A Review: Real-Time Wireless Audio-Video Transmission

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Abstract – **Real-time audio-visual communication has become the need of this era. Video conferencing may be one solution to saving both time and money. In fact, video conferencing may be a more effective way of communicating to clients and customers. Integrated Network Systems can install video conferencing that will allow you to share anything that is on your computer monitor and meet people face to face. In last few years, work is being done for real time transmission of audio and video. This paper presents detailed study of audio and video transmission through various channels. Most popular is using wireless LAN or Wi-Fi. Though some authors have tried audio and video transmission through visible light communication using LEDs, some have used WiMax which means broadband wireless network with high speed.**

Keywords— **Real-time audio-video transmission, WiFi.**

I. INTRODUCTION

The history of communication evolved from prehistoric age to current modern age. Communication ways have changed from smoke signal to digital signals. These days technology is improving such that people can talk face to face over 3G /Wi-Fi network using computers without bothering distance between them. Though technically all this service uses internet for transmitting voice over network. They need session protocols to start and maintain session of the networking system. Now these days we have so many technologies that support communication over internet like chatting, live video chatting, and calling from one computer to other. With better wireless network, transmission of real time media in everyday life is now possible. Many vendors are providing such type of the system but these systems are very costly and need minimum two computers for the video & audio conferencing. Videoconferencing is the way of a video streaming by a set of tele communication technologies which allow two or more locations to communicate by simultaneous two-way video and audio transmissions. Videoconferencing differs from videophone calls as it is designed to serve a conference or multiple locations rather than individuals.

It is an intermediate form of video telephony, first used commercially in Germany during the late-1930s and later in the United States during the early 1970s as part of AT&T's development of Picture phone technology. As the introduction of relatively low cost, high capacity broadband telecommunication services in the late 1990s, coupled with powerful computing processors and video compression techniques, this has made significant ways in business, education, medicine and media. Like all long distance communications technologies (such as phone and Internet), by reducing the need to travel, which is often carried out by airplane, to bring people together the technology also contributes to reductions in carbon emissions, thereby helping to reduce global warming..The benefits of videoconferencing are reduced travel costs, increased productivity across dispersed workforces and teams, support for environmental initiatives, improved hiring and retention of top talent, sustained competitive advantage.

II. LITERATURE SURVEY

According to [1], he has proposed a system that transmits voice over wireless network in real time [1]. In his project a new fully-functional embedded device has been proposed which is able to stream or transmit voice in real-time over WI-FI (IEEE 802.11) with an acceptable audio quality. The proposed system has features such as feeding recorded audio directly into a remote computer for storage from a voice recorder module. Given the credit-card- sized single-board and low price, Raspberry Pi model B is the most appropriate as a portable device for wireless requirements. The Raspberry Pi is intended to have capability of gathering audio from an USB microphone connected to it and transmit it to another remote computer in real time. The Raspberry Pi is connected to the workstation. So, there is no need of a separate monitor. To do this, the author has used SSH (Secure SHell), which is a protocol for secure data communication, remote command-line login, remote command execution, and other secure network services between two networked nodes. Open source Linux based OS is used in this project to keep the cost low.

The author has used USB voice input device for capturing audio, a USB mic or sound-card or USB CAM could be connected via USB port. Wireless USB adapters is needed for connecting raspberry Pi and remote desktop and internet. The SD card is installed with Raspberry Pi's operating system "Raspbean wheezy". An Ethernet cable is used to connect the Raspberry Pi with the computer for programming purpose. Then the Raspberry Pi's network interface settings are configured according to desired Wi-Fi network. In this phase of the project, a secure connection, with the help of SSH protocol using PuTTY software, was established between Raspberry Pi and the laptop with a Wi-Fi connection. With the help of this connection, voice was recorded, played and streamed on and from the Raspberry Pi to a laptop using a Python based GUI successfully.

In [2], Visible Light Communication (VLC) is globally recog-nized as an advanced and promising technology to realize short-range, high speed as well as large capacity wireless data transmission. Experimental results show that real-time high quality audio and video with the maximum distance of 3 m can be achieved through proper layout of LED sources and improvement of concentration effects. Lighting model within room environment is designed and simulated which indicates close relationship between layout of light sources and distribution of illuminance. In this paper, author develop a VLC prototype with large increase in transmission distance and improvement in channel capacity. The optical link which performs as the substitute of connector wire can be widely applied in video conference, real-time video frequency monitoring, smart traffic system and various practical scenarios where illumination and data transmission is in joint de- mand to serve modern daily life. MATLAB program is used to simulate the illuminance distribution for two practical light source deployments.

Author Bhushan Jichkar [3] has presented the design and implementation details of an application based on Wi-Fi technology for Wi-Fi enable devices (i.e.: mobiles, laptop, PDA's, tablets) supporting calling, community interactive services and also provides secured Wi-Fi network, based on open technologies such as android programming, MySQL database and SIP. The cost involved is only the initial set up cost and all calls within the network are free. According to author, this model will be very useful to solve the communication problems in large organizations, by making free voice calls through Wi-Fi.

The VOIP application in [4] sets the hardware foundation on ARM9 embedded platform, adopts SIP and RTP as the transmission protocol and employs CELP compression algorithms to ensure the low-latency and high quality communication.

In addition, Linux operating system and ALSA device driver are used to meet the needs of cost control and sound effects. To strengthen the real-time and QoS performance in communication, improvements on server setup and voice processing are attempted and investigated. From the aspects of the overall capacity, the system has prominence on both bit rate and voice quality,fulfilling the expected goals to design a real-time voice system on the embedded platform.

In [5], a wireless router is used to establish the wireless LAN. Authors configured one system having minimum of 1GB RAM as a server. Server is responsible for establishing and maintaining connection among clients. Any PC within the range of WLAN can be configured as client. As it requires only wireless router, personal computer & does not require internet connection, this system is very cost effective. It is easy to set up the system as no additional wiring is required in case of conventional system used for communication.

Authors Daniel Jakubisin, et. al.[6], tried the design and testing of a device that employs pre-built IEEE 802.11b wireless cards in a real-time audio application. The application for this specific device was a wireless guitar transmitter/receiver for real time transmission between a guitar and an amplifier. For testing and analysis purposes, two embedded boards interfaced to IEEE 802.11b Compact Flash cards were connected in an ad hoc network. A 16bit, 44.1 kHz mono signal was selected in order to ensure the quality of the audio output. The results confirmed that the transmitter and receiver were working properly and that data could be sent in real time with IEEE 802.11b.

This paper [7], was aimed at dissemination of the contributions in the field of streaming video over the Internet. Six key areas of streaming videos, were covered-- video compression, application-layer QoS control, continuous media distribution services, streaming servers, media synchronization mechanisms, and protocols for streaming media. Authors [7] pointed out that these are basic building blocks for a streaming video architecture. This architecture ties together a broad range of technologies from signal processing, networking and server design. A thorough understanding of the whole architecture is essential for developing the particular signal processing techniques (e.g., video compression) suitable for streaming video.

In [8], author has studied the basic problems that video transmission encounters in wireless LANs and presented some of the proposed solutions.

Authors outlined the solutions that were selected for the 802.11aa amendment to the IEEE 802.11 standard in order to provide reliable and robust transport of video streams in IEEE 802.11 wireless LANs.

An m-health system is presented [9] for real-time wireless communication of medical video based on open-source software that is low-cost telemedicine platform which allowed for reliable remote diagnosis m-health applications such as emergency incidents, mass population screening, and medical education purposes. Experimental results showed that adequate diagnostic quality wireless medical video communications were realized using the designed telemedicine platform. Advances in wireless and sensor networks, mobile and cloud computing, compression technologies, mobile devices and nanotechnologies, and associated standards and algorithms for efficient communication, interoperability, and ease of integration have fostered the evolution of such systems and services. Comprehensive experimentation showed that adequate diagnostic quality ultrasound video at the clinically acquired resolution can be realized using both WLAN and commercially available HSPA wireless networks.

The authors, Misun Yu, Woosuk Cha, et. al. in [10], have defined important requirements of audio/video group chat applications for WMNs as development of audio/video group chat applications for WMNs are still challenging because the applications cannot rely on a central server, and the topology of the underlying WMNs is frequently changed and unreliable. To show the feasibility and scalability of our application, authors implemented 802.11n WMNs and developed an audio/video group chat application working with them.

In [11], authors have presented the idea of a WiMAX based audio/video transmission. The data transmitter will transmit an audio/video signal, which will be received by the receiver side. The hardware of the data transmitter consists of a CCD camera and audio microphone. The CCD camera will capture the image and give the analog video signal to a fixed filter. The analog signal is given at the base of transistor, which will amplify this analog signal. The RF amplifier will give strength and power to the signal. Finally the signal is given to the television where the effect in real time can be seen.

Though some authors have tried audio and video transmission through visible light communication using LEDs, some have used WiMax i.e. broadband wireless network with high speed and even some have tried using wired mesh networks. The choice of the appropriate mechanism, depending on the situation, is an issue of great interest for future research.

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III. CONCLUSION

Here we have studied different ways for transmission of audio and video. Most popular is using wireless LAN or Wi-Fi.