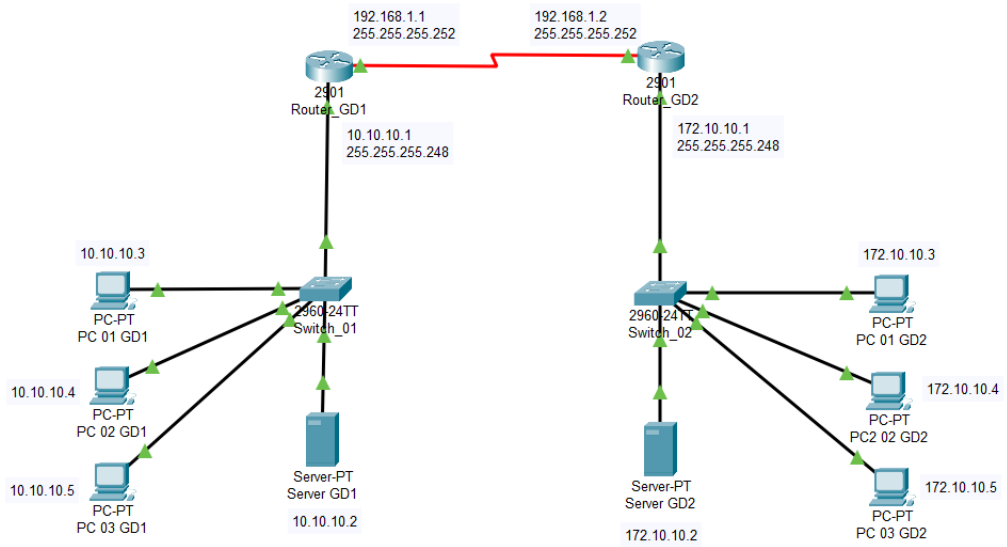
IMPLEMENTATION OF INTER-BUILDING NETWORK USING CISCO



CHAPTER I
INTRODUCTION

1.1 Background

The rapid development of information technology has increased the demand for reliable, secure, and well-integrated computer network infrastructures. In organizations or institutions that operate across multiple buildings, network connectivity plays a critical role in supporting data communication, information sharing, and operational efficiency between departments. However, challenges often arise when each building operates an independent Local Area Network (LAN) without proper interconnection. Such conditions limit collaboration, slow down data exchange, and reduce overall network effectiveness. To address this issue, an inter-building network design is required to enable seamless communication between geographically separated networks. Therefore, this case study focuses on the design and simulation of an inter-building computer network connecting Building 1 (GD1) and Building 2 (GD2) using Cisco networking devices. The implementation utilizes static routing to ensure controlled and efficient data transmission between the two networks.

1.2 Objectives

The objectives of this network simulation project are as follows:

1. To design and implement separate LANs for each building.
2. To establish a point-to-point interconnection between routers in different buildings.
3. To apply efficient IP addressing schemes using subnetting techniques.
4. To configure static routing for inter-building communication.
5. To perform connectivity testing to verify that the network operates correctly.

CHAPTER II
NETWORK DESIGN

2.1 Network Structure

The network simulation was developed using Cisco Packet Tracer, consisting of two physically separated buildings, each with its own local network infrastructure.

1. Building 1 (GD1)
    1. 1 Router (Router GD1)
    2. 1 Switch (Switch_01)
    3. 1 Server (Server GD1)
    4. 3 Client PCs
2. Building 2 (GD2)
    1. 1 Router (Router GD2)
    2. 1 Switch (Switch_02)
    3. 1 Server (Server GD2)
    4. 3 Client PCs

The two routers are directly connected using a point-to-point link to facilitate inter-building communication.

2.2 Network Topology

Each building employs a star topology, where all end devices are connected to a central switch. The routers function as gateways for each LAN and as intermediaries for inter-building traffic. This topology was selected due to its simplicity, ease of management, and suitability for small to medium-scale networks.

CHAPTER III
IP ADDRESSING SCHEME

3.1 Inter-Router Link

1. Network Address : 192.168.1.0/30
2. Router GD1 : 192.168.1.1
3. Router GD2 : 192.168.1.2

A /30 subnet was chosen because it provides exactly two usable host addresses, making it ideal for point-to-point router connections and minimizing IP address waste.

3.2 Building 1 Network (GD1)

1. Network Address : 10.10.10.0/29
2. Router GD1 (Default Gateway) : 10.10.10.1
3. Server GD1 : 10.10.10.2
4. PC01 GD1 : 10.10.10.3
5. PC02 GD1 : 10.10.10.4
6. PC03 GD1 : 10.10.10.5

3.3 Building 2 Network (GD2)

1. Network Address : 172.10.10.0/29
2. Router GD2 (Default Gateway) : 172.10.10.1
3. Server GD2 : 172.10.10.2
4. PC01 GD2 : 172.10.10.3
5. PC02 GD2 : 172.10.10.4
6. PC03 GD2 : 172.10.10.5

CHAPTER IV
NETWORK CONFIGURATION

4.1 Router Configuration

Each router was configured to perform the following functions:

1. Connect and manage the local LAN within its respective building.
2. Establish a point-to-point connection with the router in the other building.
3. Forward traffic to remote networks using static routing.

Static routes were configured as follows:

1. Router GD1 was configured with a static route to the 172.10.10.0/29 network via 192.168.1.2.
2. Router GD2 was configured with a static route to the 10.10.10.0/29 network via 192.168.1.1.

This configuration ensures that data packets destined for the remote building are forwarded correctly through the inter-router link.

4.2 PC and Server Configuration

All PCs and servers were manually configured with the following parameters:

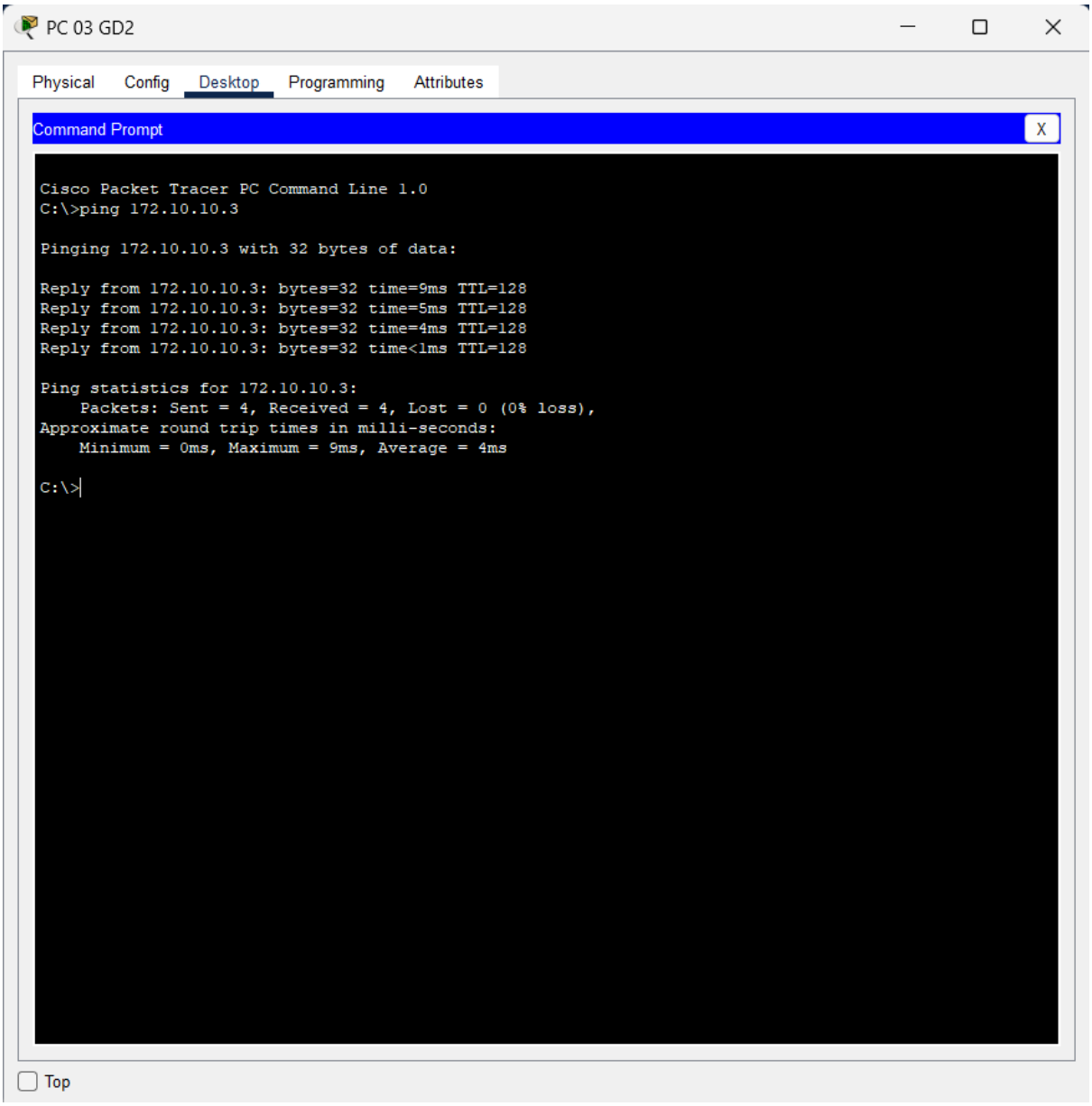
- IP address according to the assigned subnet
- Subnet Mask: 255.255.255.248 (/29)
- Default Gateway pointing to the router interface within the same LAN

This configuration allows each device to communicate both within its local network and across buildings.

CHAPTER V
TESTING AND ANALYSIS

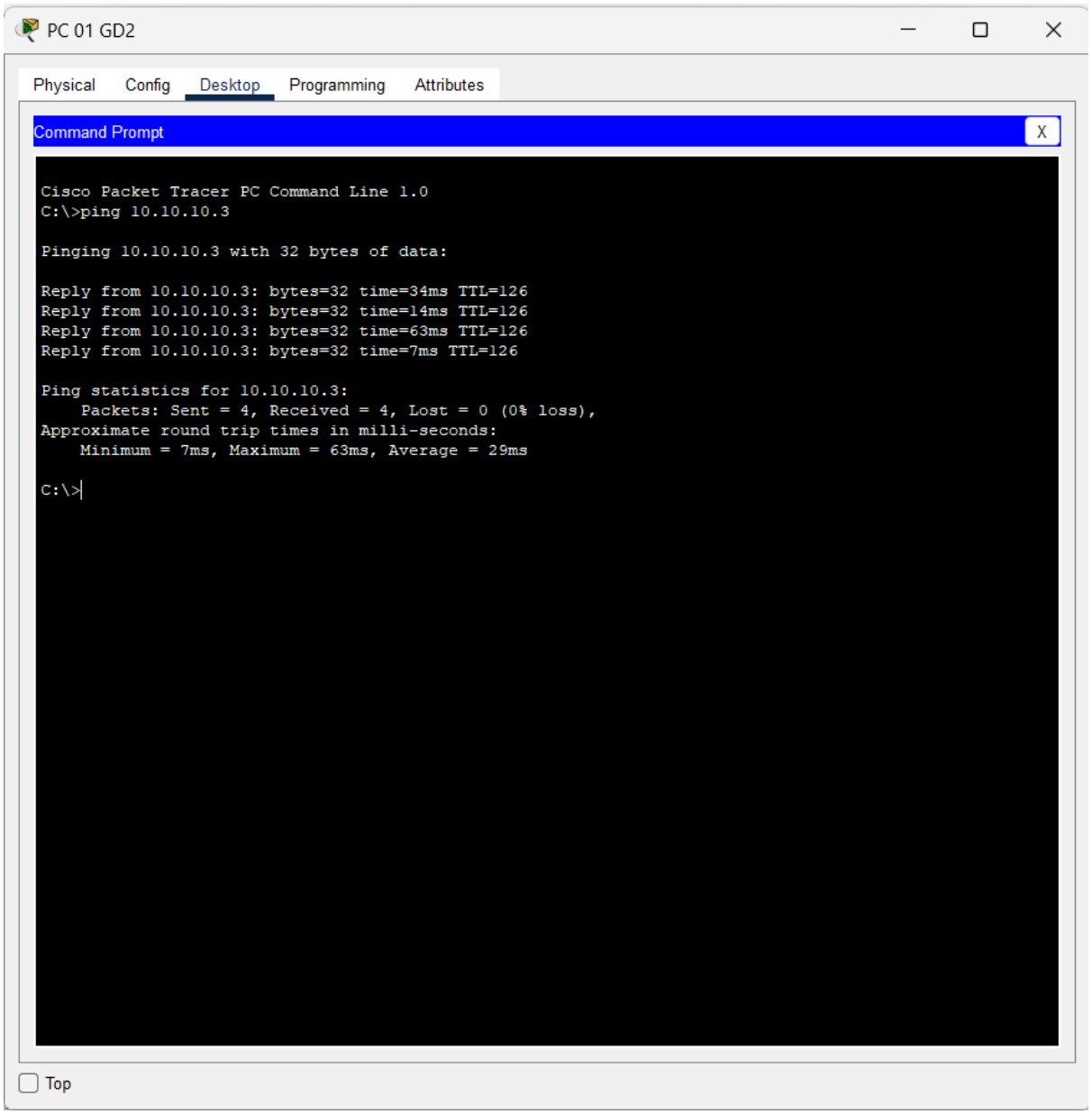
5.1 Local Network Connectivity Testing

Connectivity tests were conducted by sending ICMP echo requests (ping) between PCs within the same building and from PCs to the local server. All tests were successful, indicating that the LAN configurations were correct.



5.2 Inter-Building Connectivity Testing

Further testing was performed by pinging devices across buildings, such as from a PC in GD1 to the server and PCs in GD2, and vice versa. Successful responses confirmed that static routing was functioning properly and that inter-building communication had been successfully established.



CHAPTER VI
CONCLUSION

Based on the implementation and testing results, it can be concluded that the inter-building network simulation was successfully designed and configured. The use of /29 and /30 subnetting proved efficient for small-scale network environments, while static routing effectively enabled communication between different network segments. This project demonstrates the practical application of fundamental networking concepts, including IP addressing, subnetting, routing, and connectivity testing, making it suitable for academic reporting and professional networking portfolios

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