Efficient Video Streaming using JOKER-An Opportunistic Routing Protocol

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Abstract- The enhanced use of services like multimedia demands saving of energy as the top priority for mobile devices. But extension of life time of battery in mobile devices is very difficult and it can't be handled as expected. For this purpose, reduction in the consumption of energy in every job where these devices are used is critical. In this research work, a new routing protocol called JOKER which is opportunistic in nature is presented. This research work shows new ideas in selection of candidate and coordination phases, which allows enhancing network performance which supports multimedia traffic along with increasing the energy efficiency of the nodes. In the proposed system, the client has to request videos to the file server, and the file server will distribute the frame to the neighbours. In this system we are considering the two neighbours, neighbour1 and neighbour2 and both neighbours are receiving the frames from the file server alternatively. Finally the client will be receiving the videos from the neighbours. By using this proposed system, we can reduce the time consumed.

Keywords: Opportunistic Routing, JOKER, multimedia, protocols, Video Streaming

I. INTRODUCTION

Networks that are Opportunistic have evolved from MANETs. It is one of the most exciting features. In opportunistic networks, moving nodes have the ability so that they pass message to one another even though there is no path linking them. Moreover, nodes are not supposed to have or gain any knowledge about the network topology, which (instead) is required in traditional MANET routing protocols. Dynamically the routes are built, while messages are sent on the way between the sender and the destination(s), and any potential node can opportunistically be used as next hop, subject to the condition that there are chances of bringing the message closer to the final destination.

A difficult issue in forwarding message in a network that is opportunistic is the absence of a path that links both the ends from the sender side to the receiving side. To handle such troublesome condition, many epidemic strategies are used by the protocols that cause many replicas of the information to keep moving in and around the network. In spite of the chance that the presence of many look alike of the same message leverages the possibility of delivery of the payload, there is a chance of increased usage of bandwidth of the network which may lead to the choking of the network.

A new technology that is making news that seems interesting because of the capacity for enhancing the message passing among the nodes that are smart and mobile is the networks that are opportunistic. The evolution point of these networks is MANETs (Mobile Ad-hoc NETworks). They are composed of many interesting features because of which they are more effective than their predecessors. Particularly the best use of the broadcasting property in the networks that are wireless in nature is made by these opportunistic networks. That is nearest neighbours can hear the direct communications between two nodes. In networks that are adhoc and have multiple hops, a distinct path is computed between the end points by the routing protocols like BATMAN, AODV etc. From a given node to the end node, a single neighbour is thought of as the possible next hop. Where in networks those are opportunistic, a set of nearby nodes called as candidates is chosen by each node. These are considered to be capable next hops to the final target node. These devices are energised by a power source, development of techniques that are efficient in reducing the usage of power when the network is in work, is the necessity of the hour. As compared to traditional protocols, the protocols that are opportunistic are very efficient. A simple diagram showing an opportunistic network in which a source has several forwarder nodes to the target node is shown in figure.

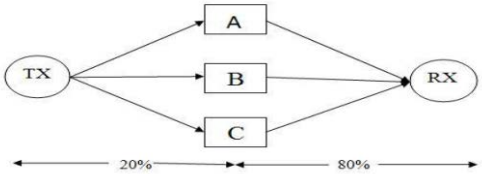

Fig. 1.1 A source node has various candidate nodes which have packet delivery ability for communication of information to the destination node.

The main idea behind Opportunistic routing is to make best use of the broadcast nature of the remote system to such an extent that propagation of message from one node can be caught by different nodes. Instead of selecting the following candidate node early, the Opportunistic Routing picks the following node in a progressive manner during the course of transmission. Consider the case as shown in figure 1, Here the source node TX has three intermediate nodes with chances of packet transmission rate of 20%. Every intermediate node has packet delivery rate of 80% to the destination. Traditional routing will select as if it were one transitional node for delivery of information, while Opportunistic Routing will take into account every one of these intermediate nodes as the potential candidates. Therefore, Opportunistic Routing turns out to be more productive and reliable than customary routing.

The method in which every node chooses its forwarder nodes and how they help each other to pick the most accurate and believed to be the most eligible forwarder are the two key characteristics to be observed in Opportunistic Routing. These qualities are the deciding factors for calculating the sufficiency of the Opportunistic routing.

An unusual routing protocol which is opportunistic in nature, called JOKER, handling the balance between 2 incompatible features like Quality of Efficiency in sending of interactive media and usage of energy is being displayed. The paradigm that is followed in selecting the neighbours is opportunistic. Apart from this, JOKER presents new ideas in both the selection of candidates; where in a new standard of measure has been newly added. This gathers the info about how reliable the links are in delivery of packets together with the how the progress occurs in covering the length towards the final destination has been newly added. The enforcement of timer in JOKER that leverages the dependability of the network is focussed. Thus the trait of utility of intermedia is increased without imposing extra burden on the network.

A BRIEF DESCRIPTION ABOUT JOKER (AUTO-ADJUSTABLE OPPORTUNISTIC ACKNOWLEDGMENT /TIMER-BASED ROUTING)

A routing protocol that is opportunistic in nature and that acquires few of its traits from the structure of the BATMAN which is an adhoc protocol is JOKER. JOKER is a zealous finding. Its design is meant to be simple and convenient to run in a range of gears having limitations in calculations or power based restrictions, e.g., IEEE 802.11 portable equipments. It is possible to change few of the settings specifications of JOKER thus JOKER can be adapted to work in varying situations in the network.

IMPORTANT FEATURES

In the OSI protocol suite the functionality of JOKER lies in the middle of link and the network layers. All the traffic and control messages which are produced by that node are (de)encased and handled by JOKER. Thus any standard convention on higher layers can run over JOKER with no changes. As node addressing related to tasks of routing relies on MAC-addresses, there is no necessity for a system for administration of addresses in the network layer, e.g., IP which disengage the setting up of system operations. Also there is no change in the protocol for links. So the native IEEE 802.11 protocol can be used by setting the network card to undiscriminating mode since JOKER is in control of handling all the frames that is received.

All the influx apart from the control messages used for transmissions which have their own organisation is encased within the JOKER header [1].

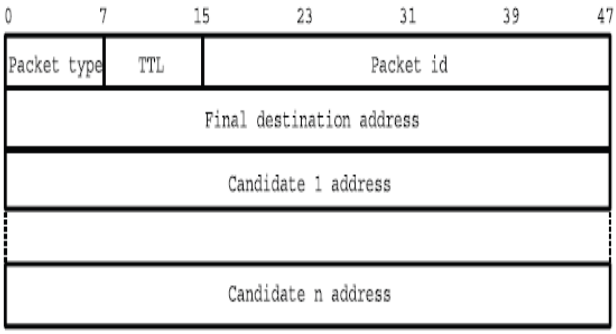

Figure 1.2 Joker Header Format

The following attributes are present in the header[1]: a packet type that explains what type is the encased parcel. Defined are three sorts: Unicast, ACK, or Forwarding parcel. The TTL (Time To Live), defines the hops count that it is allowed to navigate. After this count is crossed the parcel will be thrown out (initial setting for this is 32). A 4-byte code that distinguishes each parcel and is got by finding out the CRC-32 of the packet is the packet ID; then there is the address of the final destination, i.e., the MAC address of intended receiver of the parcel; and the candidate *x* address, which points to the MAC address of every eligible node supposed to route the packet, and there are $N_{candidates}$ number of candidates (a protocol setting parameter) summed up.

A real-time implementation of the strategic routing protocol JOKER is shown in this project. Inside this comprehension, the important traits of this protocol are mapped with those of traditional ones like BATMAN. Development of a new measure for candidate selection is done. Both the parcel transmission accuracy of the links and the advancement in length towards the ultimate target is considered by this new algorithm.

Joker can be implemented in 2 different ways. One method is to instrument the gadget to function in an environment of network emulation. Another method has been devised to function on actual gadgets. Based on QoE (user Experience Quality), QoS (Quality of Service), and power usage, an evaluation of performance of JOKER is carried out.

II. SYSTEM MODEL

Sending the video data in constricted form through the network and showing to the receiver instantaneously is called as Streaming. It is not compulsory for the user of a web to keep waiting in order to load a file to run in case of streaming of media. The media is transmitted as a continuous flow and is exercised as it reaches. The client has to make use of a machine which consists of a program that uncompress and transmits visual information to the monitor and audible information to the acoustic system. Visual streamed data is usually transmitted from previous testimonial videos, but also can be transmitted as a newscast. In a telecast that is ongoing, changing of video waves to digitized waves that are constricted is done. Transmission takes place from a distinct server on the net which is able to do dissemination, thus a single collection is transmitted to many people at the same instance.

It is time consuming to download a huge video file if we use single neighbour as in traditional protocols. In this project we use a set of neighbours as the receivers to which a huge file is divided into frames and distributed equally to them. They in turn transmit these frames to the client which increases the efficiency of transmission and therefore the video can be received in no time. The same can be applicable for large multimedia information like graphics, movies, animations etc. Therefore using this algorithm we can reduce the time consumed in these tasks. The design of the structure is as shown in the figure 2.1

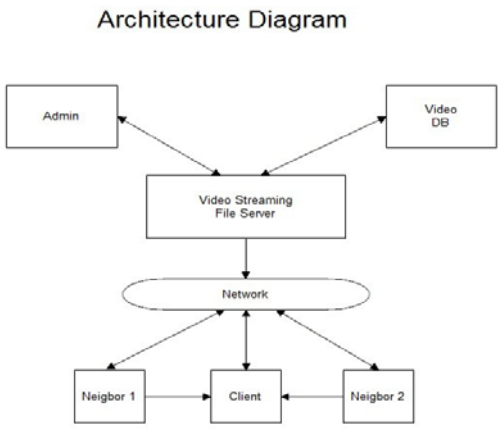

Fig 2.1 Architecture Diagram

The architecture diagram consists of admin block, video DB, video streaming file server, network, client and neighbours. The admin logs in to the system using the credentials, upon validation the request is sent to the File Server. The file server accesses the Video database and selects the video requested by the client and transfers the same via the network. This video is divided into frames by the server and then it is distributed among these potential candidates. Then these frames are transferred to the selected neighbours which are the potential candidates to the destination from the source. These neighbours then transfer the frames to the client which is reassembled at the client. The same is shown in the context analysis diagram below.

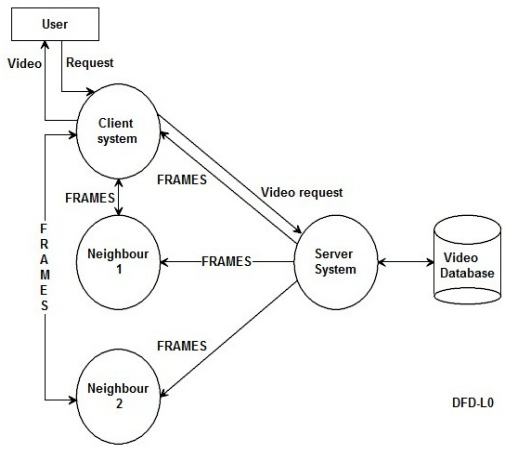

Fig 2.2 Context Analysis diagram depicting the video streaming process.

The job of the admin here is to login to the system and create the client and record their information in the data base. This is basically done to verify the clients login

credentials when it login and request the video to be downloaded. The videos are stored in the video database which is the video library. The client has to login to the system upon getting his credentials verified can request the videos from the database which will be divided into frames and given to it by the neighbours N1 and N2.

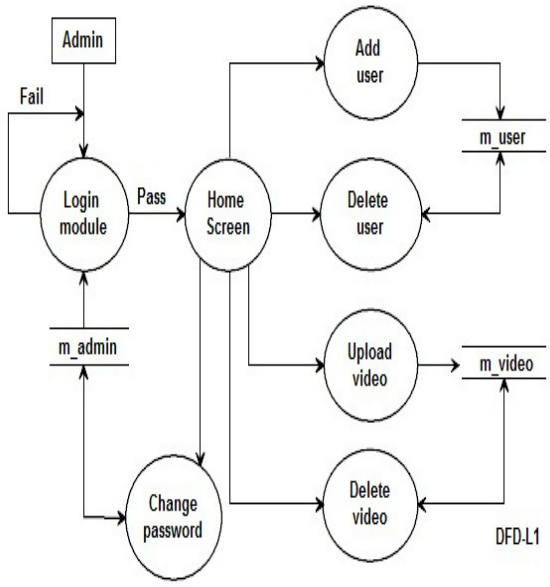

Fig 2.3 DFD depicting the Admin Session in the video streaming process

III. PREVIOUS WORK

In the past few years several works have proposed the strategic pact for ad-hoc structures and have displayed them.

Ramon Sanchez and Maria[1] have presented in their research work[1] the various features and characteristics of JOKER protocol and they have compared the performance of JOKER against another reliable and efficient Protocol BATMAN which is even now considered as the most energy efficient protocol for multimedia communications. They have explained that Joker presents new features in terms of candidate selection and candidate co-ordination schemes. They have demonstrated using experimental results that JOKER is superior as compared to BATMAN in terms of Quality of Service (QoS) and Quality of Efficiency (QoE). They have also elaborated on the candidate selection and candidate coordination schemes of JOKER and have proved the superiority of JOKER using test workbenches and various performance metrics.

In the research work [2], the authors have done an extensive research and survey on the opportunistic routing protocol JOKER. They have also explained about the various other features of opportunistic routing used in mesh networks. They have also done a brief survey of other research works which have been presented on opportunistic routing and other concepts related to it.
Wireless Sensor networks, the area in which opportunistic routing protocols are used in a large extent have been deeply analysed and several research works have been published in this area. The authors have done a deep survey on many of these research works and have researched on the various features in a great depth and discussed about them.

IV. PROPOSED METHODOLOGY

In impromptu networks based on multi jump, conventional protocols like OLSR (optimized link state routing), AODV (Ad-hoc On-Demand Distance Vector) , or BATMAN (Better Approach To Mobile Ad-hoc Networking) a distinct path is calculated amidst the end nodes. Every host takes into account one neighbour as the potential successor to the final target. However in strategic technique pacts, every hub picks a series of neighbours considered as the forwarders as the next jumps to the ultimate end host. A drawback of the current system is every host takes into account one nearby hub as the successor to reach the target. Also more power drainage takes place.

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In this proposed system which allows enhancing the networks functionality supports intermedia freight along with leveraging the power efficiency of the hosts. In the proposed system client has to send the request the videos to file server. The server receives the request and consults the video and forwarder details from the database. The server then receives the video from the video DB and then the video is divided into frames by the video to frame converter algorithm. Then these frames are partitioned and file server is distributing the partitioned frames to the potential neighbours N1 and N2. These neighbours receive the frames and forward them to the client. At the client side these frames are converted back to the video and the video is played at the client side. In this system we are considering the two neighbours, neighbour1 and neighbour2 and both neighbours are receiving the frames from file server alternatively. By using this proposed system we can reduce the time consuming.

Advantages of the Proposed System

- Enhance the functionality of instantaneous visual exchange information in cellular networks.
- We can attain productivity in time.

The proposed system is depicted in figure shown below:

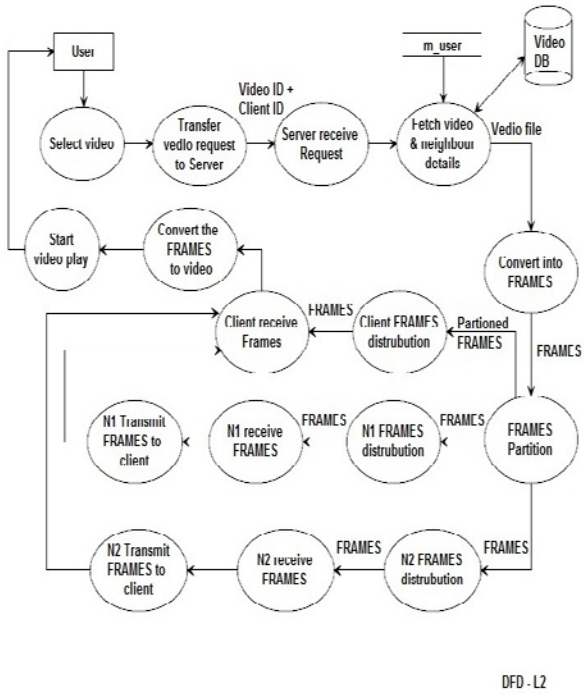

Figure 4.1: Data flow diagram depicting the video streaming process using JOKER

V. SIMULATION/EXPERIMENTAL RESULTS

Quality of efficiency approximations under MOS (mean opinion score) has been computed. We can see QOE ratings more than 3 in several of the tests conducted using JOKER which is remarkable. The best ratings are got by JOKER-timer that reaches considerable stage in QOE by getting values more than 3.5 in many of the simulations.

TABLE 1 QOE VALUES OBTAINED IN THE EXPERIMENT

	JOKER-ACK	**JOKER-timer**
TRIAL 1	3.41	3.61
TRIAL 2	3.24	3.58
TRIAL 3	2.02	2.39
TRIAL 4	2.34	2.92
TRIAL 5	3.23	3.51

The graphical representation showing the experimental results of proposed system is depicted in figure shown below.

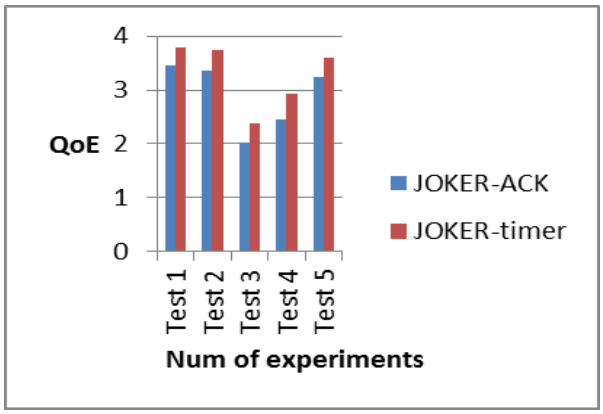

FIG 5.1 COMPARING QUALITY OF EFFICIENCY OF JOKER-ACK VS JOKER-TIMER

VI. CONCLUSION

In this research work a brief description of an opportunistic routing protocol, named JOKER, disserting the balance amidst incompatible features such as QoE in transferring of media and utilization of power is explained. Apart from the strategic model, JOKER has innovation in the choice of contenders, where in a new measure that collects the parcel-shipping dependency of the links along with the advancement in gap on the way to the last goal has been instituted, and the contender ordering scheme, in which two distinguishing methods are used, known as ACK-dependent and timer dependent allocation techniques. In addition to this, a vigorous tuning of the interval for sending of control-message of the protocol is innovated. The goal is to make JOKER compliant to the actual network settings and also to decrease energy usage.

VII. FUTURE SCOPES

As future work, we are working on to continue inquiry into the opportunistic routing approach. This permits a systematic cost effective organization of cellular net by best utilizing the immanent features present in these structures, thereby enhancing the overall performing of the network along with reducing power wastage of the hosts in the network.

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