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Review: An Access Point-Based Fec Mechanism for Data Transmission over Network

Jagdeep Sidhu[1], Er Arashdeep Singh[2]
[1]Research Scholar, [2]Assistant Professor, A.I E.T. , Faridkot

Abstract*: Video transmission over the wireless network faces many challenges. The most discriminating test is identified with bundle misfortune. To defeat the issue of bundle misfortune, Forward Error Correction is utilized by including additional bundles known as excess parcel or equality bundle. As of now, FEC instruments have been received together with Automatic Repeat ask for (ARQ) component to overcome bundle misfortunes and stay away from system clog in different remote system conditions. The number offer parcels should be created viably in light of the fact that remote system as a rule has differing system conditions. In the current Adaptive FEC component, the FEC bundles are chosen by the normal line length and normal parcel retransmission times. The ERED- FEC instruments have been proposed to suit the system condition by creating FEC parcels adaptively in the remote system. Then again, the current ERED- FEC instrument has some real disadvantages, for example, the decrease of recuperation execution which infuses an excess of unreasonable FEC bundles into the system. This is not sufficiently adaptable to adjust with fluctuating remote system condition. In light of the discoveries, the ideal measure of FEC created by Enface component can recuperate high parcel misfortune and deliver great feature quality An Enhanced Random Early Detection Forward Error Correction (ERED-FEC) system is actualized to enhance the nature of feature transmissions over Wireless Local Area Networks (WLANs).
***Keywords*: Forward error correction, Video transmission, Wireless network, Packet loss, Video quality.**

I. INTRODUCTION

In a remote system, as the outside environment changes, the channel blunder rate fluctuates. Keeping in mind the end goal to adapt to lapses, precise channel-condition estimation and a compelling mistake control instrument is required. Feature correspondence is in a far-reaching way unique in relation to information correspondence, since intuitive feature applications are postponement and misfortune touchy. Not at all like information bundles, are late arriving feature parcels pointless to the feature decoder. Besides, because of well endowed and area subordinate lapses, every client in a multicast framework will probably lose distinctive bundles. Accordingly, a straightforward ARQ (Automatic Repeat solicitation) based plan is not fitting for feature multicast benefits over remote channels since it can bring about an extensive number of retransmissions. A promising answer for lapse control in multicasting over remote systems is the utilization of forward mistake adjustment (FEC), where repetitive data is sent from the earlier by the source station, keeping in mind the end goal to be utilized by the collectors to right slips/misfortunes without reaching the source. The upside of utilizing FEC for multicasting is that a solitary equality parcel can be utilized to right free single-bundle misfortunes among diverse recipients. The effectiveness of FEC-based methodologies for lapse remedy in remote multicasting has been indicated by means of recreations [1]-[4]. In spite of the fact that these reenactment results give a few bits of knowledge in transit FEC ought to be connected, they don't consider a remote system with multi-rate abilities. Comprehensively talking, sender-based FEC plans can be sorted as either Static FEC (SFEC) or Dynamic FEC (DFEC). In SFEC plans, the quantity of repetitive parcels added to the source bundles stays consistent regardless of changes in the system condition. The recuperation execution of SFEC plans is along these lines to some degree unusual in light of the fact that they neglect to catch the ongoing system conditions and alter the FEC excess rate in like manner. In this way, different DFEC plans have been proposed as of late. In most DFEC plans, the FEC rate is tuned at the sender in view of data gave by the recipient.

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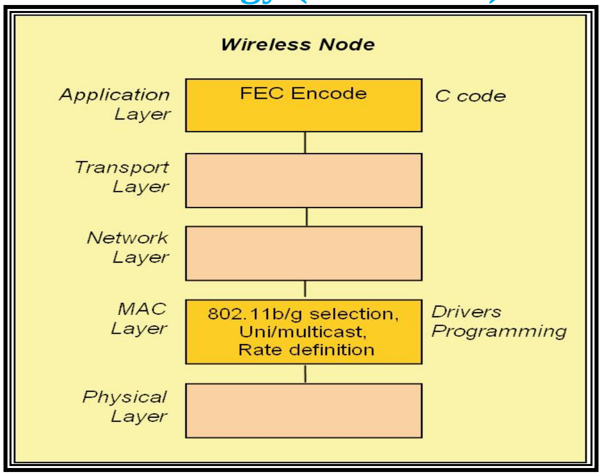

Fig. 1. Node Architecture [1]

II. RELATED WORK

A. Forward Error Correction (FEC)

The basic principle of FEC entails injecting redundant packets *(h)* into the video stream together with the source transmission packets *(k)* such that packet losses can be recovered at the receiver end without the need for retransmission. In other words, as shown in Fig. 1, the original block is encoded as *(n,k)* packets, where *n* is the summation of source packets *(k)* and redundant packets *(h)* . Thus, provided that no more than packets are lost in transmission, the source transmission packets can be successfully recovered at the receiver.

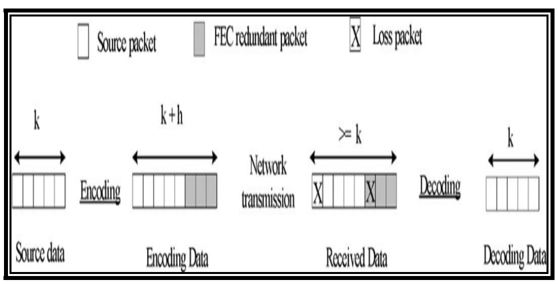

Fig. 2. FEC encoding and decoding [2]

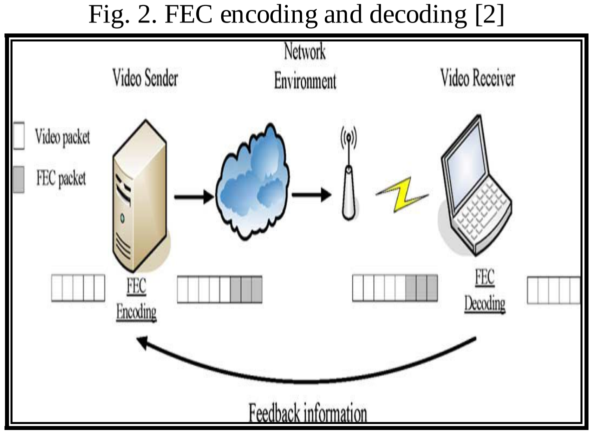

Fig. 3. Sender-based FEC scheme [2]

III. SENDER-BASED FEC MECHANISMS

A. Constant Error Rate FEC (CER-FEC)

Proposed a sender-based Constant Error Rate FEC (CER-FEC) scheme for enabling the dynamic QoS control of real-time multimedia streams over heterogeneous environments comprising wired and wireless connections. As in the proposed scheme, the packet error rate is periodically observed at the receiver side and any change in the error rate is fed back to the sender. Upon receiving this information, the sender calculates the number of redundant packets required to restore the error rate to its original value. In other words, the FEC redundancy rate is dynamically controlled in such a way as to maintain a constant packet error rate at the receiver end.

B. Cross-Layer FEC (CL-FEC)

Proposed an efficient Cross-Layer FEC (CL-FEC) scheme for wireless video multicasting designed to maintain the received video quality for all the users above a certain pre-specified level. In the proposed scheme, each user periodically reports the number of packets received out of the previously transmitted packets. The sender then calculates the number of packets which each user has lost and determines the maximum number of packets which can be decoded by all the users (i.e. the number of decodable packets for the user with the greatest number of packet losses).

C. Adaptive FEC (AFEC)

An adaptive FEC (AFEC) protocol for facilitating the end-to-end transport of real-time traffic whose timing constraints rule out the use of retransmission-based congestion control or QoS provisioning schemes. In the proposed approach, the degree of FEC redundancy is tuned in accordance with the current network delay. Specifically, the number of redundant packets is increased as the network delay decreases, but is reduced as the delay increases.

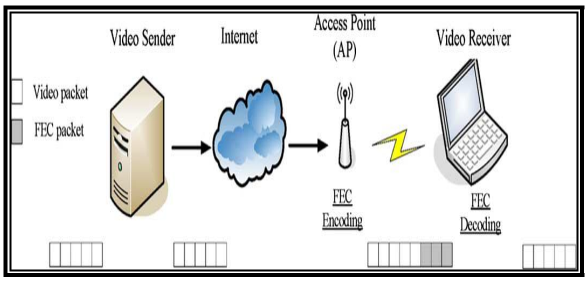

Fig. 4. AP-based FEC scheme [3]

D. Basic Concept Of ERED-FEC Mechanism

Enhanced Random Early Detection Forward Error Correction (ERED-FEC) mechanism is implemented for improving the quality of video transmissions over wireless LANs (WLANs). In the proposed approach, redundant FEC packets are generated dynamically at the AP in accordance with both the condition of the wireless channel and the current network traffic load. The channel condition is evaluated by monitoring the number of packet retransmissions. As the number of retransmissions Increases (i.e., the condition of the wireless channel deteriorates), a greater number of redundant FEC packets are generated. Conversely, as the channel condition improves, the number of FEC packets is reduced. The network traffic load is evaluated by monitoring the queue length at the wireless AP. If the queue is almost empty, i.e., the network is only lightly loaded, the number of redundant FEC packets is increased. By contrast, if the queue is nearly full, i.e., the network is heavily loaded; the number of FEC packets is reduced. By adopting this approach, the ERED-FEC algorithm significantly improves the video quality without overloading the network with an excessive number of redundant packets. An analytical model is proposed for predicting the quality of MPEG-4 video streams delivered over WLANs with FEC protection in terms of the effective packet loss rate and the Decodable Frame Rate (DFR) [12], [13]. It is shown that the model provides the ERED-FEC mechanism with the means to determine the FEC redundancy rate required to guarantee the QoS requirements of video transmissions over lossy wireless networks. Fig. 5 illustrates the basic architecture of the AP-based ERED-FEC mechanism proposed in this study. (Note that an assumption is made that the wired segment of the video delivery path is loss free.) As shown, the ERED-FEC mechanism consists of five components, namely (1) a packet type classifier (2)a packet loss monitor (3) a video quality model (4) a network load monitor and (5) a FEC packet generator. During video streaming, the streaming server encapsulates the video data in Real-time Transport Protocol (RTP) packets and delivers them to the receiver through the wireless AP. When packets arrives at the AP, the ERED-FEC controller retrieves the packet header from the UDP, and identifies the packet type by checking the RTP header. Once a complete block of video packets has arrived, the packet loss monitor estimates the packet loss rate by examining the number of packet retransmissions associated with the block. An appropriate FEC redundancy rate is then determined via the video quality model (i.e., the DFR). Finally, the ERED-FEC mechanism checks the queue length at the AP in order to evaluate the current network traffic load, and then uses this information to adjust the

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FEC redundancy rate (if required).

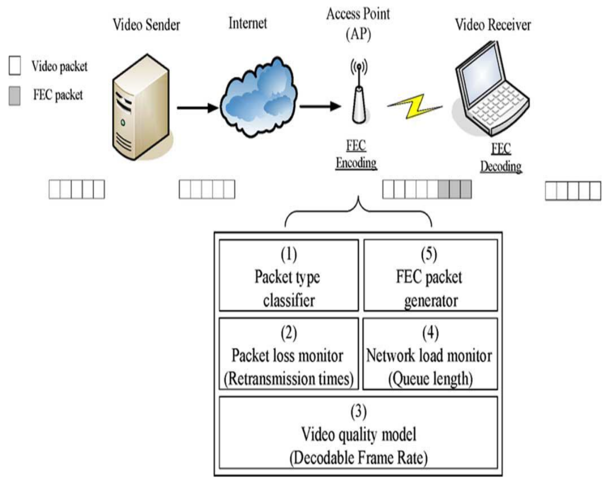

Fig. 5. Architecture of ERED-FEC controller

IV. ENHANCED RANDOM EARLY DETECTION FEC (ERED-FEC) MECHANISM

The major contribution of the present study is to propose a new AP-based FEC mechanism (ERED-FEC) for improving the quality of video transmissions over WiMAXs (WLANs). The literature contains many proposals for sender-based FEC schemes [11]–[3], which have a finite duration to feedback in-formation from the receiver. Thus, the FEC rate determined at the sender end may not accurately reflect the current network condition. The proposed ERED-FEC mechanism is AP based and the FEC rate is calculated at the AP directly without feed-back information from the receiver. Moreover, while the literature also contains various proposals for AP-based FEC schemes [10], [9], these schemes consider only single metric, such as the wireless error rate or only the traffic load to determine the FEC rate. By contrast, in the ERED-FEC mechanism proposed in this study, the FEC rate is controlled adaptively in accordance with both the wireless channel condition and the network traffic load. By adopting this approach, the ERED-FEC mechanism significantly improves the video quality and avoids overloading the network with an excessive number of redundant packets. In addition, this paper proposed an analytical model for predicting the performance of video transmissions over a WLAN with FEC protection. In fact, the video quality is determined not only by the loss effect of wireless network but also the coding dependency of MPEG-4 video frames. However, the analytical models in previous related works [12], [12], [6]–[8] did not take the FEC recovery performance and frame coding dependency aspects into consideration. In [6]–[8], the video quality cannot be directly evaluated using these models because these models did not include coding dependency of video frames. Moreover, the Decodable Frame Rate (DFR) which is proposed in [22], [23] is a performance metric to assess the video quality of streaming MPEG- 4 video. However, the loss effect of wire-less transmissions on video quality using DFR is measured by a simple parameter (such average packet loss rate in wireless net-work) without considering the actual behavior of the FEC recovery performance. The ERED-FEC mechanism consists of five components, namely (1) a packet type classifier, (2) a packet loss monitor, (3) a video quality model, (4) a network load monitor and (5) a FEC packet generator. During video streaming, the streaming server encapsulates the video data in Real-time Transport Protocol (RTP) packets, and delivers them to the receiver through the wireless AP. When a packet arrives at the AP, the ERED- FEC controller retrieves the packet header from the UDP, and identifies the packet type by checking the RTP header. Once a complete block of video packets has arrived, the packet loss monitor estimates the packet loss rate by examining the number of packet retransmissions associated with the block. An appropriate FEC redundancy rate is then determined via the video quality model (i.e., the DFR). Finally, the ERED- FEC mechanism checks the queue length at the AP in order to evaluate the current network traffic load, and then uses this information to adjust the FEC redundancy rate (if required). I

V. PROBLEM DEFINITION & OBJECTIVE

A. Problem Definition

In this research work different papers were studied to find the problem. The following problems were found that are given below:

There is no guarantee that the FEC rate implemented at the sender end accurately reflects the current network condition.

The loss of data packets during the transmission of data from source to destination.

The data redundancy problem is their when same packets are sending again and again on the same network.

Resource allocation problem during the FEC mechanism for video transmission of data.

B. Objective

The following objectives are performed in this research work that is given below:

To implement the Enhanced Random Early Detection Forward Error Correction (ERED-FEC) mechanism for improving the quality of video transmissions over wireless LANs.

Reduce the Processing time and delay of the processing data on WLAN.

To reduce the delay and Find the Queue length.

To Compare the RED-FEC and ERED-FEC algorithm with different parameters.

VI. CONCLUSION AND FUTURE WORK

This paper has presented an AP-based FEC mechanism for improving the quality of video transmissions over WLANs. In contrast to many FEC schemes, in which the FEC rate is determined at the sender end on the basis of information provided by the receiver, in the FEC mechanism proposed in this study, the FEC redundancy rate is determined at the wireless access point (AP).Moreover, the FEC redundancy rate is calculated in accordance with both the wireless channel condition and the network traffic load. As a result, the FEC mechanism significantly improves the video quality without overloading the network with redundant packets. Our future work will include further evaluation of the proposed approach. The different reviews are studied from the different papers.

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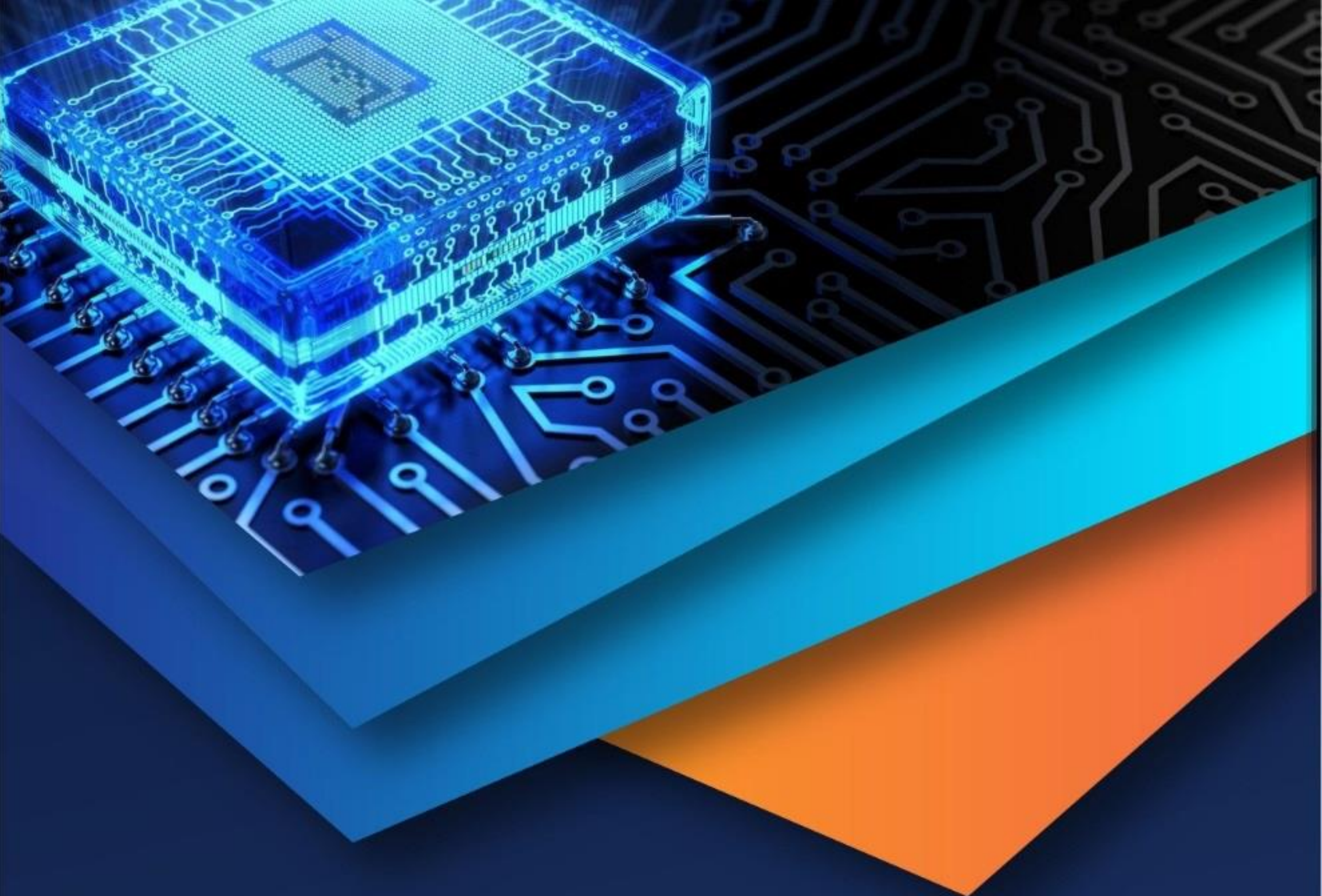

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