

GSM network based working of enhanced speed with high secured media video conference

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Abstract: In this paper a new technique is proposed to share the important conference over a wide area. In fact, the internet used to do like this sharing and allow to multi person to interact with those inside the conference hole. The internet is a global network and has no security level to establish a connection between more than one important terminals. The continuity information in the conference is other active factor to succeed it. The microwave network, which is presented in the cellular network, is proposed in this work to overcome these two important problems. The transition from the Ethernet network to the cellular network through specific modems is a special cyphering for the conference information. Number of attached person is unlimited and no quality affected, revers the internet connection that be lower with increased number of person attached. Finally, the video conference over the microwave network overcome the security situation and the transformation fees problems which are the most two important points in today's life.

Key words: Video conference, Computer Network, Cellular Network and Microwave.

Introduction

The trend in network evolution favors the presence of various network technologies that reveal different characteristics, in terms of coverage area, underlying physical medium, medium access control (MAC), available bandwidth and delay. Local and wide area, wire line and wireless, narrow-band and broadband, are pairs of opposing attributes, which are expected to co-exist in the plethora of network systems. Despite those variations, the Internet Protocol (IP) appears to be the common denominator [1].

Regarding the wide area (outdoors), the most predominant technology today in Europe is the Global System for Mobile communications (GSM [2]). However, recent advances in the cellular communications include the General Packet Radio Service (GPRS) [3] and the High Speed Circuit Switched Data (HSCSD) [4], which provide much higher bandwidth and quality than GSM. Next generation realizations are moving towards the Universal Mobile Telecommunications System (UMTS) [5], while global access can also be provided through satellite communication [1].

The electromagnetic spectrum is shown in Fig. 1. This is a region in the spectrum covering a frequency range typically known as RF, through microwave and into millimeter wave (a few megahertz to tens of gigahertz). This general part of the electromagnetic spectrum happens to be where most wireless telecommunication devices are also housed [6].

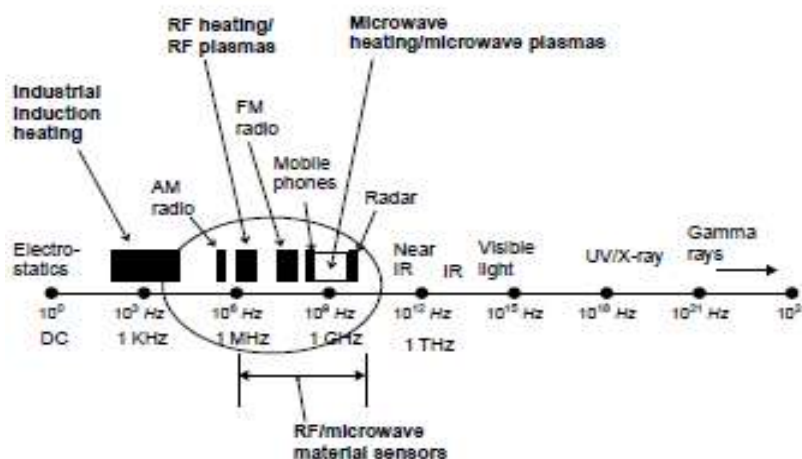


Fig. 1: The electromagnetic spectrum and its usage at various frequencies

The Proposed Media

The proposed technique requires to divide the work into three steps: first, the video scene preparation, second, the data package collector, finally, the connectivity media which is the microwave network. In this paper there are three type of signals, electronic signal from the camera, digital signal, digital signal inside the computer word, magnetic signal in the microwave network.

1. The Video Scene

In this part which is named video scene, may be a lecture or a conference or any interview between many important persons. In the traditional method the cellular system (mobile phone) or the internet are used to share the conversation between any two places. The first important point is how to record the scene? Or how to take a real pictures to be ready to share? The technique used today is fix a number of camera in specific place to cover the hole which hold the lecture that require to share it. To conjoin the video, a collector device is used to receive the output from each camera and give one output to the main admin computer. The scene produced by the computer is from all the installed camera to give a complete report to other side, see Fig. 2 for more details.

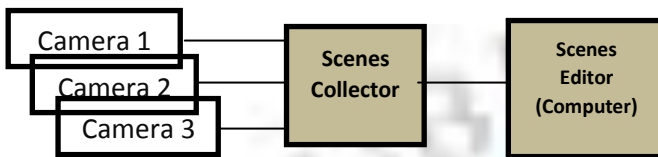


Fig. 2: Multi camera technique

There is another picturing system that reduce the number of camera to only one by adopting a sensor that guide the lens of the camera toward the speaking person only. The new technique is reduce the load on the computer that maintain the produced scene and minimize the software which is required to the computer. See the fig. 3 below.



Fig. 3: Single camera technique

2. Data Package

In many new technologies, there is at least one of network topology. The remote information to be available in any place or any college, if we need to share a lecture or conference, the computer network must be constructed. In this work simplest type of network is used, the network will be as modulation for the collector of information, after the camera take its video that represent the session case that required to be shared, the computer network make a simple maintenance and mixing of information for many scene. The building today are covered by a WiFi signal that will be used in this work to pass the session information from the main camera collector computer to main computer of the building (Server). Fig. 4 shows how the server rout this information to the balloon device that convert Ethernet data to microwave network. The balloon convert the electrical signal that are came from the computer to magnetic form to send via the microwave network.

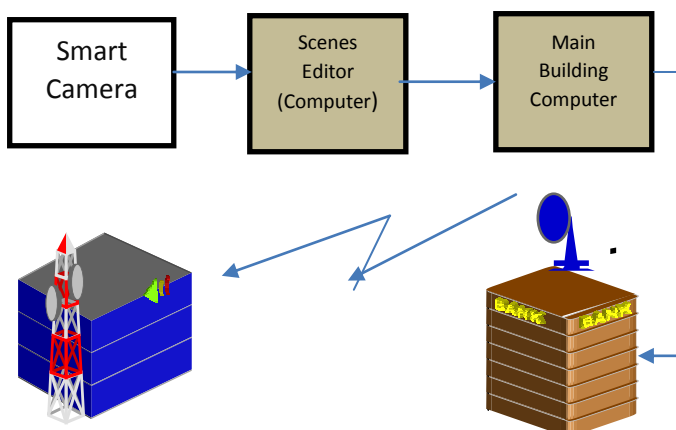


Fig. 4: Prepare the data to be send

3. Data Carrier

The idea of using microwave network, that hold a huge of information, come to mind through very large number of it in this time such cellular system company, internet service provider and official telephone office. The technique used in microwave system is point to point transmit / receive and the type of data is in magnetic form, while the frame of data is called the (E1). The E1 is a frame of package that hold maximum of 2 Mb/s as a bandwidth. For example, the E1 in the GSM divided into 32 time slot each one have eight channel with carrier frequency of nearly 8 KHz, which lead to, see fig. 5:

$F_s \geq 2 F_v$, since voice signal has frequency of 300-3400 Hz, the sampling frequency is 8000 Hz, which means one sample every 125 μ sec.

$$\text{Frame bandwidth} = 32 * 8 * 8000 = 2048000 \text{ bps}$$

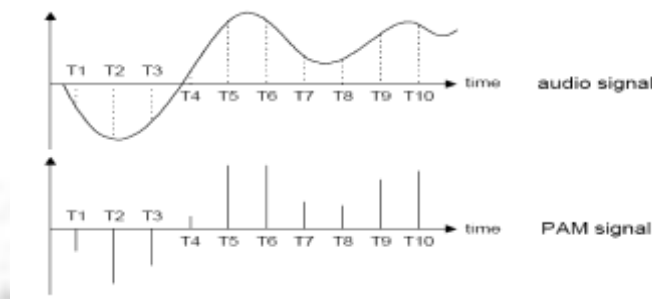


Fig. 5: Sampling process for the main signal

The first point in the microwave network is how to feed the data to it. There a device called a balloon that convert the information from the Ethernet side (electrical signal) to that data frame which is in the microwave system (magnetic signal). The building which prepare the video scene and need to share it on the network, it only determine the address of desired side and transmit the signal to the nearest dedicated microwave link.

Link Assignment

The line assignment on the microwave system achieved by two ways depending on the security level and the available bandwidth, Time Slot assignment and E1 assignment:

1. Time Slot Assignment

This technique is the simplest method to make a connection between two points on the microwave system. For example, the E1 is feed the tour in GSM and hold nearly 120 voice call at the same time, the logical frame consist of 32 time slot each one have eight channel that each one hold one call. The size of data that has been prepared in the server if in small amount and a bandwidth of less than 1 Mbps is enough, the provider can assign a number of channel for the video conference. This technique has a number of advantage, such as, the cost of assigning a channel is small and no additional efforts by the provider can be found, in other hand, the disadvantage of this technique is no high security reached as mentioned earlier because the data will be in the main switching system of the GSM and may be decoded then discovered by anyone in the system. The busy channel also can be occur when a new connection on demand, this is a problem in the planed work. See Fig.6 below for more details.

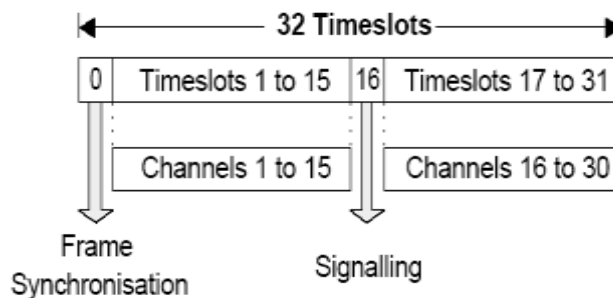


Fig. 6: The E1 frame parts

2. E1 assignment

The video conference require to high resolution camera to reach the real situation for the session. The lecturer and its devices must be visible with details information for the other side to make it with the subject as well.

In this method of assignment most condition of video conference are satisfied such as, the bandwidth (the bandwidth for single E1 reach to 2 Mbps) and security (the E1 assignment channel forwarded through the microwave links directly). The video scene may be require to more than 2 Mbps bandwidth, for tis more than one E1 may assigned from the provider. The E1 assignment technique achieved by adopting another E1 link for the nearest GSM tour, for the connection of the video conference, which is created from the main microwave router and prolonged to the fixed tour.

The second method is the best selection in this work. Further reason for selecting the second method is the "ideal channel", this is the most important point in the communication system. The busy channel is present in many type of network topology, such as, ring topology networks the computer can't send its information unless getting on the token from the ring, other computer if send its package will get on busy channel.

The video conference in this work applicable for special meeting and very secure interview, for those reasons the busy channel is forbidden case and no bandwidth enough this passage in fact days.

The technique of E1 connection between two point achieved by create a protocol with the available microwave network. The cellular network company is the most compatible choice in Iraq country for more reason, such as, the trusted work because its worker skills that import them from the famous country outside Iraq. The coverage of the cellular company reached to full country other reason for choosing it, and finally the cost is less than new network construction.

The first step is sending the package to the nearest microwave link (cellular tour), in the microwave network there are router and repeater and divider for the incoming signal, E1. The assigned E1 is always ideal for new connection and no other side use this channel for any reason. The address for all links that may be share its conference is fixed in the router, because any side needs to share the specific side give its address to the router and directly go to the assigned side. In the cellular system each tour needs to single E1 minimum, for this the provider must assign another two E1 at least to the nearest tour to satisfy the proposed technique condition. The video sharing needs to high bandwidth channel to satisfy the good condition for the remote access video conference. The 2 Mbps in the natural case comfortable in case the provider create a standby channel for suddenly failure in the connection. See Fig. 7 below to realize the scene.

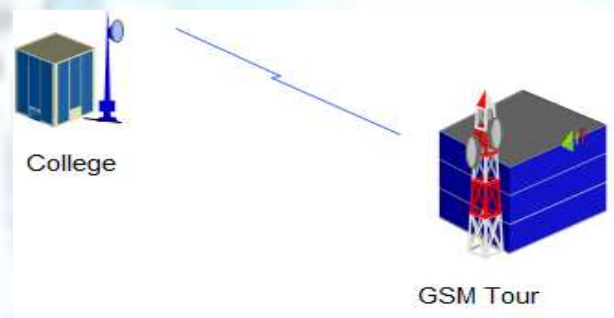


Fig. 7: Feed the data to the nearest tour

Conclusion

The microwave media to share or connect to buildings for academic purpose such as lecture sharing or in general video conference has the following specification:

1. The security reached to high level because the isolation from the internet.
2. The bandwidth can be tuned as needed by the administrator of the session.
3. The cost is very low comparing with the IP assignment.
4. The channel is always ideal for the new conference on demand.

References

- [1] Wireless Convergence Architecture: A Case Study Using GSM and Wireless LAN, NIKOS A. NIKOLAOU, Mobile Networks and Applications Vol. 7, P. 259–267, (2002).
- [2] Attachment requirements for Global System for Mobile communications (GSM) mobile stations, ETSI TBR 019, European digital cellular telecommunications system (Phase 2), (1998).
- [3] General Packet Radio Service (GPRS), ETSI EN 301 344 v7.4.1 (2000-09), Service description, Stage 2 (GSM 03.60 version 7.4.1 Release 1998) (2000).
- [4] High Speed Circuit Switched Data (HSCSD), ETSI TS 101 038 V7.0.0, Stage 2 (GSM 03.34 version 7.0.0 Release 1998) (1999).
- [5] The path towards UMTS – Technologies for the information society, UMTS Forum, (1998).
- [6] Microwave/RF Applicators and Probes for Material Heating, Sensing, and Plasma Generation, Mehrdad Mehdizadeh, Elsevier Inc. (2010).