Parul University

FACULTY OF ENGINEERING & TECHNOLOGY

BACHELOR OF TECHNOLOGY

COMPUTER NETWORK LABORATORY

(303105256)

4th SEMESTER

COMPUTER SCIENCE & ENGINEERING DEPARTMENT

Laboratory Mannual

COMPUTER NETWORK LABORATORY

PRACTICAL BOOK

COMPUTER SCIENCE AND ENGINEERING DEPARTMENT

PREFACE

It gives us immense pleasure to present the first edition of for the B.Tech. 2nd year students **COMPUTER NETWORK** for PARUL UNIVERSITY.

The Fundamental of Programming theory and laboratory courses at **PARUL UNIVERSITY, WAGHODIA, VADODARA** are designed in such a way that students develop the basic understanding of the subject in the theory classes and then try their hands on the computer learnt during the theoretical sessions.

This book is emphatically not focused on "the syntax of C". Understanding the fundamental ideals, principals, and techniques is the essence of a good programmer. Only well-designed code has a chance of becoming part of a correct, reliable, and maintainable system. Also, "the fundamentals" are what last: they will still be essential after today's language and tools have evolved or been replaced.

We acknowledge the authors and publishers of all the books which we have consulted while developing this Practical book. Hopefully this *COMPUTER NETWORK LABORATORY* will serve the purpose for which it has been developed.

Instructions to students

1. Every student should obtain a copy of laboratory Manual.
2. Dress Code: Students must come to the laboratory wearing.
   i. Trousers,
   ii. half-sleeve tops and
   iii. Leather shoes. Half pants, loosely hanging garments and slippers are not allowed.
3. To avoid injury, the student must take the permission of the laboratory staff before handling any machine.
4. Students must ensure that their work areas are clean and dry to avoid slipping.
5. Do not eat or drink in the laboratory.
6. Do not remove anything from the computer laboratory without permission.
7. Do not touch, connect or disconnect any plug or cable without your lecturer/laboratory technician's permission.
8. All students need to perform the practical/program.

Faculty of Engineering & Technology
303105256 - Computer Network Laboratory

CERTIFICATE

This is to certify that

Mr./Ms.……..... *with enrolment no. .....* *has successfully completed his/her laboratory experiments in the* ***COMPUTER NETWORK LABORATORY (303105256)*** *from the department of* ***COMPUTER SCIENCE AND ENGINEERING*** *during the academic year* ***2024-25***

Date of Submission:.....

Staff In charge:.....

Class: 4th Sem
A.Y. 2024-2025

Subject: - Computer Network Laboratory
Subject Code: 303105256

INDEX

Sr. No.	Experiment Title	Page No.		Date of Performance	Date of Assessment	Marks out 0f 10	Sign
		To	From				
1	Experiments on Simulation Tools: (CISCO PACKET TRACER).						
2	Experiments of Packet capture tool: Wireshark.						
3	To study behavior of generic devices used for networking: (CISCO PACKET TRACER).						
4	Data Link Layer (Error Correction).						
5	Virtual LAN						
6	Wireless LAN						
7	Inter networking with routers: 1: Experiment on same subnet 2: Perform Experiment across the subnet and observe functioning of Router via selecting suitable pair of Source and destination.						
8	Implementation of SUBNETTING.						
9	Routing at Network Layer.						
10	Experiment on Transport Layer.						

Practical 1

Experiment Title:

Simulation of Network Topology and Basic Configuration using Cisco Packet Tracer

1. AIM

To design, simulate, and configure a basic network topology using Cisco Packet Tracer, ensuring communication between devices in a LAN environment.

2. OBJECTIVE

1. Understand the use of simulation tools like Cisco Packet Tracer in networking.
2. Learn to configure network devices such as routers, switches, and PCs.
3. Test connectivity between devices using simulation.
4. Analyze packet flow and troubleshoot connectivity issues.

3. APPARATUS

- Hardware:
  No physical apparatus is required as this is a software-based simulation.
- Software:
  - Cisco Packet Tracer (minimum version 7.x)
  - A computer with Cisco Packet Tracer installed
  -

4. THEORY

Networking is a crucial aspect of modern communication systems, enabling the exchange of data between devices. Cisco Packet Tracer is a simulation tool used to design and configure networks virtually.
Key Concepts:

1. LAN (Local Area Network): A network connecting devices within a limited area.

2. Routers and Switches: Devices used for interconnecting and managing networks.
3. IP Addressing: Assigning unique addresses to devices for communication.
4. Ping Command: A tool to verify network connectivity.

Cisco Packet Tracer allows users to:

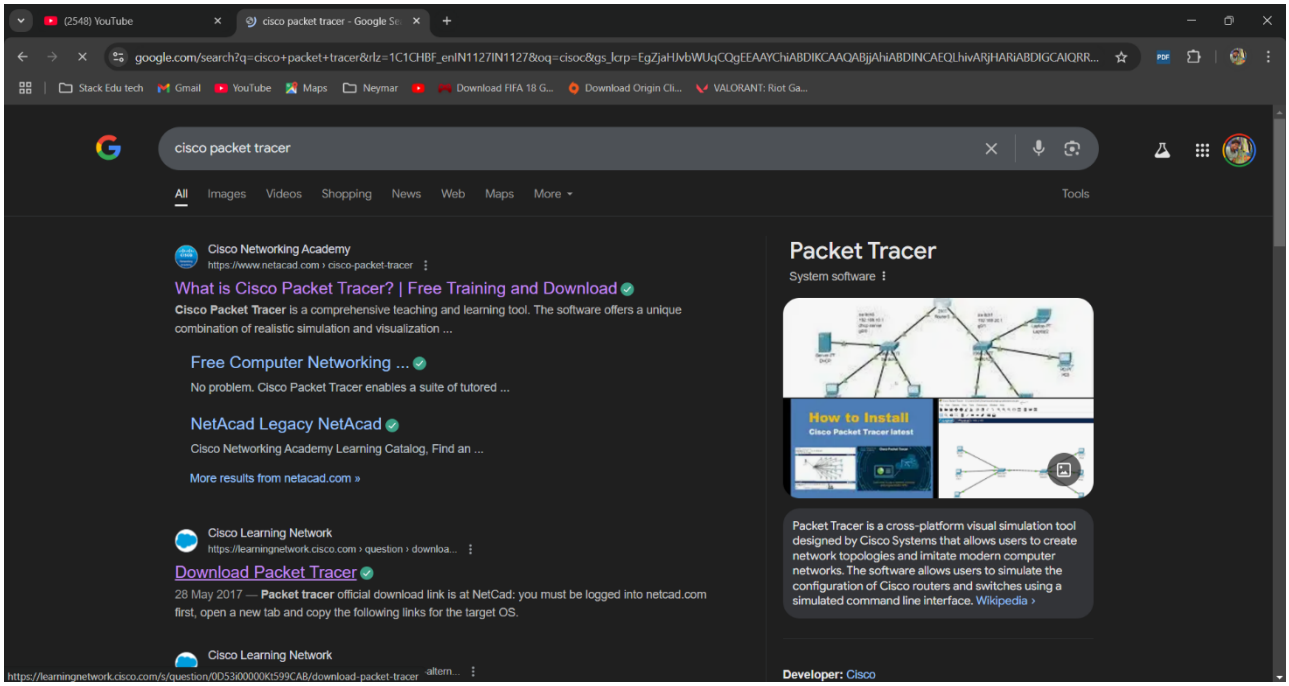
- Simulate various network topologies.
- Configure devices using CLI (Command Line Interface).
- Test configurations with tools like Ping, Traceroute, and others.

5. IMPLEMENTATION

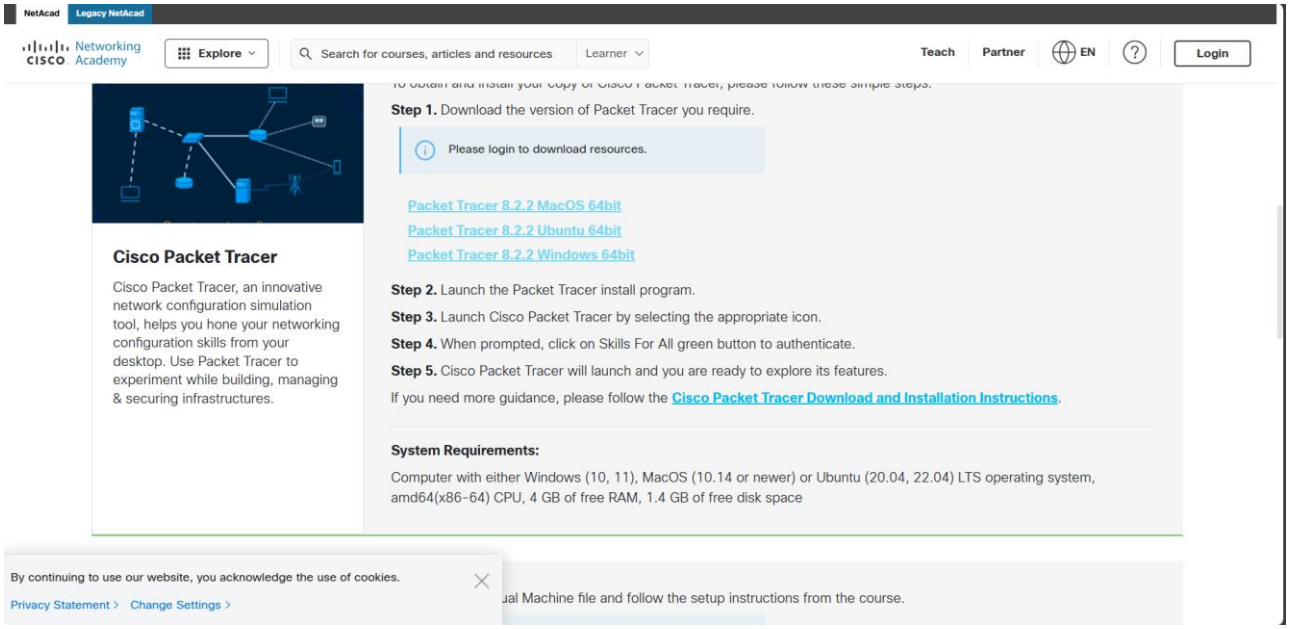
Step-by-Step Procedure:

1. Launch Cisco Packet Tracer: Open the application on your system.
2. Create Topology:
    - Drag and drop required devices (PCs, routers, switches) onto the workspace.
    - Connect devices using appropriate cables (crossover or straight-through).
3. Assign IP Addresses:
    - Access device configuration options.
    - Assign IP addresses to PCs and configure router interfaces.
4. Configure Devices:
    - Use the CLI to assign IP addresses, subnet masks, and default gateways.
    - Configure routing protocols (if required).
5. Test Connectivity:
    - Use the Ping tool to verify connectivity between devices.
    - Observe packet flow using the Simulation Mode.
6. Troubleshooting:
    - Identify and fix configuration errors if communication fails.

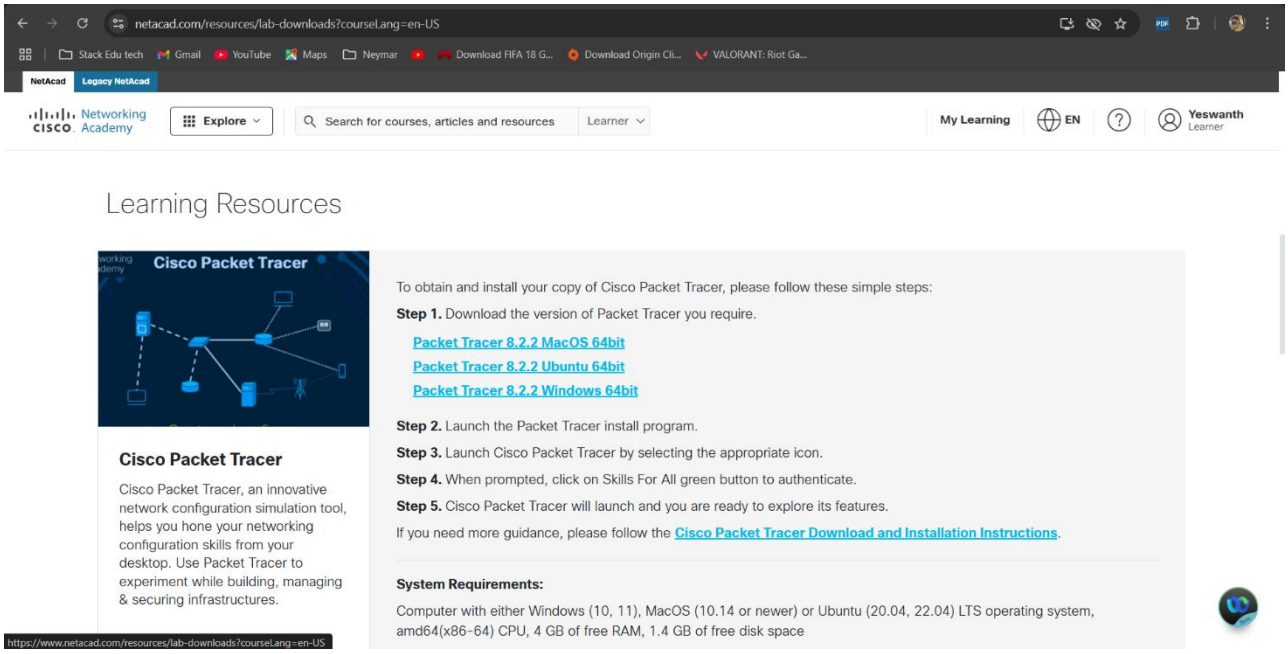
Step-1:


cisco packet tracer
All Images Videos Shopping News Web Maps More Tools
Cisco Networking Academy
https://www.netacad.com › cisco-packet-tracer
What is Cisco Packet Tracer? | Free Training and Download
Cisco Packet Tracer is a comprehensive teaching and learning tool. The software offers a unique combination of realistic simulation and visualization ...
Free Computer Networking ...
No problem. Cisco Packet Tracer enables a suite of tutored ...
NetAcad Legacy NetAcad
Cisco Networking Academy Learning Catalog, Find an ...
More results from netacad.com »
Cisco Learning Network
https://learningnetwork.cisco.com › question › downloa...
Download Packet Tracer
28 May 2017 — Packet tracer official download link is at NetCad: you must be logged into netcad.com first, open a new tab and copy the following links for the target OS.
Cisco Learning Network
Packet Tracer
System software
How to Install
Cisco Packet Tracer latest
Packet Tracer is a cross-platform visual simulation tool designed by Cisco Systems that allows users to create network topologies and imitate modern computer networks. The software allows users to simulate the configuration of Cisco routers and switches using a simulated command line interface. Wikipedia ›
Developer: Cisco

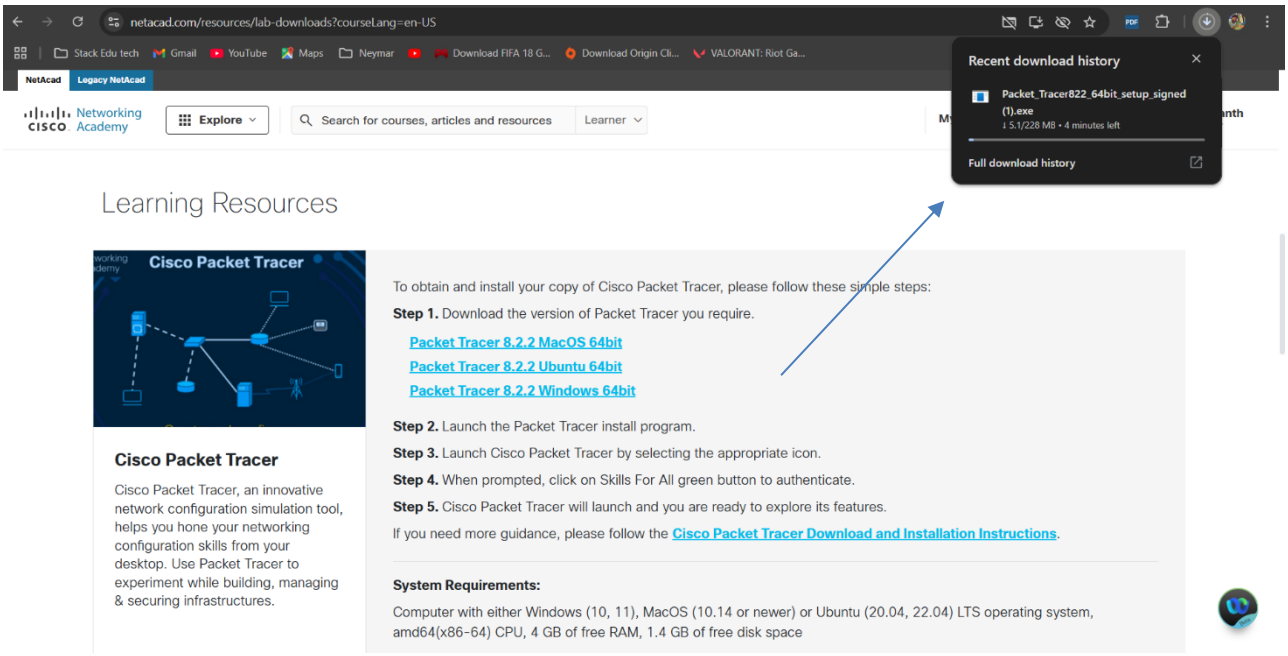
Step-2:-


NetAcad
Legacy NetAcad
Networking Academy
Explore
Search for courses, articles and resources
Learner
Teach
Partner
EN
Login
Cisco Packet Tracer
Cisco Packet Tracer, an innovative network configuration simulation tool, helps you hone your networking configuration skills from your desktop. Use Packet Tracer to experiment while building, managing & securing infrastructures.
Step 1. Download the version of Packet Tracer you require.
Please login to download resources.
Packet Tracer 8.2.2 MacOS 64bit
Packet Tracer 8.2.2 Ubuntu 64bit
Packet Tracer 8.2.2 Windows 64bit
Step 2. Launch the Packet Tracer install program.
Step 3. Launch Cisco Packet Tracer by selecting the appropriate icon.
Step 4. When prompted, click on Skills For All green button to authenticate.
Step 5. Cisco Packet Tracer will launch and you are ready to explore its features.
If you need more guidance, please follow the Cisco Packet Tracer Download and Installation Instructions.
System Requirements:
Computer with either Windows (10, 11), MacOS (10.14 or newer) or Ubuntu (20.04, 22.04) LTS operating system, amd64(x86-64) CPU, 4 GB of free RAM, 1.4 GB of free disk space
By continuing to use our website, you acknowledge the use of cookies.
Privacy Statement › Change Settings ›
ual Machine file and follow the setup instructions from the course.

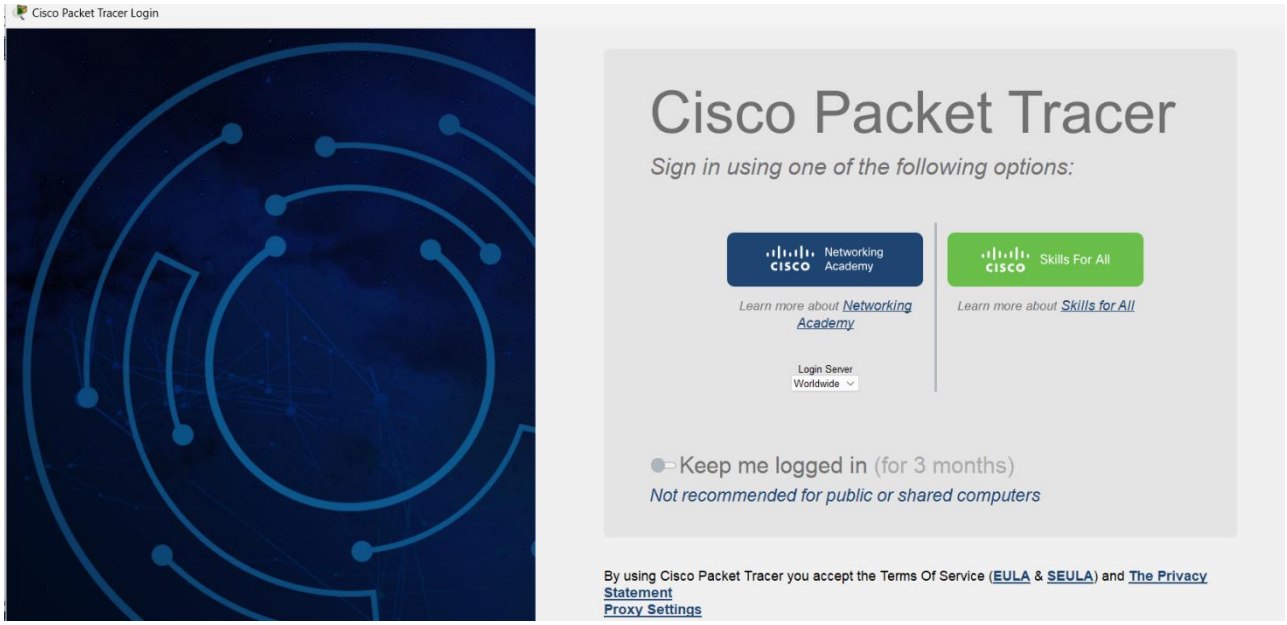
Step-3:-


netacad.com/resources/lab-downloads?courseLang=en-US
NetAcad
Legacy NetAcad
Networking Academy
Explore
Search for courses, articles and resources
Learner
My Learning
EN
Yeswanth
Learner
Learning Resources
Cisco Packet Tracer
Cisco Packet Tracer
Cisco Packet Tracer, an innovative network configuration simulation tool, helps you hone your networking configuration skills from your desktop. Use Packet Tracer to experiment while building, managing & securing infrastructures.
To obtain and install your copy of Cisco Packet Tracer, please follow these simple steps:
Step 1. Download the version of Packet Tracer you require.
Packet Tracer 8.2.2 MacOS 64bit
Packet Tracer 8.2.2 Ubuntu 64bit
Packet Tracer 8.2.2 Windows 64bit
Step 2. Launch the Packet Tracer install program.
Step 3. Launch Cisco Packet Tracer by selecting the appropriate icon.
Step 4. When prompted, click on Skills For All green button to authenticate.
Step 5. Cisco Packet Tracer will launch and you are ready to explore its features.
If you need more guidance, please follow the Cisco Packet Tracer Download and Installation Instructions.
System Requirements:
Computer with either Windows (10, 11), MacOS (10.14 or newer) or Ubuntu (20.04, 22.04) LTS operating system, amd64(x86-64) CPU, 4 GB of free RAM, 1.4 GB of free disk space
https://www.netacad.com/resources/lab-downloads?courseLang=en-US

Step-4:


netacad.com/resources/lab-downloads?courseLang=en-US
Recent download history
Packet_Tracer822_64bit_setup_signed (1).exe
5.1/228 MB • 4 minutes left
Full download history
Learning Resources
Cisco Packet Tracer
Cisco Packet Tracer
Cisco Packet Tracer, an innovative network configuration simulation tool, helps you hone your networking configuration skills from your desktop. Use Packet Tracer to experiment while building, managing & securing infrastructures.
To obtain and install your copy of Cisco Packet Tracer, please follow these simple steps:
Step 1. Download the version of Packet Tracer you require.
Packet Tracer 8.2.2 MacOS 64bit
Packet Tracer 8.2.2 Ubuntu 64bit
Packet Tracer 8.2.2 Windows 64bit
Step 2. Launch the Packet Tracer install program.
Step 3. Launch Cisco Packet Tracer by selecting the appropriate icon.
Step 4. When prompted, click on Skills For All green button to authenticate.
Step 5. Cisco Packet Tracer will launch and you are ready to explore its features.
If you need more guidance, please follow the Cisco Packet Tracer Download and Installation Instructions.
System Requirements:
Computer with either Windows (10, 11), MacOS (10.14 or newer) or Ubuntu (20.04, 22.04) LTS operating system, amd64(x86-64) CPU, 4 GB of free RAM, 1.4 GB of free disk space

Step-5:



6. LIMITATIONS

1. Simulations cannot entirely replicate real-world network conditions.
2. Performance metrics like latency, throughput, and jitter are not accurately represented.
3. Limited to the features provided by Cisco Packet Tracer.
4. Certain advanced configurations may require actual hardware or other professional tools.

7. CONCLUSION

The experiment successfully demonstrated the use of Cisco Packet Tracer to simulate and configure a basic network topology. All devices communicated effectively within the LAN. This experiment provided hands-on experience with IP configuration and network troubleshooting. While simulations are valuable learning tools, real-world testing is required for production-level networking.

Practical 2

Experiment Title:

Experiments of Packet capture tool: Wireshark

1. AIM

To capture, analyze, and interpret network traffic using Wireshark and understand its role in network troubleshooting and performance monitoring.

2. OBJECTIVE

1. Learn how to capture network packets using Wireshark.
2. Understand the structure of network packets (e.g., Ethernet frames, IP packets, TCP/UDP segments).
3. Analyze protocols like HTTP, DNS, and ICMP using captured data.
4. Identify potential network issues such as delays, packet loss, or unauthorized traffic.

3. APPARATUS

- **Hardware**:
    - A computer or laptop with an active network connection (wired or wireless).
- **Software**:
    - Wireshark (latest stable version recommended).
    - Optional: Other tools for generating network traffic (e.g., web browser, ping command, or file transfer tools).

4. THEORY

Wireshark is a network packet analyzer used to monitor and troubleshoot network traffic in real time. It operates by capturing raw packets passing through the network interface and allows users to view the details of each packet.

Key Concepts:

1. **Packet Structure**: Packets consist of layers (e.g., Ethernet, IP, TCP/UDP) based on the **OSI model**.
2. **Protocol Analysis**: Protocols like HTTP, DNS, and ICMP can be dissected to understand their operation.
3. **Filtering**: Wireshark provides filters (e.g., ip.addr == 192.168.0.1) to isolate specific traffic.
4. **Practical Applications**:
    - Monitoring bandwidth usage.
    - Diagnosing network latency or packet loss.
    - Identifying malicious activity or unauthorized access.

5. IMPLEMENTATION

Step-by-Step Procedure:

1. **Install and Launch Wireshark**:
    - Download and install Wireshark on your system.
2. **Select a Network Interface**:
    - Choose the active network interface (e.g., Ethernet or Wi-Fi) for packet capture.
3. **Start Packet Capture**:
    - Click **"Start Capture"** to begin recording network traffic.
4. **Generate Network Traffic**:
    - Perform activities such as browsing a website, using ping, or transferring a file to generate traffic.
5. **Stop Packet Capture**:
    - Click **"Stop Capture"** to end the recording after enough data is collected.
6. **Analyze Captured Packets**:
    - Use Wireshark's features to analyze traffic:
        - Apply **filters** (e.g., http, dns, or tcp) to focus on specific protocols.

- Inspect individual packets for details like source and destination IPs, protocols used, and packet size.

- Look for anomalies, such as retransmissions or large delays in communication.

7. **Export Data**:
   - Save the captured packets for future analysis (File > Save As).

6. LIMITATIONS

1. Capturing encrypted traffic (e.g., HTTPS) only provides metadata, not payload details.
2. Wireshark is resource-intensive and may slow down systems with high traffic loads.
3. Packet capture is limited by permissions; administrative rights may be required.
4. Captured data may overwhelm users without proper filtering or interpretation skills.
5. Not suitable for analyzing high-speed networks without dedicated hardware support.

7. CONCLUSION

The experiment successfully demonstrated how to capture and analyze network traffic using Wireshark. The tool provided valuable insights into network communication, including packet structure, protocol behavior, and potential issues. While Wireshark is a powerful diagnostic tool, its effectiveness depends on the user's ability to interpret captured data and apply filters effectively.