International Journal of Scientific & Engineering Research, Volume 4, Issue 5, May-2013 1967
ISSN 2229-5518

Channel Aware and Energy Efficient On demand Routing Protocols for Route Handoff Technique

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Abstract

In wireless Mobile Ad hoc Networks (MANETs), packet transmission is failed by radio link fluctuations. This paper proposes Channel Aware Adhoc Ondemand Multipath Distance Vector (CA-AOMDV).This can be combined with Max Min Residual Energy multipath protocol (MMRE-AOMDV) .These two protocols are used to select the stable links for path discovery, and applies a preemptive handoff strategy for reliable connections by exploiting channel state information. The main idea of protocol MMRE-AOMDV is to find the minimal nodal residual energy of route in the process. Once a new route with greater nodal residual energy is found, it is selected for forwarding the data packets .And CA-AOMDV can be used to find the stable link with the help of the metric called Non Fading duration Time.

1. Introduction

The multipath routing are more advantageous in larger networks, where he number of link breaks are high. When a source node needs to send data to the destination and does not have a valid path to destination, it starts a timer and relays a route request (RREQ) for destination with unique route request identifier. When source node receives a valid reply from the destination, it updates the route table entries and starts sending a data packet. If the timer expires in between, then source node increments the

route request identifier and initiates a new request for the destination. Multipath routing can increase end-to-end throughput and provide load balancing in MANETs by the use of multiple paths. The concept of multipath routing is to design a multipath routing for mobile ad hoc networks.

a. To avoid the overhead of additional route discovery attempts.

b. To minimize the routing overhead by the use of secondary paths.

c. To reduce the route error transmission during route break recovery.

Wireless mobile networks are dynamic networks in which nodes are move from anyware to anyware. A major performance constraint comes from path loss and multipath fading . Many MANET routing protocols exploit multihop paths to route packets. The probability of successful packet transmission on a path is dependent on the reliability of the wireless channel on each hop. Frequent node movements are also affect the link stability. Routing protocols can make use of prediction of channel state information (CSI) based on a prior knowledge of channel characteristics, to monitor the instantaneous link Conditions. We utilize the channel average nonfading duration (ANFD) as a measure of link stability for path selection.

The protocol uses the same information to predict signal fading and also for path handover to avoid unnecessary overhead. The average fading duration (AFD) is utilized to determine when to bring a path back into play, allowing for the varying nature of path usability instead of discarding at initial failure. A multipath routing protocol with maximal minimal nodal residual energy also for mobile ad hoc networks with the aim of enhancing the multi-hop communication and balancing individual node's battery power and the entire networks lifetime.If we sort the multipath in decending order easily find the minimal nodal energy at the source node in MMRE.In CA-AOMDV predicting the channel before sending the packet is available.

2.MANET

A mobile ad hoc network is one where in all nodes work independent of any common centralized admin. Each one of them performs the tasks of a router. They should be self-adapting in that if their connection topology changes, their routing tables should reflect the change. Mobile Ad hoc Networks (MANETs) are autonomous networks, which operate without any fixed infrastructure or wired backbone. In MANETs, nodes typically communicate over multiple hops while the intermediate nodes act as routers by forwarding data. Because of mobility and limited battery power of nodes, topology of ad hoc network is highly dynamic. Hence routing protocols should adapt to such dynamic nature and continue to maintain connection between the communicating nodes even if path breaks due to mobility and or node failures

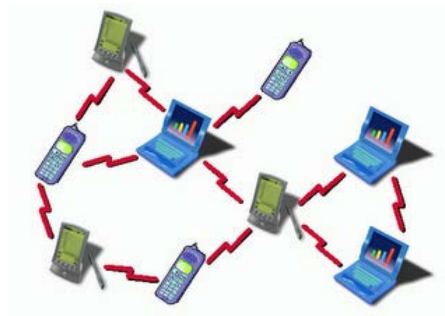

Figure:1 Mobile Ad Hoc Network

2.1 Main Characteristics Of Ad-Hoc Networks

Dynamic topology*:* Mobile Hosts are connected dynamically in arbitrary manner. Network Link can vary based on the proximity from host to host.

Variable capacity links*:* Wireless links have lower capacity than the wired links. The throughput of wireless communications is often less than a radio's maximum transmission rate.

Autonomous*:*There is no centralized administration entity is required to the operation of the various mobile hosts.

Bandwidth constrained*:*Due to the lower capacity wireless links are affected by several sources.So the degrade result is received in output.

Energy constrained*:* Battery power consumption is main thing **i**n Mobile hosts.

Limited security*:* Mobility implies higher security risks than the static operations because portable devices may be stolen or the traffic may cross into the insecure wireless links.

3.EXISTING SYSTEM

In wireless mobile ad hoc networks (MANETs), packet transmission is impaired by radio link fluctuations. Existing System proposes a novel channel adaptive routing protocol which extends the Ad hoc On-Demand Multipath Distance Vector (AOMDV) routing protocol to accommodate channel fading. The proposed Channel-Aware AOMDV (CA-AOMDV) uses the channel average nonfading duration as a routing metric to select stable links for path discovery, and applies a preemptive handoff strategy to maintain reliable connections by exploiting channel state information . Using the same information, paths can be reused when they become available again, rather than being discarded. We provide new theoretical results for the downtime and lifetime of a live-die-live multiple path system, as well as detailed theoretical expressions for common network performance measures, providing useful insights into the differences in performance between CA-AOMDV and AOMDV. Simulation and theoretical results show that CA-AOMDV has greatly improved network performance over AOMDV.

3.1.1 EXISTING SYSTEM DRAWBACKS

- Radio link fluctuations.
- Delay or overhead is expended through node negotiation with each transmission. Signal strength as a path selection criterion.

4. PROPOSED SYSTEM

4.1CHANNEL-AWAREAOMDV PROTOCOL

In CA-AOMDV we use the Average Non Fading Duration as a metric to find stable links, if any one of the link will fails use a preemption technique to choose another link and handover the process to any one of remaining selected paths. This gives only the smaller delays.Before forwarding a RREQ to its neighbors,a node will inserts a current speed to the RREQ header. So the neighbor can calculate the link with these information and finally will calculate ANFD.

4.1.1 Route Maintenance

Using prediction and handoff the disconnection can be minimized,reducing transmission latency and packet drop rate also. In route maintenance signal strength prediction takes place.All nodes maintain a table of fast signal strengths,recording of each received packet,previous hop,signal power,and arrival time. When the predicted link signal strength level falls below a network-specific threshold, the algorithm swaps to a good-quality link. The fading threshold is chosen so as to provide robustness to prediction errors. The presence of multiple users experiencing independent channel fading means that MANETs can take advantage of channel diversity, unlike data rate adaptation mechanisms such as SampleRate. All nodes maintain a table of past signal strengths, recording for each received packet, previous hop, signal power, and arrival time. Ideally, there will be M packets where M is the required number of past samples. However, this will depend on the packet receipt times compared with the specified discrete time interval, t. If packets are received at time intervals greater than t, sample signal strengths for the missed time intervals can be approximated by the signal strength of the packet closest in time to the one missed. If packets are received at intervals of shorter duration than t, some may be skipped. The handoff process is implemented via a handoff request(HREQ) packet.

CA-AOMDV routing table Entries	**MMRE-AOMDV routing table Entries**
Destination IP address	Destination IP address
Destination sequence number	Destination sequence number
Advertised hop count	Advertised hop count
Route list {(next hop1,hop-count 1,D1),(next hop2,hop-count 2,D2)…}	Route list {(nexthop1,hopcount1,min_re _energy, (nexthop2,hopcount2.min_re _energy)}
Expiration time out	Expiration time out

4.1.2 Handoff Table

Table:1Routing table entries

Each node maintains a local handoff table for the purpose of monitoring all handovers.Each entry includes source IP,source sequence number,destination IP address and expiration timeout.If HREQ came from one node it will find the destination node for forwarding packets.

4.1.3 Average Nonfading Duration

In MANETs, choice of stable links for route establishment ensures reliable packet transmission. Link stability can be represented by the distance between the nodes forming the link, and their mobilities. Thus, any measure of how stable a link is should include these factors.

The ANFD is inversely proportional to link length, d, and node velocities v_T and v_R. The ANFD of a link between two highly mobile or separated nodes will be shorter than that of a link between two slow moving and/or close nodes. In short, a link with a high ANFD will have a relatively long lifetime. Thus, using the ANFD as a metric will result in choosing more stable links. There is minimal extra calculation required to determine ANFD.

4.1.4 Average Fading Duration

The AFD metric is used in CA-AOMDV to determine for how long a faded link will be unavailable and is recorded in the route cache.The AFD metric is used in CA-AOMDV to determine for how long a faded link will be unavailable and is recorded in the route cache.

4.1.5 Channel Prediction Using Time Correlation

A feature of CA-AOMDV is the use of channel prediction to instigate handoff between paths, when a fade is predicted on a link on the active path.We choose the Linear Minimum Mean Square Error (LMMSE) algorithm for channel prediction. We assume a slow fading channel such that it is constant for a symbol duration

4.2 REVIEW OF AODV AND AOMDV

Transmissions via unreliable wireless connections can result in large packet losses. Thus, it makes sense to consider routing protocols which adapt to channel variations. The channel-aware routing protocol which extends the Ad hoc On-Demand Multipath Distance Vector (AOMDV) routing protocol.AODV is a single path ,on demand routing protocol.AOMDV provides multiple path for single discovery. The key distinguishing feature of AOMDV over AODV is that it provides multiple paths to destination.These paths are loop-free and mutually link-disjoint. AOMDV uses the notion of advertized hop-count to maintain multiple paths with the same destination sequence number. In both AODV and AOMDV, receipt of a RREQ initiates a node routetable entry in preparation for receipt of a returning RREP.

4.3 MAX-MIN RESIDUAL ENERGY MULTIPATH PROTOCOL(MMRE-AOMDV)

Since our multipath routing protocol is based on AOMDV and exploits Maximal Minimal nodal Residual Energy we call it MMRE-AOMDV. It is a multipath routing protocol that designed primarily for node battery-limited and highly dynamic ad hoc networks where link failures and route breaks occur frequently. When single path on-demand routing protocol such as AODV is used in such networks, a route rediscovery is needed in response to every route break.

Each route discovery is associated with high overhead and latency. This inefficiency can be avoided by having multiple redundant paths available. Now, a new route discovery is needed only when all paths to the destination break. The main idea in MMRE-AOMDV is to balance nodal energy , to prevent one or some critical nodes depleting their energy supplie sand dropout from the network

5.CONCLUSION

A channel-based routing metric is proposed which utilizes the average nonfading duration, combined with hop-count, to select stable links. A channel-adaptive routing protocol, CA-AOMDV, extending AOMDV, based on the proposed routing metric, is introduced. MMRE_AOMDV in order to balance the traffic load among different nodes according to their nodal residual battery and prolong the individual node's lifetime and hence the entire system lifetime. Our simulation results show MMRE_AOMDV protocol combined with CA-AOMDV are performing well. During path maintenance, predicted signal strength and channel average fading duration are combined with handoff to combat channel fading and improve channel utilization. Theoretical expressions for routing control overhead and packet delivery ratio also provide detailed insights into the differences between the two protocols. Theoretical analysis show that CA-AOMDV , MMRE_AOMDV outperforms AOMDV in practical transmission environments.

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