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# A Survey on Reducing Redundancy in Wireless Ad-HOC Network

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***Abstract:*** ***Many broadcasting protocols for ad-hoc wireless networks perform poorly in situations when network becomes unreliable or untrusted. In real environment, any node may suddenly become unavailable due to power failure or mobility, orbe unable to receive or forward broadcast packets due to noise/interference. The major goal of any broadcasting algorithm is to minimize the number of retransmissions. This paper provides different techniques to reduce redundancy. There is a need to develop fault tolerant network with reducing redundancy effectively.***
***Keywords: wireless ad-hoc network, broadcast,, broadcasting protocol, reach ability, redundancy.***

## I. INTRODUCTION

An ad hoc wireless network is a collection of wireless mobile hosts forming a temporary network without the aid of any centralized administration or standard support services. In such networks, each nodes act not only as senders or receivers but also as routers or forwarders. Routes between any two nodes may contain multiple hops. In a mobile ad hoc network, broadcasting is nothing but to send a packet from a source node to all other nodes in the network. It is a one-to-all operation which creates a multi hop scenario, where packets originated from the source hostare received and further relayed by several intermediate hosts before reaching all the nodes in the network since all mobile hosts may not be within the transmission range of the sender host due to the limited radio power. Blind flooding is a straightforward broadcasting method where each node forwards the broadcast packet exactly once whenever it receives the packet for the first time. In wireless networks, whenever a node transmits a packet, all of its neighbors residing in its transmission area receive the packet. Thus one transmission may cause multiple receptions as there may be several hosts within the transmission range of a host and it becomes worse when the unidirectional radio propagation is used. Blind flooding ensures a complete coverage, in wireless networks it becomes very much resource-consuming and also causes serious redundancy, contention and collision. Collectively, these three problems are known as the broadcast storm problem. The dominant pruning (DP) algorithm is one of the approaches that utilizes 2-hop neighborhood information to reduce redundant (re)transmissions. To reduce more redundancy, two improved algorithms named total dominant pruning (TDP) and partial dominant pruning (PDP). To make broadcasting algorithms fault tolerant, we need to increase redundancy. For broadcasting, multicover dominant pruning (MDP) which is the first fault-tolerant broadcasting algorithm is been used. MDP improves the reach ability of nodes in an unreliable ad-hoc wireless network by facilitating multiple receptions of data packets by the same host. Although MDP ensures fault tolerance, the number of packet forwarding is too large; sometimes it can be as large as the blind flooding. Three novel efficient fault-tolerant broadcasting algorithms which not only provide fault tolerance feature but also cut down the number of packet transmissions as well. The concept of PDP and TDP to reduce redundant retransmissions and modify them to provide fault-tolerance. Three fault tolerant algorithms dubbed as Multicover Total Dominant Pruning (MTDP), Multicover Partial Dominant Pruning (MPDP) and Multicover Improved Dominant Pruning (MIDP) which improves redundancy and reachability.

## II. LITERATURE REVIEW

In 2002Wei Lou and Jie Wu focused on Dominant pruning (DP) which utilizes 2-hop neighborhood information to reduce redundant transmission. Dominant pruning algorithm gives better performance compared to other blind flooding and self pruning.
In same year Khaled M. Alzoubi, Peng-Jun Wan, OphirFrieder has proposed connected dominating set (CDS) as spine of wireless adhoc network. A communication is achieved through single hop radio transmission if communication parties are close enough, or through relaying by intermediate nodes. All nodes in wireless network are distributed two dimenstional plane and have an equal maximum transmission range of unit.

Amir Qayum, Laurent Viennot, AnisLaouiti proposed multipoint relays mechanism in 2002 to efficiently do the flooding of broadcast messages in mobile wireless networks. It reduce the number of redundant re-transmissions while diffusing a broadcast messages in the network.

In 2007 Ashikur Rahman, Pawel Gburzynski, Bozena Kaminska focused on multi cover dominant pruning(MDP) which control redundancy in re-transmission to increase the reachablity and trust based dominant pruning is other proposed enhancement here node is ranked by the number of next hop neighbors it can cover.

In 2009 Ashikur Rahman, Md. Endadul Hoque, Farzana Rahman, Sabuj Kumar Kundu proposed two scheme reactive and proactive. With the reactive approach, a receiving node decides to rebroadcast the packet only if it concludes that its retransmission is going to cover new nodes, i.e., ones that have not been already covered by the received packet. In a proactive scheme, a transmitting node selecting the forwarders from among its neighbors may use such criteria as node degree, power level, coverage area, etc

## III. TECHNIQUES TO REDUCE REDUNDANCY

Notations used below to describe the heuristics are listed in Table I.

| Notation | Description |
|---|---|
| *U* | Originator node (sender) |
| *v* | Intermediate node(Receiver) |
| *N(u)* | Set of all one-hop neighbors of node *u* |
| *N(v)* | Set of all one-hop neighbors of node *v* |
| *N(n(v))* | Set of all one-hop and two-hop neighbors of *v* |
| *F(u, v)* | Set of forwarding nodes of *v* |
| *B(u, v)* | Set of nodes from which *v will create the* forwarding node set F(u,v) |
| *U(u, v)* | Set of uncovered neighbors that are exactly two-hop away from *v* |
| *S(u)* | Set of nodes that is covered by node *u only* Once |

Table 3.1Summary of Notations

### A. *Dominant Pruning*

The dominant pruning algorithm is a deterministic broadcast scheme with complete coverage. The latter means theta broadcast packet reaches all nodes in and reaches all neighbors of the sender. Let $N(u)$ be the set of all one-hop neighbors of node u. By $z^2(u)$ we shall denote the set of all one-hop and two-hop neighbors of u, i.e., $N^2(u) = \{v | v \in N(u) \vee \exists z[v\ N(z) \wedge z \in N(u)]\}$

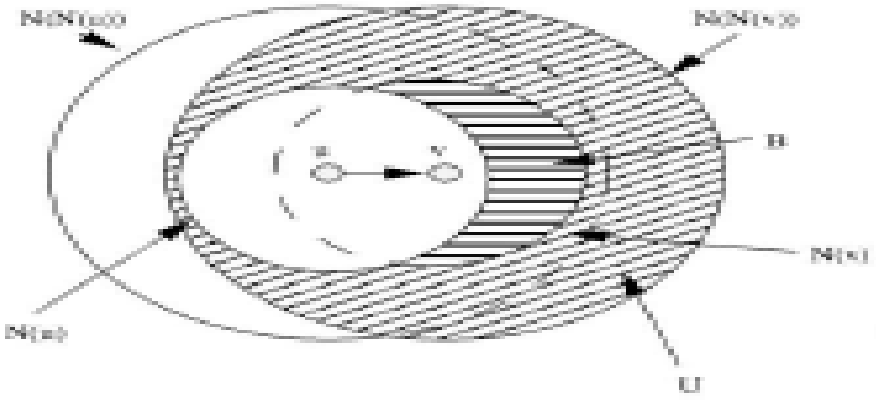


Figure 1.1 Dominant Pruning

*B. Total Dominant Pruning*

In Total Dominant Pruning (TDP) algorithm, each node piggybacks their 2-hop neighbor list in the header of the broadcast packet. When v gets N(N(u)) with the packet, v can easily deduct this set from its own 2-hop neighbor list N(N(v)) as u has already covered all the nodes in N(N(u)). Thus, U(u,v) is reduced to U(u,v)=N((v))-N(N(u)). Although TDP algorithm shows a remarkable improvement compared to DP algorithm in terms of number of forwarding, it consumes more overhead as each node needs to piggyback their 2-hop neighborhood information with the data packet and therefore, the size of the broadcast packet increases.

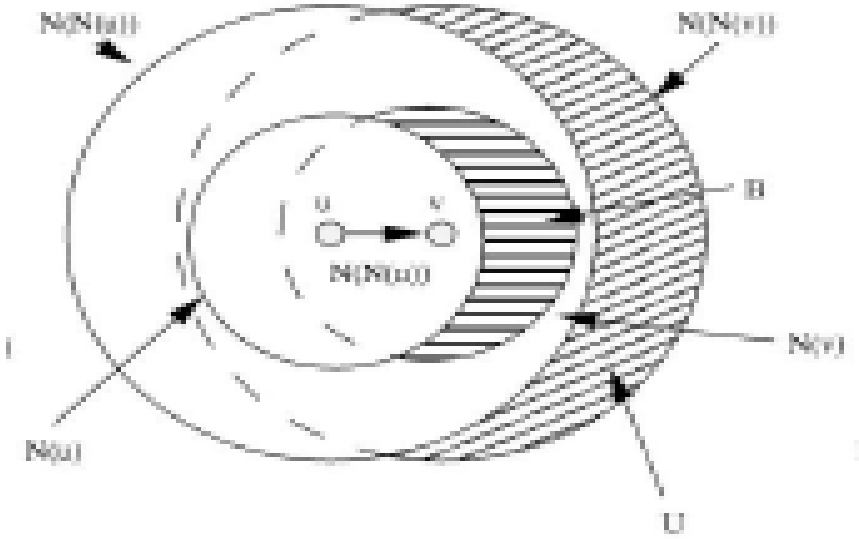


Figure 1.2 Total Dominant Pruning

*C.* Partial Dominant Pruning

In terms of Partial Dominant Pruning (PDP) algorithm, unlike the TDP algorithm, no neighborhood information of the sender is piggybacked with the broadcast packet. However, this algorithm deducts all the nodes that are deducted in DP algorithm and besides this, some more nodes are excluded from the two hop neighbor set of v. Since the neighbors of the common neighbors of u and v exist in the two-hop neighbor set of u (i.e., $N(N(u) \cap N(v)) \subseteq N(N(u))$ ), this set can be excluded from N(N(v)). Therefore, the two-hop neighbor set U in PDP algorithm is U(u,v)=N(N(v))-N(u)-N(v)-P, where P=N(N(u) ∩N(v)). Among these three optimized broadcasting protocols DP is the best for the complexity whereas TDP is the most optimized heuristic, but in terms of overhead, PDP is the real winner although it has an additional computational cost of calculation of the P-set. Therefore, the PDP algorithm is considered as one of the promising optimized broadcast protocols for wireless ad-hoc networks and due to its less overhead requirement, it is applied in ad hoc wireless mesh networks for multimedia streaming applications .

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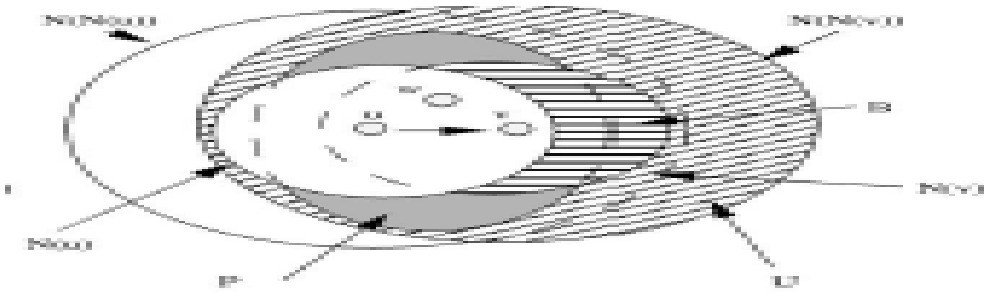

Figure 1.3 Partial Dominant Pruning

*D. Multicover Dominant Pruning*

The idea behind MDP is to introduce controlled redundancy into retransmissions—to increase the reachability without detecting or specifically circumventing the misbehaving nodes.Suppose $v$ has received a packet from its neighbor $u$, and $v$ should rebroadcast this packet. As before, $v$ determines the two sets $U_v$and $B(u, v)$. This time, however, we want the set $F_v$to be the minimum subset of $B(u, v)$ with the property that each node in $U_v$is covered at least $m$ times by the nodes in $F_v$. Formally, the forwarding set $F_v$will be a minimum subset of $B(u, v)$ such that for every node $w \in U$, $|z : w \in N(z) \wedge z \in F_v| \geq m$.

## IV. CONCLUSION

In this paper, I have surveyed various techniques to reduce redundancy of packet transmission. From the literature reviewed, it is clear that a lot of work has been done in thisarea but there is a need to develop a scheme of reducing redundancy in broadcasting.

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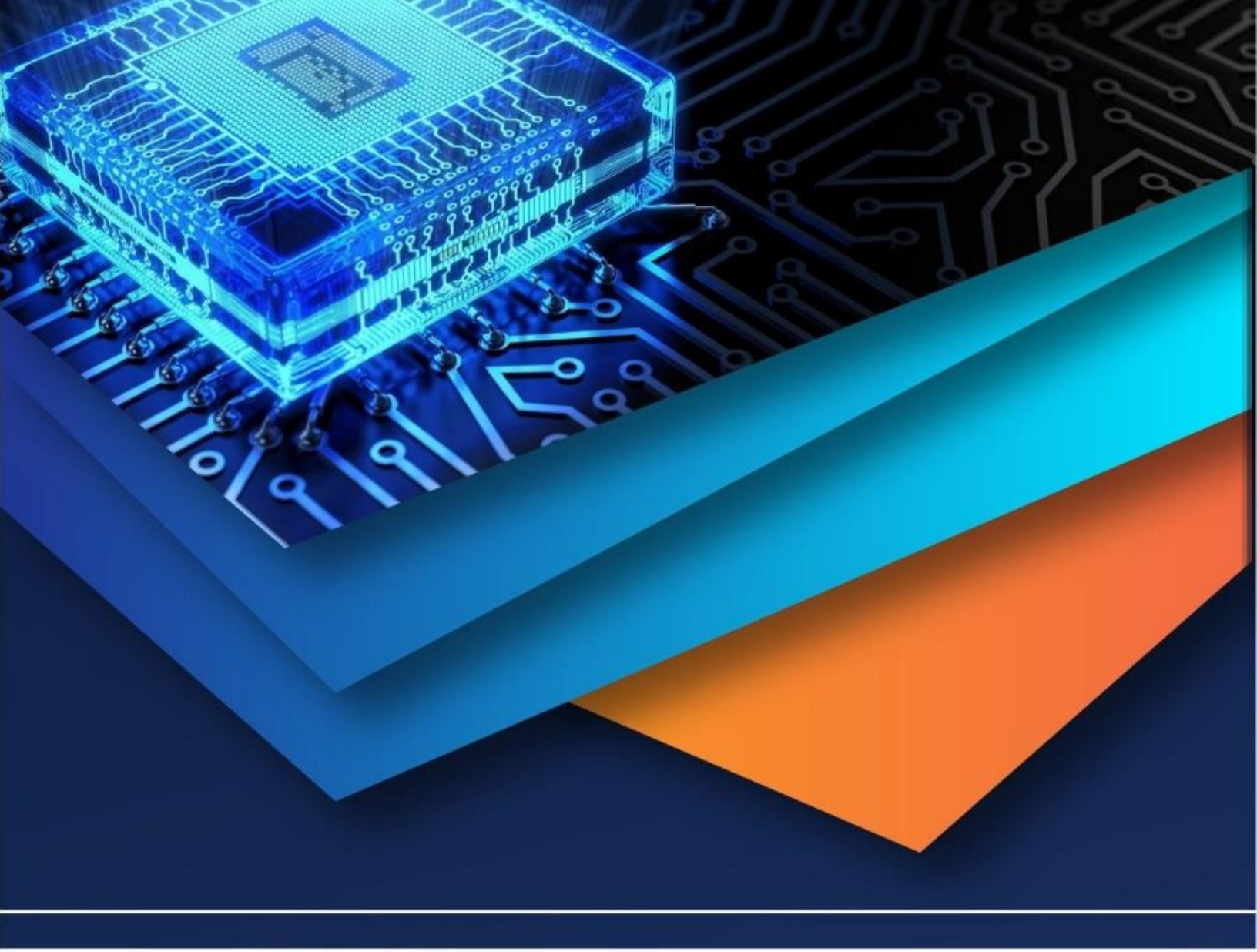

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