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Channel Fading Detection in Manets with Hand off Strategy

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Abstract: *In wireless mobile ad hoc networks (MANETs), packet transmission is impaired by radio link fluctuations. This paper proposes a novel channel adaptive routing protocol which extends the Ad hoc On-Demand Multipath Distance Vector (AOMDV) routingprotocol to accommodate channel fading. Specifically, the proposed Channel-Aware AOMDV (CA-AOMDV) uses the channel averagenonfading duration as a routing metric to select stable links for path discovery, and applies a preemptive handoff strategy to maintainreliable 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 multiplepath system, as well as detailed theoretical expressions for common network performance measures, providing useful insights into thedifferences in performance between CA-AOMDV and AOMDV. Simulation and theoretical results show that CA-AOMDV has greatly improved network performance over AOMDV*

Keywords*: Mobile ad hoc networks, routing protocols, channel adaptive routing*

I. Introduction

Wireless mobile ad hoc networks (MANETs) are self configuring, dynamic networks in which nodes are free to move. A major performance constraint comes from path loss and multipath fading .Many MANET routing protocols exploit multi hop 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. Rapid node movements also affect link stability ,introducing a large Doppler spread, resulting in rapid channel variations .Routing protocols can make use of prediction of channel state information (CSI) based on a priori knowledge of channel characteristics, to monitor instantaneous link conditions. With knowledge of channel behavior, the best links can be chosen to build a new path, or switch from a failing connection to one with more favorable channel conditions. adaptive routing.Inthispaper,weintroduceanenhanced, channel-awareversion of the AOMDV routing protocol. The key aspect ofthis enhancement, which is not addressedinother work, isthat we use specific,timely,channelqualityinformationallowing us to work with the ebb-and-flow ofpathavailability.This approach allows reuse of pathswitchbecomeunavailable for a time, rather than simply regarding them asuseless, upon failure,anddiscardingthem.Weutilizethechannelaveragenonfading duration (ANFD) as a measure oflink stability,combined with the traditional hop-countmeasure for path selection. The protocol then uses the sameinformation topredictsignalfading and incorporates pathhandover to avoid unnecessaryoverhead from a new pathdiscovery process. Theaveragefadingduration (AFD) isutilized to determine when to bring a path back into play,allowing for the varying nature of path usability instead ofdiscardingatinitialfailure.Thisprotocolprovidesadualattackfor avoiding unnecessary out discoveries,predictingpathfailure leading to handoff and then bringing paths backintoplaywhen they are again available, rather than simplydiscarding them at the first sign of a fade.

II. Existing System

In the existing system packet transmission is impaired by radio link fluctuations. Here the paths can not be used when it is available it should be discarded when the time is expired and a new route discover process must be undertaken. Path stability is completely ignored. Thus, selected paths tend to have a small number of longhops meaning that nodes are already close to the maximum possible communication distance .Here it provides unnecessary route discoveries and it does not predict the path failure. Maximum number of disconnections, high transmission latency and packet drop

1.AD-HOC ON DEMAND DISTENCE VECTOR(AODV)

1.1Advantages

AODV is a reactive protocol: the routes are created only when they are needed. It uses traditional routing tables, one entry per destination, and sequence numbers to determine whether routing information is up-to-date and to prevent routing loops .An important feature of AODV is the maintenance of time-based states in each node: a routing entry not recently used is expired. In case of a route is broken the neighbors can be notified. Route discovery is based on query and reply cycles, androute information is stored in all intermediate nodes alongthe route in theformofroutetableentries.Thefollowingcontrol packets are used: routing request message (RREQ) is broadcasted by a node requiring aroutetoanothernode, routing reply message (RREP) is unicasted back to the source of RREQ, and route error message (RERR) is sent to notify other nodes of the loss of the link.

1.2 Drabacks of aodv

It is possible that a valid route is expired. Determining of a reasonable expiry time isdifficult,because thenodes are mobile, and sources' sending rates maydifferwidely and can change dynamically from nodetonode. Moreover, cangatheronlyaverylimitedamountofroutinginformation, route learning is limited only to the sourceofanyroutingpackets being forwarded. This causes AODV to rely on a route discovery flood moreoften,whichmaycarrysignificant network overhead. uncontrolled flooding generates many redundanttransmissionswhichmaycausesocalledbroadcaststormproblem.

2. Adhoc Ondemand Multipath Distence Vector Routing(Aomdv) :

2.1Advantages

Ad-hoc On-demand Multipath DistanceVectorRouting(AOMDV) protocol isanextensiontotheAODVprotocolforcomputingmultipleloopfreeandlinkdisjointpaths.Theroutingentriesforeachd estination contain a list of the next-hops along with the corresponding hop counts. All the next hops have the samesequencenumber. This helps in keeping track of a route. For each destination, a node maintains the advertised hop count, which is defined as the maximum hop count for all thepaths,whichisusedforsending routeadvertisementsofthedestination.

2.2 Disadvantages of aomdv

AOMDV istheuseofalargenumberofcontrolpacketsforcalculating and maintaining multiple routesbetweena Source anddestination nodes.AdhocOnDemandMultipathDistance Vector(AOMDV)routingprotocolwillaccommodatechannelfading

CHANNEL FADING

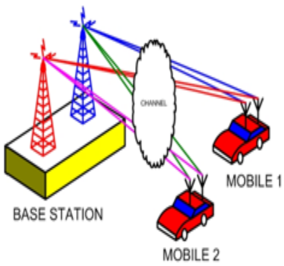


Figure-1 Multipath fading channel

MANET – MOBILE AD-HOC NETWORKS

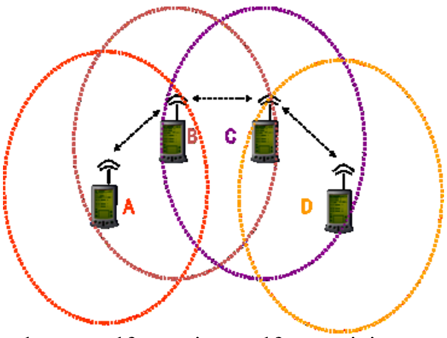


Figure-2 Ad hoc wireless networks are self-creating, self-organizing, and self-administrating networks mobile Ad-hoc Networks (MANETs) we mean wireless hop networks formed by a set of mobile nodes without relying on a pre existing infrastructure. Each node in a MANET acts as a router, forwarding data packets to other nodes. Since the topology of MANET is time-varying, unstable radio links among nodes may easily happen due to difficult to predicting the coverage pattern and mobility models, etc. Many of the routing protocols rely on the multi-hop routing paths for packet transmission. Node movements also affect the link stability. Routing protocols can make use of prediction of channel state information based on the prior knowledge of the channels. Several channel adaptive schemes have been developed for MANETs to maintain the stability. In channel adaptive schemes can be implemented in medium access control (MAC) protocols.

III.Ad-Hoc Networks

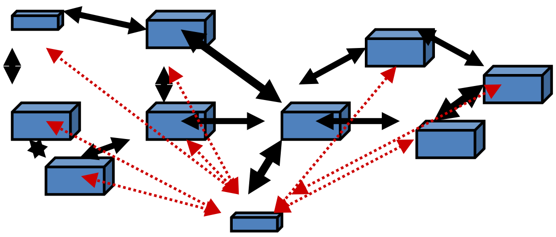


Figure-3 peer-to-peer communication

An ad-hoc network is the cooperative engagement of a collection of mobile nodes without the required intervention of any centralized access point or existing infrastructure. In this paper Ad-hoc On Demand Distance Vector Routing (AODV), a novel algorithm for the operation of such ad-hoc networks is presented. Each Mobile Host operates as a specialized router, and routes are obtained as needed (i.e., on-demand) with little or no reliance on periodic advertisements. This new routing algorithm is quite suitable for a dynamic self starting network, as required by users wishing to utilize ad-hoc networks. AODV provides loop-free routes even while repairing broken links. Because the protocol does not require global periodic routing advertisements, the demand on the overall bandwidth available to the mobile nodes is substantially less than in those protocols

IV.Proposed System (Ca-Aomdv)

Here paths can be reused when they become available again, rather than being discarded.Using prediction and handoff to preempt fading on a link on the active path, disconnections can be minimized, reducing transmission latency and packet drop rate.This protocol provides a dual attack for avoiding unnecessary route discoveries, predicting path failure leading to handoff.All nodes maintain a table of past signal strengths, recording for each received packet, previous hop, signal power, and arrival time.A key factor deciding the performance of a routing protocol in mobile ad hoc networks is the manner in which it adapts to route changes caused by mobility.

Exploiting the intuition that a lessdynamic route losts longer, a new metric, the Route Fragility Coefficient(RFC), to compare routes is proposed. RFC estimates the rate at which a given route expandsor contracts. Expansion refers to adjacent nodes moving apart, while contraction refers to their moving closer. RFC combines the individual link contraction or expansion behavior to present a unified picture of the route dynamics. It is shown that lower the value of RFC, more static (less fragile) the route. Then this metric is used as a basis for route selection so that route discovery yields routes that last longer and hence increase throughput while reducing control overhead. A simple distributed mechanism to compute RFC is provided,

V. Comparison Of Routing Table Entry

<table>
<tr><th>AOMDV routing table</th><th>CA-AOMDV routing table</th></tr>
<tr><td>destination IP address</td><td>destination IP address</td></tr>
<tr><td>destination sequence number</td><td>destination sequence number</td></tr>
<tr><td>advertised hop-count</td><td>advertised hop-count</td></tr>
<tr><td rowspan="2">path list
{(next hop IP 1,hop-count 1),
(next hop IP 2,hop-count 2),$\cdots$}</td><td>$\mathcal{D}_{\min}$</td></tr>
<tr><td>path list
{(next hop 1,hop-count 1,$\mathcal{D}_1$),
(next hop 2,hop-count 2,$\mathcal{D}_2$),$\cdots$}</td></tr>
<tr><td rowspan="2">expiration timeout</td><td>expiration timeout</td></tr>
<tr><td>handoff dormant time</td></tr>
</table>

V I.Route Maintenance In Ca-Aomdv

In mobile environments, it is necessary to find efficientways of addressingpathfailure.Usingprediction andhandoff to preempt fading on a link on the active path,disconnections can be minimized, reducing transmissionlatency and packet drop rate Route maintenance in CA-AOMDV takes advantage of ahandoff strategy using signal strength predictionto counter channel fading. When thepredicted link signal strength level falls below a networkspecificthreshold, the algorithm swaps to a good-qualitylink. The fading thesignal is chosenso as to providerobustness to prediction errors. The presence of multipleusers experiencing independent channel fading means thatMANETs cantake advantage ofchannel diversity, unlikedata rate adaptation mechanisms such as SampleRate All nodes maintain a table of past signal strengths,recording for each received packet, Ideally, there will be M packetswhere M is the required number of past samples from.However, this will depend on the packet receipt timescompared with the specified discrete time interval, _t. Ifpackets are received at time intervals greater than _tsample signal strengths for the missed time intervals can beapproximated by the signal strength of   the packet closest intime to the one missed. If packets are received at intervals ofshorter duration than _t, some maybeskipped.Anexample of handoff   in CA-AOMDV is shown in Fig. 4.The handoff process is implemented via
a handoff request (HREQ) packet.

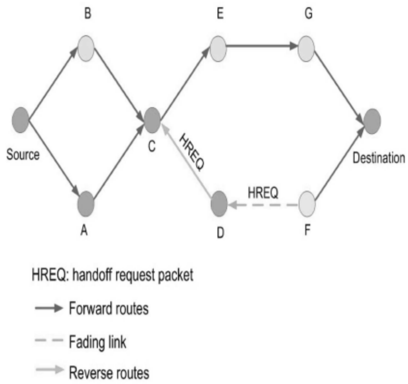


Figure.4Handoff inCA-AOMDV

VII.Theoretical Analysis

A framework is now presented to analyze the performances of AOMDV and CA-AOMDV.The probability density functions (PDFs) of the lifetimes of a single path and multiple paths are derived and the performances in terms of routing control overhead and network throughput are analyzed.

VIII .Ca-Aomdv/Aomdv Performence Anlysis

We now determineexpressions for routing control overheadand packet delivery ratio. If Φ^d is the average delay for aRoute discovery and E{Z} is the average path system lifetime, then (E{Z} Φd) represents the averageTime between two successive route discoveries per ns-ndpair. Let Ω be the number of route discoveries per second,

$$\Omega = \frac{1}{E\{Z\} + \Phi^d}.$$

In CA-AOMDV and AOMDV, when ns needs a path to nd, itbroadcasts a RREQ. n_d, or any intermediate node which hasa fresh enough path to n_d, feeds a RREP back to ns to establish the path. We can approximate Φ^d as:

$$\Phi^d = \hat{\mathcal{H}}(t_Q + t_P),$$

where tqis the one-hop propagation time of a RREQ,andtp is the one-hop propagation time of a RREP. WithC connections in the network, each lasting an average ofT seconds, the average number of route discovery processes overtime T is equal to:

$$N_{rd} = CT\Omega.$$

IX. System Design

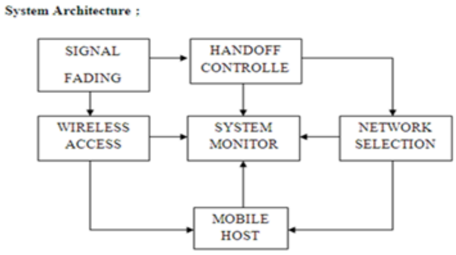


Figure-5 system design

The channel fading is detected before fading occurs. This is done by sensing the channel. A node along the path fails, causing other nodes to fail or the rear collisions along the path. Wireless access describes about thebasic communication takes place in a wireless network. The diagram explains the communication in a wireless network. Network Selection will monitor the total network and report to base station. System monitor is controlled by the base station to monitor the mobile host. Path maintenance maintains the path between communicating mobile hosts Mobile host will communicate some other mobile host within the local area or wide area. While the mobile host transmitting the data, the network monitor will monitor the total network, link state will monitor the state of
the link between the two mobile hosts which are communicating and it is controlled by base station directly.

X.-Modules Of The Ca-Aomdv

AOMDV protocol for MANETs contains three design modules, they are Wireless Access, Fading Detection, Network Selection

WIRELESS ACCESS

Wireless access module describes how the basic communication takes place in a wireless network. The fig.6 explains the communication in a wireless network.

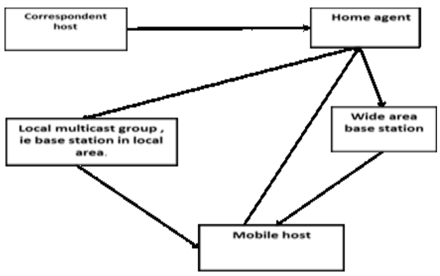


Figure-6 wireless access

In this diagram the correspondent host controls the home network. Home agent communicates with Mobile host. If the home agent wants to communicate with a mobile host within the local area means, it will communicate through local multicast group i.e base station in local area. If home agent wants to communicate with a mobile host within the wide area means, it will communicate through wide area base station. Mobile host can communicate directly with home agent

FADING-DETECTION

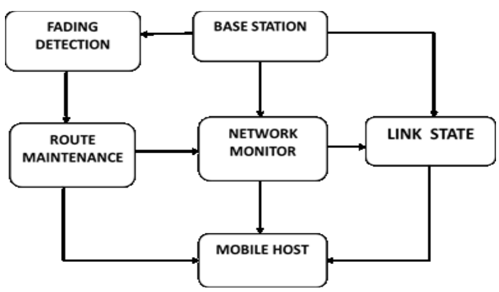


Figure-7 In the above diagram, the base station will control the local area. Mobile host will communicate some other mobile host within the local area or wide area. While the mobile host transmitting the data, the network monitor will monitor the total network,

NETWORK SELECTION

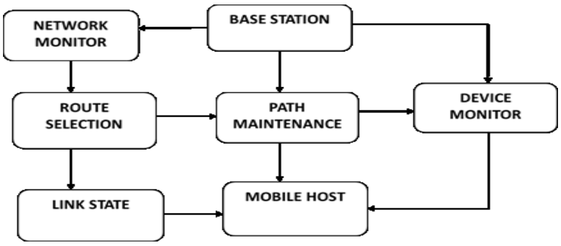
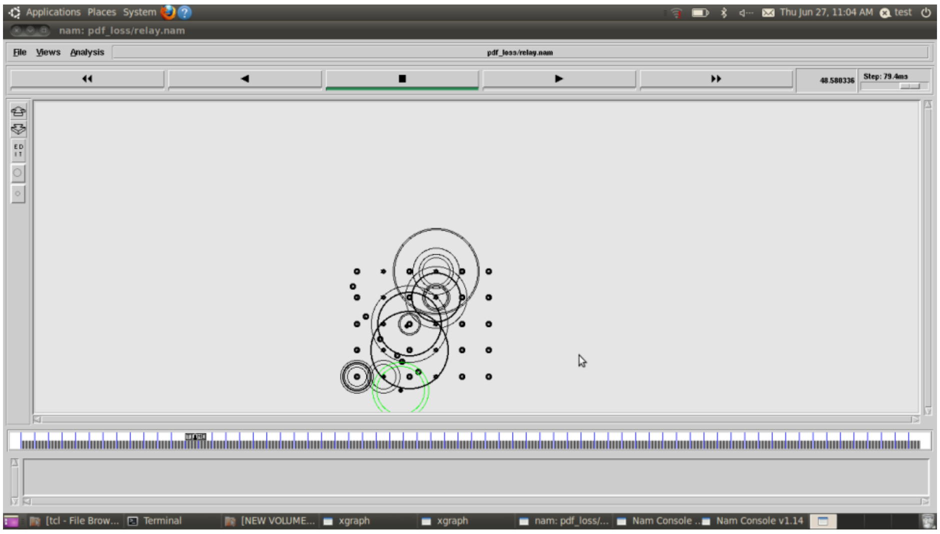
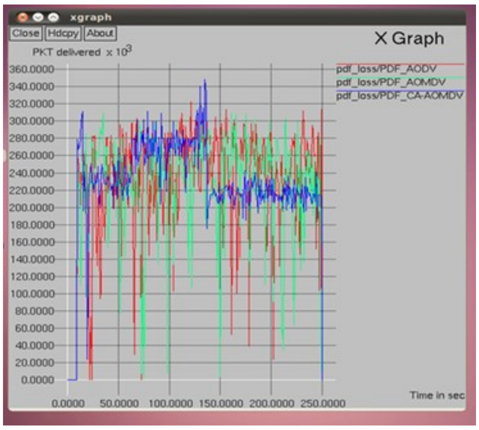


Figure- 8In this diagram, the base station controls the total network. Network monitor will monitor the total network

XI. Simulation Results





XII.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, extendingAOMDV, based on this proposed routing metric, is introduced.During path maintenance,predicted signal strength and channel average fading duration are combined with handoff to combat channel fading and improve channel utilization

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