EUROPEAN UNIVERSITY OF LEFKE
Faculty of Engineering
Department of Software Engineering

COMP - 342

COMPUTER NETWORKS

NETWORK DESIGN PROJECT

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OUTLINE

Introduction

User Requirements

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2. Reliability
3. Adaptability
4. Security

Application Requirements

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3. Applications Running on Student Machines and Laboratories

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Introduction:

In this project, main idea is create a network for the engineering faculty of a university. The visual of the network system is clearly indicated. Visual designs were made and added to the project. In this building there are 3 floors which are ground, first and second and in this floors there are some type of rooms. This floors are related with each other. Via rooters and switches. Basically we will see a network design in this project.

User Requirements:

1. **Interactivity**:

   One of the most important things for a network system is interaction. Users must communicate with each other continuously, regularly and quickly. These conditions, of course, do not occur due to a single situation or device. For example, even the interaction between the units of a computer can affect the interaction of the entire system. In the network system we have established, the interaction between the floors, between the computers in the labs, in short, within the whole system, is provided within the framework of the above-mentioned criteria.

2. **Reliability :**

   Reliability controls the integrity of all information in the security of the network and who can access this information with what authority. The network we designed has a large number of entry points. Due to the redundancy of these entry points, we use defensive methods to ensure network security. Other network security measures include regular performance of hardware and software updates and patches. These add a different reliability to the system.

3. **Adaptability**:

   Adaptable networking means that the provided network- based services are capable of handling dynamic changes in both time and position related to resources, users and changed service requirements. An adaptive network processes and organizes information and makes some adjustments to the network when necessary, enabling the network to perform its functions in accordance with changing conditions.

4. **Security**:

   The security of a network has an important place for both users and network administrators. Protection of data, removal of unwanted software and viruses on the system. In addition to the security of the virtual environment, the security of the physical parts of the network system is also very important. A secure network requires a solid setup.

Application Requirements

a) Student Management Application Systems:

i. Student attendance system
ii. Exam result system
iii. Course details system

b) Administration Management Application Systems:

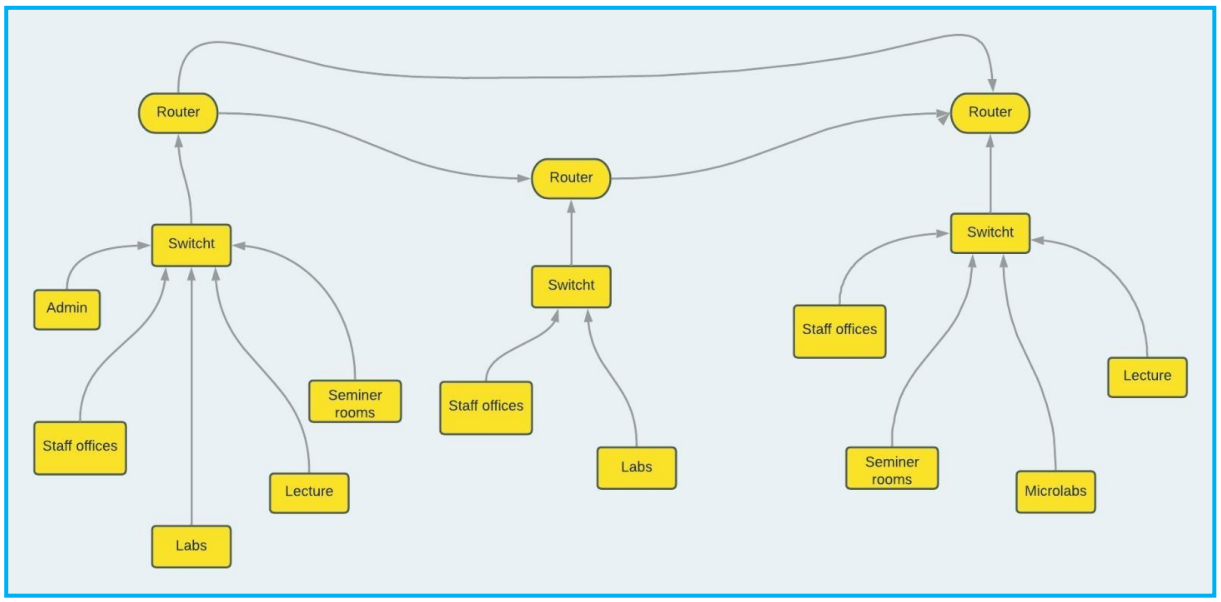
i. Exam results system
ii. Course details system (Can edit everything)
iii. Lab system
iv. Conference rooms control system
v. Class availability inquiry system

c) Applications Running on Student Machines and Laboratories:

i. Integrated programs for computers required for course content
ii. A Lab Class Appointment System
iii. Details of Lab Using
iv. Announcement part for all users

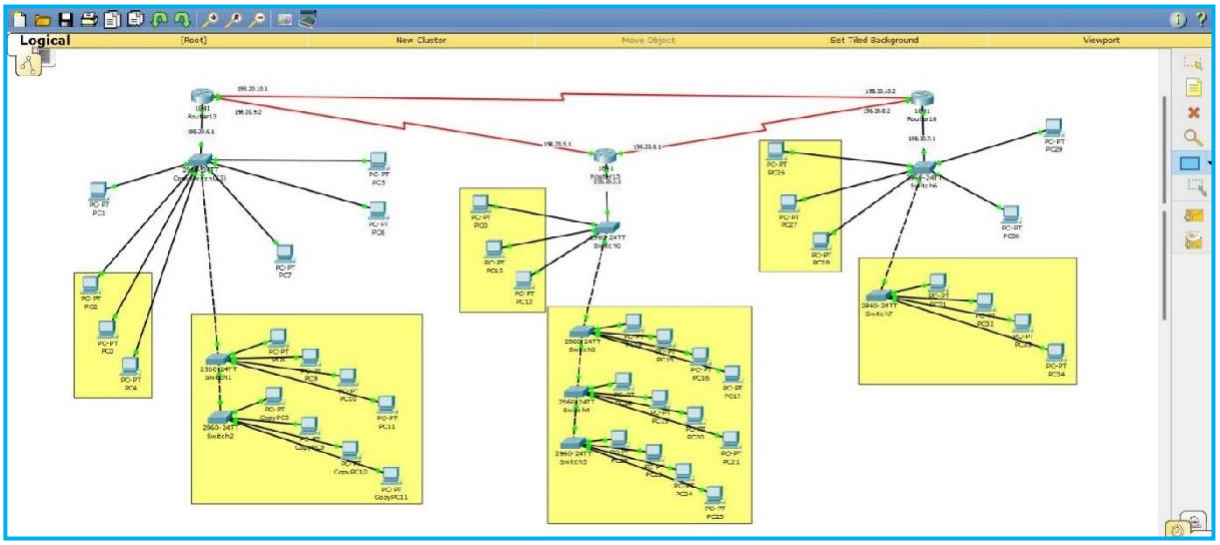
Network Design

While we are designing our network, We decided to use three routers to connect three floors together. We used one main switch for each floor. On the ground floor we have an Administration Office, Staff Offices, Labs, Lecture Theatre and Seminar rooms. On the first floor we have Staff Offices and Labs. Lastly, on the second floor we have Staff Offices, Seminar Rooms, Micro labs and Lecture Theatre.

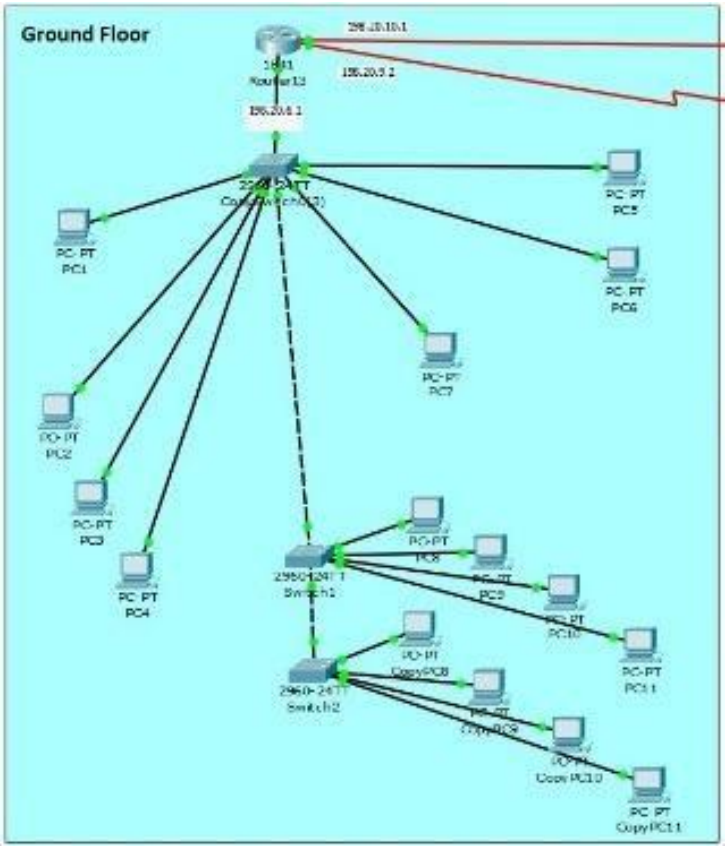


Implementation

We have one router and one main switch for each floor. We have extra switches for the Labs on each floor because we have too many devices in the labs. All other rooms are connected to main switch.



Ground Floor



Ground Floor

Administration 198.20.6.2

Number of users = 1

Seminar Rooms 198.20.6.3

Number of users = 2

Lecture Theatre 198.20.6.5

Number of users = 1

Staff Offices 198.20.6.5

Number of users = 9

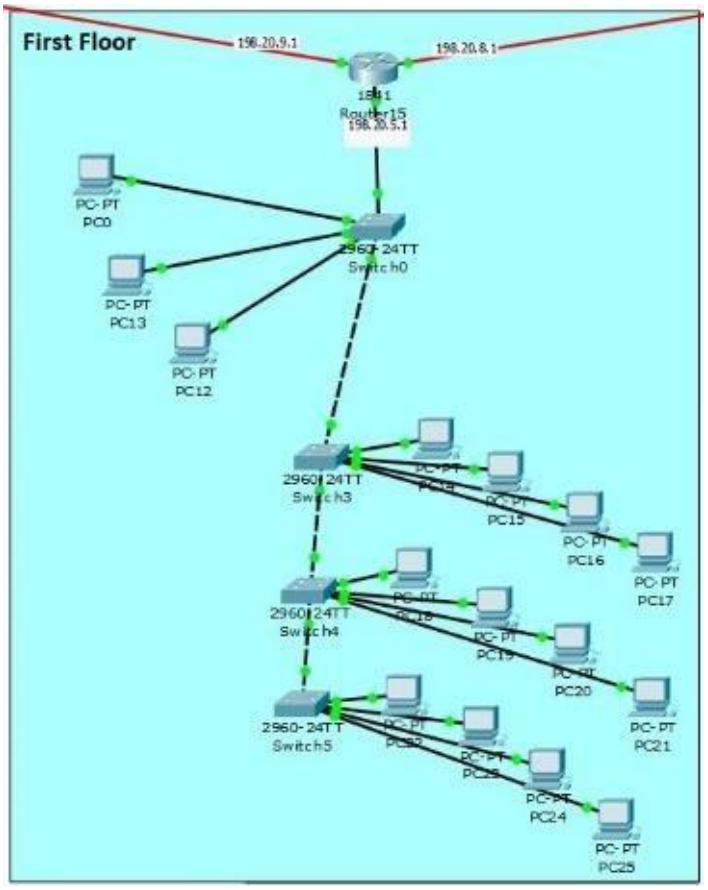
Lab1 198.20.6.15

Number of users = 21

Lab2 198.20.6.36

Number of users = 26

First Floor



First Floor

Staff offices 198.20.5.2

Number of users = 28

Lab1 198.20.5.30

Number of users = 10

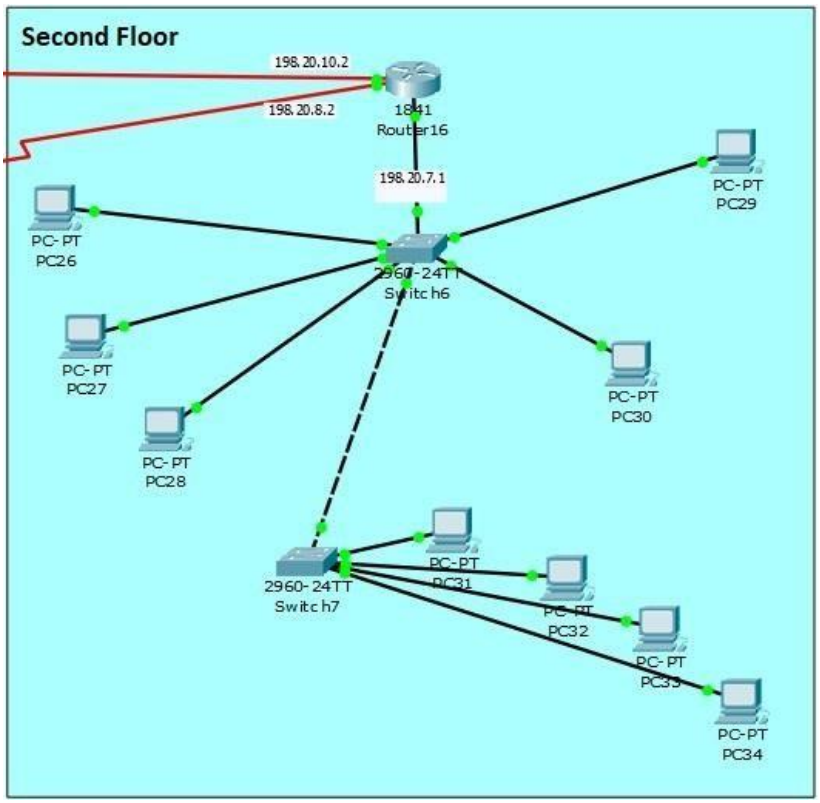
Lab2 198.20.5.40

Number of users = 10

Lab3 198.20.5.50

Number of users = 12

Second Floor



Second Floor

Seminar Room 198.20.7.2

Number of users = 1

Lecture Theatre 198.20.7.3

Number of users = 1

Staff Offices 198.20.7.4

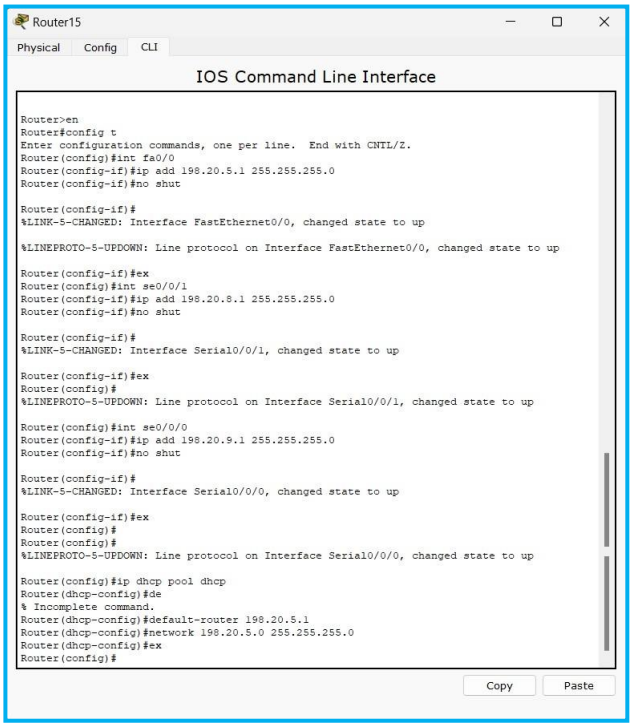
Number of users = 13

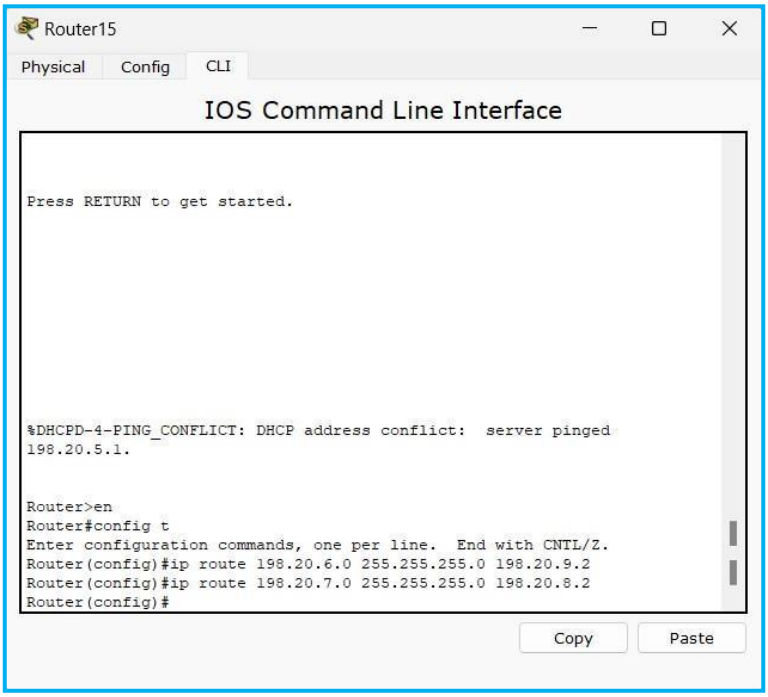
MicroLab 198.20.7.17

Number of users = 41

Rooter Commands

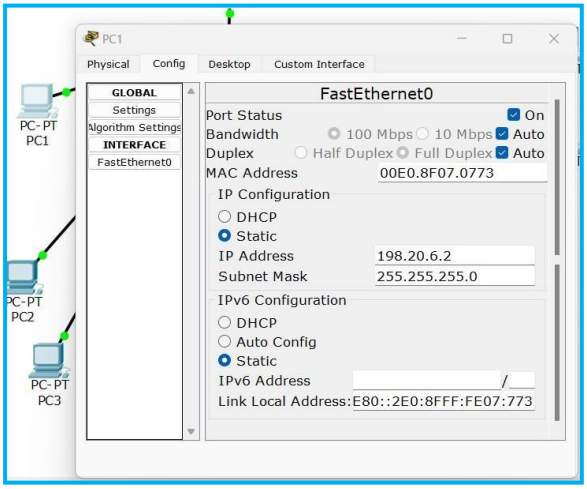
As an example, we added the commands of our router on the 1st floor. First of all, we assigned the Fast Ethernet ip, then the serial ip. We added DHCP to automatically assign IP addresses when needed.





We have assigned the necessary IP routes to perform data exchange between floors.

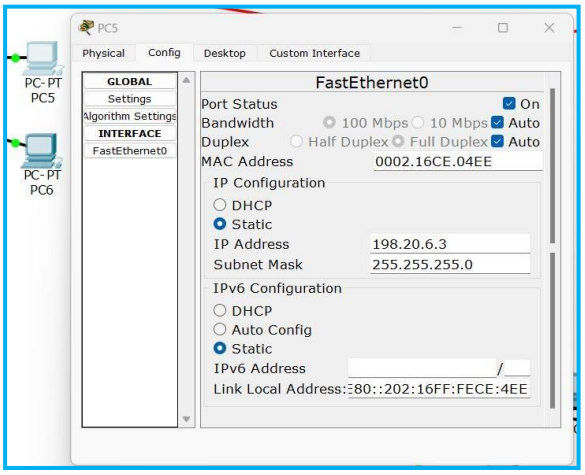
Assigning IP addresses



Administration

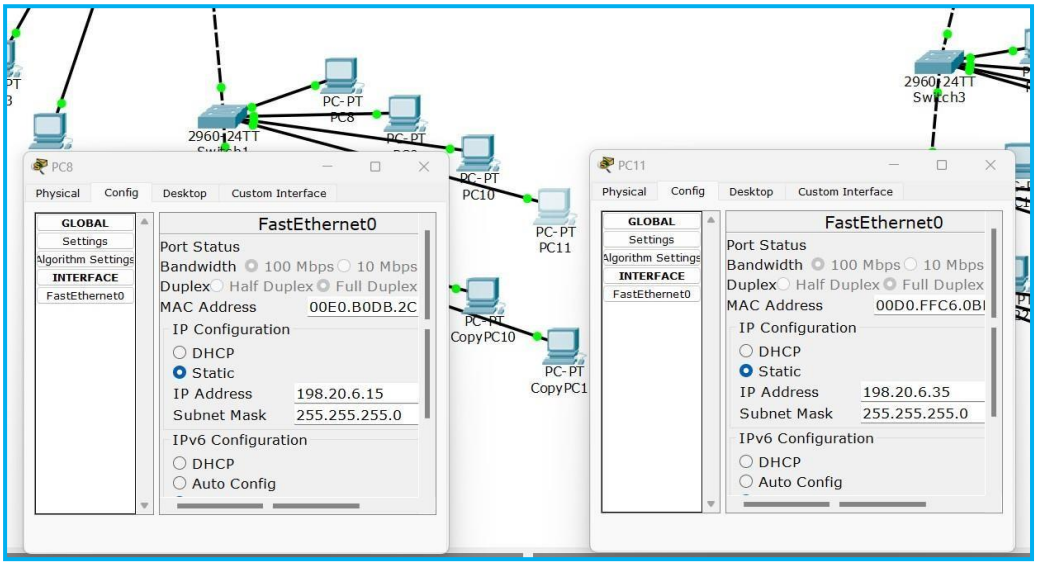
The IP we assigned to the administration on the ground floor = 198.20.6.2

We have assigned the next rope to our next room, the Seminar Room = 198.20.6.3



Seminer Room

Lab 1



There are 21 computers in our 1st Lab on the ground floor. The ip address of our first computer = 198.20.6.15 and the ip address of our last computer = 198.20.6.35.

Results and Discussion

```
PC>ping 198.20.5.2

Pinging 198.20.5.2 with 32 bytes of data:

Reply from 198.20.5.2: bytes=32 time=13ms TTL=126
Reply from 198.20.5.2: bytes=32 time=5ms TTL=126
Reply from 198.20.5.2: bytes=32 time=6ms TTL=126
Reply from 198.20.5.2: bytes=32 time=8ms TTL=126

Ping statistics for 198.20.5.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 5ms, Maximum = 13ms, Average = 8ms
```

Here we are sending ping from staff office in ground floor to staff office in first floor.

Successful

```
PC>ping 198.20.7.2

Pinging 198.20.7.2 with 32 bytes of data:

Reply from 198.20.7.2: bytes=32 time=4ms TTL=126
Reply from 198.20.7.2: bytes=32 time=4ms TTL=126
Reply from 198.20.7.2: bytes=32 time=5ms TTL=126
Reply from 198.20.7.2: bytes=32 time=13ms TTL=126

Ping statistics for 198.20.7.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 4ms, Maximum = 13ms, Average = 6ms
```

Here we are sending ping from administrator in ground floor to seminar room in second floor.

Successful

```
PC>ping 198.20.7.17

Pinging 198.20.7.17 with 32 bytes of data:

Reply from 198.20.7.17: bytes=32 time=3ms TTL=126
Reply from 198.20.7.17: bytes=32 time=3ms TTL=126
Reply from 198.20.7.17: bytes=32 time=2ms TTL=126
Reply from 198.20.7.17: bytes=32 time=2ms TTL=126

Ping statistics for 198.20.7.17:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 2ms, Maximum = 3ms, Average = 2ms
```

Here we are sending ping from Lab 1 in first floor to microlabs in second floor.

Successful

```
PC>ping 198.20.6.5

Pinging 198.20.6.5 with 32 bytes of data:

Reply from 198.20.6.5: bytes=32 time=15ms TTL=126
Reply from 198.20.6.5: bytes=32 time=7ms TTL=126
Reply from 198.20.6.5: bytes=32 time=1ms TTL=126
Reply from 198.20.6.5: bytes=32 time=4ms TTL=126

Ping statistics for 198.20.6.5:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 1ms, Maximum = 15ms, Average = 6ms
```

Here we are sending ping from lecture theatre in second floor to lecture theatre in ground floor.

Successful

```
Pinging 198.20.5.42 with 32 bytes of data:

Request timed out.
Reply from 198.20.5.42: bytes=32 time=1ms TTL=126
Reply from 198.20.5.42: bytes=32 time=3ms TTL=126
Reply from 198.20.5.42: bytes=32 time=1ms TTL=126

Ping statistics for 198.20.5.42:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
Approximate round trip times in milli-seconds:
    Minimum = 1ms, Maximum = 3ms, Average = 1ms

PC>
```

Here we are sending ping from microlabs in second floor to lab 2 in first floor.

We have 1 lost data

References:

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