A PROFICIENT AND TENABLE THREE-HOP ROUTING PROTOCOL IN HYBRID WIRELESS NETWORK

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ABSTRACT

Hybrid wireless networks collecting the recompense of both mobile ad-hoc networks and wireless networks have been getting distended consciousness due to their ultra-high concert. An efficient information direction-finding practice is central in such networks for high network capability and scalability. However, most steering protocols for these networks apparently combine the ad-hoc multiply mode with the cellular spread mode, which inherits the drawbacks of ad-hoc communication. Distributed Three hop Routing protocol (DTR) along with Register Mechanism Routing Protocol (RRP) is proposed to improve the capacity of hybrid wireless networks. To take full enhancement of the wide-ranging base stations, DTR divides a statement data flow into segments and transmits the segments in a detached manner. It makes full spatial use again of a scheme via its high rhythm ad-hoc boundary and improves mobile opening overcrowding via its cellular edge. In addition, distribution segments to a number of base posting concurrently increases throughput and makes full use of widespread base stations. In addition, DTR considerably reduces overhead due to short path lengths and the abolition of route uncovering and preservation. DTR also has overcrowding control algorithm to avoid overcrowding base stations. Hypothetical analysis and imitation results show the advantage of DTR in decision with other direction-finding protocols in conditions of throughput capability, scalability and mobility flexibility. It uses RRP algorithm for additional routing in the network. Each antenna node in the arrangement will swap over information concerning its own environmental address and the status of power supply with one a different, save all applicable information, and set up a Neighbor Information Table (NIT), which will after that be utilized for future operations.

Keyword: - *Congestion control, Hybrid wireless networks, Load balancing, Routing algorithm, Throughput.*

1. INTRODUCTION

Over the earlier period, wireless networks and Mobile ad-hoc networks (MANETs) have disturbed important research interest. The increasing yearning to increase wireless complexability for high performance applications has optimistic the maturity of hybrid wireless networks. A hybrid wireless network consists of jointly a transportation wireless network and a mobile ad-hoc network. Wireless devices like smart-phones, tablets and laptops, have both a transport crossing point and an ad-hoc interface. As the amount of such negotiation has been mounting sharply in recent years, a hybrid transmission structure will be generally used in the close to prospect.

It makes the potential support of widespread network connectivity and ever-present computing by incorporate all kinds of wireless campaign into the network. In an infrastructure network, nodes exchange a few words with each other through base stations (BSes). A hybrid wireless network synergistically combines an infrastructure wireless network and a mobile extemporized set of connections to manipulate their compensation and overcome their shortcomings, and finally enlarge the throughput capability of a wide-region wireless network. A routing protocol is a critical component that has an effect on the throughput capacity of a wireless network in data transmission.

Most present routing code of behavior in hybrid wireless networks simply come together the cellular transmission mode (i.e. Base Station transmission mode) in infrastructure wireless networks and the extemporized transmit method in movable ad-hoc networks. That is the protocols use the multi-hop routing to forward a message to the mobile opportunity nodes that are closest to the BSes or have the maximum bandwidth in the direction of the BSes. The bandwidth of a channel is the greatest throughput (i.e., transmission rate in bits/s) that can be accomplished. The mobile opportunity nodes then forward the messages to the BSes, implementation as bridges to connect the ad-hoc set of connections and the connections network. However, direct incorporation of the two relay modes comes into the following troubles that are entrenched in the ad-hoc broadcast mode, Low dependability, Dynamic and long direction-finding paths lead to untrustworthy routing.

The number of routing hops in DTR is restricted to three, together with at most two hops in the ad-hoc broadcast mode and one hop in the cellular broadcast mode. DTR also has a congestion control algorithm to balance the traffic load jammed stuck between the nearby BSes in organize to keep away from traffic overcrowding at BSes. Using self- adaptive and disseminated direction-finding with high velocity and diminutive pathway ad-hoc transmission, DTR significantly increases the throughput capacity and scalability of hybrid wireless networks by triumph over the three shortcomings of the preceding routing algorithms.

2. RELATED WORK

To increase the capability of hybrid wireless set of connections, a variety of direction-finding methods with different skin texture have been proposed. One group of routing methods amalgamates the ad-hoc broadcast mode and the cellular broadcast mode [1, 2]. Lin et al. [5] proposed a new multi-hop cellular architecture for wireless communications. Dousse et al. [6] built a Poisson Boolean model to study how a BS enlarges the competence of a MANET. Hsieh et al. [14] investigated hybrid IEEE 802.11 network architecture with both a disseminated harmonization function and a point harmonization function. Luo et al. [1] proposed an amalgamated cellular and ad-hoc set of connections structural design for wireless communication. Cho et al. [16] studied the impact of simultaneous broadcast in a downlink way (i.e. from BSes to mobile nodes) on the system capability of a mixture wireless network. Here a node initially exchanges a few words with other nodes using an ad-hoc broadcast mode, and switches to a cellular broadcast mode when its presentation is better than the ad-hoc broadcast.

The above methods are used to assist intra-cell ad-hoc broadcast rather than inter-cell broadcast. In inter-cell broadcast [1, 5, 6], a communication is frontward via the ad-hoc interface to the entryway mobile node that is neighboring to or has the highest uplink broadcast bandwidth to a BS. The entryway transportable node then forwards the communication to the BS using the cellular boundary. The Two-hop transmission protocol [19] is used in terms of the removal of route preservation and the inadequate amount of hops in routing. In two-hop, when a node's bandwidth to a BS is better than that of each national, it unswervingly sends a communication to the BS. Otherwise, it decides a neighbor with a privileged control and sends a communication to it, which further forwards the significance to the BS. In contrast, Two-hop makes use of single-path broadcast. There is other method proposed to improve direction-finding presentation in hybrid wireless networks.

Wu et al. [3] proposed using ad-hoc communicate stations to animatedly relay interchange from one cell to another in categorize to avoid traffic congestion in BSes. Li et al. [20] surveyed a number of multi-hop cellular network (MCN) structural design in literature, and compared and described methods to trim down the cost of consumption for MCNs. The throughput capability of the hybrid wireless network under dissimilar situation has also been an active investigate theme in the hybrid wireless network. The work in [17] considered the throughput of hybrid network with n nodes and m location. Liu et al. [23] hypothetically studied the capability of hybrid wireless set of connections under an unsophisticated arrangement topology and a two dimensional narrow piece methodology.

3. DISTRIBUTED THREE-HOP ROUTING PROTOCOL

3.1 Assumption and Overview

Since BSes are coupled with a wired strength of character, it shows that there are no bandwidth and power limitation on broadcast flanked by BSes. Transitional nodes are used to indicate relay nodes that function as gateways concerning an infrastructure wireless set of connections and a mobile ad-hoc arrangement. Every movable node is

dual-mode; that is; it has ad-hoc network interface such as a WLAN radio interface and infrastructure network interface such as a 3G cellular interface.

The main goal of DTR is to reduce the routing burden from the ad-hoc network to the infrastructure network by taking advantage of widespread base stations in a hybrid wireless network. Instead of using one multi-hop path to send a message to a BS, DTR uses at most three hops to send a message as segments to different BSes in a distributed manner. When a source node wants to send a message to a destination node, it divides the message into several segments and transmits each segment through neighbor node based on the Quality of Service (QoS) requirement of the application. The neighbor nodes further forward the segments in a distributed manner to nearby BSes. The final BS rearranges all the segments into the original and sends the message to the destination.

In DTR, the data routing process is divided into two steps: Uplink data routing is defined to uplink the data from the source node to the first base station and forward the message to the final base station. Downlink data routing and data reconstruction is defined to downlink the data from the final base station and rearrange the message segments in the right order so that a destination node receives the correct data.

3.2 Uplink Data Routing

A long direction-finding path will show the way to high overhead, hot spots and low reliability. Thus, DTR tries to boundary the path length. It uses one hop to frontward the part of a communication in a disseminated manner and uses another hop to find high-capacity forwarder for high performance routing. As a result, DTR restricts the path distance of uplink direction-finding to two hops in order to avoid the troubles of long-path multi-hop direction-finding in the ad-hoc set of connections. Specifically, in the uplink routing, a source node initially divides the message stream into a number of subdivision, then broadcast the division to its neighbor nodes. The neighbor nodes forward subdivision to BSes, which will forward the segment to the BS where the destination resides. When a source node sends out the message segments, it chooses the neighbor node which has enough space for storin g a segment and then chooses the neighbors that have the highest capacity. When choosing a neighbor node for data transmission, a node needs the capacity information (i.e., queue size and bandwidth) of its neighbor nodes.

3.2 Downlink Data Routing and Data Reconstruction

As mentioned above, the message stream of a source node is separated into several subdivisions. Subsequent to a BS take deliverance of a part, it needs to frontward the segment to the BS, where the target nodes reside (i.e., the destination BS). Transportable IP protocol [24] is used to enable BSes to be acquainted with the target BS. In this procedure, each movable node is connected with a residence BS, which is the BS in the node's home network not considering of its present location in the network. The home network of a node contains the registration information identified by its home address, which is a static IP address assigned by an ISP. When a mobile node m_i moves away from its home BS, the BS where m_i currently resides detects m_i and sends the IP address to the home BS of m_i. When a BS wants to contact m_i, it contacts the home BS of m_i, to find the current location where the m_i resides at.

For occurrence, data is transmitting to BS B_i that has the data's target, but the destination has moved to the choice of BS B_j before the data reach the destination at BS B_i. In the direction of deal with this trouble, we espouse the Cellular IP protocol for footpath node position. With this set of rules, a BS has a home agent and a foreign agent. The foreign agents keep track of movable nodes moving into the other BSes. The home agent interrupts received segments, reconstructs the original data, and re-routes it to the foreign agent, which then frontwards the data to the target movable node.

Subsequent to the target BS takes delivery of the segments of a communication, it reschedules the subdivision into the unique communication and then throws it to the target mobile node. A vital issue is guaranteeing that the subdivision is collective in the accurate order. For this purpose, DTR indicates the subdivision arrangement format. Each subdivision includes eight fields, followed by:

(1) Source node IP address (denoted by S);
(2) Destination node IP address (denoted by D);
(3) Message sequence number (denoted by m);
(4) Segment sequence number (denoted by s);

(5) QoS indication number (denoted by q);
(6) Data;
(7) Length of the data; and
(8) Checksum.
Fields (1)-(5) are in the segment head.

The source IP address is to inform the destination node where the message comes from. The destination IP address denotes the destination node, and is used to denote the final BS. The message sequence number differentiates the different messages initiated by the same source node. The segment sequence number is used to reorder the segmented message to the original message in the destination node. The data is the actual message that the source node wants to send to the destination node. The length field indicates the length of the DTR segment including the header in bytes. The checksum is used by the receiver node to check whether the received message has any errors. The QoS indication number is to indicate the QoS requirement of the application. Thus, each segment's head includes the information represented by (S, D, m, s, q) (m, s=1, 2, 3…). Once all the segments received at the destination node it reorders the segments to retrieve the original message.

4. PREVIOUS ANALYSIS

Though no intervention exists flanked by intra-cell, uplink, and downlink traffics, interference exists flanked by the similar types of interchange in a cell and flanked by different cells. Unlike most presented routing set of rules, DTR manufacture considerably lower transparency by eradicate route breakthrough and continuation. In addition, its unique personality of short pathway distance end to end, short- detachment broadcast, and balanced load allocation provide high direction-finding dependability and competence.

5. IMPLEMENTATION

In systematize to make bigger the competency of hybrid wireless networks; a variety of routing methods with different facial manifestation are put into practice. Planned a Multi-hop Cellular Network and resulting its throughput. The system architecture is shown as Fig 1. Hsieh scrutinize hybrid IEEE 802.11 network structural design with both a scattered synchronization purpose and a point management function. It recommends an incorporated cellular and ad-hoc arrangement structural design for wireless announcement. Deliberate the accident of concurrent transmission in a downlink direction (i.e. from BSes to mobile nodes) on the organization capacity of a hybrid wireless network. There are supplementary methods projected to improve direction-finding performance in hybrid wireless networks. An accretion and backup algorithm is proposed, which is an aggregate of biogenetic algorithm and brand circulation algorithm. In this cardboard recommend an algorithm accretion and backup algorithm that augment the strength of character if sensor nodes are abeyance i.e. sensor nodes do not accept array ability and sensors.

If activity time alcove their alternative beginning quantity RRP algorithm alter those feeler nodes acclimated the reused getting hold of paths but not alone encouragement is as well concentrated. Progress the wireless sensor collection natural life and abate the sensor protuberance exhausted price tag. This manuscript recommend RRP algorithm on brand transmission algorithm join together with the biogenetic algorithm for re-establish the sensor nodes if some of the sensor nodes are power cut. This algorithm can accord the boyhood of replacing sensor nodes and as well added acclimated acquisition paths called as RRP. This algorithm generates the brand amount and acquisition table, a set of bracket together nodes and burden quantity bicentenary sensor node.

Using self-adaptive and distributed routing with high-speed and short-path ad-hoc broadcast, DTR considerably increases the throughput capability and scalability of hybrid wireless set of connections by conquer the three inadequacies of the preceding routing algorithms. It has the following Features:

- Low Overhead - It eliminates overhead caused by route detection and continuation in the ad-hoc broadcast mode, especially in a self-motivated environment.
- Hot spot reduction - It alleviates traffic congestion at movable entryway nodes while makes full use of guide possessions through a disseminated multi-path communicate.
- High reliability - Because of its diminutive hop path distance end to end with a short substantial detachment in each step, it improves noise and neighbor interfering and avoids the difficult effect of route breakdown for the duration of data broadcast.

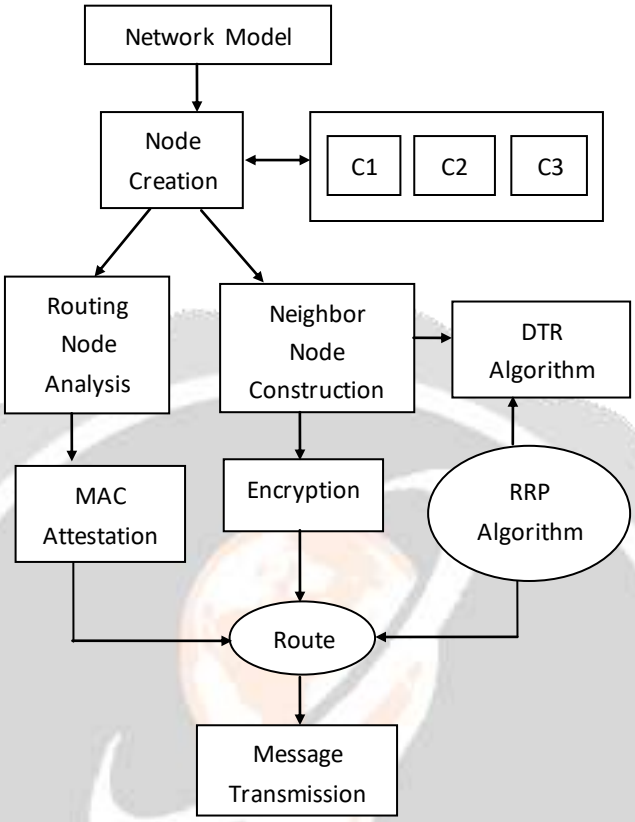

Fig -1 System Architecture

5.1 Distributed Three-Hop Routing Protocol (DTR Algorithm)

Step 1: The source node divides the message into several segments.
Step 2: Source node contribute to the subdivision to the close to (first) Base Station.
Step 3: Subsequent to a Base station take delivery of the subdivision needs to frontward the target node.
Step 4: DTR choose the neighbor node based on the Capacity (each node periodically exchanges their capacity level).
Step 5: The neighbor node broadcast the subdivision to Final Base station (near for Destination).

Since the messages are broadcast in wireless channels and through lively routing paths, mobile ad-hoc networks are not as trustworthy as transportation wireless networks. Furthermore, for the reason that of the multi-hop communication features, mobile ad-hoc networks are only appropriate for local area data transmission.

In DTR, a starting place node divides a message torrent into a quantity of segments. Each subdivision is sent to a neighbor portable node. Based on the QoS requirement, these movable relay nodes choose between direct transmissions or relay broadcast to the BS. In relay broadcast, a section is frontward to an additional mobile node with higher capacity to a BS than the current node.

5.2 Register Mechanism Routing Protocol (RRP Algorithm)

Step 1: Start the task.
Step 2: Identify the source and destination nodes and their ID's.
Step 3: Choose a shortest path from Neighbor Information Table (NIT).
Step 4: Start Send data to destination from source.

Step 5: NIT is monitor the running task achieved properly.
Step 6: If it is a failure occurs, then NIT will change the path as shortest to destination.
Step 7: Data could be retransmitted nearby failure node in alternative path chosen by NIT to destination.

Each antenna node in the arrangement will swap over information concerning its own environmental address and the status of power supply with one a different, save all applicable information, and set up a Neighbor Information Table (NIT), which will after that be utilized for future operations, such as the collection of cluster head nodes and data distribution, in the initialization stage of the network.

6. EXPERIMENTS AND RESULTS

The primary aim of this research is to reduce the time taken to deliver the message from the source node to the destination node. The comparison between the existing approach and the proposed approach in terms of time is shown in Fig 2.

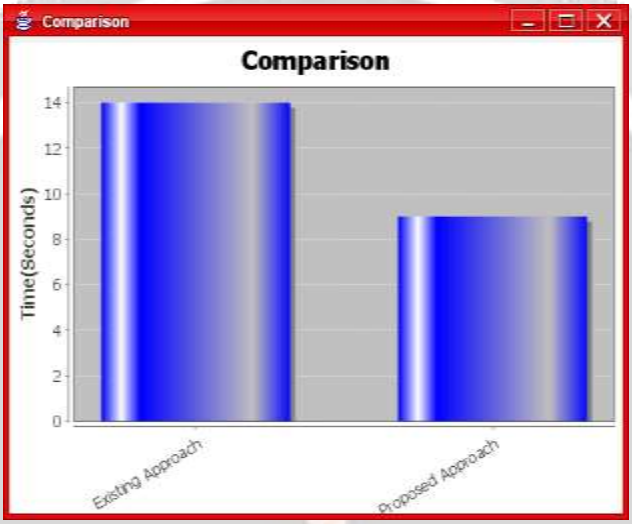

Fig -2 Performance analyses compared with existing approach in terms of time

The transmission of message has lot of issues like packet loss, network failure, data loss, node failure, etc. If any of the above problems occur in existing approach, then it will retransmit the data from the beginning. So it will take much time to deliver the message from the source node to the destination node. It is a major problem. This problem is overcome by applying DTR and RRP routing protocols. If any problem occurs while transmitting the message, then it will retransmit the data from the failure node with alternative path chosen by NIT. This reduces the time taken to deliver the message from the source to the destination. The time taken to deliver the same message in an existing approach and the proposed approach is shown in Fig 2.

7. CONCLUSION

Hybrid wireless networks have been being paid increasing attentiveness in recent years. A hybrid Wireless network combining a moving wireless network and a portable ad-hoc network control their recompense to increase the throughput capability of the system. In this proposed work, Distributed Three-hop Routing (DTR) along with Register Mechanism Routing Protocol (RRP) amalgamates the dual skin texture of hybrid wireless networks in the in sequence transmit process. DTR limitations the direction-finding path length to three and at all times put together for high-capacity nodes to advance data. Unlike most accessible routing protocols, DTR manufacture significantly lower overhead by eradicate route breakthrough and safeguarding. Speculative examination and reproduction penalty show that DTR can significantly press forward the throughput capability and scalability of hybrid wireless networks owed to its high scalability, effectiveness, and trustworthiness and low transparency.

8. FUTURE WORK

The future work is to improve the QoS in network. Three hop acquisition agreement networks could be the better results. In three acquisition agreement network the node will be reused to reduce the task. Also instead of using RRP algorithm one can use Grade circulation algorithm and Biogenetic algorithms to provide more accessory nodes if any accessory nodes breadth assemblage closing.

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