Evaluation of QoS in the Transmission of Video H.264/SVC for Ad Hoc Networks of Two Jumps

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ABSTRACT

In this article, video traffic H.264/SVC will be analyzed as well as evaluation of QoS metrics by PDR, Delay, Throughput and Jittery regarding mobility scenarios, performing characterization and QoS in the AODV protocol AOMDV in an ideal environment (without traffic) and not ideal with DCF and EDCA traffic. In this form we can analyze the impact of the transmission and recovery of video in uncontrolled hostile environments, such as Ad Hoc networks with QoS and without QoS.

General Terms:

Ad Hoc Networks, Quality of Service

Keywords:

AODV, AOMDV, H.264/SVC, Ad Hoc, QoS

1. INTRODUCTION

Applications in Wireless Local Area Networks (WLAN) support video streaming technologies (VoIP, IPTV, etc.). Their study is attractive due to mobility and portability that wireless ad hoc networks offer as an alternative to infrastructure networks, since the delivery of real time video imposes strict requirements on time and bandwidth and the emerging of many problems as a Quality of Service (QoS) means.

This article describes how the basic medium access mechanism: Distributed Coordination Function (DCF) and Enhanced Distributed Channel Access (EDCA), H.264/SVC and scalability analysis of mobility scenarios presented protocols Ad hoc On-Demand Distance Vector (AODV) and Ad hoc on-demand multi-path distance (AOMDV), in order to obtain a quantitative and qualitative analysis of the behavior of the video in Ad hoc networks through simulations performed with integrated framework such as myEvalSVC NS2, characterized by QoS metrics PDR, Delay, Jitter and Throughput

2. QUALITY OF SERVICE (QOS)

In Ad hoc networks, communication is done through a wireless medium without any physical connections (copper or fiber links) and without the intermediation of the infrastructure used in conventional networks, resulting in a spontaneous communication between adjacent nodes, creating and destroying communication links between nodes without any centralized controls.

Guaranteeing Quality of Service (QoS), routing in an ad hoc network is a difficult "task" due to the dynamic network topology that can occur, the state information for routing link is inherently imprecise. Throughout this article, an analysis of network metrics (delay, PDR, Jitter and Throughput) are exposed and how are they qualitatively and quantitatively characterized in H.264/SVC video transmission.

3. DISTRIBUTED COORDINATION FUNCTION (DCF)

The IEEE Standard 802.11 is defined for wireless local area networks. Primary Technical Control Medium Access (MAC) 802.11 is known as the Distributed Coordination Function (DCF), which acts as a carrier sense multiple access with collision avoidance (CSMA/CA) with a slotted binary scheme and exponential backoff.

802.11 priority access to the wireless medium is controlled by the use of time Inter-Frame Space (IFS) from frame transmission, where the standard specifies three time intervals IFS: Short Interframe Space (SIFS), PCF Interframe Space (PIFS) and DCF Interframe Space (DIFS).

In DCF:

—The nodes expect the medium to be free.

—The Random Backoff time algorithm is used after a period of deferment to avoid collisions.

—The reverse exponential window increase for retransmissions.

—The reverse time and clock runs only when the medium is idle.

—The different priority levels are fixed.

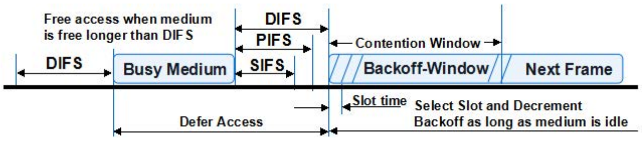

Fig. 1. DCF: Access Method CSMA/CD.

One of the main features of the DCF is that dealing with the various network packets is the same, within DCF there are no priorities and therefore video traffic is treated with the same priority as the network traffic, obtaining a Best Effort (BE) traffic.

4. ENHANCED DISTRIBUTED CHANNEL ACCESS (EDCA)

EDCA is based on the differentiation of priorities and are distributed into four access categories (AC), where each category of priority access, this network traffic is making a difference in the way each node accesses into the channel. This differentiation is achieved through the time when a node would detect the channel as idle and the length of the contention window for a backoff .

EDCA supports eight different priorities, which are grouped into four access categories, as illustrated in Figure 5.

If one of the AC has a smaller AIFS or CWmin or CWmax, AC traffic has a better chance of accessing the network or channel. A comparison is shown in the treatment of DCF and EDCA traffic in Figure 5. For the analysis developed on this paper, it is emphasized that the results in terms of QoS, are focused on specialized video AC (AC_VI), since within the Ad hoc networks are of great interest to characterize video traffic.

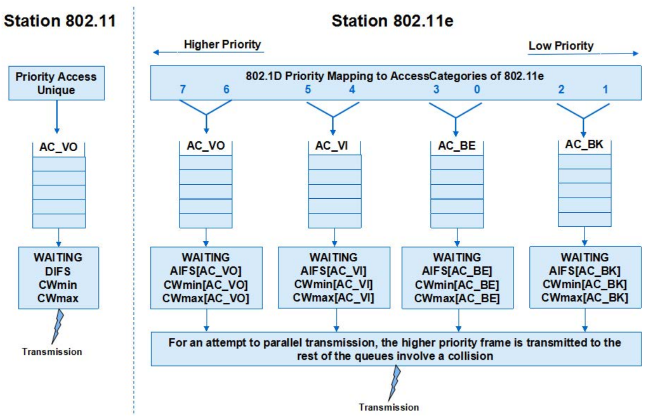

Fig. 2. Traffic prioritization in EDCA.

5. H.264/SVC

The video coding standard H.264 is flexible and offers numerous tools to support a wide range of applications with low requirements and high bitrate.

In comparison with the MPEG-2 video, H.264 video is perceptually equivalent to a third of the bit rate used in MPEG-2, representing a significant increase in complexity of encoding and decoding. The H.264 video uses the same approach as hybrid encoding MPEG video, motion compensated transform coding [10].

Despite H.264 is functionally similar to MPEG-2, H.264 coding tools significantly improves the coding efficiency. Like other video hybrid coding standards, H.264 video encoding is a block based on a standard by which a video is encoded and decoded in a macroblock (MB). The frames I, P and B are similar to the frames of MPEG-2 type, adding two new types of frames: frames Switching-I (SI) and frames Switching-P (SP), which are used in applications streaming. The [I] frames are encoded without using other predictive frames, predictive frames [P] are coded and previously coded frames frames bipredictive [B] using two previously coded frames to form the prediction.

The myEvalSVC [7] framework is the tool used in the results presented in this article, this frame encodes a YUV video format H.264/SVC, generates trace data and transmits them in a topology or network architecture simulator Realize NS2, the trace file is received at the receiver node, then decodes the video and the end user would observe is observed.

6. EVALUATION PROTOCOLS

Routing protocols on Demand (On-Demand) function are based on the principles of creating routes in the time required by the network, either for the start of a transmission or when a bond is broken and a route is lost. The Ad hoc routing protocols AODV and AOMDV were analyzed [3].

6.1 AODV

Ad hoc On Demand Distance Vector Routing (AODV) is a reactive protocol that uses a route discovery mechanism based on the creation or in the updating of routes only if needed. This protocol uses routing table entries for each destination node. Without the use of a routing table in the destination node, AODV relies on entries in your routing table to spread message RREP (Route Reply) to the destination node using the sequence numbers in your jumps to keep updated routes and information routing in order to prevent loops [8].

6.2 AOMDV

Ad-hoc On-demand Distance Vector Multi path Routing (AOMDV) [6] is a protocol extension of the AODV protocol for computing multiple loop-free paths and disjoint links.

The routing entries for each destination contains a list of the next hops along with corresponding amount. All next hops must have the same sequence numbers, helping to track a route. For each destination node, it must maintain the listing of the number of hops in each transmission, defining the maximum hop count for each of the routes, so that if you duplicate a route advertisement and it is received by the node transmitter, it defines it an alternative route to the destination node [9].

The release of the loop is secured as an intermediate node that can accept alternative routes to the destination node, selecting the least number of hops.

7. EVALUATION

The implementation of Ad hoc wireless networks in the real world is a complex and expensive task because many of the scenarios cannot be developed. Thus, one alternative is the use of simulation software to allowing recreating and simulating real-life scenarios, although simulation tools cannot fully be considered as the physical factors and human behavior.

The simulation software used is NS2 contain simulation models to approximate the results of reality and myEvalSVC integration framework is used for the analysis of streaming video in H.264.

7.1 Methodology

To compare protocols (AODV - AOMDV) on-demand ad-hoc routing, we used the same simulation environment for performance evaluation, repeating the experiment three times:

—Initiation of video transmission 0.1s, Background traffic 0.75s and Best Effort traffic in 1s.
—Initiation of video transmission 0.75s, Background traffic 0.1s and Best Effort traffic in 0.5s.
—Initiation of streaming video in 0.1s, Background traffic 0.1s and Best Effort traffic in 0.1s.

Once the respective simulations awk filters are were applied to obtain the results of Delay metrics, PDR, Throughput and Jitter, which allowed evaluating QoS in video streaming H.264/SVC.

7.2 Description of Scenario

The simulation scenario consists of a pair of nodes to transmit and receive video, a pair of nodes generating traffic Background and a pair of nodes generating Best Effort traffic, the traffic has been marked down as priorities for each of the queues used in EDCA access mechanism. The general configuration is detailed in Table 1.

Table 1. Simulation Setup.

Short Interframe Space (SIFS)	10us
Time slot	20us
DCF Interframe Space (DIFS)	50us
CWmin	32
CWmax	1024
Physical Header	192bits
MAC Header	224bits
ACK	112bits
Data rate	1Mbps
Basic rate	1Mbps
Traffic Background CBR flow	0.2Mbps
Traffic Best Effort CBR flow	0.3Mbps
Play-out delay	5s
Propagation model	Shadowing
Size of the simulation area	200m × 200m
Antenna coverage	40m
Total of nodes	11
Protocol	AODV, AOMDV
Constant speed (nodes)	0,1,2,3,4,5,6,7,8,9,10, ,15, 20,25 and 30 m/s

The test sequence used corresponds to video file "Foreman" YUV CIF (352×288) [5] with 300 frames and encoded by JSVM, where the temporal scalability of the results presented in this article are ability.

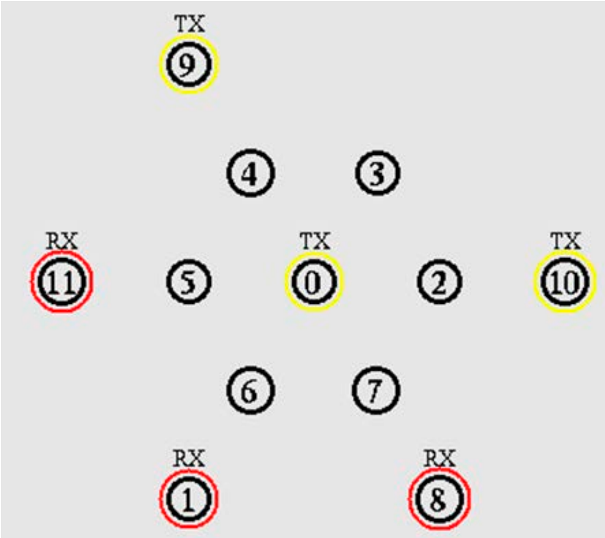

Fig. 3. Topology simulation.

Video transmission is realized node 0 as transmitter and node 1 as the receptor, two hops separated . Background traffic is realized in between nodes 10 and 1, and Best Effort traffic is realized between nodes 8 and 9. Nodes 2, 3, 4, 5, 6 and 7 are displaced from one node to another node, for example, node 2 moves to the position of the node 3, node 3 is moved to the position of the node 4 and so on. The speed ranges are described in Table 1.

7.3 Metrics Network

QoS for streaming video between AODV and AOMDV protocols with the following network metrics were compared:

7.3.1 Packet Delivery Ratio (PDR). The PDR is defined as the ratio of correct delivery packets received at the receiver in respect to the total number of packets sent by the transmitting node. The PDR is most often used to assess the quality of a metric link. The product of the PDR with the transmission speed estimation of link performance is derived; this metric has been used in many studies as a determining factor in the assessment of QoS [11].

$$PDR = \frac{\Sigma(Data\_Packets\_received) \times 100}{\Sigma(Packets\_sent\_by\_sources)} \quad (1)$$

7.3.2 Average end-to-end delay (Delay). The Delay is defined as the time difference between the instant when a packet is received by the receiving node, having been sent by the transmitting node [2]. In the video streams is due to meet the standard QoS and the packet delay must be limited and decreased for high performance transmission. The delay has been calculated as shown in Equation 1:

$$T_{AVG} = \frac{\sum_{i=1}^{N_r}(H_r^i - H_i^t)}{N_r} \quad (2)$$

where it represents the time of transmission of packet i, representing the reception time of the packet number i and N_r is the total number of packets received.

7.3.3 Jitter. Jitter is a measure of the variation of transfer delay between packets, this may depend on the routes of the packets and flows present in the queues of nodes (intermediate and receiving nodes). There are several definitions of jitter that try to capture packet delay variation. In the development of this article the definition of treated jitter in IETF [4] is adopted, which is shown in Equation 3.

$$J = E\,|T_{i+1} - T_i| \tag{3}$$

where T_i is the packet transmission time *i* and T_{i+1} represents the time of transmission of the next packet.

7.3.4 Throughput. The Throughput is defined as the number of bits successfully received by the target node divided by the total transmission time in seconds, it is also interpreted as the rate of satisfactory per second transmissions, emphasizing that the minimum bandwidth restrictions are required in a video stream to satisfy QoS requirements [1].

$$Throughput = \frac{\Sigma(Received\_Packet\_size) \times 8}{(Total\_simulated_time) \times 1000} \tag{4}$$

8. ANALYSIS OF RESULTS

Simulations for the scenario of Figure 6, considers two types of analysis:

—Analysis of traffic sources without DCF and EDCA.
—Background and Analysis with Best Effort traffic in DCF and EDCA.

The metrics used to evaluate QoS in AODV and AOMDV protocols are: Delay, Jitter, PDR and Throughput.

Table 2. Delay Without Traffic

Speed(m/s)	AODV		AOMDV	
	DCF	EDCA	DCF	EDCA
0	0.950	0.868	0.968	0.901
1	0.959	0.860	0.960	0.877
2	0.917	0.844	0.940	0.745
3	0.812	0.717	0.694	0.568
4	0.865	0.726	0.680	0.511
5	0.917	0.593	0.435	0.399
6	0.933	0.541	0.340	0.336
7	0.880	0.473	0.550	0.373
8	1.060	0.396	0.326	0.308
9	0.766	0.434	0.368	0.222
10	0.894	0.417	0.301	0.272
15	0.786	0.269	0.787	0.218
20	0.562	0.237	0.490	0.183
25	0.429	0.155	0.535	0.254
30	0.550	0.178	0.784	0.192

The quality of services includes requirements in all aspects of a connection or communication P2P (Peer-to-peer) for streaming services response time is part of the service level requirements, which comprise aspects related to the capacity and coverage of the network, which in our case, is limited to the study of mobility in a network of two jumps.

Such is the case of delay, in which you can submit that packets take a long time to reach its destination, because they can stand in long queues at intermediate nodes or take an alternative route to prevent network congestion.

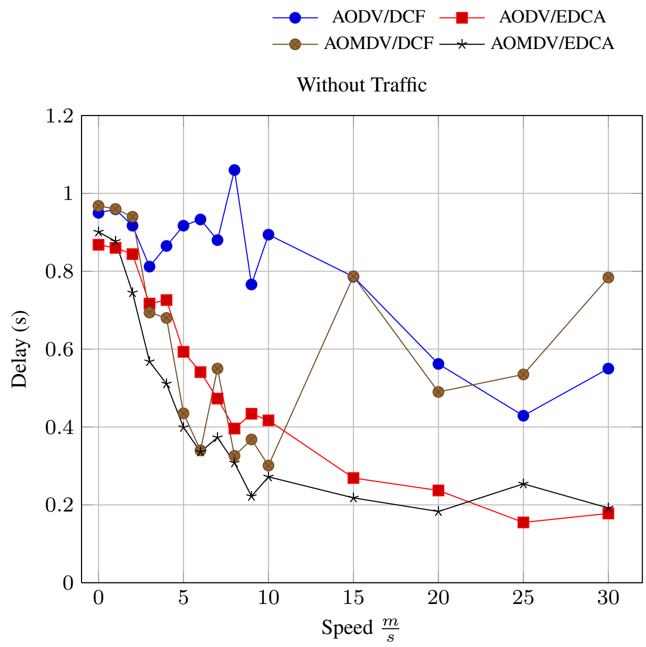

Fig. 4. Delay DCF and EDCA.

Table 3. Delay With Traffic

Speed(m/s)	AODV		AOMDV	
	DCF	EDCA	DCF	EDCA
0	1.462	0.951	1.942	1.015
1	1.051	0.921	1.122	1.073
2	1.087	0.930	1.015	1.007
3	0.987	0.768	0.729	0.701
4	0.894	0.671	0.840	0.684
5	0.936	0.649	0.450	0.444
6	1.011	0.813	0.872	0.343
7	1.077	0.563	0.772	0.377
8	1.181	0.533	0.684	0.369
9	1.069	0.333	0.354	0.310
10	0.468	0.326	0.351	0.230
15	0.922	0.353	0.461	0.179
20	1.745	0.356	1.542	0.186
25	1.467	0.225	2.480	1.557
30	1.526	0.188	2.632	1.979

To study the delay in a network of two jumps (see Figures 4 and 5) latency can be abstracted as the time it takes a packet to reach its destination, showing results that are inherent and uncontrollable in the network, either by their mobility a package can get stuck in an intermediate node, or take an alternative route, always to avoid congestion. These observations differ in performance because the delay may improve over time, by stabilizing routes.

In scenario (see Figure 3) and analysis of the delay seen in Figures 4 and 5, shows that for the two protocols (AODV and AOMDV), at speeds over 5m/s delay increases significantly, which despite apply an access mechanism as EDCA, it is possible coding gain up to 8m/s. For either case, either DCF or EDCA packets arrive at the receiver, but can not be encrypted, so we can conclude that based on QoS metrics, delay, is not recommended for high mobility scenarios (greater than 5m/s), as packets arrive but can not be encoded.

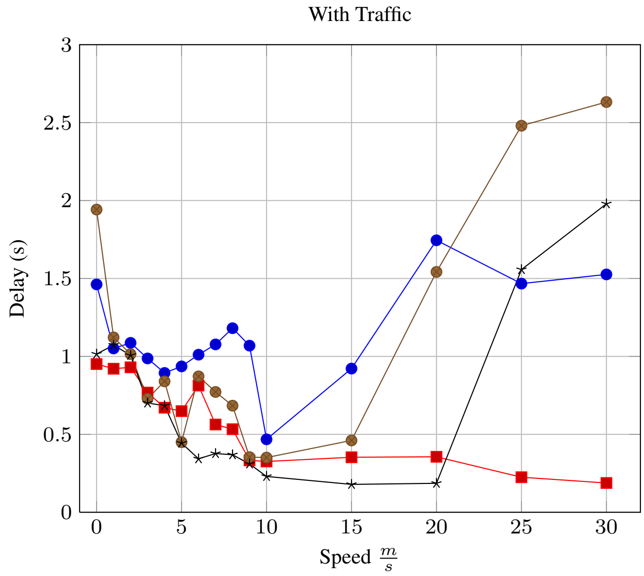

Fig. 5. Delay DCF and EDCA.

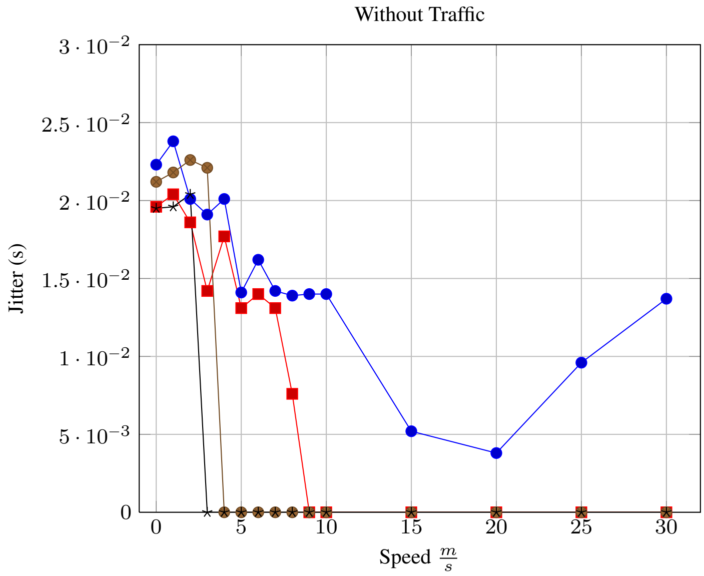

Fig. 6. Jitter DCF and EDCA.

We analyze that the delay that occurs in a network IEEE 802.11 DCF MAC shows lower delay in sending and receiving video with AODV protocol with traffic, compared to AOMDV protocol, since the AODV protocol reduces its computational complexity and memory requirements to the processing of each node.

It is observed that in an IEEE 802.11e EDCA MAC network significantly reduces the delay in respect to the IEEE 802.11 DCF MAC networks due to traffic prioritization mechanism, although the present protocol AOMDV involves more overhead for multiple paths within the protocol.

Table 4. Jitter Without Traffic

Speed(m/s)	AODV		AOMDV	
	DCF	EDCA	DCF	EDCA
0	0.0223	0.0196	0.0212	0.0195
1	0.0238	0.0204	0.0218	0.0196
2	0.0201	0.0186	0.0226	0.0204
3	0.0191	0.0142	0.0221	0.0000
4	0.0201	0.0177	0.0000	0.0000
5	0.0141	0.0131	0.0000	0.0000
6	0.0162	0.0140	0.0000	0.0000
7	0.0142	0.0131	0.0000	0.0000
8	0.0139	0.0076	0.0000	0.0000
9	0.0140	0.0000	0.0000	0.0000
10	0.0140	0.0000	0.0000	0.0000
15	0.0052	0.0000	0.0000	0.0000
20	0.0038	0.0000	0.0000	0.0000
25	0.0096	0.0000	0.0000	0.0000
30	0.0137	0.0000	0.0000	0.0000

Jitter is considered a variation of a "periodic" signal in time and for IP networks and streaming services, especially video, it is useful to know the variability of latency (delay) of packets across network. The Jitter packet is expressed as the mean change in average latency of the network and reveals how variable are the delivery of packets in the network, for example, in an increased jitter, the variation

Table 5. Jitter With Traffic

Speed(m/s)	AODV		AOMDV	
	DCF	EDCA	DCF	EDCA
0	0.0225	0.0131	0.0142	0.0111
1	0.0203	0.0169	0.0189	0.0161
2	0.0170	0.0142	0.0043	0.0000
3	0.0137	0.0132	0.0000	0.0000
4	0.0191	0.0123	0.0000	0.0000
5	0.0158	0.0132	0.0000	0.0000
6	0.0130	0.0097	0.0000	0.0000
7	0.0139	0.0047	0.0000	0.0000
8	0.0042	0.0000	0.0000	0.0000
9	0.0000	0.0000	0.0000	0.0000
10	0.0079	0.0014	0.0000	0.0000
15	0.0000	0.0000	0.0000	0.0000
20	0.0000	0.0000	0.0000	0.0000
25	0.0000	0.0000	0.0000	0.0000
30	0.0000	0.0000	0.0000	0.0000

of the network latency is greater. For our case, the AODV protocol presents a jitter behavior in two-hop networks without constant traffic and by DCF access mechanisms, EDAC for AODV has less jitter becoming an option to guarantee an independent protocol of Quality of Service (QoS).

The transmitted packets may arrive at your destination with different delays. A delay of a packet varies unpredictably with its position in the tails of intermediate routers (routers nodes) along the path between the source node and the destination node. This variation in delay is so abstract as jitter and can seriously affect the quality of the video stream in the delivery of packets out of order.

On stage two hops, packets may take different paths, resulting in different delays. This causes packets arrive in different order than how they were shipped. This problem requires a protocol that can fix out of order packets to an isochronous state once they reach their destination, if not done in video encoding H.264/ SVC.

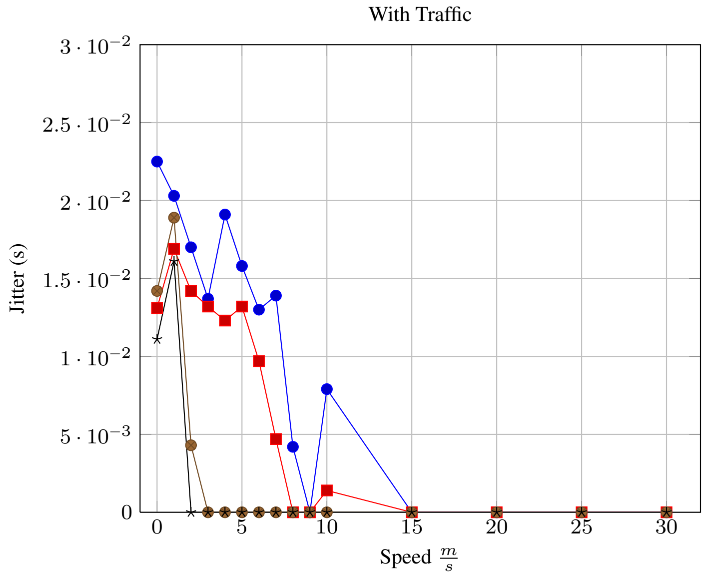

Fig. 7. Jitter in DCF and EDCA

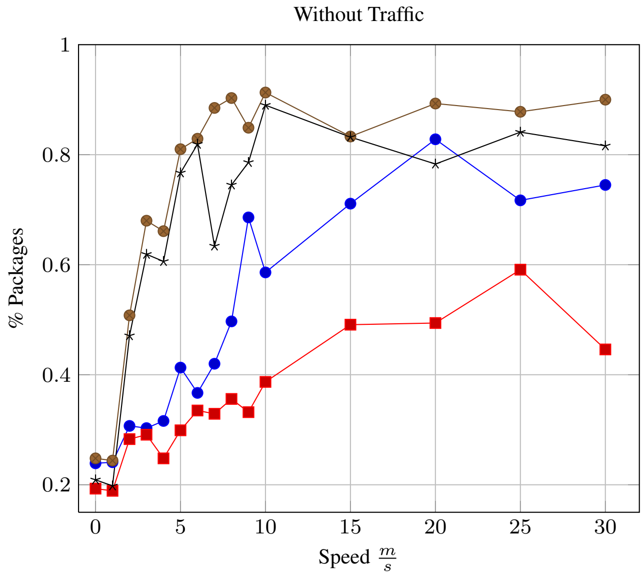

Fig. 8. PDR without traffic in DCF and EDCA

Table 6. PDR Without Traffic

Speed(m/s)	AODV		AOMDV	
	DCF	EDCA	DCF	EDCA
0	0.239	0.193	0.248	0.209
1	0.241	0.189	0.244	0.198
2	0.307	0.283	0.508	0.471
3	0.303	0.291	0.68	0.619
4	0.316	0.248	0.661	0.606
5	0.413	0.299	0.81	0.767
6	0.367	0.335	0.829	0.819
7	0.42	0.329	0.885	0.634
8	0.497	0.356	0.903	0.745
9	0.686	0.332	0.849	0.786
10	0.586	0.387	0.913	0.89
15	0.711	0.491	0.833	0.832
20	0.828	0.494	0.893	0.783
25	0.717	0.591	0.878	0.841
30	0.745	0.446	0.9	0.816

Table 7. PDR With Traffic

Speed(m/s)	AODV		AOMDV	
	DCF	EDCA	DCF	EDCA
0	0.474	0.245	0.530	0.373
1	0.387	0.290	0.423	0.295
2	0.405	0.316	0.561	0.503
3	0.413	0.386	0.669	0.601
4	0.409	0.351	0.632	0.623
5	0.481	0.380	0.824	0.790
6	0.487	0.465	0.864	0.608
7	0.551	0.417	0.887	0.675
8	0.575	0.527	0.795	0.762
9	0.751	0.562	0.873	0.799
10	0.847	0.527	0.928	0.766
15	0.666	0.533	0.893	0.827
20	0.893	0.774	0.897	0.832
25	0.902	0.609	0.877	0.842
30	0.910	0.672	0.902	0.840

In the results it was shown that EDCA had a higher performance in low mobility compared to DCF. The AODV protocol tends to have a stable performance for speeds less than 10m/s.

In Figures 8 and 9 it can be seen no significant difference between the different mechanisms implemented in DCF and EDCA for low speed networks (less than 5m/s), showing slight changes in protocols AODV and AOMDV.

It is observed that AOMDV is a multipath protocol, but is not designed to react to changing scenarios expressing the change in the packet loss, increased at low speeds evaluation despite found with EDCA. Furthermore, AODV has become overloaded so there is less control, allowing it to perform in high mobility environments for analysis of two jumps in DCF and EDCA.

In a two-hop network, video traffic is demanding, with respect to data transmission and other required minimum transmission speed to reliably transmit video (Throughput), which largely can decrease the loss packet, which is related to compliance with other parameters such as jitter, latency and packet reordering at the receiving node.

The video coding especially H.264/SVC, bandwidth demand averaged 0.3Mbps, which must be supported by the Ad Hoc network to provide good service. If the network is not able to provide this speed information is lost, as in the case of nodes moving at speeds greater than 5m/s, resulting in significant packet loss.

Packet loss, either because of excessive network traffic (traffic background) or any other cause, causes him to lose video quality, I and P lost packets can be recovered video with B packages, that in the case of framework myEvalSVC repeats the last frame received.

EDCA enabled video decodes to all those who are below 40%, while packet loss is visually lower in DCF, video decoding is not carried out, since the delay between packets were highest in EDCA. AOMDV to prove that the multipath routes in harsh scenarios can

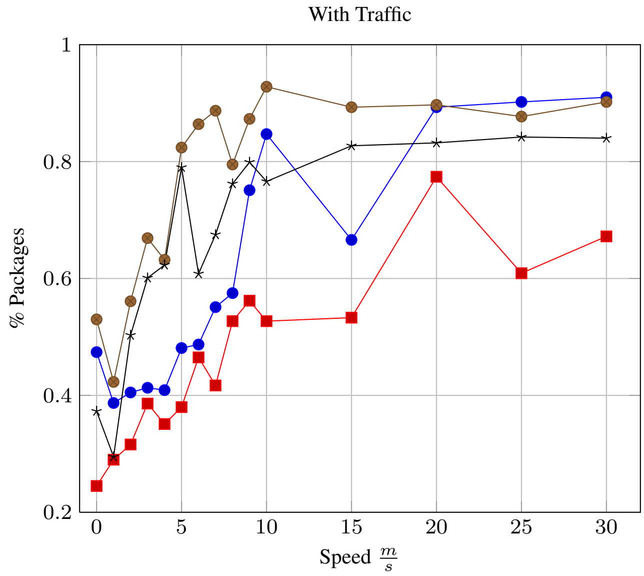

Fig. 9. PDR with traffic in DCF and EDCA

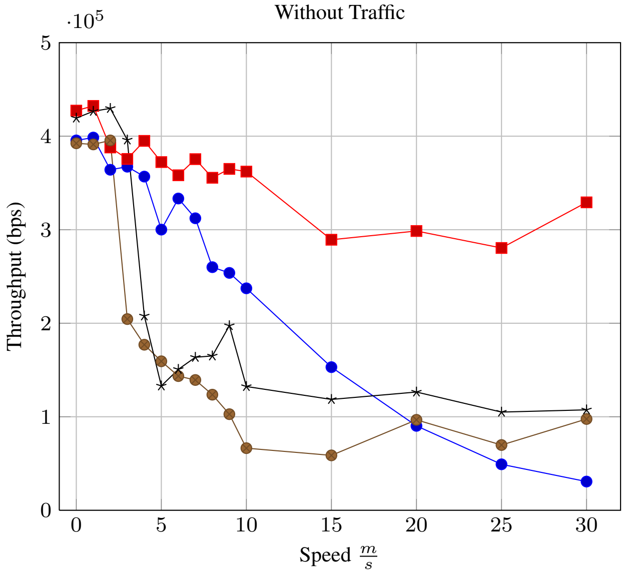

Fig. 10. Throughput DCF and EDCA

Table 8. Throughput Without Traffic

Speed(m/s)	AODV		AOMDV	
	DCF	EDCA	DCF	EDCA
0	395476.7	427355.6	392402.2	419368.1
1	398543.9	432363.0	391197.8	426615.0
2	364091.0	387937.2	395467.4	429715.3
3	367358.7	375662.7	204450.6	395965.4
4	356792.7	394982.9	177023.2	207831.0
5	300098.3	372316.1	159319.6	132986.8
6	333360.3	358214.9	143490.2	150720.2
7	312233.1	375453.7	139319.9	163601.2
8	259951.8	355540.1	123619.9	165065.0
9	253817.2	365013.6	102770.6	197408.8
10	237343.4	362153.4	66439.9	132367.4
15	153060.6	289276.8	58723.5	118539.7
20	90271.2	298619.3	96721.6	126458.1
25	49176.3	280469.5	69789.4	105014.4
30	30724.3	329249.4	97626.8	107417.1

Table 9. Throughput With Traffic

Speed(m/s)	AODV		AOMDV	
	DCF	EDCA	DCF	EDCA
0	270663.5	394868.1	202873.8	327302.3
1	303875.3	358897.2	278092.9	355135.2
2	296784.5	364440.6	228077.9	257207.7
3	307825.8	314225.4	172348.9	210267.9
4	302013.1	337458.2	186571.5	192998.3
5	318538.9	344459.9	119065.5	148049.2
6	266164.7	280072.5	168519.4	199273.6
7	235035.2	325104.8	154265.3	174216.8
8	238093.4	241299.6	136376.8	165042.2
9	223330.8	304863.7	106233.5	169433.4
10	219241.2	277063.3	134810.1	201490.0
15	72621.8	265868.2	58831.0	137387.1
20	31247.5	151086.5	76021.2	123088.5
25	64990.2	235061.6	72369.4	101593.2
30	32582.2	199226.9	66169.5	86835.1

decrease the time delay depending on the speed, at sacrifice in overhead which results in further loss of packets. Packages delivered with AOMDV for mobility scenarios between 1m/s to 10m/s present better delay compared to DCF, due to the multipath generated in this protocol.

One of the most notorious and prominent results in the simulations lies in the jitter, since the awk filter applied to the trace of reception places a zero value if the package has not arrived at the destination node. In the results discussed in IETF [4], the author calculates that the jitter at the source node, which discussed in this article is calculated at the receiving node.

Experiments characterize the AOMDV protocol as unfit for the transmission of H.264/SVC in high mobility scenarios protocol. This protocol can be implemented at low speed, as in the case of implementation in personal networks that do not exceed 2m/s. For video streams H.264/SVC devices represented by the nodes should ensure a range of 0.3Mbps to 0.45Mbps to guarantee QoS.

During the development of this paper reviewed the problems encountered in two-hop networks for the transmission of H.264/SVC over wireless ad hoc networks, with emphasis on the variability of the speed of the nodes exchange information cross traffic and video traffic background, finding that many problems remain open, particularly in the context of ad hoc networks, so it is unclear whether the strict restriction latency speeds in transit from 5 to 8m/s can be guaranteed by an EDCA mechanism prioritizing multiple hops, since such networks can address how to prioritize video traffic between heterogeneous traffic, finding you can guarantee QoS as displayed in the performance metrics (delay, jitter, PDR and Throughput), either with traffic and no traffic.

9. CONCLUSIONS

In this work was evaluated QoS in video streaming H.264/SVC, in mobile Ad hoc networks (MA-NET) with AODV and AOMDV protocols. The performance was evaluated in a scenario with two hops away without traffic and with traffic in the medium ac-

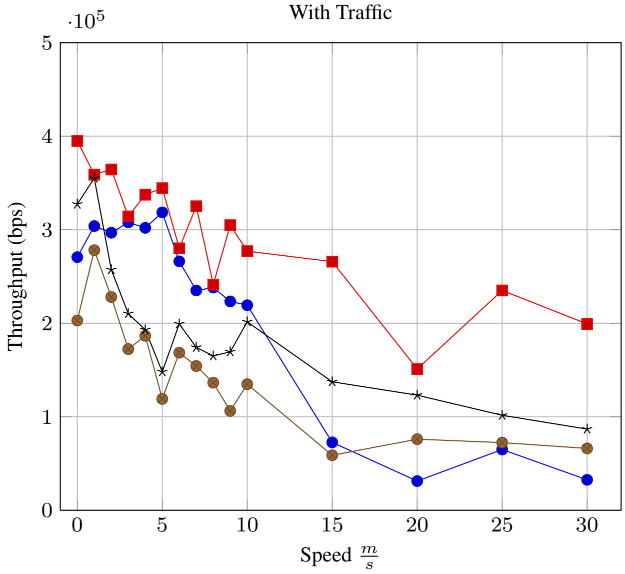

Fig. 11. Throughput DCF and EDCA

cess mechanisms DCF and EDCA, whilst evaluating the effect of increased speed at intermediate nodes. The results showed that AODV is higher than AOMDV in both DCF and EDCA networks with AOMDV high mobility and better performance in terms of its mechanism of delay multipath.

For speeds above 5m/s, the construction of routing tables for AODV and AOMDV protocol increases the delay and the throughput is decreased thus increasing packet is loss for both DCF and EDCA.

The best performance in terms of quality of service was achieved by AODV due to minor delays obtained in EDCA by prioritizing traffic video in general terms. AOMDV is a protocol that presents stability matrices evaluated for networks of low mobility and it is suitable for transmitting traffic to their mechanisms, although generally, multipath delays are achieved below.

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