HOSPITAL NETWORK DESIGN

18CSC302J- COMPUTER NETWORKS

A PROJECT REPORT

Submitted by
Jaipal Reddy [RA2111003010869]
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Abhinay S [RA2111003010875]
Manikanta [RA2111003010837]
Sanjay Kumar Reddy [RA2111003010880]

Under the Guidance of

Dr. M. Suchithra
Associate Professor, Department of Computing Technologies

In partial fulfilment of the requirements for the degree of

BACHELOR OF TECHNOLOGY
In
COMPUTER SCIENCE AND ENGINEERING

DEPARTMENT OF COMPUTATIONAL TECHNOLOGIES

SRM INSTITUTE OF SCIENCE ANDTECHNOLOGY

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BONAFIDE CERTIFICATE

Certified that btech **18CSC302J computer networks** course project report titled "HOSPITAL NETWORK DESIGN USING CISCO PACKET TRACER" is the bonafide work of Jaipal Reddy [RA2111003010869] Saketh Nandan [RA2111003010883], Abhinay S [RA2111003010875].Manikanta [RA2111003010837], Sanjay Kumar [RA2111003010880] who carried out the project work under my supervision. Certified further, that to the best of my knowledge the work reported herein does not form part of any other thesis or dissertation on the basis of which a degree or award was conferred on an earlier occasion for this or any other candidate

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Own Work Declaration Form

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Title of Work : HOSPITAL NETWORK DESIGN

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ABSTRACT

This report describes the network design of Health care management or Hospital. In this network topology the nodes (i.e., computers, switches, routers) are connected to a local area network (LAN) and network via links (twisted pair copper wire cable or optical fiber cable). Giving the IP addresses manually in big organizations is a very tedious task and the chances of error are really high, so for that DHCP is used through which the configuration is automated. Additionally, the communication between the various wards should be maintained. We have used Cisco Packet Tracer for designing the network topology It's a general design which can be implemented at any higher level to manage network system.

OBJECTIVE

This project aims to design a network proposal for a hospital which has the following. There is a main block and three wards in the campus. The main block is the administrative block where registration of new patients takes place. The main block has 3 floors. The hospital has identified hospital management software, which should be accessible by the employees. The software is installed on a server at the administrative block. At the ground floor, there are 10 computers at the billing section. At other floors, there is one computer user each. The farthest distance between the computer on the top most floor and the ground floor is less than 70 meters. The wards have 3 floors each, with 5 computers in the ground floor of each ward. The distance between the wards and the blocks are less than 80 Meters. The computers in the wards may be increased based on future expansion plans.

LIST OF FIGURES

LIST OF ABBREVIATIONS

DHCP	Dynamic host configuration protocol
DTE	Data terminating equipment
TCP	Transmission control protocol
LAN	Local area network
Fa	Fast ethernet
IP	Internet protocol
PC	Personal computer

SOFTWARE USED

Cisco Packet Tracer:

- Cisco Packet Tracer is a visual simulation tool designed by Cisco Systems that allow users to create network topologies and imitate modern computer networks.
- We can also configure each and every router and network with the IP address and tested whether the data transfer is successful or not.
- Using packet tracer, we have implemented network topology, assigned routers and switches.

NETWORK REQUIREMENTS

The main block is the administrative block where registration of new patients takes place. The main block has 3 floors. The software is installed on a server at the administrative block so we need a server in the administrative block. Three are three wards in the hospital campus, with 5 computers in the ground floor of each ward. The distance between the wards and the blocks are less than 80 Meters, so we can use LAN topology. As per the requirements the IP addressing of all the pcs should be dynamic so we can use DHCP dynamic host control protocol. by setting RIP routing we can access hospital management software from all pcs.

NETWORK REQUIREMENTS ANALYSIS

The software used is cisco packet tracer and for implementing the entire network we have used 1941 routers which are then interconnected with the routers of the other local area networks. The local area networks such as the main block and three wards are interconnected with the help of 2960-24TT switches, in which more than 20 pcs can be connected at the same time. so, starting with the local area networks (the main block, server room and three wards), they are internally connected with the help of switches using the copper cross over cables, then one individual router is connected to the switch of particular area network. Only in the server room we have server connected to switch, and then to router. All the routers are then connected with each other serial DTE cables.

The wireless access point provides wireless connectivity to the network.

HARDWARE INVENTORY LIST

Devices	Required nos.
Pcs	28
Switch	5
Router	5
Cables	As and when required
Server	1

HARDWARE ANALYSIS

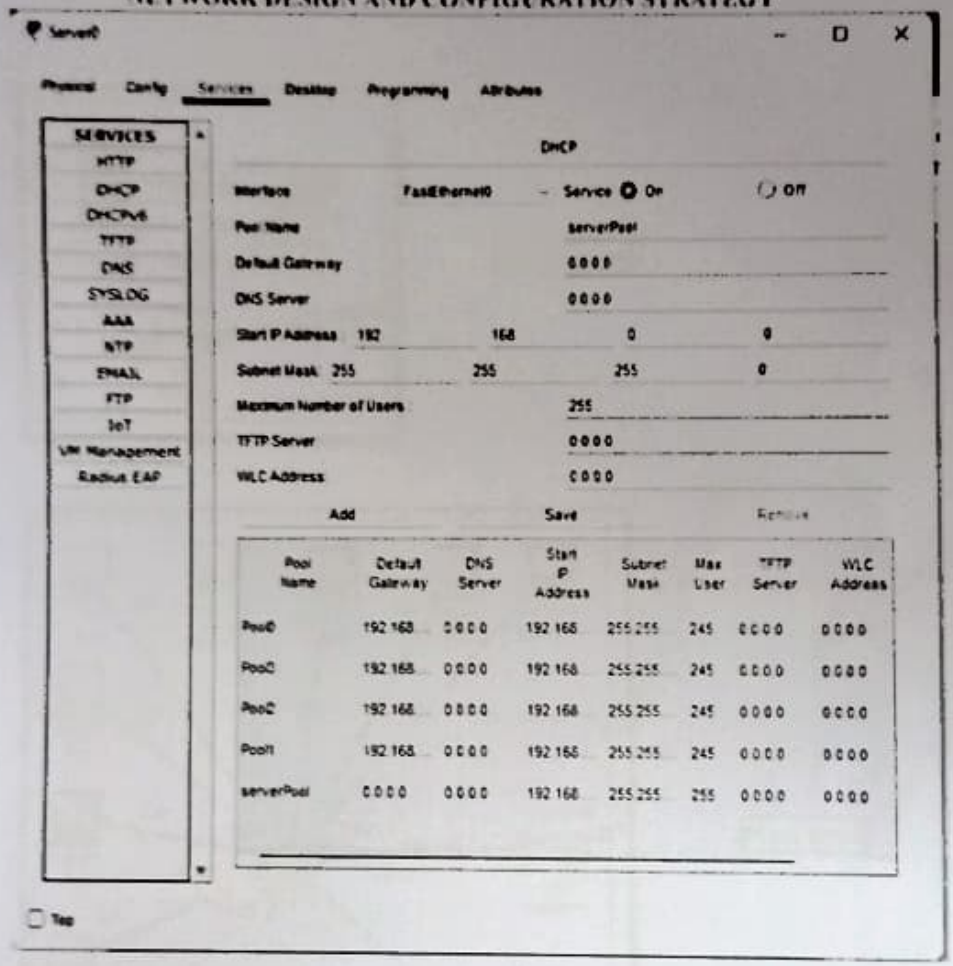
- At Server room: a server, a 2960-24TT switch, and a router
- At the main Block: 2960-24TT switch, a 1941 router, and 13 pcs
- At each ward: 2960-24TT switches, a 1941 router and 5 pcs

IP CONFIGURATION TABLE

Device	Interface	IP address	Subnet mask	Gateway
Router 0	Serial0/1/0	192.168.4.2	255.255.255.0	-
Router 0	Serial0/1/1	192.168.5.1	255.255.255.0	-
PC0	Fa0/1	192.168.1.12	255.255.255.0	192.168.0.1
PC1	Fa0/2	192.168.1.11	255.255.255.0	192.168.0.1
PC2	Fa0/3	192.168.1.17	255.255.255.0	192.168.0.1
PC3	Fa0/4	192.168.1.20	255.255.255.0	192.168.0.1
PC4	Fa0/5	192.168.1.14	255.255.255.0	192.168.0.1
PC5	Fa0/6	192.168.1.13	255.255.255.0	192.168.0.1
PC6	Fa0/7	192.168.1.19	255.255.255.0	192.168.0.1
PC7	Fa0/8	192.168.1.18	255.255.255.0	192.168.0.1
PC8	Fa0/9	192.168.1.23	255.255.255.0	192.168.0.1
PC9	Fa0/10	192.168.1.22	255.255.255.0	192.168.0.1
PC10	Fa0/11	192.168.1.21	255.255.255.0	192.168.0.1
PC11	Fa0/12	192.168.1.15	255.255.255.0	192.168.0.1
PC12	Fa0/13	192.168.1.16	255.255.255.0	192.168.0.1
Router 4	Serial0/1/0	192.168.4.1	255.255.255.0	-
PC25	Fa0/5	192.168.8.11	255.255.255.0	192.168.0.1
PC26	Fa0/4	192.168.8.13	255.255.255.0	192.168.0.1
PC27	Fa0/3	192.168.8.14	255.255.255.0	192.168.0.1
PC28	Fa0/2	192.168.8.15	255.255.255.0	192.168.0.1
PC29	Fa0/1	192.168.8.12	255.255.255.0	192.168.0.1
Router 2	Serial0/1/0	192.168.6.2	255.255.255.0	-
Router 2	Serial0/1/1	192.168.7.1	255.255.255.0	-
PC20	Fa0/2	192.168.3.14	255.255.255.0	192.168.0.1
PC21	Fa0/3	192.168.3.15	255.255.255.0	192.168.0.1
PC22	Fa0/4	192.168.3.11	255.255.255.0	192.168.0.1
PC23	Fa0/5	192.168.3.12	255.255.255.0	192.168.0.1
PC24	Fa0/1	192.168.3.13	255.255.255.0	192.168.0.1
Router 3	Serial0/1/0	192.168.7.2	255.255.255.0	-
PC15	Fa0/1	192.168.2.13	255.255.255.0	192.168.0.1
PC16	Fa0/2	192.168.2.15	255.255.255.0	192.168.0.1

PC17	Fa0/3	192.168.2.14	255.255.255.0	192.168.0.1
PC18	Fa0/4	192.168.2.12	255.255.255.0	192.168.0.1
PC19	Fa0/5	192.168.2.11	255.255.255.0	192.168.0.1
Router 1	Serial0/1/0	192.168.5.2	255.255.255.0	-
Router 1	Serial0/1/1	192.168.6.1	255.255.255.0	-

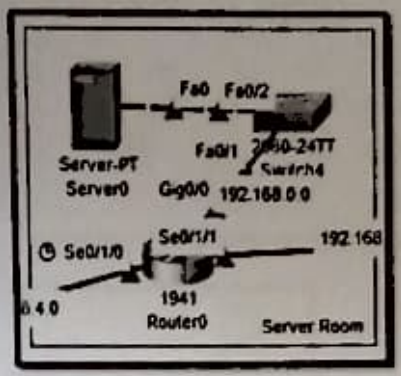
Since we have implemented dynamic host protocol (DHCP), with each DHCP request, the pcs are allocated with different IP address of that particular range. For example, here in main ward we have 13 pcs and the start address is given as 192.168.1.11 so with each request, PC0 of main ward is assigned with an IP address that lies between 192.168.1.11 to 192.168.1.23. Similarly, for each ward we have a start address and a range. Therefore, we cannot have a fixed IP configuration table, only the IP address of routers stays fixed because it establishes the connection between the main block, wards and the server room. The IP addresses of the pcs recorded while doing the project are listed in the above table.



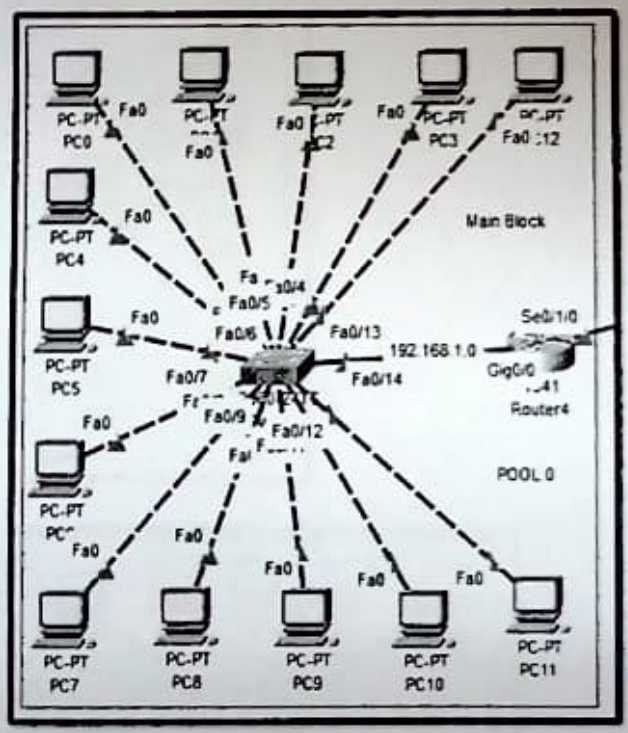
The configuration of DHCP was done manually, for each ward and the main block, a pool was added with providing the start IP address of the network. Every device on a TCP IP- based network must have a unique unicast ip address to access the network and its resources. Without DCHP, ip addresses for new computers or computers that are moved from one subnet to another must be configured manually; IP addresses for computers that are removed from the network must be manually reclaimed.

With DHCP, this entire process is automated and managed centrally. The DHCP server maintains a pool of IP addresses and leases an address to any DHCP-enabled client when it starts up on the network. Because the IP addresses are dynamic (leased) rather than static (permanently assigned), addresses no longer in use are automatically returned to the pool for reallocation. Hence the pools were manually configured for the hospital management system and the rest of the configuration was automatically done by DHCP.

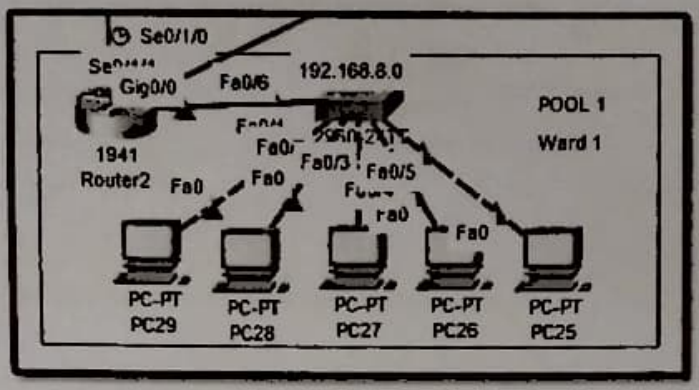
NETWORK TOPOLOGY DIAGRAM

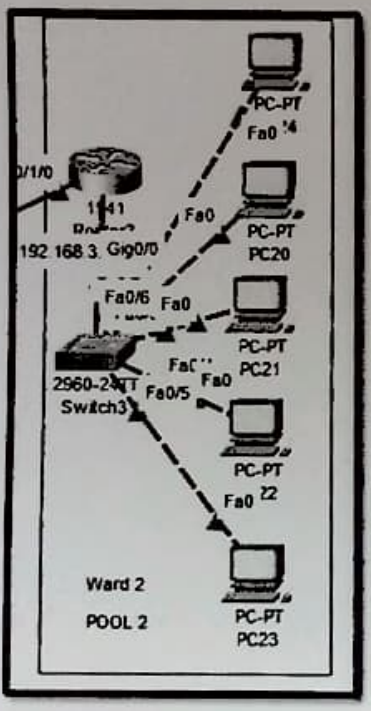


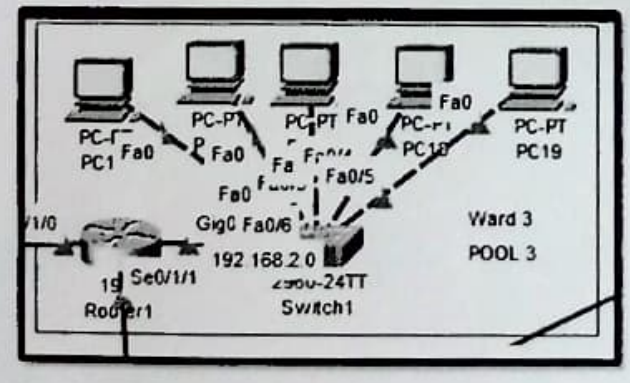
Server room

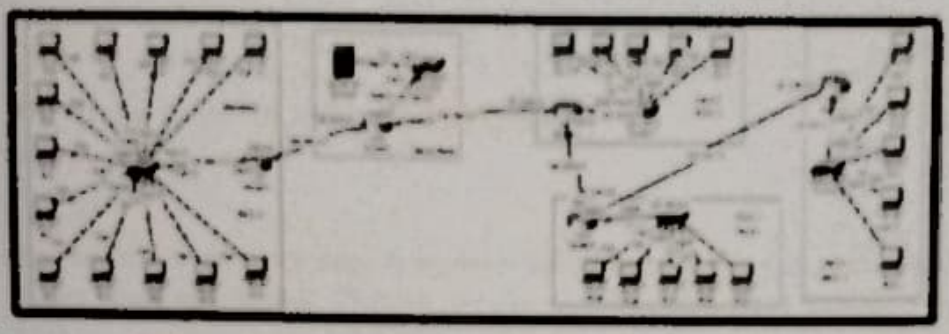


Main block


Se0/1/0
Gig0/0
Fa0/6
192.168.8.0
POOL 1
Ward 1
1941
Router2
Fa0
Fa0/3
Fa0/5
PC-PT
PC29
PC-PT
PC28
PC-PT
PC27
PC-PT
PC26
PC-PT
PC25


PC-PT
PC20
PC-PT
PC21
Fa0/5
PC-PT
PC22
Ward 2
POOL 2
PC-PT
PC23


PC-PT
PC1
Fa0
PC-PT
PC19
Fa0/5
Gig0 Fa0/6
192 168.2.0
Ward 3
POOL 3
Se0/1/1
Switch1

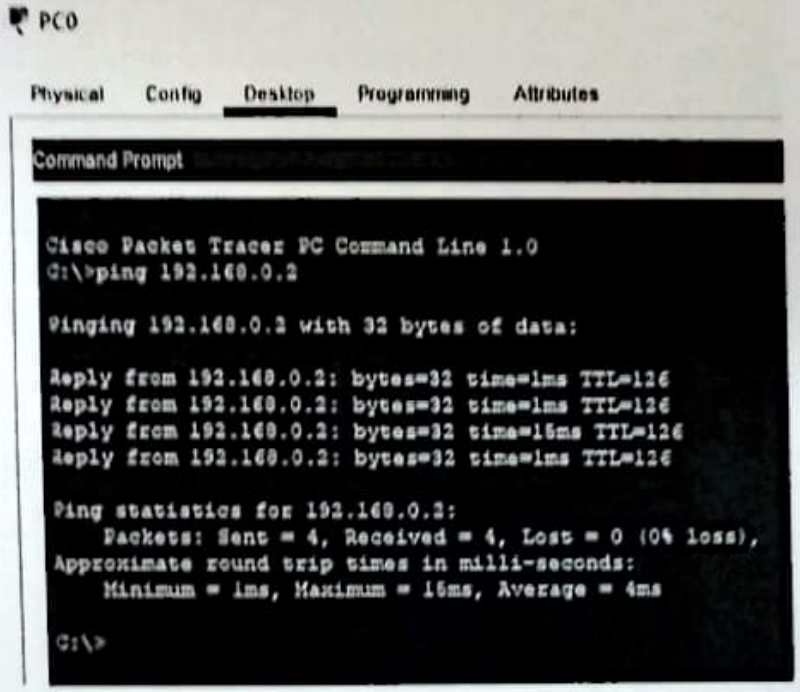


Hospital network

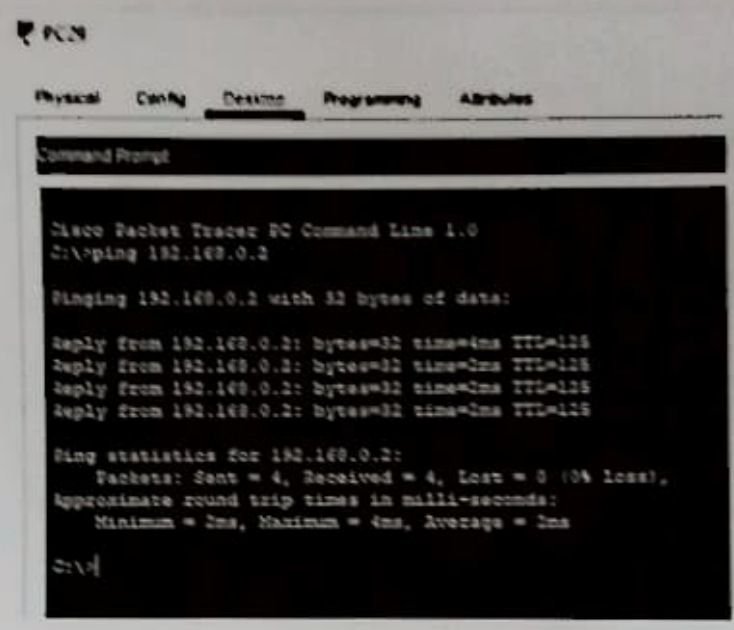
NETWORK TESTING AND VERIFICATION

Our objective is to check if every computer is able to access the hospital management software from each location. Therefore, we have checked that if one pc from the main block and each block is able to ping the server or not, i.e, data packets are sent and the reachability of a host on a network is tested. Also, the communication between wards and main block is tested by pinging them. Below are some of the screenshots:

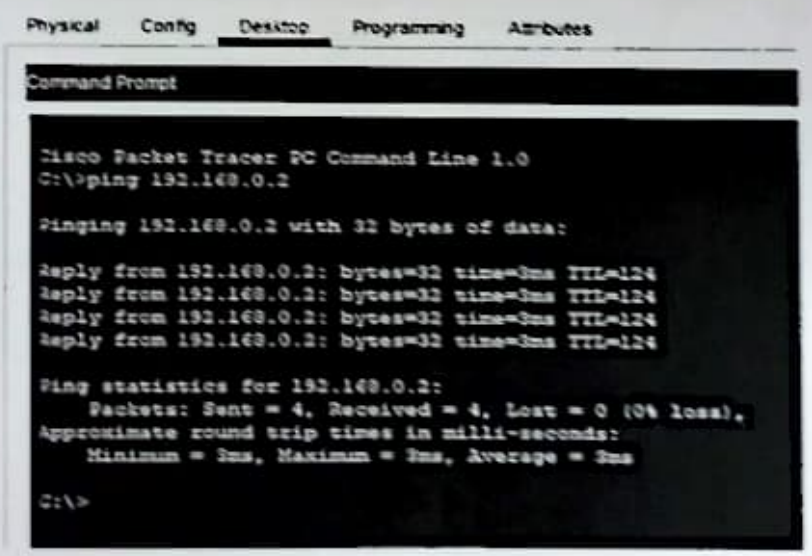
- Pinging server from a pc of main block:



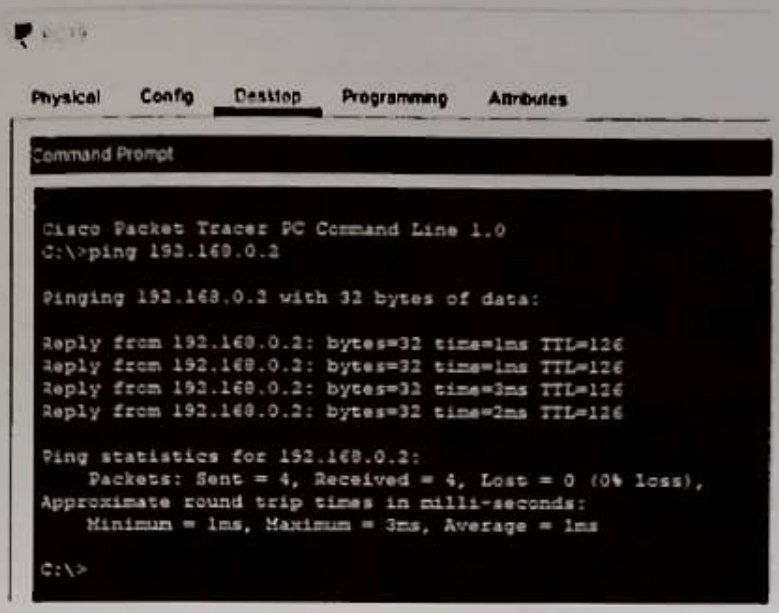
- Pinging server from a pc of ward 1:



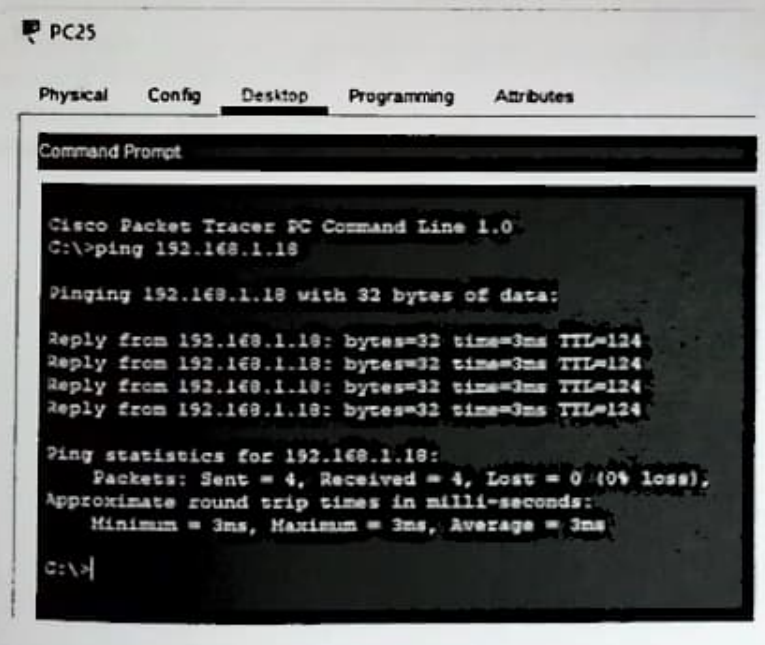
- Pinging server from a pc of ward 2:



- Pinging server from a pc of ward 3:



- Pinging PC0 (main block) from a PC25 (ward 1):



CONCLUSION

The report describes how we have designed network topology of Hospital (Health care Management System). Since the distance was not greater than 80 meters, the LAN topology was successfully implemented. And with use of DHCP, the ip addresses were assigned dynamically. After the configuration of DHCP, the ip address and the other related configuration information such as the subnet mask and the default gateway were automatically provided to each pc in the network. This topology can also be implemented on higher level of hospitals. The devices in the wards can be increased based on future expansion plans.

REFERENCES

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- https://youtu.be/Yn3H3bpC2Sk