



Data Transmission in Mobile Wireless Networks

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Abstract

Mobile wireless network is the combination of group of wireless nodes without infrastructure which would transfer the data from one node to another node. The data transmission in the mobile wireless network might get affected due to various reasons where one of the major reasons is the node failure. The node failure might occur due to various reasons such technical problems and limited resources. Here node failure recovery becomes the most major concentrated research issue which needs to be concerned more to avoid the data loss/corruption. This is focused and resolved in the existing research method by introducing the technique namely probabilistic detection approach. However, this method may fail to detect the failed nodes by not focusing on the transmission range of the nodes.

Keywords: mobile, data, network

Introduction

Mobile Ad hoc Network which is a wireless mobile nodes collection which forms a short-term network without any centralized administration or infrastructure. Ad hoc has become accepted one since it is wireless network and is relatively a new way of multi-hop wireless networking. This is examined to be a very absolute part of the computing environment system, consist of infrastructure-less mobile networks [K0P99]. Each node in MANET makes the information in

right way with nearby nodes or indirectly through means of in between the nodes. The extension of ad-hoc network has of credits which go for its self-configuring and self-organizing properties. Where in mobile routers engaged in some routing protocol demand for continue and deciding the routes, where all these nodes in MANET will functions basically. Where the MANETs are infrastructure-less, self-organizing, quickly deployable wireless networks, These MANET are well applicable for the applications engaged in particular communications, outdoor events in regions without the wireless infrastructure, natural disasters and emergencies, and mine site functionalities, military functions, robot data accession and sudden business conferences.

Routes intermediate the nodes in an ad hoc network in general might involve multiple hops and, hence it is well suited to name such networks as “multi-hop wireless ad hoc networks”. MANET consist the nodes is battery functional. Impedance of network production at its higher rate and basic possibilities of network i.e., routing gets influenced by the defect of some other nodes functions. Mobility models is employed for explaining the location, movement pattern, pause distribution, direction of movement, acceleration and speed change over time of the mobile nodes could be described by means of their mobility models. In Figure 1.1 depicts an exemplar mobile communication topology and its ad hoc network.

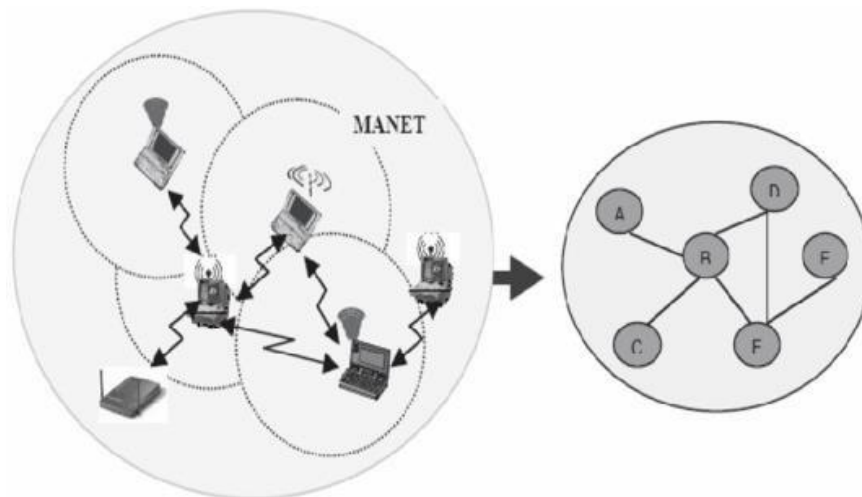


Figure 1.1 Mobile Ad Hoc Network Topology

Characteristics of Manet

In general MANET comprises of the characteristics of wireless network.

Specific characteristics in addition to that of the Ad Hoc Networking are:

Wireless: Wireless node communication and sharing of the same media (infra-red, radio, etc.)

Ad-hoc-based: A mobile ad hoc network is formed dynamically in arbitrary manner as it is a temporary network by means of collection of nodes as and when the need arises

Autonomous and infrastructure-less: MANET does not solely depend on any centralized administration or established infrastructure. Each node acts as an independent router and generates an independent data as well as it operates in distributed peer-to-peer mode.

Multi-hop routing: There is no need for dedicated routers; for enabling information sharing between mobile hosts, every node acts as a router and it forwards each other's' packets [DOW05]

Mobility: While communication happens with other nodes, each node is free to move. Due to the constant movement of the participating nodes, the topology of such an ad hoc network is dynamic in nature thereby causing an intercommunication pattern among nodes to change it continuously

Advantages

The advantages over MANET in terms of various features have been displayed in this section.

Accessibility: MANET gives us access to both information and the services regardless of geographic position

Deployment: At any place and time the network can be setup.

Infrastructure-less: Without any pre-existing infrastructure the network will work. Where it allows outside peoples and devices to interwork with those areas where there is no supporting for infrastructure.

Dynamic: Can freely and actively self-organize into random and the short-term network topologies.

MANET Applications

At anytime and anywhere the Mobile ad hoc networks are flexible networks that can be easily setup, without any of the infrastructure, where it including administration or pre-configuration, nowadays people have to come and realize the commercial ability and the boon about what the mobile ad hoc networking will brings. The self-organised nature and absence of infrastructure built-in to these networks will make them highly enchanting for many applications, where it results in a significant performance penalty. For low-cost commercial systems there is a lack of infrastructure, where it ignores a huge investment to get the network up and leads to successful functioning, and the network success is due to the deployment costs. In military systems the absence of infrastructure is also highly usual thing, when the need arises where the communication networks should be configured quickly, repeated in many remote areas. Simple way of network reconfiguration and minimal maintenance costs are the other benefits of adhoc wireless network. Therefore, these benefits must balance against any performance penalty where it resulting from the multi-hop routing system and distributed control essential to these networks. Below ones are few of the MANET applications:

Data Networks: The Ad-hoc wireless data networks initially help in exchange of data's passed between laptops, palmtops, personal digital assistants (PDAs), and other needed informative systems. The data networks usually leads into 3 categories depending up on their coverage location: LANs, MANs, and WANs. Infrastructure-based wireless LANs is quite as usual, where it exposes super performance with its low cost. Whereas, ad hoc wireless data networks has few advantages over that of these infrastructure-based networks. Primarily, we need only one access point to link to the backbone wired infrastructure: by this way it minimizes the cost and installation requirements. In order to that, it can be incompetent for nodes to reach through base station or an access point. For example, PDAs that are one by another can transform information in same way apart from routing passes an intermediate node.

Home Networks: Home networks are imagine to stand up for supportive for communication between PCs, laptops, PDAs, cordless phones, smart appliances, security and monitoring systems, consumer electronics, and entertainment systems within and surrounding near homes. Through this network can enable smart rooms that identify the people and motion and adjust

light, heating accordingly. “Aware homes” with creating the network identifiers and computers, helps in living of seniors and leads to disabilities.

In Home networks also enclose by video else sensor monitoring systems with high techniques to functioning. Home network explains the data and make an alert the house owner or policeman and fire department with unusual patterns. Brilliant appliances function cooperatively with other another and using with the network for remote control, software up gradations. By this, can make a scheduled and maintenance, entertainment systems where it allows functioning to a VCR, set-top box, or PC from any television or stereo system located at home?

Device Networks: The Device networks helps in short-range wireless connections between devices. Device networks are initially intended to place inconvenient cabled connections with wireless connections. By this, the desperate for the cables and the similar connectors through the cell phones, modems, headsets, PDAs, computers, printers, projectors, network access points, and other devices is ignored. Main technology drivers the above networks are at low-cost and low-power radios with networking capability through the Bluetooth. Radios are connected with the commercial electronic devices to establish the networking capabilities between the devices. Few common applications include a Bluetooth headset for cellular, a wireless USB or RS232 connector, wireless cards, and wireless set-top boxes.

Sensor Networks: The Wireless sensor networks composed of tiny nodes with its sensing, computation, and wireless networking capabilities. Three important technologies are chosen by Sensor networks for its coverage. Sensor network have numerous ability for consumer and another one if for military applications. The Military missions need sensors and various intellects capturing system where it can be placed very closer to its calculated targets point.

Manet Design Issues: Where the Ad hoc wireless networks makes the traditional struggles to that of wireless communications, whereas bandwidth optimize, power control, finally transmission quality improvements. Additionally, its mobility, multi-hop nature, lack of fixed infrastructure makes the number of complications also designs the restrictions which are newly for mobile ad hoc networks.

In magnet design issues, the issues about the MANET are researched and discussed. Numerous

research points are already invented and explained as well in this field. Numerous defects are analyzed, identified and then make a solution so as to primarily maximize the MANET withstand. Few issues over the MAGNET are explained and explained as follows:

Routing: Routing is primarily needs and it is an important one in this field, since the modifications with the network topology happens suddenly. Very sustainable routing protocol needed to survive with mostly for the fluid network conditions. Where the authority of routing protocol having the transformation of route messages; searching for feasible path at its target, depending up on the strategies like hop length, less power needed, and life of the wireless passage; collecting the messages regarding the path breaks; fixing the splitter way expending minimum making power [SIN98] and bandwidth. In ad hoc wireless networks the mage requirements are as follows:

Less route acquisition detain

- Sudden route rearrangement
- Loop-free routing
- Sharing routing approach
- Less control overhead
- Scalability
- Requirements of QoS
- Helping of time-sensitive congestion
- protective and privacy

Multicasting / Broadcasting: Broadcasting service helps the users having the interface with other members within a multicast group. The Broadcasting has its vital role in the typical applications of ad-hoc wireless networks, namely, emergency search-and save the operations and military communication. In this environment, nodes with the groups to moved out certain tasks that require multipoint-to-multipoint and point-to-multipoint voice and data communication. The random chance move of nodes changes the topology changes in a manner. Nodes with the mobility, with the obstacles of power source and, which makes the multicast

routing with very challenging one. The Broadcast service helps the users by passing the information with every member within network.

Location Service: Global Positioning System uses the location information (GPS) or the network depends on geo-location methodologies to get the physical point of a final target one. Then the load with wireless passage gets changes with the number of nodes held on in a given geographical areas. By this way there is the disagreement for the channel with highly when the counting of nodes gets higher. Rise in contention for this passage final outcome with more number of fusions and a many frequent disposal of bandwidth. Frequently routing protocol can be made while building up the systems for transferring the network load similarly over the network so that the making of regions where large channel contentions can be ignored.

Clustering: By the Clustering methodology partitioning the hosts with the many groups and gives a helpful framework for resource management, routing and virtual circuit support. Cluster methods itself is not identified algorithm, but the general work can be solved and can be successful by different algorithms that get vary importantly in their knowledge of what constitutes a cluster and how efficiently indicate them. Famous notions of clusters have its groups with tiny spaces between cluster members; data space has dense areas, having the gap or specific statistical distributions. By Clustering method therefore can be making as multi-objective optimized solutions. The parameter settings and appropriate clustering algorithm (has its strategies like the distance function to usage, a density threshold or the number of needed clusters) based on the separate data set and intended has its results. The Cluster verification is not an automatic task, but it is repetitive method of knowledge invented or interactive multi-objective optimization that makes involvement trial and failure. Clustering always requires making changes in data pre-processing and modeling parameters till the final outcome has the wished properties.

Mobility Management: Where one of most vital properties of ad-hoc wireless networks is mobility attached with the nodes. Within the ad-hoc network surroundings, the mobile hosts can have no restrictions which can reaches from one place to another place. These mobility nodes provides in repeated path breaks, packet collisions, transient loops, stale routing communications, and harder in resource allocation. Mobility management manages the

capacity, supervise and get back of the mobile node position passages.

Transport Layer Protocols (TCP/ UDP): The aim and objective of the transport layer protocols has its setting up and managing end-to-end information, reliable point-to-point exchange of data packets, flow control, and difficult control [SWA09]. Where it has easy connectionless transport layer protocols (UDP) which neither achieves continuous control and congestion control nor gets the reliable data exchange. By such the not reliable protocols will not take with the account the present network status such as congestion at the middle links, the rate of collisions, else various factors that causes network throughput. The major performance degradation faced by a reliable connection oriented transport layer protocol such as Transmission Control Protocol (TCP) in an ad hoc wireless network arises due to frequent path breaks, presence of stale routing information, high channel error rate, and frequent network positions. Both TCP and UDP are the standard protocols and used in Internet.

IP Addressing: The important thing is to set of IP addresses that are allocated to the ad-hoc network. Where IP addressing and the address auto-configuration has much impressed attention in MANETs.

Radio Interface: To transmit package Mobile nodes depends on the radio interface. Identifying on packet transferring or getting through radio interface or antenna methodology in MANETs is very helpful.

Bandwidth Management: The Bandwidth management in MANETs is a typical characterization. Because the bandwidth is usually limited, effectively managing and using it is a very important issue. Since the mobile nodes interferes with other via bandwidth constrained, different capacity, error-prone, and not secured wireless channels, wireless passage will move to have primarily lower capacity than wired links and, hence, many issues in network congestion. Hence the channel is passed with all nodes in the broadcast region; hence the bandwidth occurs per wireless passage based upon the number of nodes and then traffic they manages.

Factors For Qualitative Analysis

Many qualitative scenarios stated to MANETs. By this section, 8vital factors are explained:

Adaptability: Adaptability explains the reaction to modifies with in a network. Adaptability permits the network to function despite modifies with in the environment.

Flexibility: Flexibility is the easy and fastest where the modifications can be happened to various part of the network platform and the range of modifications that can be happens without having to replace, redevelop, or ignore existing network parts.

Heterogeneity: Heterogeneity explains a network having its dissimilar devices that has its dissimilar protocols and in various cases helps dissimilar operations or applications.

Performance: Performance is accountable for identifying and having its control with the network efficiency, like as network throughput and problem rates.

Reliability: Reliability calculates continuous, free errors network functions. Exact reliability over a provided period of time means no failure and no problems occur.

Scalability: Scalability network needed be able to growth. For initial design needed highly growth else make without any primary modifications to the all over design.

Security: Security network's physical arrangements needed to be managed from harm and sensitive information keep from not authorized users while giving the simple and not expensive access on a wide-scale basis. Thereby research is important needs to verifies how to end up intruders from capturing the network.

Stability: Stability a network environment, the network topology is influenced highly by mobility. When node mobility has larger, the topology structure has a highly ways for disintegration and encounters strength defects.

Manet Mobility Models

The mobility model has its very primary role in determining the protocol performance in mobile ad hoc Network. The mobility model is modified and defined to explain the movement

pattern of MNs, and how their speeds and directions are modified over the time. Recently there are 2 types of mobility models used in the simulation study of MANET:

Traces base model - Random way point

Synthetic base model – Random walk

The traces depends model has its deterministic data from that of the real system. By these mobility model is needed in its beginning stage of research, hence thereby not suggestion to be used. Picking the specific movement pattern lay on applications that use the model.

Self-Organization in Ad Hoc Networks

One of the very important property where the ad hoc wireless network needed to exhibit is well planned and managing the network by itself. The primarily activities that an ad hoc wireless network needs to has for self-organisation are with the neighbour invention, topology organisation and topology reorganisation. Below are the categories of self-organisation are as follows:

Self-healing—These methods allow identifying, localize, and modify defects automatically; primarily separated by the cause of the defects, e.g. breakdown, overload, malfunction.

Self-configuration—by this step for (re-)generating adequate configurations based up on the present scenario not in terms of environmental situations

Self-management - capability to manage devices or networks based on the present strategies of the method.

Self-optimization - Likewise to self-management where focuses on the fine choice of methodologies and with its parameters depending on the system habitats.

Conclusion

This method delivers the introduction about the MANET clustering protocols and the node issues identification and avoidance. This method gives us a brief regarding the benefits and application about the MANET in the sensor nodes. In this method, number of mobility designs of MANET environment and with their usages and applications are explained. This chapter gives usual over display of the discussed research method, issues detection and aim of the discussed research methods.

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