Enhancing the Quality of Services in Mobile Ad-Hoc Network Using M-QMR based on the CEDAR

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Abstract: ***The mobile ad-hoc network is a collection of mobile nodes that configure automatically and a temporary network. Only those nodes or devices can be communicated with each other that come under the radio range (wireless connection). It is a not depend upon the pre-existing or pre fixed network infrastructures. The scenario of this network is based on the intermediate nodes or multi-hop network. Topology of the network also changes because mobility nature of the network and nodes are added or removed in any. With the advancement of wireless technology, the necessary of Quality of Services is increasing rapidly. Developing QoS constraint routing protocol for MANET is still a challenging task. As routing protocol has to decide which route is able to fulfill the requirement of the desired QoS. The data transaction in MANET is called routing. Routing is the most important part to accomplish the specified application with desired QoS metrics. The main purpose of QoS aware routing is to find an optimal (best) secure route from source to destination which satisfy requirement. In this paper, we propose a QoS aware metric based protocol scheme to discovery all possible secure paths.***

IndexTerms - MANET, QoS, Link state propagation, Cross layer, CEDAR.

Introduction

The mobile ad-hoc network is a collection of mobile nodes that configure automatically and a temporary network. Only those nodes or devices can be communicated with each other that come under the radio range (wireless connection). It is a not depend upon the pre-existing or pre fixed network infrastructures [1], [7]. The scenario of this network is based on the intermediate nodes or multi-hop network [4]. The meaning of the intermediates node is to pass or forward the packet node to node within the network. In this network the source node forwards the packet directly to the destination node but location of the destination is long then data passes through the intermediate nodes.

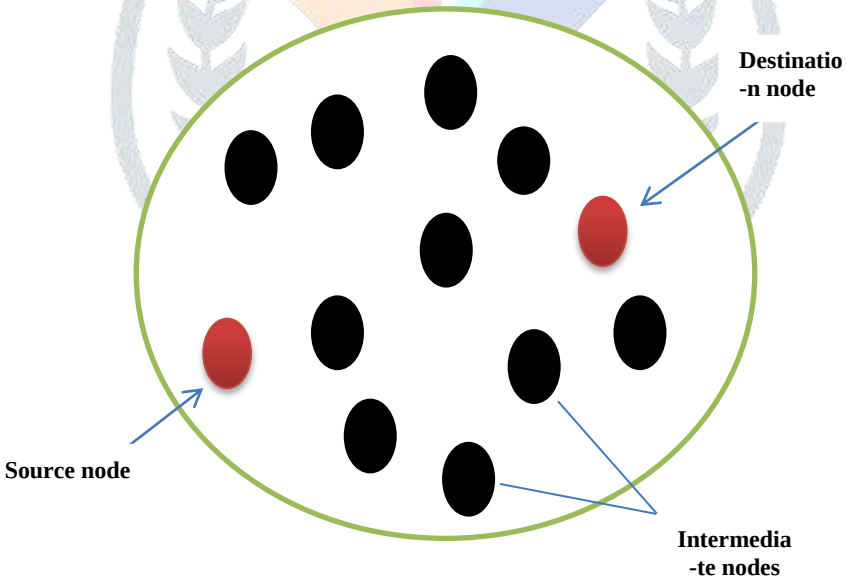

Figure1.1: Mobile ad-hoc network scenar..

The MANET is decentralized types of the network, it means that it does not depend on the centralized or pre-established network and is peer to peer network. The Topology or structure of this network is also changing because of the mobility (movements) nature of a network and nodes are added or removed any time because it is performed distributed operation and it does not depends on other nodes[4]. It is type of WANET) that provides communication between the nodes or devices. The various simulations perform the routing using the protocols and their abilities, assuming moving degrees of mobility within an area.

1.1 TERMINOLOGY –

1) **Nodes**: A set of the mobile devices with the wireless transmission capabilities are called nodes; they can join and leave the network at any time. Node -any device (router or host, mobiles) that implements using internet protocol (IP) address.
2) **Mobility:** Mobility depends on the characteristics of the user as well as the environment because here each node travels independently in the environment.
3) **Router**: A router is a device that forwards the packet. It is device that can be connect different two network
4) **Host:** Any node that is not a router. It is computer device that communicates with other devices using IP address.
5) **Data traffic:** It is possible to generate data traffic in term of open session between a pair or a group of users.

6) **Link:** A wireless connection between mobile devices. A link is connection between two terminals, formerly cabled, but now quite often RF. A link can support multiple channels.
7) **Channel:** A channel is an allocation of the spectrum (channel frequency). This kind of network is couched in environment well defined by the physical characteristics of the node, which affect both the propagation and mobility the pattern of the radio signals.

1.2 FEATURES OF MANET

There are various features of MANET as following:

a) **Autonomous node or devices**: In MANET network every terminal is a self-governing node and operates as a host or a router. Each mobile node is an independent node [1].
b) **Partitioned operations/Distributed** [20]: The nodes occupied in a MANET should co-operate each other. Every node is acting like a relay. A centralized firewall is absent here.
c) **Multi hop routing:** It is a multi-hop or intermediate nodes network. Main function of this pass the packet, that node receives who required.
d) **Light weight terminals**: Mostly mobile device is a small device that occupy small memory, battery etc.
e) **Infrastructure less:** Not connected with pre-established network.
f) **Wireless Links:** It is used for communication between devices or nodes. In wireless network used radio waves for connection.

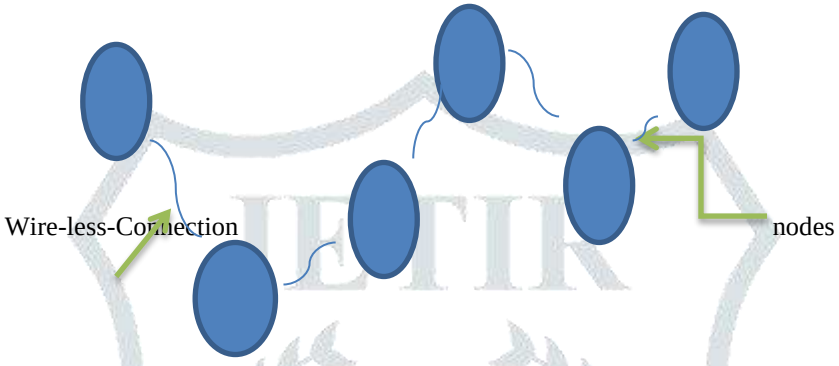

Figure 1.2: Nodes with the wireless link

g) **Dynamic topologies:** The structure of the network changes because of rapidly movement of nodes in the network
h) **Self-Configuring:** The automatically establish without using the manually interaction.

1.3 MANET challenges are:

1. **Dynamic topology:** The dynamic topology membership may disturb the trust relationship among nodes. The trust may also be distributed if some nodes are detected as compromised.
2. **Mobility –induced route change:** The network topology in an ad-hoc network is highly dynamic due to movement of nodes; hence an on-going session suffers frequent path breaks.
3. **Limited bandwidth:** Wireless link continue to have significantly lower capacity than the infrastructure network. In addition the realized throughput of the wireless communication after accounting for the effect of the multiple access, fading, noise and interference conditions etc.
4. **Packet losses due to transmissions error:** Ad-hoc wireless networks experiences a much higher packet loss due to factors such as increased collisions due to the presences of hidden terminals, presences of interference, frequently path breaks due to mobility of nodes.
5. **Battery constraints:** Devices used in these networks have restrictions on the power source in order to maintain portability, size and weight of the devices.

1.4 ADVANTAGES:

There are various advantages [1,13] of the MANET are as follows:

1. They provide access to the information of other network.
2. Cost estimation is very less and require less time as compared to wired network.
3. Independence from pre-fixed network administrations.
4. Auto create network nodes also act as routers.
5. Network can be set up any time.
6. Strong due to decentralize administration.

1.5 APPLICATIONs:

MANET is used in following areas:

1. Military
2. Wireless sensor network
3. Commercial sector
4. Local level

1. **Military battlefield:** Now a days military contains some list of computer devices or equipment [22],[1]. The modern digital battlefield demands strong and reliable communication in many forms. In the battlefield it is needed by soldiers for relaying information related to situational. It is maintaining the information among the soldiers, vehicles military information head quarter[5].
2. **Sensor Networks:** Another application of MANETs is sensor networks .This technology is a network composed of a very large number of small sensors. These can be used to detect any number properties of an area. Examples include temperature, pressure, toxins, pollutions, etc. Applications are measurement of ground humidity for agriculture, forecast of earthquakes.
3. **Commercial sector:** Ad hoc network can be used in emergency operations for disaster relief efforts, e.g. in fire, flood, or earthquake. Emergency operations must take place where non-existing or damaged communications infrastructure and rapid deployment of a communication network is needed. Data is forward from one member to another over small hand-held devices.
4. **Local Level: T**he local level application might be in conference, classroom and home networks where devices can directly exchange information etc.

1.6 QUALITY OF SERVICES –

The Quality of services can measure the network performances to check the network transmission quality and services availability [20]. The main goal of Quality of services is to make a network more deterministic. The number of packets transferred by the network should be more and reducing the routing overhead and number of packets drop in the network is less and the resources used in the network should be better utilized. The designing of that type of routing protocol which provides QoS is a challenging task[14]. The supporting Quality of services in MANETs, i.e., providing resources such as bandwidth and buffer space to real-time flows to satisfy their rate, delay, or jitter requirements, is a challenging problem. QoS can be implemented at different layers of a network and if it is implements in network layer then it is for finding the
route with required quality. The QoS routing protocol should respond quickly in case of path breaks and recompute the broken path or bypass the broken link without degrading the level of QoS.

1.7 VARIOUS QOS MODELS:

In order to provide quality of service in the ad-hoc network the following models have been proposed –Out of the following models, I have chosen the core extraction distributed ad-hoc routing (CEDAR)[12] model that provides quality of services in ad-hoc network. CEDAR models is a core extraction distributed routing models oriented to QOS in mobile ad-hoc network [26] and bandwidth as the QOS parameters is used. This model was basically designed for small and middle size network. The protocol is aimed to satisfy bandwidth requirements of a flow from a given source to a destination. This model consists of three steps namely core extraction, link-state propagation, and route computation. CEDAR is a QOS metric based single constrained routing protocol. We believe that CEDAR is a robust and adaptive algorithm that reacts quickly and effectively to the dynamic nature of the network while still approximating link-state performance for stable networks. Bandwidth is the QOS parameter interest in the cedar and also provides for effectives route re-computation mechanism for route change in on-going connections. .The core extraction distributed ad-hoc mode is provides the soft types of QOS guarantees and used the QOS metric is bandwidth. The cedar also support QoS and routing that is achievable by Modify quality of services multipath routing protocols.Qos is specify set of the parameters that can be assigned numerical values for the ability of the network to provide different services to various types of network traffic[19]. The QOS is an assurance to provide some guaranteed constrained parameters services such as delay, bandwidth, jitters and packet delivery ratio. There are various QOS routing protocols in mobile ad-hoc network to fulfill these requirements [14],[15]. The aim of a routing protocol is to discover the best route that links up two nodes while guaranteeing a QOS in communication.

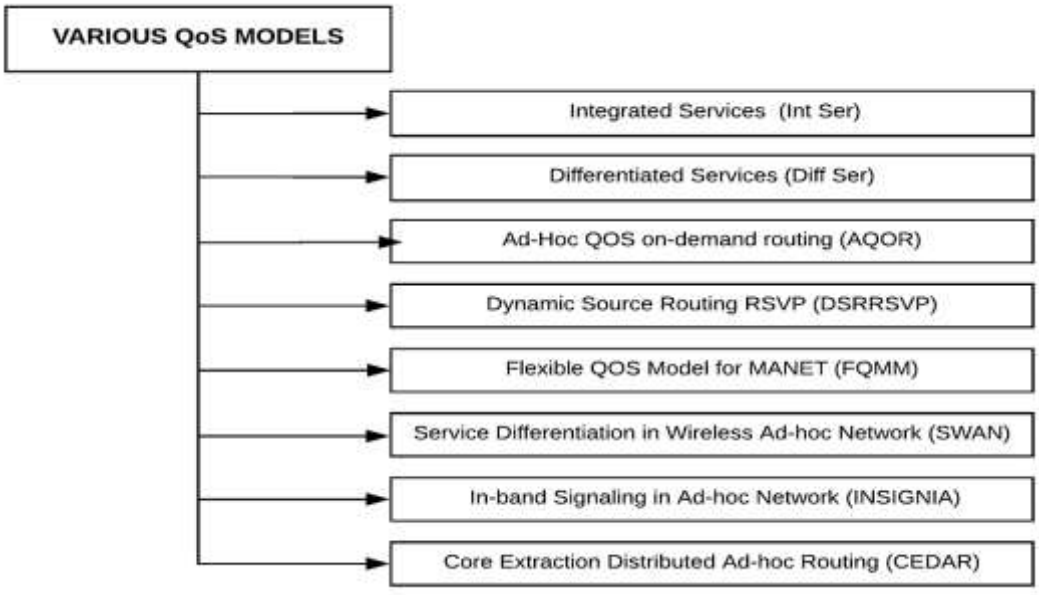

Figure 1.3: various QoS models

The cedar model combine support the routing and quality of services. It means find the route and provides the various QOS -requirement satisfaction. The cedar is based on the interaction between the routing protocol and QOS provision mechanism approaches protocol. It is closely interact with other for delivering the QOS guarantee. The quality of services provisioning is based on the two-Think one is network layer and second is cross layer. In the network layer is based on routing, control flooding and traffic aware scheme. The further based on two

path uni-path (single path) and multipath (multipath) routing. A cross layer approaches mean transfer the information between layers and we can say that communication between layers[21].

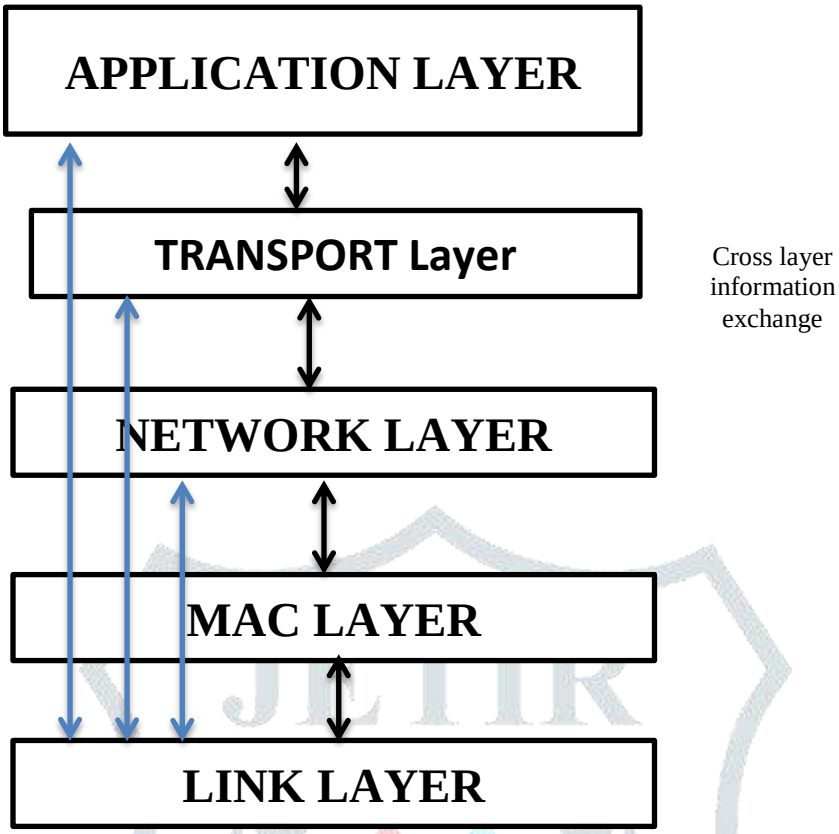

Figure 1.4: A typical cross layer design

It is like open source interconnection (OSI) models. The cross layer is based on multi scheduling rate, bandwidth estimation and resources allocation schemes.

In the cross-layer technique, information sharing takes place between nonadjacent layers to optimize the overall performance of the network. By using the cross-layer interaction between layers many QoS parameters like energy, security, tree management cost and various controls overhead can be optimized for improved performance.

Common cross-layer solutions:

- For PHY layer, a cross-layer solution can be used to optimize the power for wireless links in such a way that maximum transmission range can be ensured.
- At the network layer, optimal route selection schemes may be deployed to adopt the dynamic topology. The network layer deals with the change in bandwidth and delay.

The transport layer focuses on the delay and packet loss due to transmission errors.

- Congestion control at end terminals may be used for reliable communication at the transport layer

CONCLUSION

The main purpose of QoS aware routing is to find a feasible route from source to destination which satisfy two or more end to end QoS constraints. Provides QoS support in ad-hoc wireless network is one of the active research area. QoS implemented in the network layer aims at finding a route which provides the required quality. The metrics used to select the route are not only the number of hops along the route but also other metrics like delay, bandwidth, network life time and data rate. QoS routing is a scheme that takes into consideration the appropriate information about each link. Based on that information it selects paths that
satisfy the QoS requirements of a flow. In the CEDAR approach, the core provides an efficient and low-overhead infrastructure to perform routing, while the state propagation mechanism ensures the availability of link-state information at the core nodes without incurring high overheads The bandwidth is used as the only QoS parameter for routing. Multimedia applications have stringent QoS requirements such as throughput, end-to-end delay, jitter and network lifetime.

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