An Advanced Compressed-Sensing-Enabled Video Streaming for Multimedia over WSN's

[1]S.Akhila, [2]GUNDEBOINA ROJA
[1]Assistant Professor, [2]M.TECH STUDENT
[1,2] Dept of CSE,Megha Institute of Engineering & Technology For womens, Edulabad, Ghatkesar mandal, RangaReddy Dist,Telangana ,India

Abstract:

This Article Presents The Design Of Continuous Video Streaming Compression Of A Networked System For Joint Compression, Error Detection And For Error Correction. Video Compression Applications Are Becoming More Popular Over Wireless Multimedia Sensor Networks. The objective of this work is to design a cross-layer system that jointly controls the video encoding rate, the transmission rate, and the channel coding rate to maximize the received video quality. First, compressed sensing based video encoding for transmission over wireless multimedia sensor networks (WMSNs) is studied. Wireless Multimedia Sensor Networks
(WMSNs) have gained significant attention with capabilities of retrieving video and audio streams, still images, and scalar sensor data but with challenge of high data loss. As more and more wireless devices are equipped with multiple network interfaces, multimedia delivery over multipath has been cognized as a more promising approach in wireless transmission. In this paper, based on the Concurrent Multipath Transfer (CMT) extension for Stream Control Transport Protocol (SCTP), we propose a novel environment-aware CMT (e-CMT) to overcome the high data loss challenge, as well as "a hot potato" congestion problem in wireless transmission.

Keywords: Compression, Congestion Control, Multimedia, Rate Controller, Streaming, Sensor Networks

Introduction:

Due to the advances in low-cost and low power consumption, Wireless Sensor Networks (WSNs) have gained variety of attentions and resulted in thousands of peer-reviewed publications. Significant results in this area have enabled multiple applications used in military and civilian. Most of researches and deployments on WSNs are concerned with scalar sensor networks that measure physical phenomena, such as temperature, pressure, humidity, or location of objects that can be transferred through low-bandwidth and delay-tolerant data streams. In general, WSNs are designed with purpose of data-only delay-tolerant applications with- out high bandwidth requirements [1].

A Higher Packet Loss Ratio and Variation of the Wireless Channels, along with the Heterogeneity of the users, make Video Streaming Compression over Wireless Sensor Networks a Challenging Problem. Wireless Multimedia Sensor Networks will enable new Applications including Multimedia Surveillances, Storage And Subsequent retrieval Of Potentially relevant activities. Video Compression is nothing but reducing the Large Sized Video File in to small sized Video file. Compression is very important due to the large amount of the Multimedia data especially in the Video.

Video Compression Technologies are used to reducing and removing the Redundant Information so that the file can be effectively sent over a Network. Video Compression basically means Reducing the Video data mentioned previously a Digitized Video Sequence can compress up to 165mps of Data. There are two basic categories of compression. Lossless Compression is a class that will allow for the exact Original data to be Reconstructed From the Compressed Data. That means a Limited amount of Techniques are made available for Reducing the data so that result is Limited for Reduction of the data.GIF is an Example of Lossless Video Compression, but because of its limited abilities that are not relevant in the Video Compression Surveillance. In this paper, we study the potential of Compression Video Streaming for Wireless Multimedia Sensor Networks by conducting a Cross-Layer Performance Evaluation of Wireless Streaming of the Compressed Sensing Video on the Resource constrained Devices.

As more and more wireless multimedia devices are equipped with multiple network interfaces, it becomes increasingly common for a wireless video device to be connected to more than one access networks employing either a homogenous technology or heterogeneous, the multi homed technology is becoming an important technology in wire- less transmission. Due its feature of multi homing, Stream Control Transport Protocol (SCTP) [4] shows its advantages on the serious data loss nature of wireless networks, and its performance adopted in multimedia streaming services over- multi homed wireless networks has been studied widely [5]. Thus, SCTP will become a promising transport protocol for video delivery over multi homed WMSNs.

The multi homed SCTP based wireless multimedia sensor networks. Video transport usually has stringent bandwidth, delay, and loss requirements due to its nature of real time [6]. To improve the performance of video content delivery over multi homed WMSNs, it is important to distribute data across all available paths to achieve high users‟ of quality of experience. Concurrent Multipath Transfer (CMT) [7] extension for SCTP (CMT-SCTP), further referred to as CMT, uses the SCTP‟s multi homing feature to distribute data across multiple end-to-end paths in a multi homed SCTP association and maintains more accurate information (such as available bandwidth and RTT) of all the paths [8].

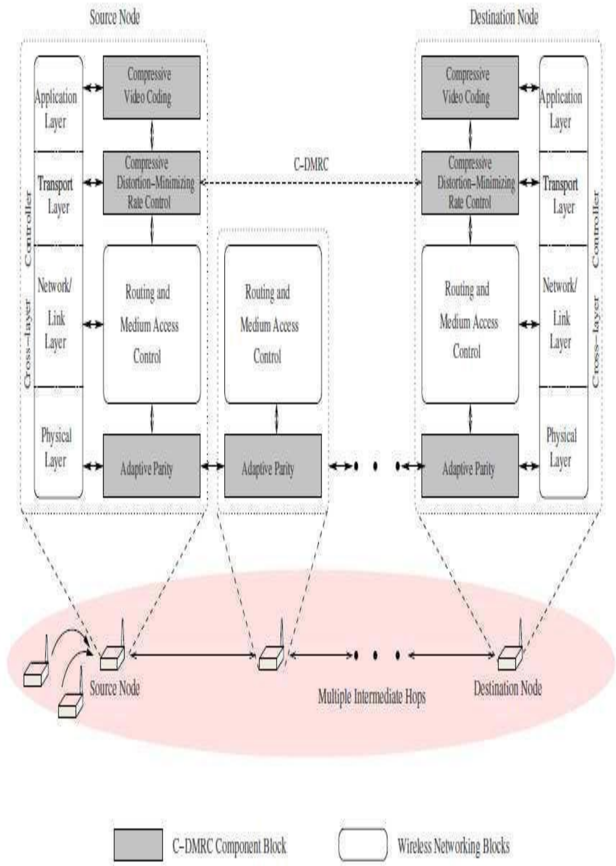
These features make CMT attract more and more studies for the video delivery under stringent bandwidth, delay, and loss wireless transmission. However, the original CMT lacks the capability of cognizing wireless link condition; this disadvantage makes CMT cannot enable an adaptive retransmission trigger mechanism to provide a best services for the high data loss nature of WMSNs.

Existing System:

In existing layered protocol stacks based on the IEEE 802.11 and 802.15.4 standards, frames are split into multiple packets. If even a single bit is flipped due to channel errors, after a cyclic redundancy check, the entire packet is dropped at a final or intermediate receiver. This can cause the video decoder to be unable to decode an independently coded (I) frame, thus leading to loss of the entire sequence of video frames. Disadvantages: Instead, ideally, when one bit is in error, the effect on the reconstructed video should be unperceivable, with minimal overhead. In addition, the perceived video quality should gracefully and proportionally degrade with decreasing channel quality.

Architecture:

The system takes a sequence of images at a user-defined number of frames per second and wirelessly transmits video encoded using compressed sensing. The end-to-end round trip time (RT T) is measured to perform congestion control for the video within the network, and the bit error rate (BER) is measured/estimated to provide protection against channel losses.



Proposed System :

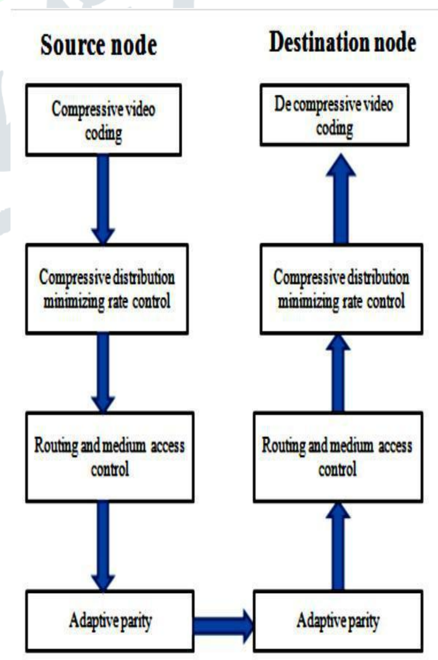
The Following Proposed System Consists of Problem Definition, Software Architecture and finally the proposed Solution.

Problem Definition:

In existing layered protocol stacks based on the IEEE 802.11 and 802.15.4 standards, frames are split into multiple packets. If even a single bit is attacked due to some of the channel errors, after a cyclic redundancy check, so that the entire packet will be dropped at a final or intermediate node. This can cause the video decoder is unable to decode an independently coded (I) frame, this leads to loss of the entire sequence of video frames.

Software Architecture:

The figure shows that the architecture of a Video Streaming Compression for Wireless Multimedia Sensor Networks. At The Application Layer, the Video file from the source is Compressed and divided in to „N‟ number of packets and then each packet is encoded, at Transport Layer the Congestion-Distortion Optimized Scheduling takes full advantage of this Rate Allocation to select and transmit the packets of the Video stream which will maximize video quality. Next the Network Layer is responsible for packet Forwarding including routing Through An intermediate routers, then the Data Link Layer is Responsible for Media Access Control, Flow Control of the Video and then Error Checking .At the destination, the information is decoded and decompressed to obtain the original video file.



Video Encoder:

Key Establishment in Sensor Networks is a Challenging Problem because Asymmetric Key Cryptosystems are Unsuitable for use in Resource Constrained Sensor Nodes and also the Nodes could be physically compromised by an Attacker. For Each and Every Splitted Packet a Unique ID can be assigned. So that the Video File can be Send Effectively to the Receiver. There are three types of General Key Agreement Schemes.1.Trusted-Serverscheme.2.Self-Enfourcing Scheme.3.Key Pre-Distribution Scheme. In this paper Key Pre-Distribution Scheme is Used. In Key Pre-Distribution Scheme the Information of the Secret Key is Distributed among all the Sensor Nodes prior to deployment.

This paper makes important contributions against the state of art of the literature in the following three stages:

1. introducing an accurate path quality-aware model to sense each path‟s current transmission status and the causes of transmission condition change;
2. designing an efficient packet loss sensor and further proposes an adaptive retransmission trigger mech- anism to handle the high packet loss challenge in WMSNs;
3. introducing an intelligent data distribution strategy to deliver data accordance with each path‟s current transmission quality and mitigate network conges- tion if any.

To make CMT support a best service for efficient multimedia content transfer over multihomed WMSNs, this paper pays attention on following three research problems.

(i) How to design a newly path quality-aware sensor to distinguish the transmission quality of each path and the causes of transmission condition change.
(ii) How to design an adaptive retransmission trigger in compliance with real-time condition to handle the high packet loss challenge of WMSNs.
(iii) How to make CMT support a self-aware cognitive capability for efficient multimedia content transfer‟ over multihomed WMSNs.

Related Work:

The Potential Compressed Sensing [3] has been investigates for Video Streaming in Wireless Multimedia Sensor Networks. The Rate Control[4] scheme is designed in order to Maximize the received video quality and to prevent the Network congestion while maintaining fairness between multiple video transmissions at the Receiver Side. Video Distortion is represented through Analytical and Empirical Models and at the Physical Layer based on the estimated channel quality the video Encoding rate and channel coding rate can be estimated. In order to avoid Congestion while maintaining fairness in the Domain of video quality rather than data rate the End-To-End Data rate is regulated [7],[8],[9]. In paper [5] [6] a new rate allocation algorithm is designed for Transform Domain Wyner-Ziv Video Coding (WZVC) without Feedback.

Its objective is to design Intra-Frame Encoding and Complex Inter-Frame Decoding that is based on the Slepian-Wolf

And Wyner-Ziv Distributed Source Coding Theorems. To allocate oroper Number of bits to Each Frame, Most Existing Wyner-Ziv Video Coding Solutions need a Feedback Channel (FC) at the Decoder. However, in many Video Coding Applications, .The FC is not allowed. Moreover, the FC will introduce Latency and also the increase of Decoder complexity because several iterative decoding operations may be needed to decode the data to achieve target Video Quality. The Algorithm predicts the Number of bits for each Wyner-Ziv frame at the encoder as a Function of the Coding mode and the Quantization Parameters. Such Predictions will not significantly increase the complexity at the encoder. However, the prediction will be able to properly select the best mode and Quantization Parameter For encoding each Wyner-Zivframe. Experimental Results show that the Algorithms is able to achieve good encoder rate allocation while still maintains consistent coding efficiency. Comparing To The WZVC[7] Coder With FC, this New WZVC Coder Without FC Induces only a small loss in Rate-Distortion Performance.

Conclusion:

In this paper we addressed the problem of packets dropped at an intermediate node or final node. Where the attacker is a part of the Network who is aware of Network secrets and also the implementation details. In order to Overcome the problem of dropped Packets we develop Adaptive Rate Control Scheme that Reconfigure the dropped Packets. We Analyze the Security of our schemes and through simulation we can achieve the higher throughput by Re-sequencing the dropped Packets.

References:

1 Aaron, A. S. Rane., R. Zhang, and B. Video: Applications To Compression And Error Resilience, In Proc. Of IEEE Data Compression Conf. (DCC), Snowbird, UT, March. Pp. 93 –102.

2 Akyildiz, I. F., T. Melodia, and K. R. Chowdhury, (2007). A Survey on Wireless Multimedia Sensor Networks, Computer Networks (Elsevier), Vol. 51, No. 4, Pp. 921–960, Mar. 2007.

3 Donoho, D. (2006). Compressed Sensing, IEEE Transactions On Information Theory, Vol. 52, No. 4, Pp. 1289–1306, Apr.

4 Duarte, M., M. Davenport., D. Takhar., J. Laska., T. Sun., K. Kelly, and R. Baraniuk, (2008). Single Pixel Imaging Via Compressive Sampling, IEEE Signal Processing Magazine, Vol. 25, No. 2, Pp. 83-91..

5 Girod, B. A., Aaron, S. Rane, and D. Rebollo-Monedero, (2005). Distributed Video Coding, Proc. of The IEEE, Vol. 93, No. 1, Pp. 71 – 83, January.

6 Pudlewski, S. T., Melodia, and A. Prasanna, (2010). “C-DMRC: Compressive Distortion-Minimizing Rate Control for Wireless Multimedia Sensor Networks, In Proc. Of IEEE International Conference on Sensor, Mesh and Ad Hoc Communications and Networks (SECON) 2010, Boston, MA, June.

7 Romberg, J. (2008). Imaging Via Compressive Sampling, IEEE Signal Processing Mag Azine,Vol. 25, No.2, Pp.14 -20.

8 Sheng, T. G., Hua, H. Guo, J. Zhou, and C. W. Chen, (2008). Rate Allocation for Transform Domain Wyner-Ziv Video Coding Without Feedback, In ACM Intl. Conf. On Multimedia, New York, NY, USA, October. Pp.

9 Wakin, M. J., Laska, M., Duarte, D., Baron, S., Sarvotham, D., Takhar, K., Kelly and R. Baraniuk (2006). Compressive Imaging For Video Representation And Coding, In Proc. Picture Coding IEEE COMSOC MMTC E-Letter 26/30 Vol.4, No.9, October 2009 Symposium (PCS), April.

AUTHOR

First Author: Swapna veeramalla received the B.Tech degree in computer science and engineering in the year 2013 and pursuing M.Tech degree in co mputer science and engineering fro m , **MLR Institute of Technology**.

N.SubbaReddy M.Tech received her M.Tech degree and B.Tech degree in computer science and engineering . he is currently working as an Assoc Professor in , MLR Institute of Technology.