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Wireless ad-hoc Network Routing Protocol Research

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Abstract

Based on the in-depth analysis of the performance characteristics of typical routing protocols in present Adhoc, for on-demand routing protocols instability and large delay jitter characteristic is proposed based on the opportunity to forward the robustness of routing protocols. Through the simulation analysis of the its superiority compared with other certainty path as the routing protocol, gives the performance characteristics of its transmission in different environments.

Keywords: *Adhoc network ; control channel; channel allocation; route discovery*

1. Introduction

Adhoc flexible networking technology makes it an important complementary technology in the next generation of mobile communication network. IEEE802.11 g physical channel rate can reach 54 MBPS, studies have shown that access points (AccessPoint) model of the application level of the network mode can reach 32 megabits per second largest data transfer rate (packet size of 1500 byte), and the network model has got the very extensive application "and more jump connection Adhoc mode is widely used but is limited by a number of technical factors, one of the reasons is the network mode can provide the best performance on the Internet is not clear" this chapter is devoted to provide a more accurate assessment jump Adhoc provides one of the biggest business velocity analysis method.

On multiple hops Adhoc currently available capacity of research, mostly relation model provides a more macro, and not according to the actual network which could provide specific quantitative model. Such as literature [2] by establishing a network protocol model and physical model is deduced more jump Adhoc each node in the theory of maximum throughput, and suggests that the network capacity and the number of each node into a reverse relationship between growth, the conclusion provides for wireless self-organized network capacity overall understanding. [3] by a two-dimensional markov chain model, are analyzed from the points of view of MAC layer saturated state when multiple nodes jump competition access channel available theory system throughput, for the node in the wireless access behavior analysis of MAC layer laid the important foundation, many throughput analysis of the network under certain conditions, are all based on it. Ping Chung Ng et chain-shaped topology is given in the research literature. Jump more cases, a single stream best throughput quantitative analysis methods, respectively from the affected by the hidden nodes and carrier sense restrictions in both cases, analyzes the application layer can achieve the best throughput "the literature is jumping Adhoc system capacity research provides a very good idea.

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In Adhoc routing protocols is the main function of monitoring network topology changes, to exchange routing information, production, selection and maintenance of routing, and according to the selection of routing forwarding data, in order to provide the connectivity of the network. However, due to the mobility of the terminal! The variability of network topology, transmission of multiple hops, the unreliability of wireless channel and the limitation of network resources, such as many wireless ad-hoc network features, makes the routing protocol research is facing great challenges. Therefore, the routing protocol for wireless ad-hoc network research one of the focus problems, IETF has formed a special MANET working group to study the routing protocol in wireless Adhoc. Has put forward a MANET routing protocol scheme has dozens of, can from different angles to classify these protocols: according to different routing discovery strategy, it can be divided into active routing protocol and on-demand driven routing protocol; According to the difference of network topology, it can be divided into flat structure routing protocols and clustering routing protocol; As a condition of auxiliary routing according to whether or not to use the GPS system, which can be divided into location aided routing protocols and location aided routing protocols and so on. The following main according to the first kind of classification method is introduced to determine the path routing protocol and its performance characteristics. Active Routing protocols is also known as active Routing protocols or should first Routing protocol, is a kind of Routing protocol based on Routing table "in the active Routing protocols, each node of a MANET must maintain one or more of the Routing table to record the Routing information" by the periodic exchange Routing information between nodes to update its Routing table, so as to reflect the change of network topology in a timely manner "active Routing protocol to inherit traditional Routing protocols, but in such aspects as removing Routing loop and obsolete Routing improvements made for ad-hoc network characteristics. It’s the biggest advantage is: when inter-node communication needs, the Routing information can be immediately available, its main drawback is that: maintain and update the Routing tables will bring huge network overhead" the difference between different active Routing protocols different node number of Routing table maintenance and network topology information of the different methods of distribution and update "existing active distance vector Routing protocols DSDV Routing protocol including target list (Destination a sequeneedDistanee Veetorprotoeol), wireless Routing protocol WRP (wireless Routing protoeol), global state Routing protocol GSR (GlobalstateRouting), FsR fisheye state Routing protocols (FisheyeStateRouting), optimized link state Routing protocol OLSR (OptimizedLinkStateRouting), *etc*.

On-demand routing protocols, also known as reactive routing protocols "on-demand driven routing protocol does not need to periodically for routing updates, only when the source node communication needs, to establish routing" route setup process is the source node to the entire network flooding routing request control message, the process of the destination node after receiving the route request message, based on some kind of routing algorithms to establish the optimal route back to the source node. After the construction of the routing, data grouping established good along the path from source node to destination node. In the process of data forwarding set up good routing maintenance by routing maintenance program, when the path is interrupted by the routing maintenance program to repair, on-demand driven routing protocol of the biggest advantages is that it only when there are communication needs to establish routing, do not need to be periodically broadcast routing control message, saves valuable bandwidth resources. The disadvantage is the data session due to waiting for

routing to create certain access latency. Now common on-demand driven Routing protocol including temporary sequential TORA Routing Algorithm (Temporally Ordered Routing Algorithm), Based On the Cluster of CBRP Routing protocol agreement (Cluster -based Routing protol) and Dynamic Source Routing protocol DSR (Dynamic Source Routing), on-demand distance vector Routing protocol AODV (On - DemandDistaneeVeetorRouting) and so On. Active and on-demand driven routing protocol belong to a single path routing protocols, they are committed to between the source node and destination node to seek a best path. But in the wireless self-organized network, due to the change of network topology path failure phenomena often occur, causing frequent routing maintenance process. Multipath routing protocol is refers to between the source node and destination node creating multiple transmission path, and allows the nodes choose how to use these paths. The presence of multipath routing mechanism not only can reduce the frequent routing maintenance frequency, but also can realize load balance on multipath! Bandwidth polymerization mechanism, *etc*. Several kinds of Multipath Routing protocols are present in a single path Routing protocols such as AODV and DSR and extended On the basis of, such as on-demand Multipath Distance Vector Routing protocol AOMDV (Adhoc On - demand Multipath short Vector) backup, on-demand Distance Vector Routing protocol AODV - BR (AODV Baekup Routing), divided Multipath Routing protocol SMR (splitMultipathRouting) and so on.

2. Related Works

A lot of literature put forward opportunity store-and-forward mechanism to combat fading characteristics of wireless channel. Opportunity forwarding mechanism is the core idea is for each data packet is not fixed transmission path, each candidate forwarding nodes may become the next jump forward from the current node, as to who are the real forward, according to a certain decision criteria to determine that it can use in the process of packet forwarding a large number of potential instantaneous link to forward the packet. Opportunity when forwarding mechanism is very suitable for wireless link quality degeneration, just keep there are quite a number of nodes, there are at least one node to forward the data packet.

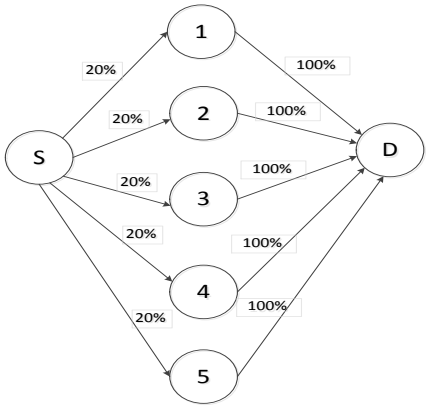


Figure 1. Opportunity Forward Schematic Diagram

Analysis: refer to Figure 1 set link (x, y) delivery probability P (x, y), the source node to relay node 1 S, 2, 3, 4, 5, link the delivery rate of 20%, from the relay node to

the destination node D link delivery rate of 100%. Using traditional routing mechanism, no matter which path to choose, a data packet from the source node has been successfully forwarded to the destination node delivery rate of 20% "if using the method of opportunity relaying node 1 to 5 are candidates for forwarding relay nodes, then forward to complete end-to-end delivery rate for (l-(l-20%)5)=67%, The process involves the source node to the delivery of relay node and relay node to the destination node delivery two process. Arbitrary data packet routing to the source node success probability of a next hop node was 67%, and success will be selected by the relay node data packet delivery to destination node probability of 100%. But it is important to note that if you have more than one relay node received data packet from the source node must be selected by a relay node to continue the data packet forwarding "here needs a mechanism for determining the forwarding nodes according to specific rules" or if multiple data source node grouping of relay nodes are involved in to continue to forward the data packet, is bound to the introduction of group data redundancy transmission or data packet collisions, occupy the excess bandwidth, lead to more problems. Forward above is only include a chance of communication process as an example to illustrate the functions and characteristics of forward opportunity. If the network packet delivery needs through multiple hops, forward the opportunity many times to complete, realize the opportunity forward routing protocol will face more problems, Such as: how to establish effective candidate forwarding node set problem, forwarding node determine strategies (redundant forward to avoid the problem), data packet collision problem solving, *etc.*, these problems are opportunities for forwarding mechanism is the key problem. In the design and implementation of opportunity forward strategy of routing protocols, should according to the specific indicators of network requirements and characteristics of network design, the key technology in the corresponding implementation strategy, such as the validity of the routing protocol, reliability, and the load of routing protocols, compatible with existing MAC layer protocols, whether can use the network state information, whether to support code function, whether can use the node location information such as "is based on the key technology of implementation is different, the way of opportunity forward routing protocol can be divided into the following five categories: the establishment of the candidate forwarding node set in a different way, the determination of optimal forwarding node in a different way, determine the forward and forward probability based on topology, based on the position and the choice of candidate forwarding node set and whether to adopt network coding.

3. Routing Algorithm

Simple opportunity to SOAR execution adaptive routing algorithm in addition to maintaining a shortest path between source and destination, each node should also maintain the local forward list (this mechanism to support the existence of the business flow, namely node priority is a priority, within the scope of local rather than the end-to-end priority, for all the business flow of node's priority is the same), updated list for forwarding node and its priority order cycle (sending a probe packets per second to calculate the node to the adjacent nodes link ETX); Forward the establishment of the node list employing sophisticated search algorithm to forward the node node list is limited to the source! To couple the shortest path between a range of nearby. Is used for the data packet forwarding nodes according to the priorities set delay timer, the method of high priority to low priority nodes forward linear reduce waiting time, this routing algorithm with extreme opportunity is similar; Using the network layer by jumping to

confirm the mechanism of explicit confirmation message reply ACK mechanism to avoid data packet retransmission; But this kind of mechanism is very complicated, simple opportunity to SOAR execution adaptive routing algorithm in order to avoid to confirm each data packet and produce a large amount of control overhead, the selective mechanism, that is only to confirm happen out-of-order data grouping nodes before after receiving the confirmation will think out-of-order data grouping have sent successfully; In selective confirmation mechanism on the basis of using the confirmation message ACK compression and in data packet from the mechanism, if you did not receive any response within the allotted time, the data packet retransmission, maximum retransmission times for 3. Adaptive routing algorithm SOAR execution in extreme simple choice.On the basis of the routing algorithm improved to opportunity forward routing mechanism to support the existence of the business flow, and do not use in batches of transmission, and added to the data packet retransmission mechanism "but simple chance to adapt to the routing algorithm SOAR execution when determining node priority still used the ETX real-time measurement mechanism, and still USES the priority scheduling time forwarding mechanism, which limits the opportunity store-and-forward mechanism of extensibility and flexibility, assumes that the node density is large, is to determine the priority of trival, and node forwarding timer time will be extended.

Extreme opportunity "routing algorithm in order to improve the data in the Ad hoc network throughput and opportunity store-and-forward mechanism is put forward, which adopts the method of partial delivery. The sending node before sending a batch of grouping based forwarding node set, and follow the distance from the destination node for centralized forwarding node prioritization. When the packet forwarding head has to carry by priority sorted candidate forwarding node set. Extreme opportunity "routing algorithm with node to the destination node when forwarding the message the expectations of the transmission frequency to determine each intermediate node forwarding priorities, the priority is a global priority, with the lowest ETX value forward candidate forwarding node with the highest priority. Send is to carry on data grouping, each group contains a fixed number of data packet, the data packet in the head with a set of candidate of this data packet forwarding nodes region and a batch of bitmap region, guangdong

Hair concentration of the intermediate nodes will be received for your group data for a record (mainly the data packet number stored in the position of figure or about the bitmap information according to the received this update status chart) and timing of data packet forwarding; Timer Settings according to node priority setting, the highest priority nodes shortest regularly, it estimates the source node sends out the entire data packet will be forwarded immediately after the batch of received data packet, and in the package of the bitmap area indicate the highest priority node ID and the serial number of packets forwarding, other nodes with the received data packet bitmap chart updated our status, or if it is a higher priority node forwarding a serial number of the package is documented, or inaction; Stay your timer to constantly, according to the bitmap forward is not a higher priority node forward before the rest of the pack, and will carry the latest local bitmap in the data packet. Extreme opportunity routing algorithm that stipulated in the "if the node status through this figure found this batch package with more than 90% of the data packet is a higher priority node forwarding, it won't be for the rest of the data packet forwarding; When the source node group found that more than 90% of the data has been higher priority nodes forward, after the traditional route for the remaining 10% of the data packet forwarding. Source node in after sending the first data packet,

and then to the second batch of data packet sent. Extreme opportunity "routing algorithm proposed based on the idea of opportunity forward than traditional routing mechanism. Very big superiority, but its implementation still have defects ", for example, its strict and tedious forward priority setting mechanism and timer mechanism, making it difficult to support multiple flows in the network at the same time there (i.e. each node has different priorities for different flow, when for different flow priority conflict how to do it, and when the flow number too much, no operability); its data packet transmission will introduce several large time delay, is not conducive to delay sensitive transfer of the business, the grouping of data transmission for more than 90%, and adopts the traditional route to transport in more routing to establish the time delay is introduced.

Geographical random GeRaF forwarding algorithm is proposed for Ad hoc and wireless sensor network of a kind of typical random grouping store-and-forward mechanism, the implementation of the it combined with energy-saving dormancy mechanism of nodes. Related literature includes three articles, respectively introduces the geographical random GeRaF forwarding algorithm basic idea and dance performance, more energy and time delay performance of equilibrium problems, conflicts at the MAC layer to avoid problems. Geographical random GeRaF forwarding algorithm is a kind of based on node location information known a packet delivery mechanism, it does not establish an end-to-end forwarding node set, using two separate frequency channel, the control channel is used to transfer control message, data channel is used to transmit data grouping. Sending nodes to send data packet contains the destination node location information and their location information, before sending the data packet, with control channel broadcast a RTS message, first in its neighbor regions node competition reply CTS message, the sending node right after receiving a CTS message will be delivered successfully the CTS news of nodes selected as the next-hop relay nodes, and then the data packet is sent to the node, after receiving the data packet, the relay node to reply a confirmation message ACK to sending nodes, then the relay node to the next round of data packet forwarding, forward other neighbor nodes to give up. Among them, the best relay node selection process is a complex process, when the receiving node receives the RTS, according to the RTS news contained in the source! Destination node and its location information to calculate with the distance of the destination node, according to distance judgment belongs to which priority area (the higher the closer distance destination node priority) is divided into several steps: (l) node with the highest priority in receiving Rl, S first response time response CTS message, if the sending node success receive CTS will this successful send CTS as a best nodes, send its data packet; (2) if the reply in the first time is not yet received the CTS radio/CONTINUE0 message, then in the second priority areas of node reply CTS, with the remaining steps (l); (3) if the messages are received, but it is not correct CTS shows a collision happens, the radio/COLLISION0 message, the receiving node to start the conflict resolution mechanism, forward to retreat or probability to reinstate the CTS, until the sending node received the CTS. The random forwarding mechanism is equivalent to in the process of data packet forwarding temporary forward to determine the best of the next-hop node, basic won't produce redundant forward.

Articles correctly in hypothesis system always choose the best under the premise of relay nodes randomly forward geographical GeRaF mechanism will packet from the source node to destination node average hop count was analyzed, and the analysis results show that the average chance forwarding mechanism takes the hop with the distance between the source to the destination node related to participate in forwarding

node average neighbor node number, that is related to connect and the length of the node density. If a connection for the length of the D (set maximum transmission range for a unit of length, node set each intermediate node can reach the maximum transmission range when the source to the destination node, the length of the length of the unit for connection between the minimum hop count between the source to the destination node), is when the nodes density is infinite average hop count converges to D+l. In this paper, theoretical analysis is verified with simulation accuracy, and compared the geographic random forwarding algorithm GeRaF forward than other constraint mechanism of superiority.

4. The Network Layer to Confirm Retransmission Routing Mechanism

In this paper, we study the routing mechanism of draw lessons from the thoughts of forwarding of opportunity, does not establish a specific path before forwarding data grouping, but according to the given (source and destination nodes) node pair to choose a candidate of the data packet forwarding forwarding node set. Candidate forwarding nodes according to the distance to the destination node for simple prioritization, a total of five levels; Candidate in the first time after receiving the data packet forwarding node will forward, forward before each node to a random delay, which do not use strict time delay according to the priority scheduling mechanism; This mechanism avoids the complex time scheduling algorithm, reduces the time delay, and can support concurrent business flow, and data packet confirm retransmission mechanism is higher or equal priority strategy, that is listening to the same or higher priority node package will be considered a confirmation message, if you don't listen to the same or higher priority packages nodes in the retransmission timer retransmission timeout after; This mechanism in the middle node is not set explicit ACK confirmation message, thus greatly save the control load ", the author implements the routing mechanism in NS2, said in the introduction of the radio to confirm this mechanism for the network layer opportunistic routing mechanism NWB - OP (network layer broadcast and OPPortunity):

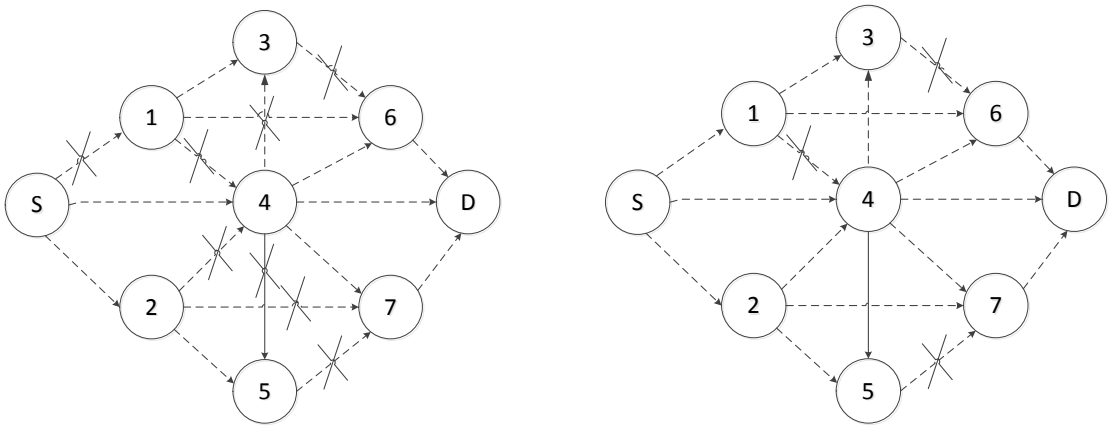
4.1. Forward List Set Up Process

Each node has a forward list cache, equivalent to the routing table "in the traditional routing network layer routing mechanism NWB radio and identify opportunities - OP source routing mechanism was used to construct forward list, radio source node routing request message RREQ, intermediate nodes forward routing request message RREQ, RREP reply destination node routing reply message. Intermediate node can jump on from different nodes of the same RREQ message forward 2 times, to ensure that can collect more forwarding nodes. The RREQ destination node for each received message to reply, according to the records in the baotou path to return to the source node.

The following examples: in Figure 2 (a), (b) the two charts respectively expressed intermediate node for the same RREQ of when a forward with a different number. In Figure (a), S and D is the source node and destination node respectively, S broadcasting RREQ message to D, before the middle node receives the RREQ when it first determines whether received the RREQ, if has received a RREQ will be discarded, otherwise it will be the radio again. After two rounds of radio D has received the RREQ, S (l, 4, 2) in the first round, the second hypothesis forwarding order is 4, 2, l, is 4 (6 D, 7), 2 (4,7,5), 1 (3,6,4), according to the rules of the same RREQ forward only once, in the node 4,7,6 deals only with the first receive RREQ, so there are three RR who

arrived at the destination node D Q, the corresponding path is S4D respectively, S46D, S47D "source node to build forward list for (S, 4, 6, D)"

In Figure (b), intermediate nodes to forward from different jump neighbors on the same RREQ 2 times, more than 2 times to discard the received the same RREQ "again after two rounds of broadcast destination node RREQ, have been received in the first round of S (l, 4, 2), the second hypothesis forwarding order is 4, 2, 1, it is 4 (6 D, 7), 2 (4,7,5), l (3,6,4), due to the nodes for the same RREQ can forward 2 times, therefore, node 4,7,6 place will be the second broadcast of the RREQ, thus reach D path for six, of S16D respectively, S46D, S4D, S24D, S47D, S27D, the source node to construct the forward list as the (S, 1,2,4,6,7, D), forwarding a list of priority arrangement plan according to related literature, the forward list set up only in the original DSR routing mechanism on the basis of a little modification, simple operation and high efficiency, end-to-end based time delay is small.



（a）The Biggest Forwarding Number is 1 （b）The Biggest Forwarding Number is 2

Figure 2. RREQ Forward Schematic Diagram

4.2. Data Packet Forwarding Process

Data packet forwarding process as shown in Figure 3: when the source node has data packet to send, check local forward list cache, if the cache to a given destination node forwarding list entry, initiated the process of creating forward list "if there is to the destination node forwarding list entry, is to forward the corresponding list items attached to the data packet head and broadcast data grouping, each source node to create a data packet will be increasing to endow them with a serial number, a serial number for a (source, destination) is the only pair. The middle node after receiving the data packet will check whether or not they located in the data packet header to carry forward the list, if the grouping on data processing, is located in the intermediate node forwarding list only for the first time after receiving the data grouping random delay for forwarding, and preserve its serial number, for the second time or the NTH received data packet, it checks whether the group had already been forwarded to confirm or discarded directly. No other in the middle of a forward list focused nodes to simply discard the received data packet. Forwards because the address is the broadcast address, therefore, is located in the forwarding node can be in the list of current data grouping the next-hop node, this forwarding mechanism equivalent to have multiple the next-hop node as its forwarding data grouping, increased the probability of successful forwarding,

if multiple forward the next-hop node failed to success, or data packet collisions occur, can be confirmed by data packet retransmission mechanism to make up for.

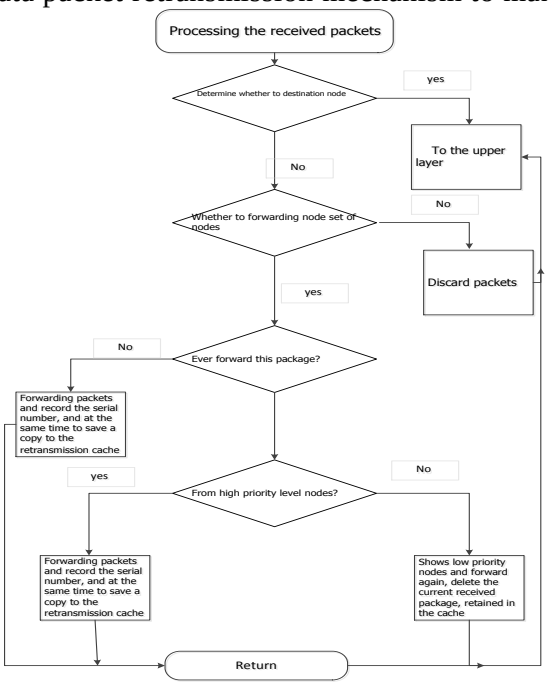


Figure 3. Data Packet Forwarding Process

4.3. Confirm Retransmission Process of Data Packet

802.11 MAC mechanism is not set to broadcast packets retransmission mechanism, broadcast packets once collision is discarded, therefore, NWB - OP to add data grouping confirm retransmission mechanism of the network layer. Group data confirm the retransmission mechanism is a priority "node after the first forwarding a data packet forward to save a copy of the group on the local retransmission cache and set a timer (timeout), if before the timer when received from the same or higher priority node, it can feel the same or a higher priority node forwarding before sending the data packet, will the retransmission cached copy deleted; if still have not received after the timer will equal or higher priority node from the data packet, the copy of the data packet retransmission cache for retransmission, until you reach maximum retransmission times, discard it, every time the retransmission waiting time is in line with the binary exponential growth" destination node after receiving the data packet radio a TTL = l explicit ACK message to alert the node around it have received data packet, receives this confirmation packet retransmission nodes will be located in the node delete the cache in the same package. This confirmed the retransmission mechanism make full use of the radio characteristics of wireless channel, not to introduce significant control overhead.

4.4. Update Process of Forward List Items

When a local forward forward a list entry in the list buffer is not used to a certain time, is that it has already expired, when there is a new data packet arrival, if the forward list yourself after a period of the new forward list build process "for ongoing communication, forwarding list update cycle, cycle length according to change of

network topology, the topological degree changed can be used in a short update cycle, the degree of change hours longer update cycle can be used. The network layer routing mechanism NWB radio and identify opportunities - OP using the radio characteristics of wireless channel transmission, through the broadcast data packet routing layer solves the unicast routing protocol next jump suddenly unreachable problem, using serial mechanism to avoid the redundancy of the data packet forwarding, increased the confirmation delivery failure data packet retransmission process.

5. Simulation Results

Using NS2 simulation tool and Nakagami -m wireless channel model verification for radio network layer routing mechanism NWB opportunity - OP a lot as well as the comprehensive simulation, including different node density scene! Different channel quality! Rate of different business three aspects "at the same time as the simulation the traditional single path routing protocols DSR in the three aspects of performance, by comparing with NWB - OP" specific parameters of the simulation are shown in Table 1, by setting up multiple random seed for each scenario simulation for many times, respectively from the group average end-to-end delay, packet delivery ratio and routing control message overhead assessment in three aspects: the two kinds of routing mechanism of network performance.

Table 1. The Simulation Parameters

Physical layer	DS-CDMA	Channel Transmission Model	Nakagami-m
MAC layer	802.11DCF	Simulator Time	500S
Channel Bandwidth	11Mbps	Service types	On-off
Basic Rate	1Mbps	Packet Size	512Bytes

Nakagami -m model is a new development of NS2, and add a wireless channel model, it can be used to simulate the time-varying characteristics of wireless channel, set the channel with different distance of different degree of decline, at a given distance from the point of the received power strength in line with the gamma distribution, thus has no fixed transmission range of each node "relative to existing in NS2 Shadowing and Two - rayground model, Nakagami -m models have more configurable parameters, makes it possible to more accurately simulate the wireless communication channel" in Nakagami - m channel model, a total of 10 configurable parameters, including gammao, g/mmal, gammaZ signal on the corresponding distance attenuation, the average do_gamma_ cut-off and d1_gamma_ are different gamma value; MomlmZ said the decline of the wireless signal on the corresponding distance, do_m_ and d1_m_ cut-off is the distance between different values of m, at a certain distance of the received signal power value is the attenuation of the signal path and decline the result of joint action.

The simulation results as shown in Figures 4 to 5, said channel level 1 in the 50 m from ZOm and are the Rayleigh fading channel. As can be seen from the figure 4, when the channel quality for level 1, DSR delivery rate is greater than NWB - OP, but when the channel quality becomes poor, especially in the back of three kinds of channel level, network layer routing mechanism NWB radio and identify opportunities - OP can maintain a very stable delivery rate, and delivery performance of DSR protocol rapidly deteriorating. This is because the wireless channel parameter variation, link between envoys point not reliability enhancement, may cause the DSR routing is not available, just set up so that the communication interrupt! The packet is discarded. And NWB - OP data packet is through multiple the next-hop transmission, when one link failure,

through other link transmission data packet can still not lead to loss of data packet. So, the network layer routing mechanism NWB radio and identify opportunities - OP in poor channel parameters can reflect its advantage more.

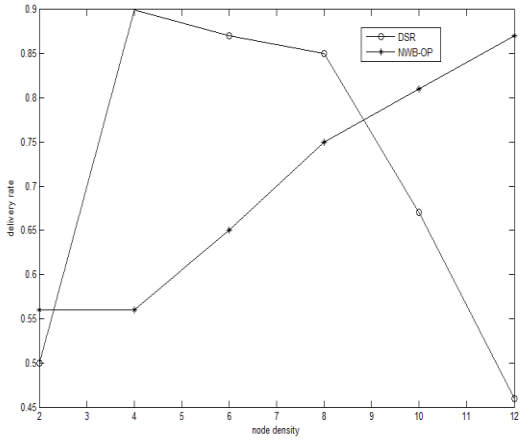


Figure 4. Delivery Rate Under Different Density

As can be seen from the Figure 5: as the channel variation in the quality of the DSR protocol increases the average end-to-end delay, and significantly higher than the NWB - OP, in under three kinds of channel parameters, the average end-to-end delay is beyond the limits of certain business application can tolerate; And NWB - OP group average end-to-end delay under most of the channel parameters are less than 50 ms, 1-3 orders of magnitude than the DSR improves. Because of the wireless channel parameter variation makes the link between node failure probability increase, increase the probability of reconstruction of the DSR routing, by rerouting the time delay makes the average end-to-end delay of both rise. And NWB - there are no routing maintenance concept in OP, as long as there is can take advantage of the node and the forward list can participate in the forward, and the path reconstruction without traditional routing delay.

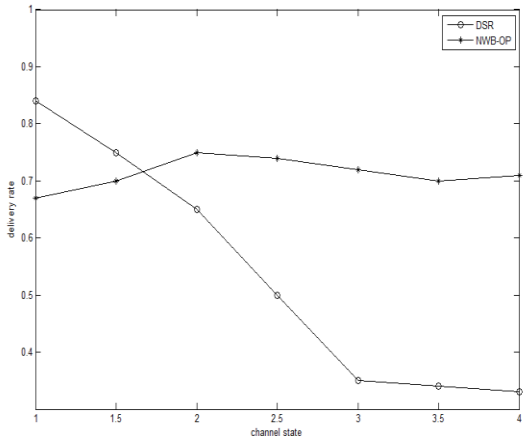


Figure 5. Packet Delivery Ratio under Different Channel State

6. Conclusion

In this paper, from the Angle of the forward path and the random path analysis is applied to wireless Adhoc routing protocol performance, this kind of routing protocol is also studied and analyzed in the flat, quasi-static fading channel characteristics, points out the existing disadvantages of the simple network layer confirm retransmission opportunistic routing protocol NWB - OP, and carries on the comprehensive performance simulation and analysis

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