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SURVEY ARTICLE

A Survey on Wireless Mesh Networks Performance, Routing Metrics and Protocols

Ravi Kiran D[1], E. Jagadeeswararao[2], G. Nagaraju[3]
M.Tech, Software Engineering, School of Information Technology, JNTUH, Hyderabad, India
Lecturer, Software Engineering, School of Information Technology, JNTUH, Hyderabad, India
Lecturer, CNIS, School of Information Technology, JNTUH, Hyderabad, India
ravidkiran2000@gmail.com; jagadish@jntuh.ac.in

***Abstract*— The use of broadband, internet and other services using wireless technologies have increased exponentially during the recent years for applications like hospital emergencies, traffic management, military and other areas. "Wireless Mesh Network" is evolving as one such technology for next generation wireless networks. The capability of working without infrastructure is the main advantage of WMN's.**

***Keywords*— WMN's, Routing, Routing Metrics**

I. INTRODUCTION

WMN's (Wireless Mesh Networks) have the capability of dynamically self-configuring, self-organizing, self-healing, scalable and easy to deploy in the Network. Communication among nodes situated at various locations is carried out by relaying information over wireless links. WMN's are Packet-Switched Network with a static wireless backbone which adaptable to different traffic requirements and network changes. Two important nodes in WMN are Mesh routers and Mesh clients. Mesh Routers act as mesh backbone for clients and Mesh Clients work as routers and have devices like rfid, pda, pc, laptop, ip phone and desktop. Gateways are used to enter into another network. "Routing" involves the process of forwarding data packets from source to destination. The process of determining end-to-end path among source and destination is called as "Routing". Routing metric is a variable used by a dynamic router to calculate its routing table. It determines the route the router should use to forward a packet. They are used for making routing decisions. It is one of the fields in a routing table. Routing metrics are used in routing which has

to satisfy requirements like congestion control, flexibility, throughput, reliability and efficiency. Metrics achieve components like channel diversity, link quality, link capacity, number of hops.

II. DESIGN OF WMN's ROUTING PROTOCOL

Before designing any WMN's routing protocol we have to be aware of which performance metrics to be used, what hardware technologies are to be used, whether it should be proactive/reactive/hybrid protocol, link/path optimization, how the integrated routing and mobility management should be done.

Wireless Mesh Routing is classified mainly into three types of protocols

i) **Proactive routing** (paths are established to all destination nodes. Examples: OLSR, CGSR, DSDV)

ii) **Reactive routing** (routes are established on demand. Examples: TORA, LQSR, AODV, DSR)

ii) **Hybrid routing** (ZRP, Power-Aware Routing Protocol, Location-Aided Routing Protocol)

III. METRICS USED

Some of the metrics used in WMN's are **HOP COUNT**, **BLOCKING METRIC**, **ETX**, **ETT**, **WCETT**, **BOR**, **SFSR, energy consumption**, **path reliability**, **path availability**, **traffic**, **delay jitter**, **packet loss ratio**, **per node throughput** , **per hop round-trip time**, **per hop packet-pair**, **aggregate**, **load**, **speed**, **latency**, etc., Routing metrics characteristics are quality-aware, packet size, intra-flow interference, inter-flow interference, medium instability and data rate.

Blocking metric just emphasizes interference problem. It does not have additional cost except storing neighbours' information. **ETX** - Expected Transmission Count is used for delivering a packet over a wireless link successfully. Because of self-interference, it supports route with higher load and less hop count.

ETT- Expected Transmission Time is designed over ETX by adding Bandwidth to ETX compute i.e., it includes bandwidth in its computation. ETT = ETX * S|B

WCETT- Weighted Cumulative ETT is computed as sum of links ETT along the path. It is designed to favour channel diverse paths. WCETT (p) = $(1-\beta)\sum_{link l \in p} ETT_i + \beta \max_{1 \le j \le k} X_j$

BOR - Buffer Occupancy Ratio which gives resource utilization of node and ability of forwarding packet

BOR = occupied buffer size/buffer size

SFSR–Successful Frame Sending Ratio which gives contention of an area and cost for sending packets in that area

SFSR = number of received Acknowledgment's/number of sent frames

Only few have been discussed in this paper. There are several other routing metrics and protocols which have not been covered in this paper.

IV. ROUTING PROTOCOL CLASSIFICATION

The Four Class of Routing Protocols and Metrics used are mentioned in the table given below

Adhoc based	Controlled flooding	Traffic Aware	Opportunistic
1. LQSR - (ETX metric) 2. SrcRR - (ETX) 3. MR-LQSR - (WCETT) 4. LOLS – (ETX/ETT)	1. MMRP 2. OLSR - (Hop, ETX, ML/ETT)	1. AODV - (ETX/ETT) 2. Raniwala & Chiveh's – (Hop/Load balancing)	1. ExOR - (unidirectional ETX) 2. ROMER - (Hop/Delay)

Some of the Performance factors for WMN's on Network Design and Application are signal transmission techniques, broadband and QoS, scalability, mesh connectivity, security and ease of use. WMN's have generally three areas of Resource Management. They are Network Configuration and Deployment, Mobility Management and Admission Control and Routing. WMN's have unpredictable mobility of user so they might suffer from scheduling, routing path selection, security and congestion problems. Interference degrades the capacity and performance of wireless mesh network.

V. CONCLUSION & FUTURE WORK

The design of algorithms using various routing metrics, protocols and cross-layer approaches are evolving because of the highly unstable Wireless medium of WMN's for choosing best route and providing quality of services with low energy consumption. Cross layer metrics are being introduced using the mentioned protocols in this paper to improve the performance and reliable routing in wireless mesh networks.

REFERENCES

[1] Review on Routing Algorithms in Wireless Mesh Networks by K.P. Vijayakumar, P.Ganeshkumar, M.Anandaraj.

[2] A Survey on Wireless Mesh Networks, Routing Metrics and Protocols by Safak Durukan Odabasi, A. Halim Zaim.

[3] Routing Metrics and Protocols for Wireless Mesh Networks by Miguel Elias M.Campista, Diego G Passos, Pedro Miguel Esposito, Igor M Moraes, Celio Vinicius N. de Albuquerque. Debora Christina M.Saade, Marcelo G.Rubinstein, Luis Henrique M.K.Costa, Otta Carlos M.B. Duarte.

[4] I.F. Akyilidz and X.Wang, "A survey on wireless mesh networks",IEEE Communications Magazine, vol.43, no.9, pp.S23-S30, Sept.2005.

[5] Cross Layer Designs in WLAN Systems edited by Prof. Nizar Zorba, Charalambos Skianis and Christos Verikoukis

[6] Routing protocols in wireless mesh networks: challenges and design consideration by Sonia Waharte, Raouf Boutaba, Youssef Iraqi, Brent Ishibashi

[7] Performance Analysis Of Routing Metrics For Multi Radio Multi Channel In Wireless Mesh Networks by Mr. Mohammad Jalil Piran, Dr. G. Rama Murthy, Jagadeeswara rao.E, Stalin Babu

