

VIDEO TRANSMISSION USING WIRELESS NETWORK

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Abstract— Real time video communication has become the need of today's era. In the last few years, work has been done for the real time transmission of video. Most popular method is by using wireless LAN or WiFi. Though some authors have tried video transmission through visible light communication using LED's. WiMax provides wireless broadband access to residential & commercial internet subscribers. There is an increasing trend to employ wimax for last mile internet access to circumvent the high deployment costs & local loop distance limitations associated with wired ADSL connections. Wimax covers the radius of 50km & work with speed of 70mbps. Video formats may range from 128x128 pixels (horizontal x vertical orientation) to beyond 1920x1080 pixels with various color depths. In the proposed model the most common drawbacks of Wifi and other current methods are overcome. A Wimax transmitter and receiver section is designed such that the video transmission and reception could be performed efficiently.

Index Terms: WiMax, Broadband, IEEE 802.16, Video transmission.

I. INTRODUCTION

A. SIGNIFICANCE

Video has been an important media for communication and entertainment for many decades. Ideally video was captured and transmitted in analog form. The advent of digital integrated circuits and computers led to the digitization of video and digital video enabled a revolution in the compression and communication of videos. In this project we have used WiMAX for transmitting videos. WiMAX enables the actual broadband wireless network with high speed. It operates same like Wi-Fi but Wi-Fi operates with some limitations, like it is baseband technology and covers only 100 feet radius with slow speed. WiMAX covers radius of 50km and work with speed of 70mbps. It is replacement of wired broadband. In near future, all the intelligent systems will be incorporated with WiMAX technology and a user will be connected to Internet even if he is driving a car with speed of 120km.

B. BACKGROUND

Advancement of the technologies has exponentially growing. The backbone of all the advancement is communicational advancement. Since Development of IEEE 802.3 Ethernet the revolution has been started. Now the most speeding and reliable networking technology has been released to fulfill the end users requirements with the ease of mobility and high quality of the services integrating with best effort and connection oriented paradigm. WiMAX IEEE802.16 has been developing for achieving the same; it also called 3G communication. The aim of these networks would be to provide multimedia services, such as voice, video and continuous data streams at high data-rates to mobile users in large coverage areas at all times. The architecture for the next generation of wireless networks aims to integrate multiple networks and benefit from the resulting co-operation. There are various standardization bodies working towards this vision. Examples include the 3GPP (3rd Generation Partnership Project), 3GPP2, IEEE 802.21 Media Independent Handover Working Group and Network Working Group (NWG). However, to achieve a uniform integration there are several technical challenges that have to be addressed such as mobility management, resource allocation, admission control, protocol adaptation, security, and pricing. On the brighter side, the advances in integrated circuit design and software radio make it possible to implement multiple network interfaces in a single mobile terminal. Such terminals can access different types of wireless

and mobile networks, which provide more versatile and flexible access options, making the integration feasible.

C. SCOPE

The goal of our project is wireless video transmission. This project has wide range of applications. As the video transmission is through wireless network, the infrastructure cost is substantially reduced. The various applications in which this can be used are traffic signals, real time security surveillance camera and home automation. The major drawback of this implantation is that the camera has a fixed radius of coverage and each transmitting camera requires a central server. So to overcome this problem the cameras can be

placed such as they have a small area in common so that they can use a common server. This reduces the maintenance and works in optimum resources.

D. MOTIVATION

DSL/cable technologies require telephone/cable lines to be laid over long distances to serve customers. In countries such as India, Mexico or Brazil, the potential for broadband access is extremely high, taking into account the trend of Internet requirements. However, the penetration of DSL/cable is not as high, mainly due to a lack of reliable infrastructure, cables or backbone switching equipment.

A viable complement to DSL/cable based service is WiMAX or wireless broadband, which connects users to the Internet, even in places where the infrastructure might not be as developed. At first glance, WiMAX would seem similar to 3G cellular technologies, since both these networks can transmit data and voice, but by design, cellular 3G is voice-centric while WiMAX is data-centric.

WiMAX can achieve data rates up to 75Mbps and a theoretical 30 mile reach, however, in typical deployment scenarios, data rates fall with increasing reach. Geographically WiMAX is flexible and can improve yield due to wiring/labor cost savings. It is very likely that service providers will use the tiered pricing approach and service contracts that they currently employ for DSL/cable.

proposed system has features such as feeding recorded audio directly into a remote computer for storage from a voice recorder module. Given the Raspberry Pi model B is the most appropriate as a portable device for wireless requirements. 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.

Vasos Vassiliou, Pavlos et al [3] from University of Cyprus have explained about Requirements for the Transmission of Streaming Video in Mobile Wireless Networks. This research intends to give an understanding of transmission of video over mobile wireless networks. The researchers have conducted their research by transmitting MPEG4 video streams over wireless networks. They observed the types of errors by using subjective video quality materials such as PSNR.

Akshay Iyer et al [4] have presented 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.

Author Bhushan Jichkar [5] 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.

II. LITERATURE SURVEY

A. HISTORY

Irfanullah, Amjad Ali et al [1] have presented their idea using a WiMAX which is stated as World Wide interoperability for Microwave. The use of WiMAX has a positive aspect as it enables broadband wireless network with high speed. They have implemented and designed a WiMAX Transmitter and receiver in which a CCD camera and mic is installed to capture video signal and audio signal. These signals are amplified using transistor and are later transmitted on the receiver side where a monopole antenna is connected to receive the signals. The signal is then amplified using video amplifier and finally we can see the output (video) in the television screen.

Rajeeb Lochan Dash et al [2] has proposed a system that transmits voice over wireless network in real time. 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 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 Raspberry Pi model B is the most appropriate as a portable device for wireless requirements. 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.

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B. COMPARISON OF EXISTING IMPLEMENTATIONS

CURRENT METHODS	METHODS EMPLOYED	PARAMETERS CONSIDERED	LIMITATIONS
WiMAX based A/V Transmission	WiMAX	WiMAX T & R	Fixed radius of coverage. Each camera requires central server
Real Time transmission of voice over wireless networks using Raspberry Pi	Transmission of voice over Wireless Networks	Raspberry Pi	Voice. SD card(limited memory)
Transmission of video streaming using mobile through Wireless network	Transmission of streaming video	MPEG4 Video Stream	Low video Quality & Memory
Implementation details of applications based on WiFi technology.	Android MySQL database & SIP	WiFi enable devices,Initial cost involved & calls within network are free.	Expensive

Table 1 Comparison of existing implementation

III. PROBLEM DEFINITION

This paper focuses on the issues involved in wireless transmission of video data. In this paper we focus on the issues of video transmission and Network Prioritization which are the key factors to be considered to make efficient use of the limited available bandwidth.

We analyze the above two key factors from the practical implementation point of view. We compared several transmission techniques that are available commercially and from our analyses we recommend the use of WiMAX based transmission technique for the needs.

The second key issue is that of Network prioritization. Since the volume of traffic flow is quite high and the available

bandwidth is quite low we need to make efficient use of the available bandwidth. Thus we need to prioritize traffic so that time critical applications are given more bandwidth and high priority at times of congestion. For our study we used the commercial network prioritization tool. From our analysis we feel that transmission can be organized more easily and efficiently. Hence, we recommend the use of WiMAX for the transmission of video.

IV. METHODOLOGY

A. BLOCK DIAGRAM

The block diagram for the proposed method for both transmitter and receiver sections are explained as under.

1) TRANSMITTER

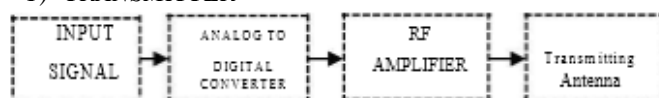


Fig 1- Block diagram of transmitter

a. Input Signal: The Camera is used as an input signal which is analog in nature. The data from the input signal will be transmitted to Analog to Digital Converter.

b. Analog to Digital Converter: It is used to convert the analog signal to digital signal i.e. it converts a continuous physical analog quantity to a discrete digital signal. The signal maybe in the form of pulses.

c. Radio-Frequency Amplifier: RF Amplifier is a tuned amplifier that amplifies high frequency signals used in radio communications. The frequency at which maximum gain occurs in an RF amplifier is made variable by changing the inductance or capacitance of the tuned circuit.

d. Transmitting Antenna: An antenna or aerial is an electrical device which converts electric power in radio waves. It is usually used with a radio transmitter.

2) RECEIVER

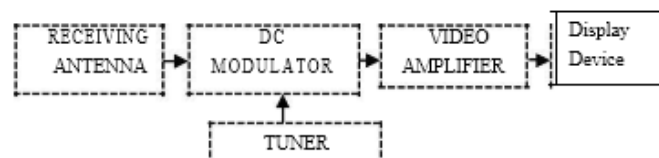


Fig. 2- Block diagram of receiver

a. Receiving Antenna: An antenna or aerial is an electrical device which converts radio waves in electric power. It is usually used with a radio receiver.

b. DC Modulator: It is one of the key element of the system as it supplies the correct voltage to the video amplifier.

effects clear signals can be received. The receiver will receive the amplified analog video signal, and its effects can be seen at the display device (television) in real time. The hardware consists of small size monopole antenna, demodulator, video amplifier, and tuner, step down transformer and TV. The monopole antenna is connected to a 3 GHz demodulator. A tuner is also connected to the demodulator, which can be tuned between 2.5 GHz and 3 GHz. The monopole antenna can receive the analog signals having the frequency range

- 2.4 GHz to 3 GHz. The demodulator is then connected with a video amplifier to amplify the signals. The signals are then given to television through lead from amplifier. On the screen of the TV we can see the image in the real time. In the video amplifier there is an IC L7805 whose function is to provide 5 volt to the demodulator.

V. SOFTWARE SIMULATION

Keil software and proteus are used for the simulation and implementation of proposed method. The Keil 8051 Development Tools are designed to solve the complex problems facing embedded software developers. At the transmitter side the coding is done for video frame transmission and for reception of the video frames at the receiver side.

Proteus PCB design combines the schematic capture and ARES PCB layout programs to provide a powerful, integrated and easy to use suite of tools for professional PCB Design. All Proteus PCB design products include an integrated shape based auto router and a basic SPICE simulation capability as standard. The implementation of proposed hardware is carried out in Proteus.

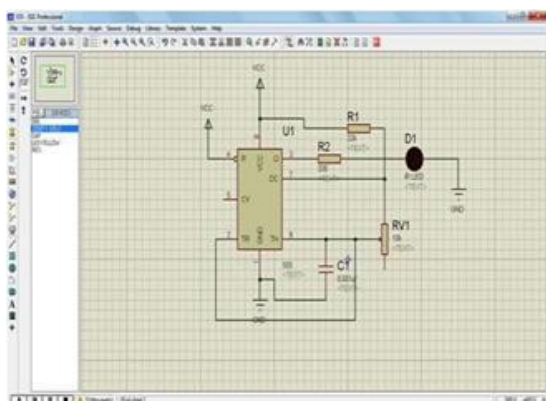


Fig 5: Example of PCB design using Proteus software

VI. CONCLUSION

Here we have studied different ways for transmission of audio and video. 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 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.

Like any new technology, WiMAX faces challenges. But once these are overcome, this technology, especially the portable WiMAX, has very exciting prospects of unwiring the high speed internet access technologies. Although it will not entirely replace incumbent broadband technologies, it will serve as a viable complement to them.

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