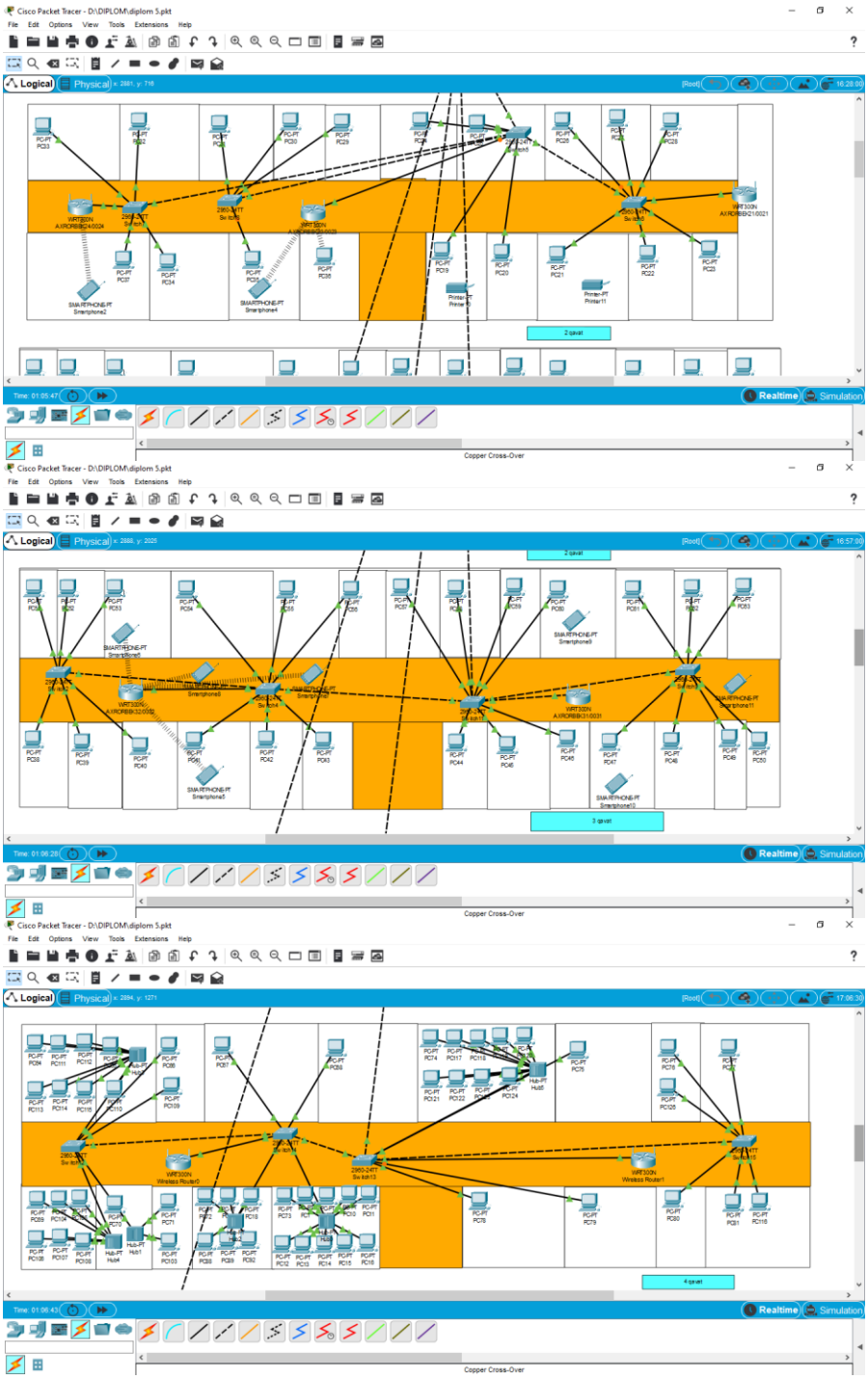


The Peerian Journal

Open Access | Peer Reviewed

Volume 31, June, 2024 **ISSN (E): 2788-0303**

Website: www.peerianjournal.com **Email:** editor@peerianjournal.com



The Peerian Journal
Open Access | Peer Reviewed
Volume 31, June, 2024
ISSN (E): 2788-0303
Website: www.peerianjournal.com
Email: editor@peerianjournal.com

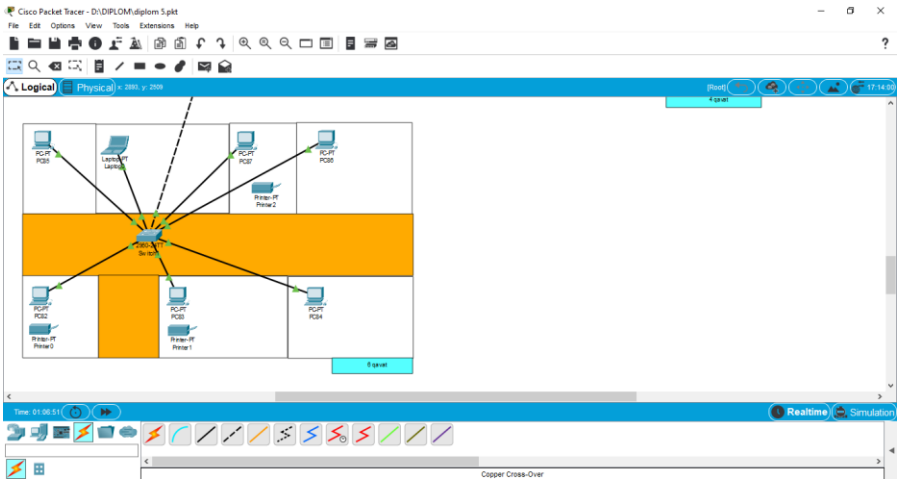


Fig.24.

After this process, we proceed to the process of configuring the switch, computer and other structures. We start the work by first giving ip to the DNCP server. We give our DNCP server ipsini 192.168.2.2, Getway 192.168.2.1 and mask 255.255.255.0.

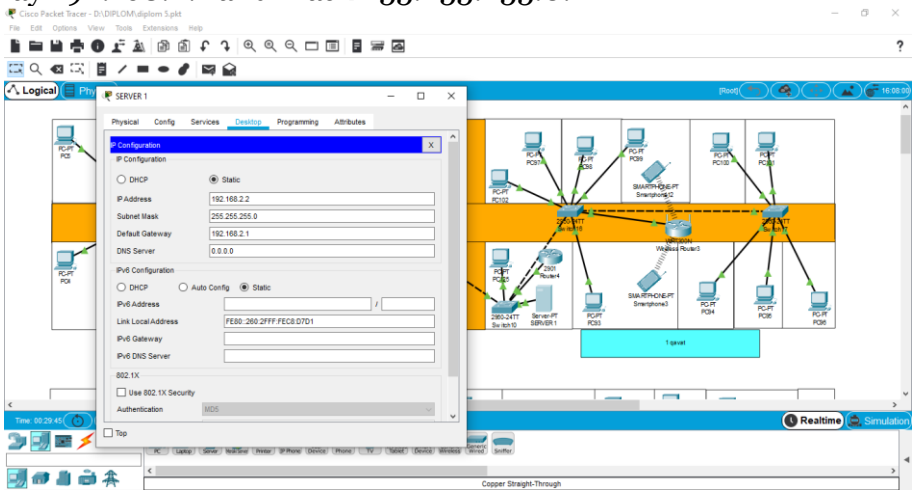


Fig.25.

In the next step, we check whether IP addresses on computers are dynamically given.

The Peerian Journal
Open Access | Peer Reviewed
Volume 31, June, 2024
ISSN (E): 2788-0303
Website: www.peerianjournal.com
Email: editor@peerianjournal.com

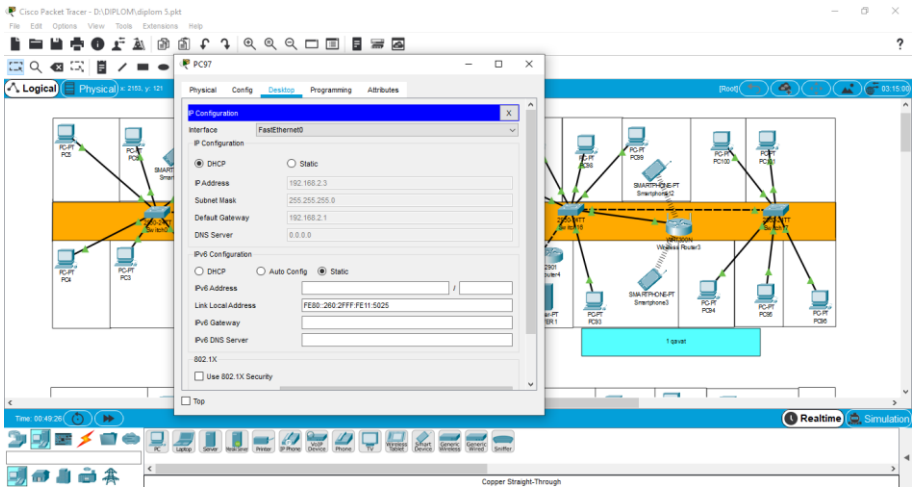


Fig.26.

In the next step, we will show that they are sharing information with one another.

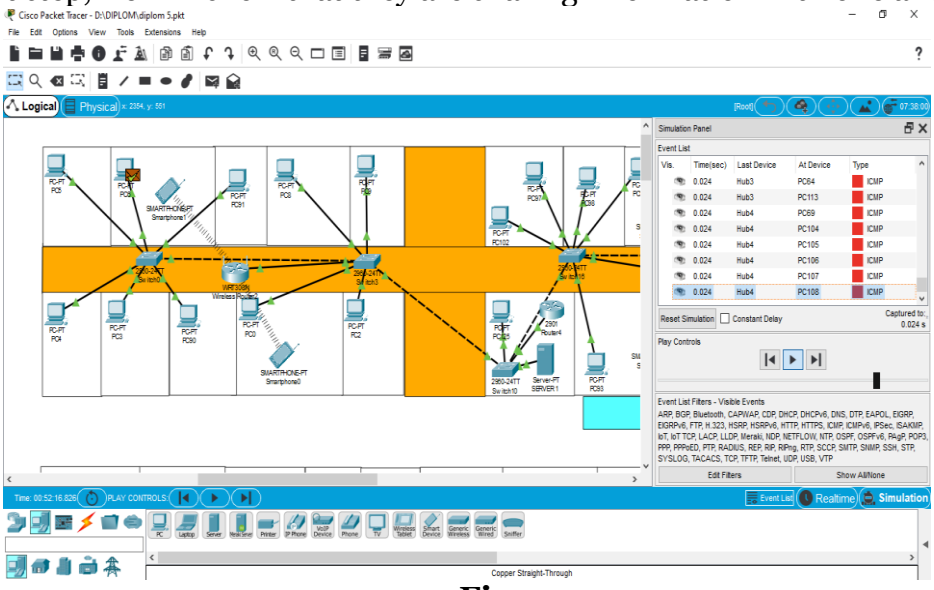


Fig.27.

REFERENCES.

1. Olifer V., Olifer N. Fundamentals of computer networks. Study guide. - St.Petersburg: Peter, 2009, 350 p.
2. Ruchkin V.N. Architecture of computer networks. Textbook. -M.: Dialog Mephi, 2009, 340 p.
3. Qaxxorov A.A. Network Planning and construction. Tutorial - t.: Publisher, 2012, 224 p.
4. Smirnova E.B., Kozik P.V. Technology of modern Ethernet networks. Study guide. - St.Petersburg: BHV-Petersburg, 2012, 272 p.
5. Musaev M.M. Computer systems and networks. Tutorial. - T.: Aloqachi, 2013, 394 p.

The Peerian Journal
Open Access | Peer Reviewed
Volume 31, June, 2024
ISSN (E): 2788-0303
Website: www.peerianjournal.com
Email: editor@peerianjournal.com

6. Tomas H. Cormen. Algorithms unlocked. - Cembridge, Massachusetts. London, 2013.
7. Yusupbekov A.N, Adilov F.T., Dozorsev V.M. A typical technological object is imitative modeling and management of qualified computer training. - T.: Tashkent, 2016, 195 p.
8. R.G. Rakhimov. On the merits of innovative and pedagogical approaches in the educational system. NamSU Scientific Bulletin. Special issue. 2020
9. R.G. Rakhimov. Clean the cotton from small impurities and establish optimal parameters. The Peerian Journal. Vol.17, pp.57-63 (2023).
10. R.G. Rakhimov. The advantages of innovative and pedagogical approaches in the education system. Scientific-technical journal of NamIET. Vol.5, Iss.3, pp.292-296. 2020
11. R.G. Rakhimov. A cleaner of raw cotton from fine litter. Scientific journal of mechanics and technology. 2023. 2 (5), Special Issue. 293-297
12. U.I. Erkaboev, G. Gulyamov, J.I. Mirzaev, R.G. Rakhimov, N.A. Sayidov, Calculation of the Fermi–Dirac Function Distribution in Two-Dimensional Semiconductor Materials at High Temperatures and Weak Magnetic Fields, Nano. **16**(9), Article No 2150102 (2021)
13. G. Gulyamov, U.I. Erkaboev, R.G. Rakhimov, J.I. Mirzaev, N.A. Sayidov, Determination of the dependence of the two-dimensional combined density of states on external factors in quantum-dimensional heterostructures, Modern Physics Letters B, **37**(10), Article No 2350015 (2023)
14. G. Gulyamov, U.I. Erkaboev, R.G. Rakhimov, J.I. Mirzaev, On Temperature Dependence of Longitudinal Electrical Conductivity Oscillations in Narrow-gap Electronic Semiconductors, Journal of Nano- and Electronic Physics, **12**(3), Article No 03012 (2020)
15. U.I. Erkaboev, U.M. Negmatov, R.G. Rakhimov, J.I. Mirzaev, N.A. Sayidov, Influence of a quantizing magnetic field on the Fermi energy oscillations in two-dimensional semiconductors, International Journal of Applied Science and Engineering, **19(**2), Article No 2021123 (2022)
16. U. Erkaboev, R. Rakhimov, J. Mirzaev, N. Sayidov, U. Negmatov, M. Abduxalimov, Calculation of oscillations in the density of energy states in heterostructural materials with quantum wells, AIP Conference Proceedings, **2789(**1), Article No 040055 (2023)
17. U. Erkaboev, R. Rakhimov, J. Mirzaev, N. Sayidov, U. Negmatov, A. Mashrapov, Determination of the band gap of heterostructural materials with quantum wells at strong magnetic field and high temperature, AIP Conference Proceedings, **2789(**1), Article No 040056 (2023)
18. U. Erkaboev, R. Rakhimov, J. Mirzaev, U. Negmatov, N. Sayidov, Influence of the two-dimensional density of states on the temperature dependence of the electrical conductivity oscillations in heterostructures with quantum wells, International Journal of Modern Physics B. (2023). https://doi.org/10.1142/S0217979224501856
19. U.I. Erkaboev, R.G. Rakhimov, Determination of the Dependence of Transverse Electrical Conductivity and Magnetoresistance Oscillations on Temperature in Heterostructures Based on Quantum Wells, e-Journal of Surface Science and Nanotechnology, (2023). https://doi.org/10.1380/ejssnt.2023-070

The Peerian Journal
Open Access | Peer Reviewed
Volume 31, June, 2024
ISSN (E): 2788-0303
Website: www.peerianjournal.com
Email: editor@peerianjournal.com

20. U.I. Erkaboev, N.A. Sayidov, R.G. Rakhimov, U.M. Negmatov, Simulation of the temperature dependence of the quantum oscillations'effects in 2D semiconductor materials, Euroasian Journal of Semiconductors Science and Engineering. **3**(1), pp.47-55 (2021)
21. U.I. Erkaboev, G. Gulyamov, J.I. Mirzaev, R.G. Rakhimov, Modeling on the temperature dependence of the magnetic susceptibility and electrical conductivity oscillations in narrow-gap semiconductors, International Journal of Modern Physics B. **34**(7), Article No 2050052 (2020)
22. G. Gulyamov, U.I. Erkaboev, N.A. Sayidov, R.G. Rakhimov, The influence of temperature on magnetic quantum effects in semiconductor structures, Journal of Applied Science and Engineering, **23**(3), pp.453-460 (2020)
23. R. Rakhimov, U. Erkaboev, Modeling of Shubnikov-de Haaz oscillations in narrow band gap semiconductors under the effect of temperature and microwave field, Scientific and Technical Journal of Namangan Institute of Engineering and Technology, 2(11), pp.27-35 (2020)
24. U.I. Erkaboev, R.G. Rakhimov, N.A. Sayidov, Mathematical modeling determination coefficient of magneto-optical absorption in semiconductors in presence of external pressure and temperature, Modern Physics Letters B, **35**(17), Article No 2150293 (2021)
25. U.I. Erkaboev, R.G. Rakhimov, N.Y. Azimova, Determination of oscillations of the density of energy states in nanoscale semiconductor materials at different temperatures and quantizing magnetic fields, *Global Scientific Review,* **12,** pp.33-49 (2023)
26. U.I. Erkaboev, R.G. Rakhimov, J.I. Mirzaev, N.A. Sayidov, The Influence of External Factors on Quantum Magnetic Effects in Electronic Semiconductor Structures, International Journal of Innovative Technology and Exploring Engineering, **9**(5), pp.1557-1563 (2021)
27. U.I. Erkaboev, R.G. Rakhimov, Determination of the dependence of the oscillation of transverse electrical conductivity and magnetoresistance on temperature in heterostructures based on quantum wells, East European Journal of Physics, **3,** pp.133-145 (2023)
28. U.I. Erkaboev, R.G. Rakhimov , Simulation of temperature dependence of oscillations of longitudinal magnetoresistance in nanoelectronic semiconductor materials, e-Prime - Advances in Electrical Engineering, Electronics and Energy, **3,** Article No 100236 (2023)
29. U.I. Erkaboev, G. Gulyamov, R.G. Rakhimov, A new method for determining the bandgap in semiconductors in presence of external action taking into account lattice vibrations, Indian Journal of Physics, **96**(8), pp.2359-2368 (2022)
30. U.I. Erkaboev, R.G. Rakhimov, N.A. Sayidov, J.I.Mirzaev, Modeling the temperature dependence of the density oscillation of energy states in two-dimensional electronic gases under the impact of a longitudinal and transversal quantum magnetic fields, Indian Journal of Physics, **97**(4), pp.1061–1070 (2023)
31. U.I. Erkaboev, R.G. Rakhimov, J.I. Mirzaev, U.M. Negmatov, N.A. Sayidov, Influence of a magnetic field and temperature on the oscillations of the combined density of states in two-dimensional semiconductor materials, Indian Journal of Physics, **98**(1), pp.189-197 (2024)
32. U.I. Erkaboev, N.A. Sayidov, U.M. Negmatov, J.I. Mirzaev, R.G. Rakhimov, Influence temperature and strong magnetic field on oscillations of density of energy states in

The Peerian Journal
Open Access | Peer Reviewed
Volume 31, June, 2024
ISSN (E): 2788-0303
Website: www.peerianjournal.com
Email: editor@peerianjournal.com

heterostructures with quantum wells HgCdTe/CdHgTe, E3S Web of Conferences, 4**01,** Article No 01090 (2023)
33. U.I. Erkaboev, N.A. Sayidov, U.M. Negmatov, R.G. Rakhimov, J.I. Mirzaev, Temperature dependence of width band gap in $In_xGa_{1-X}As$ quantum well in presence of transverse strong magnetic field, E3S Web of Conferences, **401,** Article No 04042 (2023)
34. U.I. Erkaboev, R.G. Rakhimov, U.M. Negmatov, N.A. Sayidov, J.I. Mirzaev, Influence of a strong magnetic field on the temperature dependence of the two-dimensional combined density of states in InGaN/GaN quantum well heterostructures, Romanian Journal of Physics, **68,** Article No 614 (2023)
35. R.G. Rakhimov, Determination magnetic quantum effects in semiconductors at different temperatures, VII International Scientific and Practical Conference "Science and Education: problems and innovations", February 12, pp.12-15 (2021)
36. G. Gulyamov, U.I. Erkaboev, R.G. Rakhimov, N.S. Sayidov, J.I.Mirzaev, Influence of a strong magnetic field on Fermi energy oscillations in two-dimensional semiconductor materials, Scientific Bull., Phys. and Mathematical Res. 3(1), Article No 2 (2021)
37. U.I. Erkaboev, R.G. Rakhimov, N.A. Sayidov, Influence of pressure on Landau levels of electrons in the conductivity zone with the parabolic dispersion law, Euroasian Journal of Semiconductors Science and Engineering, **2**(1), pp.27-33 (2020)
38. R. Rakhimov, U. Erkaboev, Modeling the influence of temperature on electron landau levels in semiconductors, Scientific and Technical Journal of Namangan Institute of Engineering and Technology, 2(12), pp. 36-42 (2020)
39. R.G. Rakhimov, Clean the cotton from small impurities and establish optimal parameters, The Peerian Journal, 17, pp.57–63 (2023)
40. U.I. Erkaboev, R.G. Rakhimov, J.I. Mirzaev, N.A. Saidov, U.M. Negmatov. Calculation of the oscillation of the density of energy states in heteronostructured materials in the presence of a longitudinal and transverse strong magnetic field. International conferences "Scientific foundations of the use of information technologies of a new level and modern problems of automation", pp.341-344 (2022)
41. U.I. Erkaboev, R.G. Rakhimov, J.I. Mirzaev, N.A. Saidov, U.M. Negmatov. Calculations of the temperature dependence of the energy spectrum of electrons and holes in the allowed zone of a quantum well under the influence of a transverse quantizing magnetic field. International conferences "Scientific foundations of the use of new-level information technologies and modern problems of automation", pp. 344-347 (2022)
42. U.I. Erkaboev, N.A. Sayidov, J.I. Mirzaev, R.G. Rakhimov, Determination of the temperature dependence of the Fermi energy oscillations in nanostructured semiconductor materials in the presence of a quantizing magnetic field, Euroasian Journal of Semiconductors Science and Engineering, **3**(2), pp.47-52 (2021)
43. U.I. Erkaboev, U.M. Negmatov, J.I. Mirzaev, N.A. Sayidov, R.G. Rakhimov, Modeling the Temperature Dependence of the Density Oscillation of Energy States in Two-dimensional Electronic Gases Under the Impact of a Longitudinal and Transversal Quantum Magnetic Field, Acta Scientific Applied Physics, 2(3), pp.12-21 (2022)

The Peerian Journal
Open Access | Peer Reviewed
Volume 31, June, 2024
ISSN (E): 2788-0303
Website: www.peerianjournal.com
Email: editor@peerianjournal.com

44. R.G. Rakhimov, U.I. Erkaboev. Modeling of Shubnikov-de Haase oscillations in narrow-band semiconductors under the influence of temperature and microwave fields. Scientific Bulletin of Namangan State University. Volume 4, Number 4, pp.242-246.
45. U.I. Erkaboev, R.G. Rakhimov. Oscillations of transverse magnetoresistance in the conduction band of quantum wells at different temperatures and magnetic fields. Journal of Computational Electronics. 2024. pp. 1-12