© 2016 IJSRSET | Volume 2 | Issue 3 | Print ISSN : 2395-1990 | Online ISSN : 2394-4099
Themed Section: Engineering and Technology

# Improved Quality of Service in Wireless Mesh Networks with Smart Streaming Mechanism

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## ABSTRACT

These days wireless mesh networks are rapidly evolving due to their flexibility and easy integration. Wireless mesh networks consists of routers that are interconnected and arranged in a mesh topology. The reason for adopting wireless mesh networks is their easy integration with other network. But it is not designed to work with Qos mechanism and hence it fails to guarantee the quality. This work addresses the problem of unbalanced traffic distribution and wastage of bandwidth. ViLBas a selective video load balancing mechanism identifies the congested node and reroutes the flow, it works with smart streaming methodology that minimize the wastage of bandwidth and improves quality Evaluation criteria and due dates for the research paper are also provided.
**Keywords:** Wireless Mesh Networks, QOS, ViLBas, WLAN, WMN, QOAS, ETT, WCETT, RTT

## I. INTRODUCTION

Wireless Mesh Network is an emerging technology that connects the world. Wireless Mesh Network is comprised of radio nodes. As the name indicates the nodes (radio nodes) are arranged in mesh topology. Mesh cloud is also made up of radio nodes, but when all the radio nodes work together as a single network it is called so. Wireless Mesh Network can be either to work as a centralized network or decentralized network. Wireless Mesh Network is used in US military forces, satellite constellation, public safety, city wide wireless coverage etc., the important constraint of Wireless Mesh Network is shared bandwidth and interference, number of nodes and their location.

The topology of Wireless Mesh Network remains stable. The main desirable options of Wireless Mesh Network are reliability, redundancy, rapid deployment, cost effective, resilient and extensible. Dynamic protocols (ad-hoc on demand distance vector, Babel etc.,) or auto-configuration protocols (proactive protocol, ad-hoc configuration protocol) can be used. In addition to user data it is imperative to protect the control data (routing, monitoring, etc.).If the control data is unprotected, it will be relatively easy for an attacker to disable a WMN. The principle of Wireless Mesh Network is similar to wired network. The application of Wireless Mesh Network includes broadband internet access, indoor WLAN coverage and mobile access connectivity. In spite of the advantages Wireless Mesh Network also faces challenges such as uneven distribution of traffic, degraded quality of service, channel assignment problem.

To overcome the issue of load balancing ViLBas was introduced. It is a selective load balancing algorithm for delivering videos. This prevents packet drops. Rerouting is carried out at each congested node. Since the network is arranged in mesh topology, the data can reach the destination through an alternate path until the congested node is not the destination node. Rerouting at all the nodes will result in overloading and hence the most congested node is chosen and load is balanced selectively. The congested node is identified with the help of queue occupancy maintained at each nodes of network. Threshold is maintained at each queue, once when a threshold is reached the notification of congestion is sent and rerouting is carried out. To maintain the bandwidth smart-streaming was included which tracks the segment time and delivers at a constant rate with the help of round trip time.

This paper proposes a solution with smart streaming to work with vilbas. Due to their versatility, WMNs can efficiently satisfy the needs of multiple applications.

## II. METHODS AND MATERIAL

### Related Works

In this section, Different routing techniques have been suggested that considers load balancing are to be discussed. In WMN routing is the process of finding a path from a source node to destination node. Mesh network requires each node to share route information with others. An efficient routing algorithm should consider the factors like minimizing delay, maximizing probability of path delivery, fault tolerance and load balancing.

WMN is a technology developed to provide high bandwidth broadband service to a large community of users. As a result a great portion of users intends to communicate with the outside networks via the internet gateways, so due to high traffic there will be potential bottleneck in the gateway. Incrementing the number of gateway nodes does not improve the throughput of Wireless mesh network unless load balancing scheme is employed. If the routing algorithm does not take account of traffic load, some gateway may be overloaded while others may not. So load balancing is essential to exploit the underutilized paths in the network.

In 2014, M. Kserawi, S. Jung, D. Lee, J. Sung, and J.-K. K. Rhee worked on "Multipath video real-time streaming by field-based anycast routing". This paper introduced field based anycast routing. It also handles congestion avoidance and node failure with the assistance of gateway load sharing. It can deliver only two streams sent over a particular time. In 2014, E. P. da Silva Mineiro and D. C. Muchaluat-Saade, worked on "CAC-OLSR: Extending OLSR to provide admission control in wireless mesh networks". This paper introduced a call admission control OLSR. It focus on voice and video categories. It fails to work with large number of mesh nodes. And the channel occupation estimation varies with the actual value. In 2014, Liang Chen, Yipeng Zhou, and Dah Ming Chiu worked on "Smart Streaming for Online Video Services". This paper introduced a smart streaming mechanism. It focuses on the bandwidth. It has been implemented for a single video through a peer network. In 2013, A. Hava, G.-M. Muntean, Y. Ghamri-Doudane, and J. Murphy, worked on "A new load balancing mechanism for improved video delivery over wireless mesh networks". This paper introduced an hybrid architecture which is a combination of centralized and decentralized architecture. It computes the threshold dynamically. It monitors and reports the traffic at periodic intervals. It doesn't focus on handling node failure. In 2012, R. Matos et al. worked on "Quality of experience-based routing in multi-service wireless mesh networks". This paper focus on quality of experience by introducing double reinforcement learning mechanism with the help of Q-learning algorithm. It splits up the work into two phases- exploration and exploitation. The convergence speed and adaptation to the network traffic was not explored. In 2011, K.-H. Kim and K. G. Shin worked on "Self-reconfigurable wireless mesh networks". This paper proposes autonomous reconfiguration system. It can monitor the system periodically to detect failure and reconfigure the system. It reconfigure despite of the flow assignment and routing.

In 2006, Deepti Nandiraju, Lakshmi Santhanam, Nagesh Nandiraju, and Dharma P. Agrawal worked on "Achieving Load Balancing in Wireless Mesh Networks Through Multiple Gateways." This paper proposes a load balancing mechanism that discovers the ateway initially and the mitigate the load through the discovered channel in the case of congestion. Packet drop percentage was not taken into account.In 2005, G.-M. Muntean, P. Perry, and L. Murphy worked on "Objective and subjective evaluation of QOAS video streaming over broadband networks". This paper introduced QOAS scheme for high quality video streaming. It should be implemented on multicast transmission with feedback and arbitration of heterogeneous client. In 2004, R. Draves, J. Padhye, and B. Zill worked on"Routing in multi-radio, multi-hop wireless mesh networks." ETT and WCETT that measures the transmission time and choose the node for video transmission. It is implemented in static scenarios.

## III. RESULTS AND DISCUSSION

### Proposed Work

Smart streaming is an orthogonal strategy that tries to use pre-fetching during less busy times to reduce the load at peak hours. Although smart streaming serves as a centralized resource allocation strategy at the server, it can be implemented in a distributed manner as well.

### A. Architecture

Instead of the client making one request for all video segments and the server deciding how and when to send the segments, smart streaming can be implemented based on the existing HTTP streaming protocol - having the client side request for each segment. Based on this information, together with the knowledge of whether the requested segment belongs to the browsing or viewing phase, the server can implement BB. To be more accurate, it would also be helpful for the client side to include the round-trip time (RTT) i the request, so that the server can better take the delay into account.

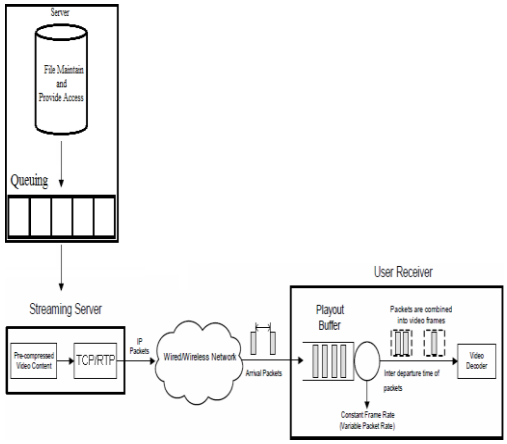


**Figure 1.** Architecture of Load Balancing Mechanism

### B. Modules

1) Buffer state estimation

During the media playout, the packets are discharged from the playout buffer and injected to the media player for playback. As long as the playout buffer is non-empty, the continuous media playout is always guaranteed. The client buffer state is reflected by the client buffer remaining space. And the client remaining space reflects the client receptivity.

2) The client control mechanism

On receiving the arrived packets; RTT is calculated using the information in data header. It evaluates the sending rate based on the calculated RTT. Detect the buffer changes and calculate the bounds. If the condition matches, send the evaluation rate, and the warning bounds back to the video server.

3) The video server control mechanism

The video server receives the ACK packets from multi-client. It carries on resource scheduling and multi-client balance. The server continues to detect the arrived ACK packets, obtain the evaluated sending rates, buffer warning bounds in the feedback packets. It carries on the weighted processing to the evaluated sending rates based on the client buffers' state.

4) Smart Streaming

Smart streaming strategy that can significantly improve overall streaming service quality under given server bandwidth. The improvement is achieved by avoiding the waste based on predicted user departure behavior. The streaming of multi videos with single server application is achieved by switching port number to corresponding system.

## IV. CONCLUSION

A new congestion control mechanism to improve the quality of service has been presented. An unbalanced traffic distribution leads to both poor utilization of network resources by overloading some mesh nodes and, due to the consequent loss, to lower user perceived video quality. The load balancing mechanism can be the answer to many yet unsolved but crucial challenges in Wireless Mesh Network like link adaption, transmission power level, live streaming. The issue of unbalanced traffic distribution in WMNs with focus on video flows. We proposed ViLBaS mechanism to work with smartstreaming. ViLBaS, is a selected load-balancing mechanism, which prevents mesh node congestions by monitoring the video traffic and performing re-routing for selected video flows around the loaded area. This also provides quality of service. The congested node are identified and re-routed through alternate path. The smartstreaming reduces the wastage of bandwidth. It will be a beneficiary function to eliminate congestion of future networks and systems.

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