

Voice Calling Using TCP/IP Protocol Over Local Area Network

Mahesh Shripat Pokharkar¹, Nilesh Vasant Kurhade²

¹(Computer Engineering, Sharadchandraji College of Engg/ SPPU Pune, India)

²(Computer Engineering, Sharadchandraji College of Engg/ SPPU Pune, India)

Abstract: *Calling is a very essential thing nowadays for us. But sometimes some problems occur because of network connection that affects everything related to our work and many things. This problem can be solved using the concept of Voice Calling Using IP Address Over Wireless Local Area Network (WLAN). This can be a solution for the problem mentioned above. This will be useful in an office or in a communication lab. TCP/IP will use existing network of office for communication which will be cost effective, secure and can work without any internet service.*

I. Introduction:

TCP/IP, or the Transmission Control Protocol/Internet Protocol, is used for communication between the two machines in the form of text, audio and video.

In the IT company or other organization where data is very sensitive and important where it is vulnerable to break of confidentiality principle of security while using the application based on the internet such as skype, email, facebook etc. Even it requires the internet for the use.

When an employee uses such application, it may divert to other tasks apart from his work. So it will be better to keep communication private within the LAN as well as fast and costless. It is possible by using TCP protocol with the help of socket programming. Socket programming provides Socket class used on client side and ServerSocket class which is used on server side.

II. Material And Methods

Client Server communication between the sockets created at both the ends which is server and client. On server side Socket is obtained by calling accept() of ServerSocket. The accept() will return the Socket only when client is connected to server.

We can obtain both the InputStream and OutputStream from the Socket. InputStream is used for accepting the input from other end by using read(). OutputStream is used for sending the output to the other end by using write().

It transmits a single message, and its connection remains in place until all the packets in a message have been received and reassembled at the destination.

Inclusion criteria:

1. Computer network with each computer having the operating system based on Berkeley sockets
2. Computer should have LAN either wired or wireless
3. Each computer system must be java enabled
4. IP address of machine should be known and fixed.
5. Computer have microphone based headphone

Exclusion criteria:

1. Automatic IP based machine
2. Non java system.
3. Android or ios platform

Procedure methodology

It is based on basic client server algorithm

Algorithm 1

Server Side:

1. Create Server on a single by using ServerSocket class
2. Call accept() method to accept the connection from the client.
3. Return Socket after connecting client
4. Create the OutputStream from Socket object to send message
5. Create the InputStream from the Socket object to receive the message

6. Repeat steps 4 and 5 until communication stops
7. Close the Input and Output stream
8. Stop

Client Side:

1. Create Client on all client machines by using Socket class
2. Create the InputStream from the Socket object to receive the message
3. Create the OutputStream from Socket object to send message
4. Repeat steps 3 and 4 until communication stops
5. Close the Input and Output stream
6. Stop

Above algorithm was modified to make communication between one server and many clients

1. Create a ServerSocket on those PC that we want to use as a server. **Ex** ServerSocket ss=new ServerSocket(2035);
2. Now create Socket object on client machines. While creating Socket object mention the IP address of Server machine and port no of ServerSocket as a parameters.

Ex Socket s=new Socket("192.168.10.157",2035);

3. Now on client machine create the object for **InputStream** and **OutputStream**

Ex:

InputStream is=s.getInputStream(); OutputStream os=s.getOutputStream();

4. Now on server machine create the array of the object for **InputStream** and **OutputStream** InputStream[] is=new InputStream[noOfClient];

```
OutputStream[] os=new OutputStream[noOfClient]; Socket[] s=new Socket[noOfClient];
for(int i=0;i<noOfClient;i++)
{
s[i]=ss.accept();
is[i]=s[i].getInputStream();
os[i]=s[i].getOutputStream();
}
```

noOfClient specifies the number of clients to be connected to the server

5. Now we can send **msg** from server to client in the form of byte[] and using the method write of **OutputStream** class

```
for(int i=0;i<noOfClient;i++)
{
os[i].write(msg.getBytes());
}
```

6. Now client can receive this data on the its InputStream and obtained using read() of InputStream object.

```
b=new byte[50];
```

```
is.read(b);
msg=new String(b);
```

7. Now client can send **msg** from client to server in the form of byte[] and using the method write of **OutputStream** class
os.write(msg.getBytes());

8. Now server can receive this data on the its InputStream and obtained using read() of InputStream object.

```
b=new byte[50]; is.read(b); msg=new String(b);
```

9. Steps no 5 to 8 are repeated until communication between client and server will stop.

10. End

Statistical analysis

Communication between the machines using LAN by TCP/IP is analyzed by comparing with communication between the machines using Internet.

For the security analysis , breach of security principles in the case of TCP/IP through the LAN and packet switching through the internet can be considered.

III. Result

If we plot table of data size against different internet bandwidth and LAN bandwidth, then it will appear as shown below

Table 1 size versus bandwidth

Size	Time required for				
	Internet Bandwidth 10Mbps	Internet Bandwidth 20 Mbps	Internet Bandwidth 50 Mbps	Internet Bandwidth 100 Mbps	LAN (250 Mbps)
10MB	300 ms	200ms	150ms	100ms	50 ms
20 MB	500 ms	400ms	250ms	200ms	90 ms
30MB	700 ms	520ms	300ms	260ms	120 ms
40MB	900 ms	600ms	400ms	340ms	150 ms
50MB	1000 ms	800ms	600ms	500ms	200 ms

If we plot table of data size against different internet bandwidth and LAN bandwidth and their cost thn it will appear as shown below

Table 2 Cost vs Bandwidth

Cost per 20 computer for	Internet Bandwidth 10Mbps	Internet Bandwidth 20 Mbps	Internet Bandwidth 50 Mbps	Internet Bandwidth 100 Mbps	LAN (250 Mbps)
1 month	14000	27000	500000	100000	500
2 months	20000	38000	100000	95000	500
3 months	30000	55000	150000	290000	500
6 months	50000	90000	280000	570000	500
12 months	85000	160000	550000	1000000	500

III. Discussion

In Table no 1, if we observe the information carefully then it is found that as the bandwidth increases , time required for delivering message is decreases. It is lowest for LAN .

In Table no2, if we observe the information carefully then it is found that as the bandwidthincreases then cost per computer increases for specific time but for the LAN it is not happening. As the period of usage increases then also cost for the LAN does not increases.

IV. Conclusion

TCP/IP communication over LAN is cheap. Faster and secure for the private communication such as the school, IT company where data security is most important.

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