

POPULAR APPROACHES TO HANDLE THE CONGESTION PROBLEM USING LOAD BALANCING STRATEGIES

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Abstract

A mobile ad hoc network (MANET) is a free arrangement of mobile hosts connected by wireless links with no supporting standard infrastructure or focal administration. Mobile Ad-hoc Network (MANET) comprises of a few mobile nodes with wireless interfaces. The source node transfers packets to the goal by means of different nodes of the network. They speak with each other by utilizing on peer-to-peer routing Mobile Ad hoc Networks (MANETs). It can be characterized as self-sufficient arrangement of mobile nodes associated with each other by means of wireless. The nodes of the MANET demonstration both as a router and additionally have. Since there is no incorporated administration, the control is conveyed among every one of the nodes in the network. Each node in MANETs fills in as a router and also a host and advances packets to each other to enact the communication between nodes not specifically associated by wireless links. The fundamental test on wireless MANETs is an advancement of dynamic conventions that can proficiently discover courses between communication mobile nodes. Along these lines, a MANET is a multi-bounce gathering, the hosts in that may serve like routers. These hosts are unbound to move arbitrarily, that builds up numerous highlights for MANETs: a) The gathering topology may regularly adjust and all of a sudden b) The hosts have just the confined battery energy and need to vie for restrained bandwidth c) The wireless association between hosts may contain diverse limit and the link course might be unidirectional or bidirectional.

1. INTRODUCTION

Load balancing is a PC networking framework for partitioning workloads into the different figuring resources, for example, PCs, a PC bunch, network links, focal handling units or the circle drives. Load balancing means to advance asset utilize, expand throughput, 5 limit reaction time, and overlook the overload of somebody of the resources. Utilizing numerous parts with load balancing instead of a one segment may be upgrade the dependability from the repetition Load balancing is typically given by devoted software or the hardware, as the multilayer switch or the Domain name framework server

process. Load balancing is a center networking arrangement at risk for the separating approaching traffic among servers facilitating similar application content. By balancing application asks for over different servers, a load balancing keeps any application server from turning into a solitary purpose of the disappointment, this are improving general application presence and responsiveness. For instance, when one application server winds up inaccessible, the load balancing essentially guide all new application solicitations to other accessible server in the pool. Load balancing additionally enhances server usage and boost accessibility.

Load balancing most direct system of the scaling out into the application server infrastructure. As application request increment, new servers can be effectively added to the asset pool, and the load balancing will quickly start sending traffic to the new server. In writing there are diverse techniques presented for MANET load balancing in view of various parameters and systems, anyway every one of the properties of load balancing procedure were not addressed by existing strategies. In addition to this, present MANET networks are utilized as MANET networks which are not contemplated by existing load balancing techniques. In this theory we are presenting new MANET network based load balancing strategy which is having point of enhancing the unwavering quality, routing execution and energy efficiency.

2 MANET: AN OVERVIEW

Mobile Ad hoc network (MANET) has been made to comprehend the normal restriction of the wired spine networks. A MANET is a free rush of mobile users which impart over precarious wireless links in the circumstances where brief network availability is required and is valuable in the zones where no already settled infrastructure can be produced ,, for example, calamity alleviation where existing sub-structure is being harmed, or in military applications where a strategic network is required. Every gadget or node can move uninhibitedly in a MANET, as the topology of the network isn't settled with regards to the traditional network of communication. Every one of the exercises of network like messages conveyance and looking through the topology ought to be done by the nodes themselves. In this way routing process, ought to must coordinate in to the mobile nodes for exchanging the information or messages from source to the goal. The Mobile ad hoc

networks gives novel advantages and adaptability to such conditions on account of some uncommon highlights, for example, an already existing and settled substructure isn't required in MANETs.

- Such networks don't work under the limitations of an inflexible or solidified topology
- Summation of another node, evacuation of existing nodes and so forth require just the association
- Other nodes instead of other organization's association.

2.1 MANET Applications

With the expansion in compact gadget and also advance of wireless communication, ad hoc networking is picking up significance in view of its expanding number of widespread applications .ad hoc networking can be connected anyplace and whenever without infrastructure and fixable networks, ad hoc networking enables the devices to keep up association with the network and additionally effectively adds and expels devices to and from the network. Following focuses speaks to the MANETs applications:

- Police territory activities or military front line: ad hoc networks can be extremely helpful in setting up communication around the gathering of fighters for the strategic task and additionally for the military to exploit typical and military information headquarters. The other imperative factor that makes MANET extremely helpful and let it fit in the army installation is the way that the military articles, for example, airplanes, tanks and warships.

- Commercial area: the other sort of condition that uses an ad hoc network is crisis safeguard task. The ad hoc type of communication is the particularly valuable into people in general wellbeing and inquiry & rescue applications. Medicinal groups require quick and compelling communications when they race to hazardous situation to treat casualties, the therapeutic groups can utilize ad hoc networks (mobile nodes, for example, workstations and PDAs and can convey by means of the wireless link with the healing facility and the restorative groups nearby.
- Local level: Ad hoc networks can independently link in moment and impermanent interactive media network utilizing scratch pad and PCs to spread and offer information among members at gathering, at meeting, or in classrooms

2.2 MANET Layers

Physical layer: security is vital for anchoring MANET the same number of attacks can happen in this layer. The physical layer must adjust to quick changes in interface attributes. At the PHY layer, obstruction and blurring may bring about bit blunders and lost packets. While wired links would now be able to be viewed as so steady that one can disregard the likelihood of packet loss caused by bit mistakes, this isn't the situation with wireless links. For wireless links, the bit mistake rate is a few requests of size higher than wired links. The TCP protocol was initially intended for wired networks, and its congestion avoidance mechanism does not consider interface blunders as a conceivable purpose behind packet mistakes or losses. Rather, TCP deciphers packet losses caused by bit blunders

as congestion. This can altogether debase the execution of TCP over wireless networks, when TCP superfluously summons congestion control, causing diminishment in throughput and connection usage.

MAC layer: the dispute based medium access may instigate delay and can't totally stay away from crashes, conceivably causing packet loss if retransmission mechanisms can't rescue the issue. All MANET nodes share a similar wireless medium. The conflict and danger of impacts is significantly higher in such wireless networks than in the wired condition. The IEEE 802.11 is a CSMA/CA protocol, and work on such protocols has demonstrated that the TCP execution diminishes definitely as the jump check is expanded. Retransmission mechanisms may likewise additionally increment the transmission delay, and make jitter as the quantity of required retransmissions shifts. A result of unsuccessful transmissions can likewise be a flag adjustment change to enhance the transmission achievement rate. This may bring about a diminishment of the bit rate.

Transport layer: The TCP is a conclusion to-end protocol. It ought to be skeptic to the accessible execution and traits of the lower layers. In any case, any arrangement that means to enhance TCP execution in MANETs by tuning the TCP protocol should manage senders that may not know that the receiver, or part of the route, is in a MANET. All things considered, the conclusion to-end functionality of TCP is a test, since an interconnected MANET will empower associations between end-clients that may have extraordinarily contrasting renditions of TCP executed.

Application Layer: Applications should be intended to deal with visit disengagement and reconnection with peer applications and also

broadly changing deferral and packet loss attributes. Like different layers application layer likewise defenseless and appealing layer for the assailant to assault. Since this layer contains client information that backings numerous protocols, for example, SMTP,

HTTP, TELNET and FTP which have numerous vulnerabilities and passageways for assailants. The fundamental attacks in application layer are malicious code attacks and repudiation attacks.

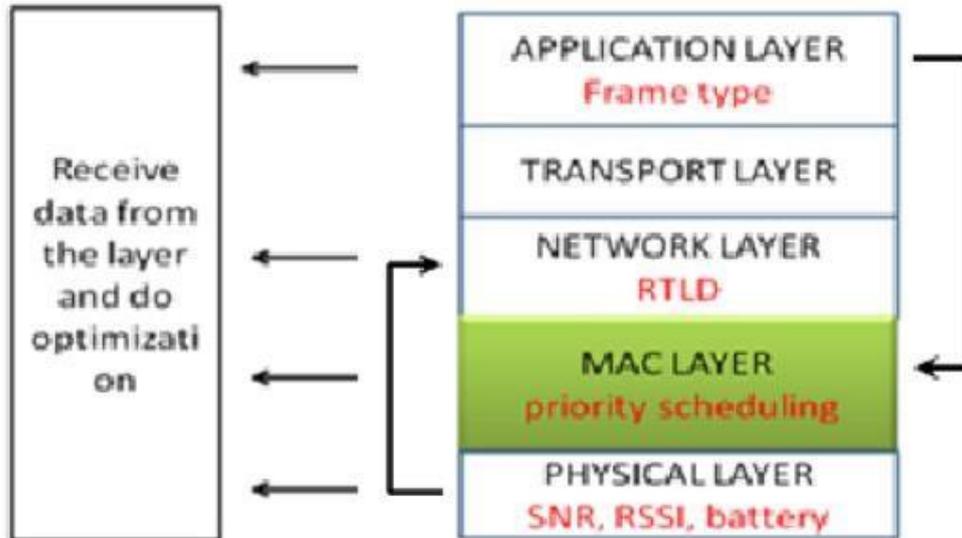


Table 1: Security threats and countermeasures

Layers	Attacks	Solutions
Application layer	Lack of cooperation attacks, Malicious code attacks (virus, worms, spywares, Trojan horses) etc.	Cooperation enforcement (Nuglets, Confidant, CORE) mechanisms, Firewalls, IDS etc.
Transport layer	Session hijacking attack, SYN flooding attack, TCP ACK storm attack etc.	Authentication and securing end-to-end or point-to-point communication, use of public cryptography (SSL, TLS, SET, PCT) etc.
Network layer	Routing protocol attacks (e.g. DSR, AODV etc.), cache poisoning, table overflow attacks, Wormhole, blackhole, Byzantine, flooding, resource consumption, impersonation, location disclosure attacks etc.	Source authentication and message integrity mechanisms to prevent routing message modification, Securing routing protocols (e.g. IPSec, ESP, SAR, ARAN) to overcome blackhole, impersonation attacks, packet leases, SECTOR mechanism for wormhole attack etc.
Physical layer	Jamming, interceptions, eavesdropping	Using Spread spectrum mechanisms e.g. FHSS, DSSS etc.

3. PROBLEM OF CONGESTION IN MANETS

MANETs empower the exchange of information between the various separated

networks. In MANETs every gadget functions as a router and causes each other in fruitful conveyance of the information. MANETs experience the ill effects of high transmission mistake rate in view of the high transmission "Congestion". The issue of congestion happens in every one of the sorts of network however to deal with this issue in wired networks isn't as troublesome when contrasted with the Mobile ad-hoc network in light of the fact that in any wired network there congestion control systems are executed at the vehicle layer where its capacities are composed independently from the elements of different layers. Such kind of congestion control methods don't straightforwardly use to ad hoc networks, due to restricted resources like restricted wireless bandwidth, control imperatives, constrained cushion measure and so on. Congestion is an issue which creates on the common networks, when various users need to run similar resources like bandwidth, buffers, and lines and request of these resources end up bigger than the limit of network. This circumstance is precisely called "Congestion".

TCP gives a dependable communication link; since it utilizes the essential strategy affirm information conveyance, yet more postponement when contrasted with the UDP bundle, so that if the sender share a typical halfway node, that congestion increments, and the most extreme deferral. A TCP parcel misfortune because of congestion of the wireless channel blunders, link endorsement, versatility and multi-way routing for mobile ad-hoc networks that can fundamentally hurt on account of a verifiable supposition is invalid, TCP, networks (MANETs) mobile in the conveyance of bundles ineffectively run or cluttered.

The traffic which enters in the network is called as "Offered load". At first, when the offered load builds, the network throughputs additionally increments directly yet after some time load approaches the network limit "the knee point", and if load gets persistently increment then throughput does not increment. There is a nearby association among sort of network traffic, network congestion and buffering. Continuously network condition, each link limit is constrained and aggregate request of the resources may surpass when contrasted with the accessible limit. In such sort of circumstance link ends up overloaded and when this happens it ends up congested. This issue of congestion might be diligent (changeless) or transient (brief).

3.1 Popular Approaches to Handle the Congestion Problem

There are two types of popular approaches as explored below:

I. Congestion Prevention

Congestion Prevention is the technique to deal with the network from congestion which comes to play before network faces congestion. For this, nodes should screen their status and they consult with the neighbor node in the network so no more traffic than the coveted quantity which the node can't deal with, ought to be permitted to go into the network along these lines no congestion can happen. Congestion had expansive effects on the execution of network. So some fundamental congestion control strategies are being expected to keep the network from the congestion. The accompanying is a portion of the fundamental QoS upkeep issues in MANETs.

II. Congestion Control

Another approach can be utilized to conquer the issue of congestion in which a congestion control instrument is performed. This instrument by and large performs to enhance the general execution of the network. The fundamental point of congestion control is to limit the deferral and cushion flood condition which is caused by network congestion and subsequently make the network ready to perform better. As congestion is straightforwardly identified with the issue of dropping parcel, it is required that some technique have been connected on the network so the drop of bundle turns out to be less. To control the measure of dropping rate is more troublesome in MANETs when contrasted with the wired network because of some uncommon qualities of MANETs like: Subsequently it can't be anticipated whether a node which is taking an interest amid the transmission will participate transmission or not. In the event that no way is found to forward the data, it begins to drop the parcel after a specific time.

4. NEED FOR LOAD BALANCING

The principle purposes behind balancing the load from the source node to the goal on a network are given as takes after:

- The load balancing plans enhance efficiency and heartiness.
- It decreases the End-to-End defer and the flood of data packets.
- It adjusts the energy utilization of the network nodes.
- It enhances the network asset usage.
- It upgrades the general execution of the network.
- It lessens the impact by conveying the loads to sit out of gear ways.

5. LOAD BALANCING STRATEGIES

The three vital parameters must be considered for choosing the best among the different load balancing strategies:

- a. Who is responsible for taking the decision of load balancing?
- b. What information is used for settling on the load balancing decision?
- c. Where the decision has been finished?

A portion of the load balancing systems is portrayed as takes after.

➤ **Centralized Load Balancing:** In the brought together load balancing approach, the focal node is responsible for assessing the aggregate load to be transmitted and in addition dispersing the load to alternate nodes. Since the focal load is responsible for dissemination of assignment, the whole network declines if this node comes up short. In any case, this technique incorporates all-to-one and in addition one-to-all communication mode. In this plan, a node is chosen for controlling the measure of load balancing to be finished. Each sender node get to this chose node for assessing the quantity of load to be transmitted and additionally to identify where the load must be sent using the most limited way routing.

➤ **Local or Global Load Balancing Strategy:** In nearby load balancing approach, each processor chooses alternate processors in its neighborhood and makes utilization of this neighborhood data to settle on a load transmission, in this manner diminishing remote communications. A processor communicates with its prompt neighbor at each progression for accomplishing load adjust. The standard goal is to viably adjust the load and also to diminish remote communications. Then again, the

worldwide load balancing approach requires a particular measure of worldwide data with a specific end goal to start the load balancing.

- **Static or Dynamic Load Balancing:** In static load balancing approaches the measure of load is appointed to all nodes toward the start and there is no variation in the load in the middle. This sort of load balancing approach does not require persistent load checking and isn't appropriate for true applications.
- **Sender-started or receiver-started load balancing:** In sender started procedures, congested node tries to exchange the load to gently loaded nodes while in recipient started system, softly loaded nodes checks for intensely loaded nodes from which load can be gotten.

6. LOAD BALANCING SCHEMES

- **Distributed Load Balancing Scheme:** This technique for load balancing actualized with each node, accumulates the present load information of different nodes by rehashed question informing and the appraisals the normal.
- **Load Balancing in Clusters:** The two variables which could be utilized to adjust the load in clusters by giving the part of cluster head among typical nodes are Node ID and Node Degree. Different methodologies allocate the energy of being a cluster head among various nodes inside the cluster and offer the load to keep the expiry of overloaded nodes. Nodes ID load balancing heuristic capacities in light of the guideline of a roundabout line on the grounds that the virtual IDs of the part node spin through the round line at a rate of 1 unit for every

run. The base esteem (1) and a most extreme esteem (MAX_VAL) are given to the round line. Once a node is chosen as a cluster head, its VID is given an esteem bigger than MAX_VAL. A cluster head will protect the incentive until the point that it has spent its cluster head length, spending plan, which is a client characterized condition and faces the uncommon attributes of the system. i.e., the battery life of individual nodes.

- **An Approach Based on Clustering:** The point of this plan is to locate the correct nodes to share the load for counteracting, or if nothing else diminishing irregular characteristics with low overhead. The calculation is called each time when the unevenness happens in light of a load limit. The parameter for execution assessment is computed in view of work execution energy time utilization and. A node node's having high energy and low versatility will be picked as the cluster head. Portability is the measure of average speed nodes. The load balancing calculation is a brought together calculation since the worldwide members load information about the different cluster is got by their cluster heads, which guarantees load adjust between its members. The cluster development starts with perceiving the neighbors of every node, where the separation between a node and its neighbor will be not exactly or equivalent to the transmission range of the specific node.
- **Ant-Based Load Balancing Scheme:** For powerful data move in the network, the insect settlement load balancing plan is utilized. The point of Ant Colony Optimization (ACO) meta-heuristic is gotten from the sustenance seeking

conduct of genuine ants. The field "Forward" is a 1 bit field; it is set to 1 when subterranean insect is FANT and 0 for BANT. The congestion refresh message as an improvement recognizes the load awkwardness at a node and is sent by the goal to the source in the wake of accepting a data parcel. The message advises the wellspring of the congestion at that route. The esteem will be set to 1 if the route is overloaded, for an under loaded route esteem will be - 1 and 0 for the ordinary load. The pheromone esteem will be diminished with a specific esteem if the way is overloaded. On the opposite side, it will be expanded on the off chance that it is under loaded. In the event of a normal/balanced route the pheromone will dissipate in light of the vanishing equation. In this manner, the congestion on a specific path can be averted if multiple paths are followed with meet likelihood. Insect Based Load Balancing Scheme does not bolster ideal paths to the goal but rather keeps the congestion and abatements the odds of load unevenness by part traffic.

- **Multi-Agent Load Balancing Scheme:** The Multi-Agent Load Balanced ACO (MALBACO) presents another routing system having two provinces of ants. At first the ants are instated as exhibits [000....0] and the accessible links and introduced as [000sent...0] by the source node after each settled time interval. A cost table is kept up which comprises of the cost of achieving nodes in the following jump. Cost is estimated as far as the time required for sending the HELLO message and getting an ACK message. $LOCK[m][n]$ is utilized for congestion control in the system. In the event that $LOCK[i][j]=1$, a bolt is

procured and the path from I to j has pheromone esteem which has surpassed the most extreme pheromone (maxphr) esteem. The pheromone refreshing and vanishing on a path between the nodes relies upon the cost of data transmission through that path. At first it is assessed by sending a HELLO message and comparing ACK message and estimating the time delay between the sending and accepting of these messages. After the choice of the route to forward data crosswise over it, the cost table will be refreshed by the cost information in the data packet and the affirmation of the data packet. This keeps the need of occasionally sending HELLO and ACK messages.

- **Load Balancing Scheme for Supporting QoS in MANETs:** When the load offered to the networks surpasses its accessible limit, it leads to the issue of the congestion and causes degradation in the channel quality and expands the packet misfortune proportion. In the load balancing algorithm proposed by, the messages used are: QUEUE_INFO, INFORM and REPLY. At whatever point a node acquires a data packet, a QUEUE_INFO message is broadcasted to its neighbors, if the node winds up congested. A REPLY message is sent from every one of the neighbors subsequent to accepting the QUEUE_INFO message, just on the off chance that it contains adequate cushion space. The congested node at that point chooses the one that is inside the sender's transmission range and cont remaining information for additionally bolster for a specific timeframe and an INFORM message is sent to the sender to illuminate the address of the picked node.

7. CONCLUSION

The self-organization of specially appointed networks is testing when two self-sufficiently made networks approach together. This is another exploration territory that has results on all levels of the system design. At the point when two autonomous specially appointed system moves to a similar district, meddling with each other wind up self-evident. Preferably, the system will recognize the situation and will consolidate. Yet, the issue of joining the two networks isn't irrelevant as the networks may use different MAC or routing protocols. A standout amongst the most huge points of the ongoing exploration is to give a consistent coordination of different sorts of system. The utilizations of MANET change from vast scale, mobile, exceptionally dynamic networks, static networks that are constrained by power sources (Priakanth and Thangaraj 2008). Other than the standard applications that range from infra organized foundation into the specially appointed viewpoint, an assortment of administrations would be delivered for the new condition (Ankur et al 2013). A considerable measure of new hunt gauges, for instance, tabu pursuit and insect province enhancement have demonstrated their feasibility in handling computationally in-depth issues. This prescribes the examination of the conceivable outcomes for settling the TAP using new meta-heuristics. The piping stack operation integrates both the piping and the stack operation. The incorporation of both pipe and stack operations keeps the storage occupied untouched with the end goal that the quantity of execution per unit time is bigger than the past piping approach.

REFERENCES

- [1]. Sumit Kothari, Shiv Sahu, K&AmitSinha, 2013 „Awareness in Congestion for Multipath Load Balancing in MANET“, International Journal of Computer Applications.
- [2]. Khulood Ahmed Nassar&ZainabSaadKaram AL-Musawi 2013 „Fuzzy Neural Network for Dynamic load balancing of nodes for ad hoc network“ Journal of Basrah Researches,pp.77-89.
- [3]. SupreetKaur&VarshaKumari, 2014 „A Proposed Model for Load Balancing in MANET“, International Journal of Computer Applications.
- [4]. PaingThweSoe,SoeSoeKhaing 2013 „A Reliable Load-Balance RLBAODV Routing Protocol“, International Journal of Computer & Communication Engineering Research.
- [5]. Hui Cheng, Shengxiang Yang &Jiannong Cao 2012 “Dynamic Genetic Algorithms for the Dynamic Load Balanced Clustering Problem in Mobile Ad Hoc Networks“, Expert Systems with Applications.
- [6]. Aleksandra Smiljanic, NatasaMaksi c, Marija Antic,(2015),Two-phase routing for load balancing in lossless and lossy networks, 2015 IEEE 16th International Conference on High Performance Switching and Routing (HPSR).pp :1021-1029.
- [7]. Sinchan Roy chowdhury ,ChiranjibPatra (2010), Geographic Adaptive Fidelity and Geographic Energy Aware Routing in Ad Hoc Routing, f IJCCT Vol.1; 2010 for International Conference , pp: 309-312.
- [8]. Sujata V. Mallapur, Siddarama R. Patiland, Jayashree V.

- Agarkhed,(2016),LoadBalancing Technique for Congestion Control Multipath Routing Protocol in MANETs, Wireless Personal Communication, Springer, Volume 92 , pp:749-770.
- [9]. Jenish G and Rutvij J, (2015).Energy Efficient Routing Approaches in Ad hoc Networks: A Survey, Advances in Intelligent Systems and Computing, Springer339: pp: 751-760.