INTRODUCTION

The main goal of this project is to implement the Client-Server Protocol Implementation.

The dream global communication is solved in a great deal by the introduction of Internet. This made the necessity of networking in communication clear.

The internet protocol TCP/IP uses computers called gateways. Which provide all interconnections among physical networks.

A gateway is a special purpose, dedicated computer that attaches to two or more networks and routes packets from one to other. It will be having the information regarding the network connected to it. The gateways exchange routing information periodically to accommodate network changes and keep their route up-to-date.

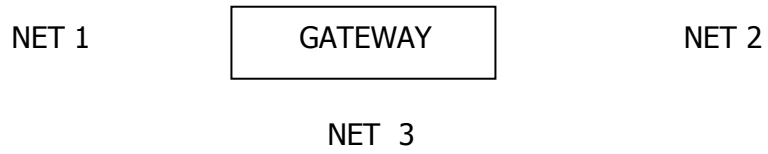
This protocol permits a new core gateway to be added to the internet without modifying the existing gateways.

Whenever a new core gateway is added to the existing intranet it will be assigned to one or more neighbours with which it communicates, the neighbors already members of the working internet have already propagated routing information among themselves.

Thus the gateway has to inform its neighbors about the network it could reach so that they can update the routing table and propagate the information to the remaining gateways in the internet. The new gateway also updates its routing table.
Firstly we deal about the gateways its function and routing in gateway in chapter 3 we discuss gateway to gateway protocol, its format and its application.

GATEWAYS

2.1 Introduction to gateways:



Gateways connect two networks that are heterogeneous in nature. (That is a network differing in IP).

2.1.1 Heterogeneous networks.

Heterogeneous networks may differ among themselves in no of ways. They are as follows

1. Addressing schemes
2. Maximum packet size
3. Network accesses mechanism
4. Time-outs
5. Methods of error recovery
6. Methods of status reporting
7. Routing techniques
8. Users access control
9. Connection oriented/Connectionless

2.2 Work done by Gateway

1. Addressing
2. Routing of Datagram in the Internet
3. Datagram lifetime: if dynamic or alternate routings are used, the potentials exist for Datagram to loop indefinitely through the internet, which is undesirable

A simple way to overcome this is to implement lifetime, which uses hop count. Each time the Datagram passes the gateway the count is decrement. Once the count becomes zero Datagram is discarded.

2.2.1 Fragmentation and reassembling

The fragmentation is done in gateways when the data gram has to pass through the network which provide smaller maximum message size, than what is the present message size. Reassembling is done at the destination. It is advantageous over the reassemble at intermediate gateways because..

a. Large buffers are required at gateways and there is potential.
b. All fragments of datagram must pass through the same gateways. This inhibits the use of dynamic routing.

2.2.2 Error control and flow control:

Flow control allows the gateway or receiving station or both to limit the rate at which they receive the data.

2.3 Routing in gateways:

Routing is generally accomplished by maintaining the routing table in host and gateways. Hosts do not have complete knowledge of all possible destination networks. They depend on default entries in the routing table to send to the nearby gateways. All datagram for which they have no specific routes.

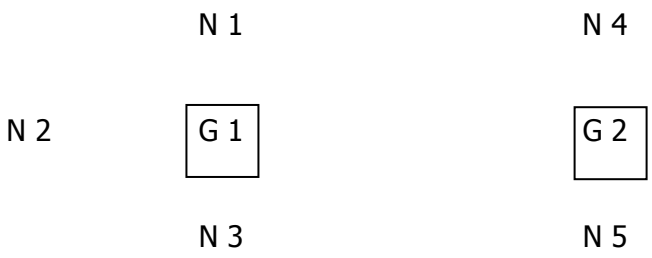
Gateways have no information's of each possible destination networks and the next gateway to which the IP data gram should be send and also total no. of hops to the destination.

Routing table may be static or dynamic. The static table however could alternate routes if gateway is unavailable. Dynamic table is more flexible in responding to errors and congestion control.

Routing table may be also needed to support other Internet services such as security and priority.

Routing tables in a gateway may have different information's. One such routing table is Bellman Ford routing table. This contains 3 fields,

1. Destination network
2. Next gateway to which the packet must be sent
3. No. of gateway hops to reach the destination



For the above internet the routing table of the gateway G 1 will contain

DESTINATION	DISTANCE	ROUTE
N 1	0	direct
N 2	0	direct
N 3	0	direct
N 4	1	GATE – G2
N 5	1	GATE – G2

Distance is measured in hops

IP Gateway :

In an Internet, computers called IP Gateways, or routers that attached to two or more networks, form interconnections among networks. Gateways route packets between networks by receiving them from one network and sending them to another

IP Address :

The designer of TCP/IP chose scheme analogues to physical network addressing in which each host on the Internet is assigned an integer address called its Internet address or IP address. Each host on a TCP/IP Internet is assigned 32-bit Internet address that is used in all communication with that host. If host moves from one network to another, its IP address must be changed.

Port Number :

Every incoming information carries along with it the destination place with in the computer also. This is called Portal the programs are connected to the port and based on the port number in the incoming information it will be given to the corresponding program.

3. Client-Server Protocol Implementation(cspi)

A protocol (i.e. a set of rules) which is use to transfer routing message from one gateway to another gateway is a cspi.

> The original core gateways use a vector-distance protocol known as the client server protocol Implementation (CSPI) to exchange routing information. The exchange of routing information is necessary to avoid the clash between the different networks in the net. The CSPI is designed to travel in the IP datagrams or TCP circuits. Client-Server protocol implements a distributed shortest path routine communication. The original core system is arranged to permit a new core gateway to be added without modifying existing gateways. When a new gate way is added to the core system it is only necessary to inform its neighbors about the networks it could reach.

CSPI is a true vector distance protocol. The routing information gateways exchange with CSPI consists of a set of pairs (N.D), where N is a IP network address and D is a distance measured in hops. CSPI measures distance in gateway hops from directly connected networks, one hop from networks that are reachable through one other gateway and so on.

CSPI measures the distances in gateway hops. A gateway is defined to be zero hops from directly connected networks, one hop for a network reachable through one other gateway and so on. Thus the number of hops or the hop count along a path from a given source to a given destination refers to the number of gateways that a datagram encounters along that path is should be obvious that using hop counts to calculated shortest path dose not always produce desirable results.

3.1 VECTOR DISTANCE (BELLMAN FORD) ROUTING:

The term vector distance refers to a clause of algorithms gateways use to propagate routing information. The idea behind vector distance algorithms is quiet simple. We assume that each gateway begins with a set of routes for those networks to which it attaches. It keeps the list of routes in a table, where each entry identifies a destination network and gives the distance to that network measured in hops.

DESTINATION	DISTANCE
NET 1	0
NET 2	0

An initial distance routing table with an entry for each directly connected network.

Periodically, each gateway sends a copy of its routing table to any other gateways it can be reach directly. When a report arrives at gateway k from gateway j, k examines the set of destinations reported and the distance to each. If j knows a shorter way to reach a destination, or if j lists a destination that k does not have in its table or if k currently routes to a destination through j and j' s distance to that destination changes, k replaces its table entry. For example from below table shows an existing table in a gateway K and an update message from another gateway j.

ROUTING TABLE OF GATEWAY K

NETWORK DESTINATION	NEXT GATEWAY	DISTANCE
NET 1	DIRECT	0
NET 2	DIRECT	0
NET 3	GATEWAY 3	4
NET 4	GATEWAY 5	2

ROUTING TABLE OF GATEWAY J

NETWORK DESTINATION	NEXT GATEWAY	DISTANCE
NET 5	DIRECT	0
NET 6	DIRECT	0
NET 3	GATEWAY 3	10

ROUTING TABLE OF GATEWAY J AFTER UPDATE

NETWORK DESTINATION	NEXT GATEWAY	DISTANCE
NET 5	DIRECT	0
NET 6	DIRECT	0
NET 1	GATEWAY K	1
NET 2	GATEWAY K	1
NET 3	GATEWAY K	5

Note that if j reports distance N, an update entry in K will have distance N+1, when a gateway J adds or update an entry in response to a message from gateway k, it assigns gateway K as the route for that entry.

3.2 CSPI MESSAGE FORMAT:

There are four types of messages each with its own format types

1. **Type 1 CSPI routing updates message**

Type (12)	Un used
Sequence no	
Update	Num distances
Distance D1	Num net at D 1
First net at distance D 1	
…. ….. ……	
Last net at distance D1	
Distance D2	Num net at D 2
First net at distance D2	
Second net at distance D1	
…. ….. ……	
Last net at distance D1	

This message gateway exchange to learn about the gateway. This information contains a pair or IP networks and the distance values. To keep this message, small networks are grouped together by distance and message consists of a sequence of sets where each set contains a distance value followed by a list of all the networks at that distance

- Value 12 in the field labeled TYPE specifies that the message is the routing update message.
- 16 bit sequence no. is used to validate a GGP message: Both sender and receiver must agree on the sequence no before the receiver will accept the message.
- Field update is a binary value that specifies whether the sender needs update from receiver.
- The NUM DISTANCE specifies how many distance groups are present in this update.

TYPE 2 :

When a gateway receives a GGP routing update message it sends acknowledgement back to sender.

Using positive acknowledgement if routing update was accepted and negative acknowledgement if an error is detected. In positive acknowledgement the field labeled SEQUENCE specifies the sequence no. the receiver last received correctly.

Type 2 identifies the message as positive acknowledgement and type 10 as negative.

0	8	16	32
Type (2 or 10)	Un used (0)	Sequence	

Type 3 :

In addition to routing update messages, the GGP protocol includes messages that allow one gateway to test whether another is responding. A gateway sends an echo request so that the recipient responds by sending back an echo reply message.

0	8	16	32
Type (8 or 0)	Un used (0)	Sequence	

Type (8) identifies the message as an echo request. While type (0) identifies the message as echo reply.

3.3 Applications of GGP

This GGP is used in the Internet following cases:

1. When two existing Internets are to be connected to form a single co-ordinate unit, the corresponding gateway of each Internet are connected to propagate their routing information.

2. When a new network is added to the gateway, the gateway should generate a GGP update message to inform the other gateways about addition of network so that they make an entry of this network in the routing table, similarly the deletion of a network is carried on.

3. To ensure that all networks remain reachable with a high reliability, and Internet must provide globally consistent routine

4. GGP ensure the networks to remain reachable and provides a globally consistent routine.

5. it ensures the Internet from a clash when a new network is added to it.

6. GGP ensures the traffic in the network by using the shortest path.

7. GGP provides the solution for the routing problem by having each gateway, having information about the neighbor gateways and their networks.

4. I C M P (Internet Control Message Protocol)

Internet protocol provides an unreliable connectionless data gram delivery service, and that a data gram travels from gateway to gateway until it reaches one that can delivery it directly to its final destination. If a gateway cannot route or deliver a data gram or if the gateway detects an unusual condition, like network condition, that effects its ability to forward the data gram, it needs to instruct the original source to take action to avoid or correct the problem

To allow gateways in an internet to report errors or provide information about unexpected circumstance, the designers added a special purpose message mechanism to the TCP/IP protocol the mechanism, known as the INTERNET CONTROL MESSAGE PROTOCOL (ICMP)

Like all other traffic, ICMP messages travel across the internet in the data portion of IP data grams.

The ultimate destination of an ICMP message is not an application program or user on the destination machine, however, but the Internet protocol software on that machine that is, when an ICMP error message arrives, the ICMP software module handles it. Of course, if ICMP determines that a particular higher level protocol or application program has caused a problem, it will inform the appropriate module.

The ICMP allows gateways to send error of control message to other gateways or hosts; ICMP provides communication between the Internet protocol software on one machine and the Internet protocol software on the another.

4.1 ERROR REPORTING VS ERROR CORRECTION:

Technically, ICMP is an error reporting mechanism it provides a way of gateways that encounter an error to report the error the original source.
Although the protocol specification outlines intended uses of ICMP and suggests possible action to take in response to error reports, ICMP does not fully specify the action to be taken for each possible error. It takes action to correct the problem.

4.2 TESTING DESTINATION REACHABILITY AND STATUS

TCP/IP protocols provide facilities to help network managers or users identify network problems. One of the most frequently used debugging tools invokes the ICMP echo request and echo reply message. A host or gateway sends an ICMP echo request message to a specified destination. Any machine that receives an echo requests formalities an echo reply and returns to the original sender. The request contains an optional data area the reply contains the copies of the data sent in the request. The echo request and the associated reply can used to test whether a destination is reachable and responding. Because both the request and reply travel in IP datagrams, successful receipt of a reply verifies and major piees of transport system work.

4.3 IP data grams in a gateway

Gateways in a TCP/IP Internet form a cooperative, inter connected structure. Datagrams pass from gateway to gateway until they reach a gateway that can deliver the datagram directly.

The usual IP routing algorithm employs an Internet routing table or IP routing table. On each machines that stores information about possible destination and how to reach them. Because both gateways and hosts route datagrams, both have IP routing table. Whenever the IP routing software in a host or gateway needs to transmit a Datagram, it consults the routing table to decide whether to send the Datagram. If every routing table contained information about every possible destination address, it would be impossible to keep the tables current. Furthermore, because the number of possible destinations is large machines would have insufficient space to store the information.

Fortunately, the IP address schemes help achieve this goal. IP address or assigned to make all machines connected to a given

1. Abstract

Today, the world is on the anvil of being shrunk into a global net. All the systems around the world are to be used in the epoch of a nanosecond even when installed across continents and oceans. This is possible only through networks. It is in this context that networks become crucial to the viability of science and engineering research. The unprecedented growth of

networking has helped in breaking all geographic barriers of the world and building the information super highway and global village.

In this direction a new technology has developed in the past few years which makes it possible to interconnect many disparate networks and make them work as a co-coordinated unit. Thus the technology is designed to foster the communication between 2 machines with hardware architectures, to accommodate and use any packet switched network hardware and to accommodate multiple operating systems.

It is in this context that Gateway has gained importance for communications between disparate networks.

3.1 Existing System

The present system is having different networks for each department. Where in the files has to be manually transferred. which is not a good way of practice of file transfer, for that we have given this proposed system. Where the file transfer is done through the networks.

3.2 Problem Statement

A computer network is a communication system for connecting end system, in order to send messages or files. From one to another. So to achieve proper

communication the network should be a dedicated one. the interconnection i.e. physical connections should be proper.

Whenever a new network is added it should not disturb the existing network. Similarly when a network is deleted communication should be carried on properly

The network should be reachable with a high reliability and should provide consistent routing and should be able to provide solution for the routing problem.

3.3 Proposed System

In the proposed system all the sub-networks are added to the gateway and the transfer of the different document and file takes place through this gate way. Where we can not only reduce the delay in file transfer but also we can maintain the log.

PROJECT MODULES

This project is divided into four modules:

Module 1:

In this module we provide mechanisms for adding a new network to a Gateway and deleting the existing network from the Gateway and displaying a routing table for a Gateway.

Module 2:

In this module there are three methods first, to create a route message, second sending a routing message to other gateways, third updating the routing message.

Module 3:

In this module we develop an application program to know the date and time the routing table is transferred to other gateway.

Module 4:

In this module the errors occurred by the invalid inputs given by the user or any unexpected circumstances is reported to the gateway by using ICMP protocol.

Hard ware Specification:

Processor	**:**	Intel P-III based system
Processor Speed	**:**	250 MHz to 833MHz
RAM	**:**	64MB to 256MB
Hard Disk	**:**	2GB to 30GB
Key Board	**:**	104 keys

Software Requirements:

Language	**:**	JDK 1.5, Socket Programming.
Protocols	:	TCP/IP, HTTP
Operating System	**:**	WindowsNT/95/98/2000