

**On Practical Construction of Quality Fault-Tolerant Virtual Backbone in Homogeneous Wireless Networks**

**Abstract:**

Over years, many efforts are made for the problem of constructing quality fault-tolerant virtual backbones in wireless network. In case that a wireless network consists of physically equivalent nodes, e.g., with the same communication range, unit disk graph (UDG) is widely used to abstract the wireless network and the problem is formulated as the minimum *k*-connected *m*-dominating set problem on the UDG. So far, most results are focused on designing a constant factor approximation algorithm for this NP-hard problem under two positive integers *k* and *m* satisfying *m \_ k \_* 1 and *k \_* 3. This paper introduces an approximation algorithm for the problem with *m \_ k \_* 1. This algorithm is simple to implement; it connects the components by adding a bounded number of paths, which first computes a 1-connected *m*-dominating set *D* and repeats the following steps: (a) search the separators arbitrarily in (*i−*1*, m*)-CDS with *i* = 2*,* 3*, ・ ・ ・ , k*, (b) add a bounded number of paths connecting the components separated by separators in (*i−*1*,m*)-CDS to improve the connectivity of (*i−*1*,m*)-CDS, until it becomes *k*-connected, and (c) remove redundant paths if there exist at every iteration. We provide a rigorous theoretical analysis to prove that the proposed algorithm is correct and its approximation ratio is a constant, for any fixed *k*.

**Existing System:**

In most cases, a wireless node is battery operated and thus has a limited power source. In wireless communication, the amount of energy consumed for a node to transmit a message to another node increases super-linearly proportional to the distance between them. As a result, most wireless networks prefer multi-hop communication over long range direct communication to conserve its energy.

Unfortunately, the multi-hop communication strategy increases the number of messages flying over the network drastically and causes a huge amount of wireless signal interference and collision. As a result, the nodes consume much of its energy for retransmitting messages and waste lots of energy. This problem is known as the broadcasting storm problem and is a serious but inheriting issue in most multihop routing wireless networks. To ease the impact of the problem, one promising strategy would be having a backbonelike structure in the wired counterpart so that the number of nodes which are involved in the routing can be reduced.

**Proposed System:**

This subset is called as a virtual backbone (VB) of the wireless network. Recent studies show that in addition to improve the efficiency of the wireless network, virtual backbone is known to bring several advantages to wireless networks as its adoption can be used to alleviate routing overhead and serve as an efficient platform for unicast, multicast, and fault-tolerant routing.

A subset of nodes in the unit disk graph (UDG) representing a wireless network of interest can be a VB in the graph if (a) the subgraph of the UDG induced by the subset is connected and (b) all nodes are either in the subset or adjacent to a node in the VB. In theory, the subset of a graph satisfying the requirements is referred as the connected dominating set (CDS). Apparently, a CDS of a UDG is better than another CDS of the UDG if its size is smaller as that means the CDS will suffer less from wireless signal interference and collision.