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A Review: Video Quality Evaluation of MPEG-4 Using (MOS) Mean Opinion Score in NS-2

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Abstract – The ever increasing demand for the use of the wireless devices has led to simplify networking by enabling multiple computer users to concurrently share resources in a home or business without additional or intrusive wiring. These resources may include a broadband Internet connection, network printers, data files, and even streaming audio and video. The standard for the wireless LAN is IEEE 802.11x, where IEEE 802.11 is the specification developed by the IEEE for wireless LAN i.e. an over the air interface between a wireless client and a base station or between two wireless clients. The wireless communication had a great influence in the communication whether it is infrastructure or infrastructure less. The infrastructure networks are the networks which consist of access point (AP). Access point is the central base station of the network; all the mobile networks are connected to each other through this access point and the access point is connected to the distribution network which can be any IEEE LAN such as Ethernet. Whereas the infrastructure less networks are the networks in which there is no access point i.e. it is completely decentralized network in which all the mobile nodes are independently connected to each other. This is also known as MANETS or Mobile ADHOC network. Ad hoc network means "for this purpose merely or for a particular purpose" i.e. its topology changes erratically. Then an Ad hoc network is a single session network connection for which AP or a wireless base station does not required. Basically, a temporary network connection created for a specific purpose (e.g. to transfer data from one computer to another) and to set up a connection for a longer time, E.g. an Ad hoc network might be created to transfer file from a laptop (node) to a computer (node) by using Ethernet cross cable or computer's wireless card and moreover a multi hop ad hoc network to share data with more than one computer and transfer data over multiple nodes. The host movement and the topology are changed frequently in MANETs. These types of network have very high prospects of research and studies for which simulation is needed to be carried out. There are several network simulators available in the industry but the choice of these simulators is decided according to the need and requirement of proposed network. Network simulator best suited for the simulation of Adhoc networks is NS-2 i.e. network simulator 2, it is a freeware software. The network simulator 2 or more often known as NS-2 is dynamic tools to analysis the nature and the aspects of the communication networks. It is widely used for both wired and wireless network functions and protocols like (TCP, UDP) can also be analyzed. It is primarily UNIX based software and uses OTCL as its scripting language. It is made by the combination of two languages C++ and OTCL. Analysis of these protocols are done on the basis of the throughput by changing the parameter like bandwidth and delay and found out that the throughput of the UDP is much more than that of the TCP protocol as UDP is very simple protocol which doesn't have any connection mechanism.

Keywords– MANETS, MPEG, NS-2, Adhoc Networks, PSNR,MOS.

1.INTRODUCTION:-

The video transmission by wireless network is commonly today's necessity of each laptop, palmtop, and other mobile users. Without compression it is extremely complicated to transmit video over wired or wireless network since video content require exceptionally large network bandwidth. For example, 720p video at 60 frames/s using 10 b/color requires about 1.4 Gb/s. To transmit the content over bandwidth- limited media similar to wireless IEEE 802.11, the content needs to be compressed. The outline of video transmission over wireless network is shown figure below. In order to examine the wireless communication and networking for transmitting video a simulation environment is necessary. The Network Simulator 2 (NS2) is freeware simulation tool used for examine the state and scope of these networks. There are two usually operating system to generate simulation environments are: Cygwin in Microsoft Window–xp and another is Fedora. The Cygwin has various restrictions. It works finely only in Microsoft Window-xp. The recently downloaded Cygwin software is not oftenly used for Network Simulation, but Cygwin version 2.4 or 2.5 is used not higher version. It would not contain all facility which is provided by Linux. Although this operating system is also a freeware. So it is better to set up NS2 for research in Fedora as Fedora support jam-packed Linux environment. In this atmosphere normal NS2 research work will run except tool set of video transmission over wireless will produce problems while running because they directly won't run.

So for that we have requirement special installation process to do study video transmission on wireless in Fedora Environment.

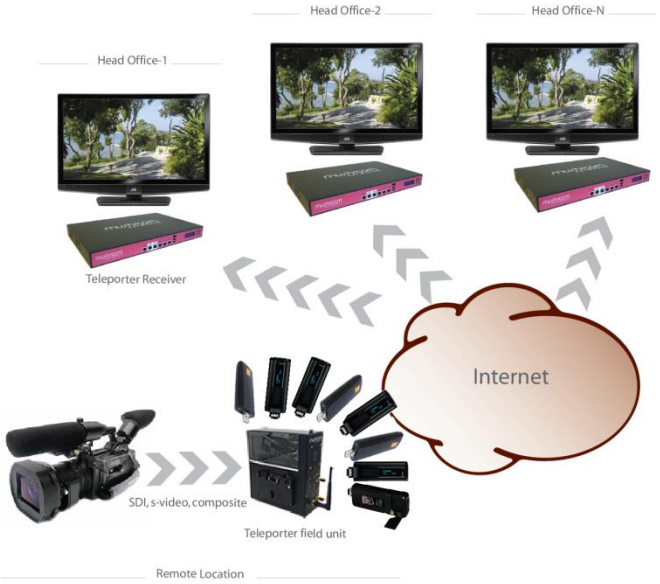

Fig: Video transmission over wireless network

Openly available tools for video quality valuation often believe synchronized frames at the sender and the receiver part, which means they can't estimate the video quality in the case of frame drops or frame decoding errors. Examples are the JNDmetrixIQ software and other is AQUAVIT project. Such tools are not intended for evaluation of incompletely received videos. They are only valid to videos where each frame could be decoded at the receiver part. On the other hand , other researchers busy with video quality evaluation of transmission-distorted video, e.g., [20, 21], did not make their software openly accessible. To the best knowledge of the authors there is at no cost tool-set available which satisfy the above mentioned necessities. In this paper we introduce EvalVid, a framework and a toolkit for a unified evaluation of the quality of video transmission. EvalVid has a modular structure, making it promising to exchange at users discretion together the underlying transmission system as well as the codecs, so it is valid to any kind of coding scheme, and might be used together in real experimental set-ups and simulation experiments. The tools are implemented in pure ISO-C for highest portability. All communications with the system are done via two trace files. So it is very simple to integrate EvalVid in any environments.

LITERATURE REVIEW

Behrouz A Forouzan (2012) explains the concept of IEEE 802.11 standard for wireless LAN i.e. MANETS which is mobile Adhoc network means for this purpose only.**Gilberto Flores Lucio** (et.al) (2006) had presented the paper to compare three hybrid network simulators available: OPNET modeller, NS-2 and NCTUns by using CBR and FTP traffic to set up experiments on these simulators, the outcome reveals that NS-2 had better performance for CBR session than as compare to FTP session [3].**Raffaele Bruno** (et.al) (2008) had analysed and calculates the throughput of the IEEE 802.11 WLAN in multitraffic flow of data i.e. using TCP and UDP traffic flows and there outcome clearly reveals that the throughput of TCP traffic is independent of open TCP connections and the n UDP traffic flow is the n times the throughput achieved by the TCP flow [8].

Video Quality Evaluation

Digital video quality measurements should be based on the discern quality of the real video being received via users of the digital video system since the impression of the user is what counts in the last part. There are fundamentally two approaches to determine digital video quality, namely subjective quality measures and objective quality measures. Subjective quality metrics always grasp the crucial factor, the impression of the user watching the video while they are extremely costly: highly time consuming, high manpower requirements and special equipment needed. Such objective methods are explained in detail by ITU , ANSI and MPEG. The human quality impression regularly is given on a scale from 5 (top) to 1 (worst) as in Table 1. This scale is often called as Mean Opinion Score (MOS).
Table 1 represents ITU-R quality and impairment scale.

Scale	Quality	Impairment
5	Excellent	Imperceptible
4	Good	Perceptible
3	Fair	Slightly Annoying
2	Poor	Annoying
1	Bad	Very Annoying

Many tasks in business and research require automated methods to evaluate video quality. The exclusive and complex subjective tests can often not be afforded. So, objective metrics have been developed to try to be like the

quality impression of the human visual system (HVS). There is an comprehensive discussion of various objective metrics and their performance compared to subjective tests. But the most important widespread method is the calculation of peak signal to noise ratio (PSNR) image by image. It is actually a derivative of the well-known signal to noise ratio (SNR), which compares the signal energy to the error energy. The PSNR compares the highest possible signal energy to the noise energy, which has been revealed to result in a higher correlation with the subjective quality opinion than the conventional SNR.

Equation below is the definition of the PSNR among the luminance component Y of source image S and destination image D.

$$PSNR(\eta)dB=20\log_{10}\left(\frac{V_{peak}}{\sqrt{\frac{1}{N_{col}N_{row}}\sum_{i=0}^{N_{col}N_{row}}\sum_{j=0}[Y_S(n,i,j)-Y_D(n,i,j)]^2}}\right)$$

where Vpeak = 2k-1

and k = number of bits per pixel and is known as luminance component.

PSNR determines the error between a reconstructed image and the original one. Before transmission, one might then compute a reference PSNR value sequence on the reconstruction of the encoded video and later it is compared to the original raw video. After transmission is finished, the PSNR is computed at the receiver end for the reconstructed video of the probably corrupted video sequence received. The individual PSNR values at the source or receiver don't mean so much, but the variation in the quality of the encoded video at the source and the received one can be used as an objective QoS metric to review the communication impact on video quality at the application level.

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