

Computer Networks (Design Network of Case Study)

Assignment # 01

Section-S

Due: Feb 23, 2023

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Course Instructor

Computer Networks

CS-3001

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Assignment # 01

Network Design of Case Study:

Requirements:

ABC Pvt. Ltd is a renowned software development company in Islamabad. They have recently moved to a new building. They are working on latest web technologies.

By considering the network requirement of the company that having currently

- 1- 25 employees (1 CEO, 1 HR, 3 Admin, 1 Finance, 3 employees working on documentation, 16 employees of frontend and backend).
- 2- Each employee needs to connect laptop & mobile phone to LAN Network (ONT Device).
- 3- The internet connection is of 25 Mbps.
- 4- The new building has 2 floors, Ground floor and First floor. The 14 rooms are of 15*15 feet of height 12 feet.
- 5- There is conference room that is to be connected with the computer for presentations.
- 6- They have 2 servers in IT room. (1 server for website and other for file storage)

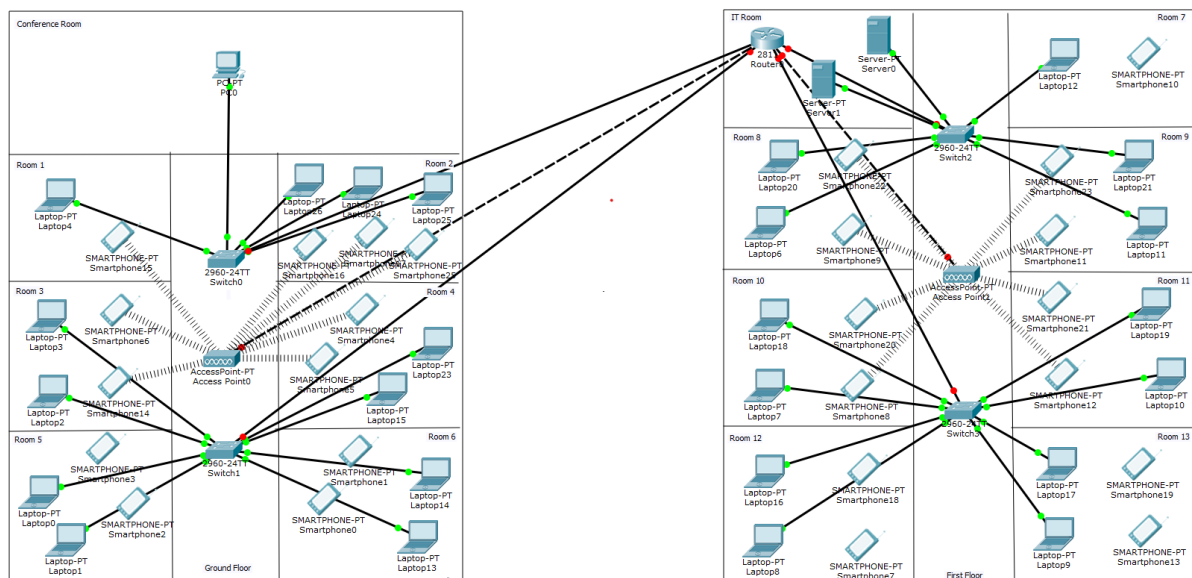
By Considering this information to construct a network that ABC Pvt Ltd would follow can be:

For Currently 25 Employees:

The Devices that to be needed to build a network.

Sr No	Devices	Require	Rate	Amount
1	Router (8 port)	1	35000	35000
2	Switch (24 port)	1	15000	15000
3	Switch (16 port)	2	8000	16000
4	Switch (8 port)	1	3000	3000
5	Access Point (70*70 feet)	2	3000	6000
Total Cost				75000

Network Diagram of 25 Employees are:



While considering the above network, now check the cost of cables connections with all devices in all the rooms.

Disclaimer:

In calculating the wire length in terms of feet, we are considering the room size (15*15) and height of the rooms (12 feet) and also the extra space of lobby (15*5) is also used for the connections of wire.

Now, first we calculate the cables connection of the **Ground Floor**.

Conference Room:

In conference room, there would be only one computer for the presentations, so we need only computer connections and access points connections. As the computer has to be connected with the switch 0, so the cable needed for the connection of switch to RJ-45 connector is 20 feet and the cable needed for the connection of RJ-45 connector to Computer is 7 feet. As Access point (70*70 feet range), so it is easy to access in the conference room, as it is placed in the middle of the lobby of Ground Floor.

- 2 RJ-45 Connectors (Good quality) - $2 \times \text{Rs } 15 = \text{Rs } 30$
- 27 feet Twisted Pair Cable (Good Rs 10/feet)- $27 \times \text{Rs } 10 = \text{Rs } 270$

Hence, **Total cost would be: Rs 300/-**

Room 1(CEO):

In room 1, there would be only one computer and Mobile phone for CEO, so we need only computer connections and access points connections. As the computer has to be connected with the switch 0, so the cable needed for the connection of switch to RJ-45 connector is 19 feet and the cable needed for the connection of RJ-45 connector to Computer is 6 feet. As Access point (70*70 feet range), so it is easy to access in the room 1, as it is placed in the middle of the lobby of Ground Floor.

- 2 RJ-45 Connectors (Good quality) - $2 \times \text{Rs } 15 = \text{Rs } 30$
- 25 feet Twisted Pair Cable (Good Rs 10/feet)- $25 \times \text{Rs } 10 = \text{Rs } 250$

Hence, **Total cost would be: Rs 280/-**

Room 2(Admin):

In room 2, there would be three computer and Mobile phone for Admin, so we need only computer connections and access points connections. As the computer has to be connected with the switch 0, so the cable needed for the connection of switch to RJ-45 connector is 15 feet and the cable needed for the connection of RJ-45 connector to Computer is (4+5+6=15) feet. As Access point (70*70 feet range), so it is easy to access in the room 2, as it is placed in the middle of the lobby of Ground Floor.

- 6 RJ-45 Connectors (Good quality) - $6 \times \text{Rs } 15 = \text{Rs } 90$
- 30 feet Twisted Pair Cable (Good Rs 10/feet)- $30 \times \text{Rs } 10 = \text{Rs } 300$

Hence, **Total cost would be: Rs 390/-**

Room 3(Finance & HR):

In room 3, there would be two computer and Mobile phone for HR & Finance, so we need only computer connections and access points connections. As the computer has to be connected with the switch 1, so the cable needed for the connection of switch to RJ-45 connector is 19 feet and the cable needed for the connection of RJ-45 connector to Computer is (4+5=9) feet. As Access point (70*70 feet range), so it is easy to access in the room 3, as it is placed in the middle of the lobby of Ground Floor.

- 4 RJ-45 Connectors (Good quality) - $4 \times \text{Rs } 15 = \text{Rs } 60$
 - 28 feet Twisted Pair Cable (Good Rs 10/feet)- $28 \times \text{Rs } 10 = \text{Rs } 280$
- Hence, **Total cost would be: Rs 340/-**

Room 4(Employees):

In room 4, there would be two computer and Mobile phone for employees, so we need only computer connections and access points connections. As the computer has to be connected with the switch 1, so the cable needed for the connection of switch to RJ-45 connector is 20 feet and the cable needed for the connection of RJ-45 connector to Computer is $(4+5=9)$ feet. As Access point (70*70 feet range), so it is easy to access in the room 4, as it is placed in the middle of the lobby of Ground Floor.

- 4 RJ-45 Connectors (Good quality) - $4 \times \text{Rs } 15 = \text{Rs } 60$
 - 29 feet Twisted Pair Cable (Good Rs 10/feet)- $29 \times \text{Rs } 10 = \text{Rs } 290$
- Hence, **Total cost would be: Rs 350/-**

Room 5(Employees):

In room 5, there would be two computer and Mobile phone for employees, so we need only computer connections and access points connections. As the computer has to be connected with the switch 1, so the cable needed for the connection of switch to RJ-45 connector is 19 feet and the cable needed for the connection of RJ-45 connector to Computer is $(4+6=10)$ feet. As Access point (70*70 feet range), so it is easy to access in the room 5, as it is placed in the middle of the lobby of Ground Floor.

- 4 RJ-45 Connectors (Good quality) - $4 \times \text{Rs } 15 = \text{Rs } 60$
 - 29 feet Twisted Pair Cable (Good Rs 10/feet)- $29 \times \text{Rs } 10 = \text{Rs } 290$
- Hence, **Total cost would be: Rs 350/-**

Room 6(Employees):

In room 6, there would be two computer and Mobile phone for employees, so we need only computer connections and access points connections. As the computer has to be connected with the switch 1, so the cable needed for the connection of switch to RJ-45 connector is 19 feet and the cable needed for the connection of RJ-45 connector to Computer is $(5+6=11)$ feet. As Access point (70*70 feet range), so it is easy to access in the room 6, as it is placed in the middle of the lobby of Ground Floor.

- 4 RJ-45 Connectors (Good quality) - $4 \times \text{Rs } 15 = \text{Rs } 60$
 - 30 feet Twisted Pair Cable (Good Rs 10/feet)- $30 \times \text{Rs } 10 = \text{Rs } 300$
- Hence, **Total cost would be: Rs 360/-**

Now we calculate the cable connections of the **First Floor**.

IT Room (Employee):

In IT room, there are two servers of the company, so we need only server connections and access points connections. As the servers has to be connected with the switch 2, so the cable needed for the connection of switch to RJ-45 connector is 18 feet and the cable needed for the connection of RJ-45 connector to Computer is $(5+5=10)$ feet. As Access point 1 (70*70 feet range), so it is easy to access in the IT room, as it is placed in the middle of the lobby of First Floor.

- 2 RJ-45 Connectors (Good quality) - $2 \times \text{Rs } 15 = \text{Rs } 30$
- 28 feet Twisted Pair Cable (Good Rs 10/feet)- $28 \times \text{Rs } 10 = \text{Rs } 280$

Hence, **Total cost would be: Rs 310/-**

Room 7(Employee):

In room 7, there would be only one computer and Mobile phone for employee, so we need only computer connections and access points connections. As the computer has to be connected with the switch 2, so the cable needed for the connection of switch to RJ-45 connector is 18 feet and the cable needed for the connection of RJ-45 connector to Computer is 5 feet. As Access point 1 (70*70 feet range), so it is easy to access in the room 7, as it is placed in the middle of the lobby of First Floor.

- 2 RJ-45 Connectors (Good quality) - $2 \times \text{Rs } 15 = \text{Rs } 30$
- 23 feet Twisted Pair Cable (Good Rs 10/feet)- $23 \times \text{Rs } 10 = \text{Rs } 230$

Hence, **Total cost would be: Rs 260/-**

Room 8(Employees):

In room 8, there would be two computer and Mobile phone for employees, so we need only computer connections and access points connections. As the computer has to be connected with the switch 2, so the cable needed for the connection of switch to RJ-45 connector is 19 feet and the cable needed for the connection of RJ-45 connector to Computer is (5+6=11) feet. As Access point 1 (70*70 feet range), so it is easy to access in the room 8, as it is placed in the middle of the lobby of First Floor.

- 4 RJ-45 Connectors (Good quality) - $4 \times \text{Rs } 15 = \text{Rs } 60$
- 30 feet Twisted Pair Cable (Good Rs 10/feet)- $30 \times \text{Rs } 10 = \text{Rs } 300$

Hence, **Total cost would be: Rs 360/-**

Room 9(Employees):

In room 9, there would be two computer and Mobile phone for employees, so we need only computer connections and access points connections. As the computer has to be connected with the switch 2, so the cable needed for the connection of switch to RJ-45 connector is 19 feet and the cable needed for the connection of RJ-45 connector to Computer is (4+6=10) feet. As Access point (70*70 feet range), so it is easy to access in the room 9, as it is placed in the middle of the lobby of First Floor.

- 4 RJ-45 Connectors (Good quality) - $4 \times \text{Rs } 15 = \text{Rs } 60$
- 29 feet Twisted Pair Cable (Good Rs 10/feet)- $29 \times \text{Rs } 10 = \text{Rs } 290$

Hence, **Total cost would be: Rs 350/-**

Room 10(Employees):

In room 10, there would be two computer and Mobile phone for employees, so we need only computer connections and access points connections. As the computer has to be connected with the switch 3, so the cable needed for the connection of switch to RJ-45 connector is 19 feet and the cable needed for the connection of RJ-45 connector to Computer is (5+6=11) feet. As Access point 1 (70*70 feet range), so it is easy to access in the room 10, as it is placed in the middle of the lobby of First Floor.

- 4 RJ-45 Connectors (Good quality) - $4 \times \text{Rs } 15 = \text{Rs } 60$
- 30 feet Twisted Pair Cable (Good Rs 10/feet)- $30 \times \text{Rs } 10 = \text{Rs } 300$

Hence, **Total cost would be: Rs 360/-**

Room 11(Employees):

In room 11, there would be two computer and Mobile phone for employees, so we need only computer connections and access points connections. As the computer has to be connected with the switch 3, so the cable needed for the connection of switch to RJ-45 connector is 19 feet and the cable needed for the connection of RJ-45 connector to Computer is (4+6=10) feet. As Access point (70*70 feet range), so it is easy to access in the room 11, as it is placed in the middle of the lobby of First Floor.

- 4 RJ-45 Connectors (Good quality) - $4 \times \text{Rs } 15 = \text{Rs } 60$
 - 29 feet Twisted Pair Cable (Good Rs 10/feet)- $29 \times \text{Rs } 10 = \text{Rs } 290$
- Hence, **Total cost would be: Rs 350/-**

Room 12(Employees):

In room 12, there would be two computer and Mobile phone for employees, so we need only computer connections and access points connections. As the computer has to be connected with the switch 3, so the cable needed for the connection of switch to RJ-45 connector is 19 feet and the cable needed for the connection of RJ-45 connector to Computer is (5+6=11) feet. As Access point 1 (70*70 feet range), so it is easy to access in the room 12, as it is placed in the middle of the lobby of First Floor.

- 4 RJ-45 Connectors (Good quality) - $4 \times \text{Rs } 15 = \text{Rs } 60$
 - 30 feet Twisted Pair Cable (Good Rs 10/feet)- $30 \times \text{Rs } 10 = \text{Rs } 300$
- Hence, **Total cost would be: Rs 360/-**

Room 13(Employees):

In room 13, there would be two computer and Mobile phone for employees, so we need only computer connections and access points connections. As the computer has to be connected with the switch 3, so the cable needed for the connection of switch to RJ-45 connector is 19 feet and the cable needed for the connection of RJ-45 connector to Computer is (4+6=10) feet. As Access point (70*70 feet range), so it is easy to access in the room 13, as it is placed in the middle of the lobby of First Floor.

- 4 RJ-45 Connectors (Good quality) - $4 \times \text{Rs } 15 = \text{Rs } 60$
 - 29 feet Twisted Pair Cable (Good Rs 10/feet)- $29 \times \text{Rs } 10 = \text{Rs } 290$
- Hence, **Total cost would be: Rs 350/-**

Now, something remaining about those connections of routers with the switches and access points,

1- Router to switch 2:

- 18 feet Twisted Pair Cable (Good Rs 10/feet)- $18 \times \text{Rs } 10 = \text{Rs } 180$
- Hence, **Total cost would be: Rs 180/-**

2- Router to switch 3.

- 27 feet Twisted Pair Cable (Good Rs 10/feet)- $27 \times \text{Rs } 10 = \text{Rs } 270$
- Hence, **Total cost would be: Rs 270/-**

3- Router to switch 1.

- 35 feet Twisted Pair Cable (Good Rs 10/feet)- $35 \times \text{Rs } 10 = \text{Rs } 350$
- Hence, **Total cost would be: Rs 350/-**

4- Router to switch 0.

- 37 feet Twisted Pair Cable (Good Rs 10/feet)- $37 \times \text{Rs } 10 = \text{Rs } 370$
- Hence, **Total cost would be: Rs 370/-**

5- Router to Access point 0.

- 36 feet Twisted Pair Cable (Good Rs 10/feet)- $36 \times \text{Rs } 10 = \text{Rs } 360$
Hence, **Total cost would be: Rs 360/-**

6- Router to Access point 1.

- 21 feet Twisted Pair Cable (Good Rs 10/feet)- $21 \times \text{Rs } 10 = \text{Rs } 210$
Hence, **Total cost would be: Rs 210/-**

Sr No	Devices	Require	Rate	Amount
1	Router (8 port)	1	35000	35000
2	Switch (8 port)	1	3000	3000
3	Switch (16 port)	2	8000	16000
4	Switch (24 port)	1	15000	15000
4	Access Point (70*70 feet)	2	3000	6000
5	Ground Floor (Cabling)	-	-	2370
6	First Floor (Cabling)	-	-	2340
7	Router Connections	-	-	1740
Total Cost				81,450

Hence, The Total cost for currently 25 employee network is 81,450/-

For Future Employees (up to 40):

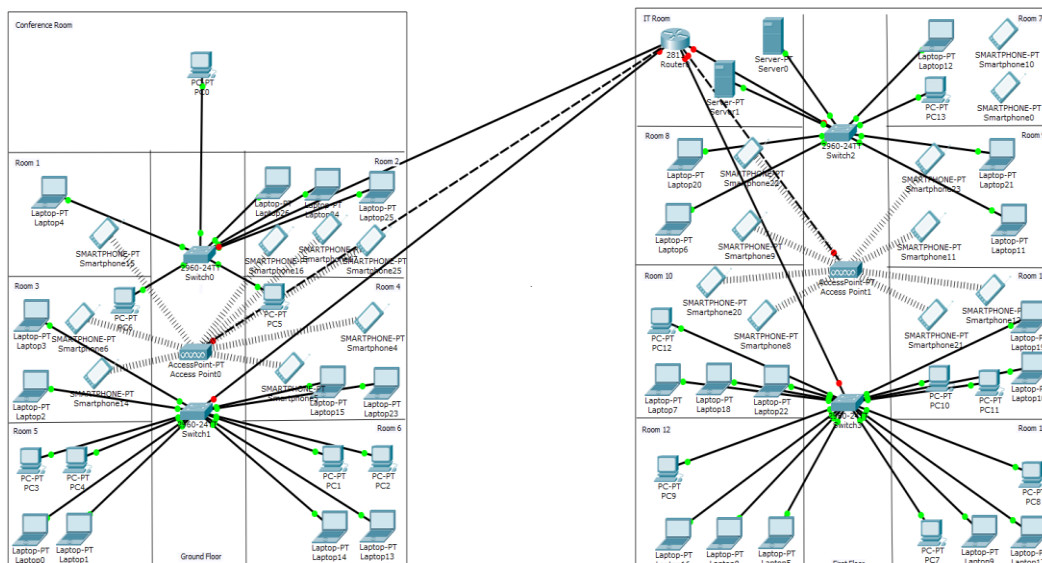
Now the Company is planning to expand till the end of 2024 to the no of employees up to 40. So now we have to plan the network for 40 employees.

Let's look over the network design, we previous have, to check if there any changes or not.

Sr No	Devices	Require	Rate	Amount
1	Router (8 port)	1	35000	35000
2	Switch (24 port)	1	15000	15000
3	Switch (16 port)	2	8000	16000
4	Switch (8 port)	1	3000	3000
5	Access Point (70*70 feet)	2	3000	6000
Total Cost				75000

Now, checking and going through we think there is no need to be changed expect the cables to be added to give more connections to the PC of the employees because the network is too strong.

Network Diagram of 40 Employees are:



While considering the above network, now check the cost of cables connections with all devices in

all the rooms.

Disclaimer:

In calculating the wire length in terms of feet, we are considering the room size (15*15) and height of the rooms (12 feet) and also the extra space of lobby (15*5) is also used for the connections of wire.

Now, first we calculate the cables connection of the **Ground Floor.**

Conference Room:

In conference room, there would be only one computer for the presentations, so we need only computer connections and access points connections. As the computer has to be connected with the switch 0, so the cable needed for the connection of switch to RJ-45 connector is 20 feet and the cable needed for the connection of RJ-45 connector to Computer is 7 feet. As Access point (70*70 feet range), so it is easy to access in the conference room, as it is placed in the middle of the lobby of Ground Floor.

- 2 RJ-45 Connectors (Good quality) - $2 \times \text{Rs } 15 = \text{Rs } 30$
- 27 feet Twisted Pair Cable (Good Rs 10/feet)- $27 \times \text{Rs } 10 = \text{Rs } 270$

Hence, **Total cost would be: Rs 300/-**

Room 1(CEO):

In room 1, there would be only one computer and Mobile phone for CEO, so we need only computer connections and access points connections. As the computer has to be connected with the switch 0, so the cable needed for the connection of switch to RJ-45 connector is 19 feet and the cable needed for the connection of RJ-45 connector to Computer is 6 feet. As Access point (70*70 feet range), so it is easy to access in the room 1, as it is placed in the middle of the lobby of Ground Floor.

- 2 RJ-45 Connectors (Good quality) - $2 \times \text{Rs } 15 = \text{Rs } 30$
- 25 feet Twisted Pair Cable (Good Rs 10/feet)- $25 \times \text{Rs } 10 = \text{Rs } 250$

Hence, **Total cost would be: Rs 280/-**

Room 2(Admin):

In room 2, there would be three computer and Mobile phone for Admin, so we need only computer connections and access points connections. As the computer has to be connected with the switch 0, so the cable needed for the connection of switch to RJ-45 connector is 15 feet and the cable needed for the connection of RJ-45 connector to Computer is (4+5+6=15) feet. As Access point (70*70 feet range), so it is easy to access in the room 2, as it is placed in the middle of the lobby of Ground Floor.

- 6 RJ-45 Connectors (Good quality) - $6 \times \text{Rs } 15 = \text{Rs } 90$
- 30 feet Twisted Pair Cable (Good Rs 10/feet)- $30 \times \text{Rs } 10 = \text{Rs } 300$

Hence, **Total cost would be: Rs 390/-**

Room 3(Finance & HR):

In room 3, there would be three computer and Mobile phone for HR & Finance, so we need only computer connections and access points connections. As the computer has to be connected with the switch 1, so the cable needed for the connection of switch to RJ-45 connector is 19 feet and the cable needed for the connection of RJ-45 connector to Computer is (4+5+6=15) feet. As Access point (70*70 feet range), so it is easy to access in the room 3, as it is placed in the middle of the lobby of Ground Floor.

- 6 RJ-45 Connectors (Good quality) - $6 \times \text{Rs } 15 = \text{Rs } 90$

- 34 feet Twisted Pair Cable (Good Rs 10/feet)- $34 \times \text{Rs } 10 = \text{Rs } 340$
Hence, **Total cost would be: Rs 430/-**

Room 4(Employees):

In room 4, there would be three computer and Mobile phone for employees, so we need only computer connections and access points connections. As the computer has to be connected with the switch 1, so the cable needed for the connection of switch to RJ-45 connector is 20 feet and the cable needed for the connection of RJ-45 connector to Computer is $(4+5+5=14)$ feet. As Access point (70*70 feet range), so it is easy to access in the room 4, as it is placed in the middle of the lobby of Ground Floor.

- 6 RJ-45 Connectors (Good quality) - $6 \times \text{Rs } 15 = \text{Rs } 90$
- 34 feet Twisted Pair Cable (Good Rs 10/feet)- $34 \times \text{Rs } 10 = \text{Rs } 340$
Hence, **Total cost would be: Rs 430/-**

Room 5(Employees):

In room 5, there would be four computer and Mobile phone for employees, so we need only computer connections and access points connections. As the computer has to be connected with the switch 1, so the cable needed for the connection of switch to RJ-45 connector is 19 feet and the cable needed for the connection of RJ-45 connector to Computer is $(4+6+5+6=21)$ feet. As Access point (70*70 feet range), so it is easy to access in the room 5, as it is placed in the middle of the lobby of Ground Floor.

- 8 RJ-45 Connectors (Good quality) - $8 \times \text{Rs } 15 = \text{Rs } 120$
- 40 feet Twisted Pair Cable (Good Rs 10/feet)- $40 \times \text{Rs } 10 = \text{Rs } 400$
Hence, **Total cost would be: Rs 520/-**

Room 6(Employees):

In room 6, there would be four computer and Mobile phone for employees, so we need only computer connections and access points connections. As the computer has to be connected with the switch 1, so the cable needed for the connection of switch to RJ-45 connector is 19 feet and the cable needed for the connection of RJ-45 connector to Computer is $(4+5+6+5=20)$ feet. As Access point (70*70 feet range), so it is easy to access in the room 6, as it is placed in the middle of the lobby of Ground Floor.

- 8 RJ-45 Connectors (Good quality) - $8 \times \text{Rs } 15 = \text{Rs } 120$
- 39 feet Twisted Pair Cable (Good Rs 10/feet)- $39 \times \text{Rs } 10 = \text{Rs } 390$
Hence, **Total cost would be: Rs 510/-**

Now we calculate the cable connections of the **First Floor**.

IT Room (Employee):

In IT room, there are two servers of the company, so we need only server connections and access points connections. As the servers has to be connected with the switch 2, so the cable needed for the connection of switch to RJ-45 connector is 18 feet and the cable needed for the connection of RJ-45 connector to Computer is $(5+5=10)$ feet. As Access point 1 (70*70 feet range), so it is easy to access in the IT room, as it is placed in the middle of the lobby of First Floor.

- 2 RJ-45 Connectors (Good quality) - $2 \times \text{Rs } 15 = \text{Rs } 30$
- 28 feet Twisted Pair Cable (Good Rs 10/feet)- $28 \times \text{Rs } 10 = \text{Rs } 280$
Hence, **Total cost would be: Rs 310/-**

Room 7(Employee):

In room 7, there would be two computer and Mobile phone for employee, so we need only computer connections and access points connections. As the computer has to be connected with the switch 2, so the cable needed for the connection of switch to RJ-45 connector is 18 feet and the cable needed for the connection of RJ-45 connector to Computer is (7+7=14) feet. As Access point 1 (70*70 feet range), so it is easy to access in the room 7, as it is placed in the middle of the lobby of First Floor.

- 4 RJ-45 Connectors (Good quality) - $4 \times \text{Rs } 15 = \text{Rs } 60$
- 32 feet Twisted Pair Cable (Good Rs 10/feet)- $32 \times \text{Rs } 10 = \text{Rs } 320$

Hence, **Total cost would be: Rs 380/-**

Room 8(Employees):

In room 8, there would be two computer and Mobile phone for employees, so we need only computer connections and access points connections. As the computer has to be connected with the switch 2, so the cable needed for the connection of switch to RJ-45 connector is 19 feet and the cable needed for the connection of RJ-45 connector to Computer is (6+6=12) feet. As Access point 1 (70*70 feet range), so it is easy to access in the room 8, as it is placed in the middle of the lobby of First Floor.

- 4 RJ-45 Connectors (Good quality) - $4 \times \text{Rs } 15 = \text{Rs } 60$
- 31 feet Twisted Pair Cable (Good Rs 10/feet)- $31 \times \text{Rs } 10 = \text{Rs } 310$

Hence, **Total cost would be: Rs 360/-**

Room 9(Employees):

In room 9, there would be two computer and Mobile phone for employees, so we need only computer connections and access points connections. As the computer has to be connected with the switch 2, so the cable needed for the connection of switch to RJ-45 connector is 19 feet and the cable needed for the connection of RJ-45 connector to Computer is (5+6=11) feet. As Access point (70*70 feet range), so it is easy to access in the room 9, as it is placed in the middle of the lobby of First Floor.

- 4 RJ-45 Connectors (Good quality) - $4 \times \text{Rs } 15 = \text{Rs } 60$
- 30 feet Twisted Pair Cable (Good Rs 10/feet)- $30 \times \text{Rs } 10 = \text{Rs } 300$

Hence, **Total cost would be: Rs 360/-**

Room 10(Employees):

In room 10, there would be four computer and Mobile phone for employees, so we need only computer connections and access points connections. As the computer has to be connected with the switch 3, so the cable needed for the connection of switch to RJ-45 connector is 19 feet and the cable needed for the connection of RJ-45 connector to Computer is (6+7+6+7=26) feet. As Access point 1 (70*70 feet range), so it is easy to access in the room 10, as it is placed in the middle of the lobby of First Floor.

- 8 RJ-45 Connectors (Good quality) - $8 \times \text{Rs } 15 = \text{Rs } 120$
- 45 feet Twisted Pair Cable (Good Rs 10/feet)- $45 \times \text{Rs } 10 = \text{Rs } 450$

Hence, **Total cost would be: Rs 570/-**

Room 11(Employees):

In room 11, there would be four computer and Mobile phone for employees, so we need only

computer connections and access points connections. As the computer has to be connected with the switch 3, so the cable needed for the connection of switch to RJ-45 connector is 19 feet and the cable needed for the connection of RJ-45 connector to Computer is (6+6+6+7=24) feet. As Access point (70*70 feet range), so it is easy to access in the room 11, as it is placed in the middle of the lobby of First Floor.

- 8 RJ-45 Connectors (Good quality) - $8 \times \text{Rs } 15 = \text{Rs } 120$
 - 44 feet Twisted Pair Cable (Good Rs 10/feet)- $44 \times \text{Rs } 10 = \text{Rs } 440$
- Hence, **Total cost would be: Rs 560/-**

Room 12(Employees):

In room 12, there would be four computer and Mobile phone for employees, so we need only computer connections and access points connections. As the computer has to be connected with the switch 3, so the cable needed for the connection of switch to RJ-45 connector is 19 feet and the cable needed for the connection of RJ-45 connector to Computer is (5+6+7+7=25) feet. As Access point 1 (70*70 feet range), so it is easy to access in the room 12, as it is placed in the middle of the lobby of First Floor.

- 8 RJ-45 Connectors (Good quality) - $8 \times \text{Rs } 15 = \text{Rs } 120$
 - 44 feet Twisted Pair Cable (Good Rs 10/feet)- $44 \times \text{Rs } 10 = \text{Rs } 440$
- Hence, **Total cost would be: Rs 560/-**

Room 13(Employees):

In room 13, there would be four computer and Mobile phone for employees, so we need only computer connections and access points connections. As the computer has to be connected with the switch 3, so the cable needed for the connection of switch to RJ-45 connector is 19 feet and the cable needed for the connection of RJ-45 connector to Computer is (6+6+7+7=26) feet. As Access point (70*70 feet range), so it is easy to access in the room 13, as it is placed in the middle of the lobby of First Floor.

- 8 RJ-45 Connectors (Good quality) - $8 \times \text{Rs } 15 = \text{Rs } 120$
 - 45 feet Twisted Pair Cable (Good Rs 10/feet)- $45 \times \text{Rs } 10 = \text{Rs } 450$
- Hence, **Total cost would be: Rs 570/-**

Now, something remaining about those connections of routers with the switches and access points,

- 1- Router to switch 2:
 - 18 feet Twisted Pair Cable (Good Rs 10/feet)- $18 \times \text{Rs } 10 = \text{Rs } 180$

Hence, **Total cost would be: Rs 180/-**
- 2- Router to switch 3.
 - 27 feet Twisted Pair Cable (Good Rs 10/feet)- $27 \times \text{Rs } 10 = \text{Rs } 270$

Hence, **Total cost would be: Rs 270/-**
- 3- Router to switch 1.
 - 35 feet Twisted Pair Cable (Good Rs 10/feet)- $35 \times \text{Rs } 10 = \text{Rs } 350$

Hence, **Total cost would be: Rs 350/-**
- 4- Router to switch 0.
 - 37 feet Twisted Pair Cable (Good Rs 10/feet)- $37 \times \text{Rs } 10 = \text{Rs } 370$

Hence, **Total cost would be: Rs 370/-**
- 5- Router to Access point 0.
 - 36 feet Twisted Pair Cable (Good Rs 10/feet)- $36 \times \text{Rs } 10 = \text{Rs } 360$

Hence, **Total cost would be: Rs 360/-**

6- Router to Access point 1.

- 21 feet Twisted Pair Cable (Good Rs 10/feet)- $21 \times \text{Rs } 10 = \text{Rs } 210$

Hence, **Total cost would be: Rs 210/-**

Sr No	Devices	Require	Rate	Amount
1	Router (8 port)	1	35000	35000
2	Switch (8 port)	1	3000	3000
3	Switch (16 port)	2	8000	16000
4	Switch (24 port)	1	15000	15000
4	Access Point (70*70 feet)	2	3000	6000
5	Ground Floor (Cabling)	-	-	2860
6	First Floor (Cabling)	-	-	3670
7	Router Connections	-	-	1740
Total Cost				83,270

Hence,

The Total cost for future up to 40 employee network is 83,270/-

Because your network is too strong and good enough, so with minimum changes of increasing the no of employees it doesn't make a huge cost difference in increasing limit.

Report: Network Design and Justification:

Introduction:

The network design was implemented in a building to cater to the networking needs of the different rooms and users in the building. The design was aimed at ensuring reliable and efficient connectivity for both wired and wireless devices. The network was composed of several components, including switches, wireless access points, routers, and cables. The design was informed by the need to provide stable connectivity for users and support data transmission between the different rooms and the IT room.

Network Design:

The network design was composed of different components, as described below:

1- Wireless Access Points (WAPs):

The building had two WAP installed in the lobby of each floor. The WAP was aimed at providing wireless connectivity for devices such as mobile phones, laptops, and tablets. The WAPs were positioned to ensure optimal coverage of the building.

2- Switches:

The building had several switches installed in the lobby of each floor. The switches were aimed at enabling wired connectivity between devices in the rooms and the IT room. Each switch was connected to a router in the IT room using a different length of good wire. The switches were positioned in the rooms to ensure ease of access for users. Ground Floor lobby had an 8-port switch and 16 port switch, First Floor lobby had 16-port switches and 24 port switches.

Justification of the Network Design:

The network design was informed by several factors, including the need for reliable connectivity, ease of use, and efficient data transmission. The use of WAPs was aimed at providing wireless connectivity, which is essential for devices such as mobile phones and tablets. The position of the WAPs was carefully considered to ensure optimal coverage of the building. The switches were installed in each lobby to ensure efficient data transmission between the devices and the IT room. The use of good wires of varying lengths was aimed at reducing signal loss and ensuring reliable connectivity.

Conclusion:

The network design in the building was aimed at providing reliable and efficient connectivity for users. The design included several components, including WAPs, switches, routers, and hubs. The design was informed by the need to provide stable connectivity for users and support data transmission between the different rooms and the IT room. The design was carefully considered to ensure optimal coverage, ease of use, and efficient data transmission.