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RESEARCH ARTICLE

A New Approach of Forward Error Correction For Packet Loss Recovery

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Abstract— Generally packet losses occur due to many reasons like buffer overflow, congestion control and some other network issues etc .When the packet loss rate in a network is higher than the rate requested by any specific application, then the transport protocol gives scope to make up for the difference in loss rate. But in high bandwidth delay product networks the latency introduced by retransmission based error recovery schemes may be a bit high for those applications with latency constraints to some extent. Now in specific in this case, Forward Error Correction can be used. FEC allows us to recover packets lost without retransmission. The extent of loss recovered strongly depends on the network loss behavior. If so losses are dispersed in time then Forward Error Correction works the best in that aspect.

Keywords— retransmission, packet loss, interleaving, redundancy, coding rate

I. Introduction

Present internet normally uses the best effective service model. This cannot assure the quality of service (QoS).Due to that transmission of audio traffic over the internet is affected by packet loss problem. The FEC (Forward Error Correction) is one of the error recovery technique that can reduce the effect of packet loss with the low latency[1] .FEC technique adds some redundancy that increases bandwidth usage.

The FEC-based algorithm can change the quantity of audio redundancy based on the number of packet lost. The performance of the media specific FEC-based algorithm can be improved by increasing the number of combination. Forward Error Correction (FEC) is a technique that is well known for its ability to correct bit errors rate at physical-layer[3]. FEC has been more commonly suggested for real time application. In addition to these, this technology can also be adapted to operate on packets at the network layer to improve application performance across network [2].

NETWORK-LAYER LOSS:

It is generally employed on this technologies:

- First one is Time Division Multiplexing (TDM) Private Line
- Second one is Internet Protocol (IP) Virtual Private Network (VPN)
- And the last one is Frame Relay or Asynchronous Transfer Mode (ATM)

TDM private lines are connected in a point-to-point fashion between two enterprise locations. A dedicated physical circuit is established and maintained through a service provider's network to provide this type of service.TDM is used as for provision and guarantee of bandwidth within the circuit. Because there is no statistical multiplexing at packet level, there will be no packet loss with this technology.

Frame Relay and Asynchronous Transfer Mode (ATM) are packet switching technologies. That are employed by service providers to deliver WAN services[5]. Service providers employ these technologies because they allows physical links within the service provider's network that is to be shared among the provider's many customers. Statistical multiplexing helps in achieving this.

IP VPNs depend on the Internet to connect remote enterprise locations.VPN technology is used for guarantee privacy of enterprise traffic as it traverses the Internet. As the usage of internet increases rapidly and cost of Internet access continues to fall and as enterprises grow more comfortable with maturing VPN technology, this option is becoming more and more commonplace in enterprise environments. As a result packet loss on the Internet can be quite high — usually much worse than a typical service provider's Frame Relay or ATM network[6]. It should be noted that the characteristics of an IP multicast channel are different from those of an (ATM) or integrated services digital network (ISDN) channel[4]. In addition, there is a wider range of loss levels in these types of environments.

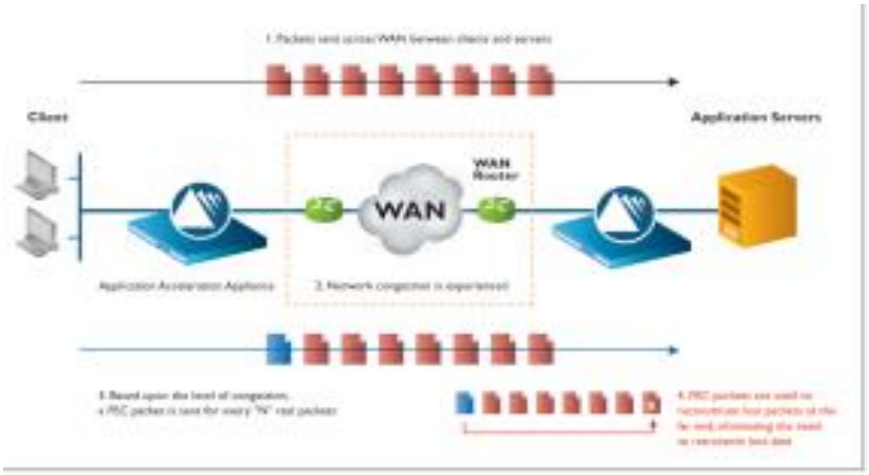

Figure: Packet Level FEC

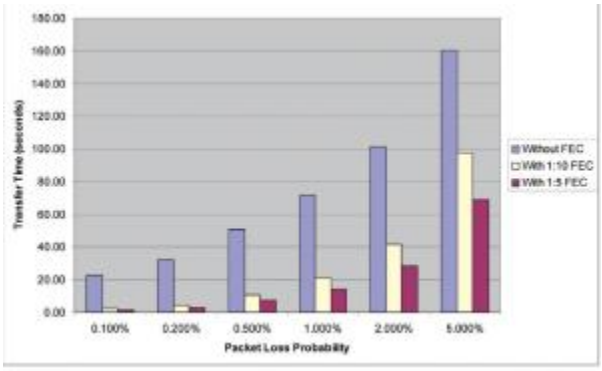

Figure: Packet Loss Probability

II. LITERATURE SURVEY

Forward Error Correction:

FEC is the process in which some duplicate data (repair data) is sent along with the original data in order to avoid the process of retransmission this is known as controlled redundancy [8], it will be used to recover the lost data at receiver end. Because of the requirements on the delay time [4].So Forward Error Correction is suggested to be used in the real time applications such as Real Time Transport Protocol(RTP). the redundancy of this data should be maintained minimal To avoid the transmission delay. FEC can be done by adding the repair data streams to the original data which is to be recovered from them if any loss happened during transmission[9].

FEC Broadly divided into two types

1. Media Independent FEC
2. Media dependent FEC

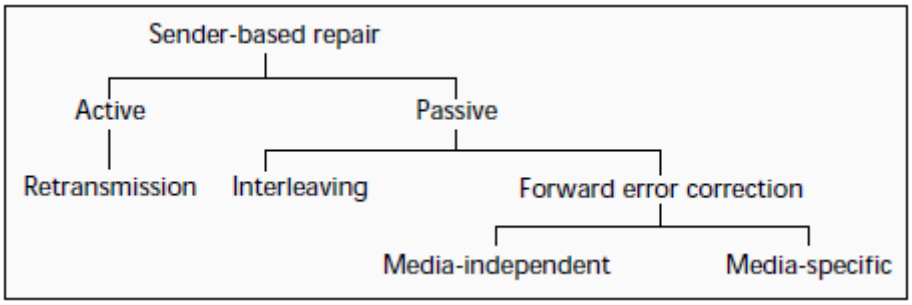

Figure: A Taxanomy of sender-based repair technique

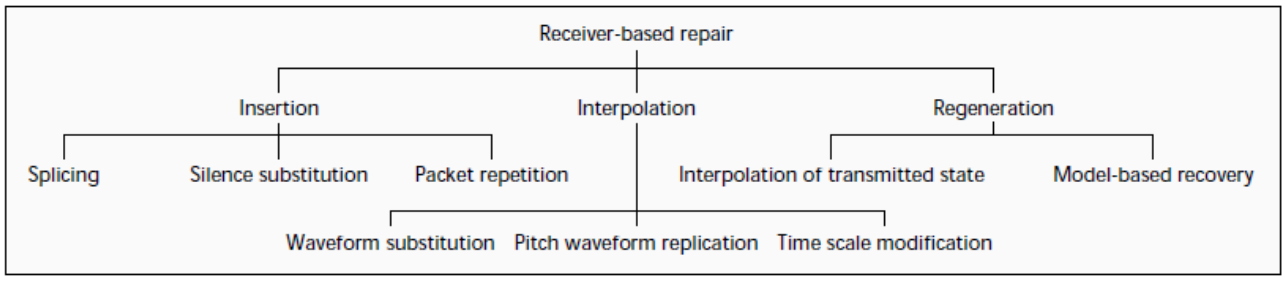

Figure: A Taxanomy of error concealment techniques

FEC Based Algorithm Steps:

To say it in simple we have perfomed it in module wise . The main modules in source end are FEC Encoding, Interleaving. At source End first we performed FEC Encoding i.e mathematical manipulation of shifting of bits and ex-or operations in an ordered way. Next operation is interleaving for security enhancement.

Interleaving:

Interleaving is a way of arranging data in a non-contiguous way in order to increase performance[10]. It is used in data transmission to protest against burst errors. In this module we arrange the data (shuffling) to avoid burst errors which is useful to increase the performance of FEC Encoding[8] .Next we create socket connection to Queue by jdbc connection statements .We create a packet loss there and process them to destination end. At Destination End first we perform FEC Decoding i.e mathematical manipulation of shifting of bits and ex-or operations in an ordered way.

Here we perform three modular redundancy at the encoding end.so any losses occurred at that we can retrieve easily by detailed study of observation. Next operation is De -interleaving to recover the packets in a fashioned way as they arrived from source end.

III. CONCLUSION AND FUTURE SCOPE

At the packet level FEC using that can easily recover the instances of packet loss in general service provider's network. In this paper we discussed Forward Error Correction potential of recovering the packet losses in a packet-switched network caused due to congestion, provided that the coding rate and other coding parameters are chosen appropriately. FEC suits best for high-rate aggregate flow, rather than the individual flows. Future work includes analysis of the additional delay caused by the FEC coding, perhaps along with new Interleaving concept. Still there is much need to improve the efficacy of FEC coding combined with interleaving in the combating packet losses in IP networks even though there are many codes like Reed Solomon for coding and algorithms like BerlekamMassey algorithm, Back propagation etc.

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BIOGRAPHY

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