Chapter 8

Conclusion and Future Work

8.1 Conclusion

This thesis addresses some fundamental issues such as uniquely addressing problems, clustering, routing and path planning in clustered networks. The techniques and algorithms which are used to construct clusters and maintain the unique clustering Hop ID for the nodes in a network so that communication between the source and destination is supported without disruption. First and foremost, the metric dimension concept is used to extract the location content of the nodes in a network. With the help of distance partition of vertex set of a graph $G$ with reference to a vertex in it is defined and with the help of the same, a graph with metric dimension two (i.e. $\beta(G) = 2$) is characterized. The concept of Cluster Dimension of a network is introduced, which is defined as the minimum cardinality of a subset $S$ of the set of nodes having the property that for any two distinct nodes $x$ and $y$, there exist the nodes $s_1, s_2$ (need not be distinct) in $S$ such that $|d(x, s_1) − d(y, s_1)| \geq 1$ and $d(x, s_2) < d(x, s)$ for all $s \in S − \{s_2\}$. The sufficient conditions for a graph of cluster dimension $n$ and a tight upper bound for the number of nodes of a network with prescribed dimension in terms of diameter is obtained. To characterize the graphs with cluster dimension two, the distance partition of vertex set of a graph $G$ with
reference to a vertex in it is defined and with the help of the same, a graph with cluster dimension two (i.e. $\beta_c(G) = 2$) is characterized. In the process, a polynomial time algorithm is developed which verifies if the cluster dimension of a given graph $G$ is two. The same algorithm explores all cluster bases of graph $G$ whenever $\beta_c(G) = 2$. A Land Marks for Unique Addressing algorithm is developed to generate unique ID for each and every node which leads to the formation of overlapping/non-overlapping clusters based on unique ID is developed. To overcome the draw back of the developed LMUA algorithm, the concept of clustering is introduced. Based on the clustering concept a Land Marks for Unique Addressing and Clustering Algorithm (LMUAC) is developed. LMUAC Algorithm constructs strictly non-overlapping clusters, with the help of the same the classification of those nodes in to cluster heads, Member Nodes, Gateway nodes is carried out. The algorithm is developed to generate the Hierarchical code for the cluster heads to operate in the level one hierarchy for wireless communication switching. Whether the expansion of the existing network can be performed or not with out modifying the cost of adding the cluster head is shown. As far path planning is concerned the design of LMUAC Routing scheme for an efficient path planning from source to destination by using the Unique clustering Hop ID is developed. By LMUAC algorithm the upper Bound expression in terms of path length, Maximum Link Utilization and Memory space requirement is calculated.

8.2 Future Work

Routing in the clustered network has been an active research areas and several methods have been studied and developed in recent years. Particularly routing plays a major role in communication networks for transfer of data from source to destination in an efficient way with out much disruption. The algorithm will be developed for data transfer from source to destination varies from application
to application. To develop an efficient routing algorithm for a path planning a clustered approach is utilized and wireless communication is adopted. The cluster heads will be treated as a base stations and all the base stations are connected as a mesh network, where all the cluster heads are in the visible communication range. The hardware used here at each and every cluster head is costly. There is a need for a backbone construction in a clustered network. The construction of back bone network between cluster heads is an NP hard problem. The network needs to be addressed for an efficient backbone construction. Management of the communication links capacity plays a major role in the construction of backbone network for an efficient data transfer via highest link capacity route through cluster heads. The construction of backbone is to be carried out using the same structure that have been utilized for the construction of clusters and routing algorithm using LMUAC.