A REVIEW ON WIRELESS MESH NETWORKS IMPLEMENTATION IN RECENT GENERATIONS

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ABSTRACT:

Wireless mesh networks (WMNs) have emerged as a key technology for next-generation wireless networking. Because of their advantages over other wireless networks, WMNs are undergoing rapid progress and inspiring numerous applications. Wireless mesh networks have the potential to deliver Internet broadband access, wireless local area network coverage and network connectivity for stationary or mobile hosts at low costs both for network operators and customers. Routing is fundamental characteristics of wireless mesh network. The strengths and weakness of routing protocol are reflected directly in WMN's characteristics. This paper focuses on a variety of routing protocols that are used in wireless mesh networks.

Keywords: *WMN, Routing Protocols, Proactive, Reactive and Hybrid.*

INTRODUCTION:

WIRELESS Mesh Networks (WMNs) are dynamically self-organized and self-configured, with the nodes in the network automatically establishing an ad hoc network and maintaining the mesh connectivity. Wireless mesh networks offer advantages over other wireless networks; these include easy deployment, greater reliability, self-configuration, self healing, and scalability. If WMNs are comprised of two types of nodes: Mesh routers and Mesh clients. Mesh routers have specific routing functions to support mesh networking. Mesh routers are not very mobile and they are considered as the mesh backbone for clients. Mesh routers have multiple wireless interfaces which can be built on either the same or different wireless access technologies. Mesh routers can be built based on dedicated computer systems such as Power PC and ARM (Advanced Risc Machines). Wireless Mesh Networks exhibit unique characteristics that differentiate them from other wireless and wired technologies. Therefore, existing routing protocols must be revisited in order to consider their adaptability to WMNs.

Routing is an important factor to forward the data packet from source to destination node. The Wireless Mesh routing protocols can be divided into proactive routing, reactive routing and hybrid routing protocols. In proactive routing protocols paths are established to all the destination nodes regardless of whether or not the routes are needed to transmit data. They are also called table-driven methods. The proactive routing protocols are Destination-Sequenced Distance-Vector Routing (DSDV), Cluster Head Gateway Switch Routing (CGSR), Optimized Link State Routing Protocol (OLSR) and Scalable Routing using heat Protocols.

In reactive routing protocols, routes are established on demand. Reactive methods are also called on-demand methods. The route discovery process is initiated when the source node requires a route to a destination node. The reactive routing protocols [3] are Dynamic Source Routing (DSR) protocol, Adhoc On Demand Distance Vector (AODV) protocol, Link Quality Source Routing Algorithm (LQSR) protocol and Temporally Ordered Routing Algorithm (TORA).

Hybrid Routing Protocols combines the merits of proactive and reactive routing protocols by overcoming their demerits and find efficient routes, without much control overhead It employs diverse routing protocols in different part of the infrastructure WMNs i.e. reactive protocols for the ad hoc network area while proactive protocols are employed in wireless backbone.

Objectives:

- To study the different types of routing protocols in wireless mesh network.
- To study the enhancement process of mesh networks in the recent years with new trends.
- To conclude scope of implementation of new trends in wireless mesh networks.

LITERATURE REVIEW:

Vijayakumar, K.P et al [1] Explains variety of routing protocols that are used in wireless mesh networks and identify the performance of these routing protocols.

Kulvir Singh, Er et al [2] Various types of routing protocols that are used in wireless mesh networks. This paper also provides mesh protocols functionality, characteristics and comparison analysis. He presented theoretical details of Reactive routing protocols.

Piotr Owczarek et al [3] provide a survey of the most popular network simulators: NS-2, NS-3, OMNET++, OPNET, GloMoSim, Qual Net and J-Sim. Based on the conducted investigations it can be concluded that for academic researchers the best choice will be NS-3.

Sarra Mamechaoui et al [4] summarized certain research results which have been reported in the literature on methodologies for energy conservation in wireless mesh networks. He conclude that if we want to conserve energy in WMN, the most effective way is to combine the most effective solutions in the three lower layers but it still a challenge because a cross-layer difficulties.

Chakrapani gadde et al [5] proposes a method to improve the network throughput in wireless mesh networks. As the wireless hops increases, interference in the network will increase. By integrating the PON with wireless mesh network we can reduce the number of wireless hops, resulting in decreased interference and increased network throughput.

Shubat S. Ahmeda et al [6] reviews on various types of routing protocols that are used in wireless mesh networks have been presented. It has been demonstrated that OLSR protocol with ETX metric improves the overall performance in all the considered scenarios.

Ian F. Akyildiz et al [7] presents a detailed study on recent advances and open research issues in WMNs. Finally, test beds, industrial practice, and current standard activities related to WMNs are highlighted.

Miguel Elias M. Campista et al [8] Performance measurements for a WMN, deployed using various routing metrics, are presented and corroborate our analysis. The design of WMNs presents a number of open issues, ranging from routing metrics to security. One direction is cross-layer design to improve routing efficiency. This is accomplished by better reflecting PHY-layer variations onto routing metrics or by better using the available radio spectrum to directly improve the network throughput.

Waharte, S. et al [9] to improve the radio resource utilization, several routing metrics have been specially designed for wireless mesh networks. Studied the performance of six different routing metrics, while varying the network size, the number of flows and the packet sizes.

Md. Arafatur Rahman et al [10] proposes a technique of integrating multiple routing metrics to improve the performance of a routing protocol. This technique is implemented in Ad hoc On-Demand Distance Vector (AODV) routing protocol and corresponding performance has been investigated in wireless mesh environment. Simulation results demonstrate significant performance improvement over standard AODV in WMNs.

Dong-Won Kum et al [11] we propose an efficient ondemand routing approach with directional flooding (DF), which is suitable for the WMNs with limited mobility. Simulation results show that AODV with DF (AODV-DF) can significantly reduce routing overhead by RREQ packets and enhance overall performance compared with the original AODV.

Rainer Baumann et al [12] report about an alternative routing paradigm, tailor-made for large multi hop wireless mesh networks. We conclude that novel routing paradigms, such as the field based any cast routing concept employed by HEAT may contribute to more affordable wireless mesh networks in the near future.

Ashish Raniwal et al [13] we propose and evaluate one of the first multi-channel multi-hop wireless ad-hoc network architectures that can be built using standard 802.11 hardware by equipping each node with multiple network interface cards (NICs) operating on different channels. At last he found that Conventional single-channel wireless mesh networks cannot adequately fulfill the role of an extended last-mile access network, let alone a wireless campus backbone that completely replaces wired Ethernet.

Er.Pushpender Sarao et al [14] presents the quick and technical brief overview of concept, technology, and architecture for wireless mesh networks. There are issues and challenges in WMNs like: fairness, power management, node mobility management, secure routing, connectivity with the Internet and connectivity with other type of networks, service levels, etc., at different layers of WMNs.

Asad Amir Pirzada et al [15] we evaluate the performance of the Ad-hoc On-demand Distance Vector (AODV) routing protocol in a Multi-Radio Wireless Mesh Network. He believe that AODV-MR is a promising candidate for multi-radio WMNs.

Mojtaba Seyedzadegan et al [16] provided the quick and technical overview of concept, technology, standard, and architecture for wireless mesh networks. To conclude, further research needed to locate the IGWs at the right place in WMNs, to minimize the number of deployed IGWs, and at the same time, maximize the network capacity.

Karthika K.C et al [17] In spite of these open research problems, we believe that WMNs will be one of the most promising technologies for next-generation wireless networking.

Amithineni Jyothsna et al [18] discusses the various routing protocols proposed for VANET Hence a survey of different VANET protocols, comparing the various features is absolutely essential to come up with new proposals for VANET.

Anna Zakrzewska et al [19] proposes the performance evaluation and comparison of the main topology-based routing protocols commonly used in wireless ad hoc networks: DSDV, OLSR, AODV and DSR in a different environment such as wireless mesh network. Based on the experimental results, we recommend using particular protocols in certain conditions.

Acharya, A et al [20] study further enhancements to 802.11 MAC that improve system throughput by allowing a larger number of concurrent packet transmissions in multi hop 802.11-based IP networks. With 802.11 poised to be the dominant technology for wireless LANs, we believe a combined approach to MAC, packet forwarding, and transport layer protocols is needed to make high-performance multi hop 802.11 networks practically viable.

CONCLUSIONS:

WMNs (multi-hop) Technology is facing many problems while it has many great advantages which make it a most likely technology of today. This paper presents the review of wireless mesh network. Wireless mesh networks are becoming increasingly popular as they have significant advantages over competing technologies. Routing Protocol is an important component of communication in Wireless Mesh Networks. He explains about the different types of routing protocols in wireless mesh network. Routing Protocol is an important component of communication in Wireless Mesh Networks. The variety of routing protocols for wireless mesh networks are compared using metrics. I. So we can select an effective protocol, depending up on the network and other conditions. This paper aims to provide a straightforward guide to the researcher for those who are interested to carry out their research in the field of WMN.

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