CHAPTER 56

TECHNOLOGY
COMPUTER ENGINEERING

Doctoral Theses

01. MALHOTRA(Amarjit)
Efficient Resource Utilization Techniques for Cloud in AD Hoc Network.
Supervisors : Prof. Sanjay Kumar Dhurandher and Prof. Bijendra Kumar
Th25323

Abstract
(Verified)

Ad hoc Cloud computing is one of the latest domains of cloud computing where nodes in the network share resources among themselves without the aid of any centralized authority or Internet connectivity. The nodes participating in the cloud contribute in task execution and data storage. In this regard; the work proposes few novel optimized task allocation and data distribution protocols for large networks with mobile nodes.The initial proposed protocol, *Multi-hop Mobile Ad hoc Cloud (MMADC)* explores the feasibility of an Ad hoc Cloud computing model by offloading the subtasks of an application for execution on other mobile nodes in the network that may be many hops away.Likewise, in the design of *Explicit Mobile Cloud (EMCloud)*, seamless resource sharing is performed in large networks considering only mobile nodes and without any dependency on any fixed infrastructure.The node selection for task offloading is a complicated process due to the diversity in the task requirements and the presence of a number of heterogeneous nodes in the network. However, there is no study that focuses on node selection mechanism keeping in view the user preferences, user requirements and optimized usage of the network resources. The work presents *Best Fit Power Weighted Difference (BF-PWD)* method for node selection that is used to rank the nodes and subsequently select the best node for task offloading.Next, the *Mobile Ad hoc Data Cloud (MDC)* proposes data distribution on mobile nodes. The unused storage capacity of the participating users can be harnessed for storage purpose by forming a *Peer-to-Peer (P2P)* Ad hoc Cloud.Finally, a scheme is proposed named as *Range Query in Mobile Ad hoc Data Cloud (RQ_MDC)* that suggests utilizing location aware data storage enabling both exact and range queries over the data stored on mobile devices in mobile Ad hoc Clouds

Contents

02. GUPTA (Nisha)
Control Mobility in Wireless Sensor Networks Using Relays.
Supervisor : Prof. Satbir Jain
Th 25325

Abstract
(Verified)

Wireless Sensor Networks (WSNs) comprise of special light weight nodes which are used to sense and record events. The data is collected by the sensor nodes and information is transferred to an infrastructural node, called the sink. Energy is major constraint in any WSN and increasing the transmission range has high energy requirements. Clustering has proven to be a solution to energy and load balancing. The network is divided into smaller areas called the clusters and each cluster has a Cluster Head. The cluster heads act as communication link between nodes of their clusters, called the member nodes, and any other cluster or sink. The nodes send collected data to their respective cluster heads, which aggregate it and transmits to the sink in single-hop or multi-hop via other cluster head with sink as the final destination. This leads to higher energy consumption at the cluster heads, so role of cluster head is alternated among nodes periodically or statistically. In the thesis, energy efficient clustering algorithms suitable for a static WSN, mobile WSN and a partitioned WSN have been presented. The algorithms result in better performance by using a mobile relay in the system which has abundant resources. The algorithms for static and mobile networks initially cluster the given WSN and then maintain the connectivity as re-clustering is an expensive job. The third algorithm first tries to maintain the clustering by electing cluster heads from the disconnected nodes and then maintains the clustering. All the algorithms have been simulated for their performance evaluation in terms of energy consumption, lifetime, delay, packet delivery and throughput. Benchmarking parameters for evaluation of clustering algorithms are also identified in order to provide a standard baseline for selecting algorithms for an application and designing new algorithms with certain advantageous results.

Contents

03. GUPTA (Nitin)
Efficient Channel Assignment Methods for Wireless Regional Area Networks.
Supervisor: Prof. Sanjay Kumar Dhurandher
Th 25324

Abstract
(Verified)

The advancement in technology and increasing interest in the various emerging wireless products has lead to an exponential growth in demand of limited spectrum, which is extremly difficult to satisfy through the current fixed spectrum assignment policy. Cognitive Radio technology has emerged as a promising solution for the spectrum scarcity problem which enables the access of licensed spectrum band opportunistically. Cognitive radio technique helps in enabling the communication on both licensed and unlicensed channels without interfering with the licensed user. One of the important issues in cognitive radio networks is the channel assignment which is the mapping of available idle licensed channels to the unlicensed users. Dynamic channel assignment is required such that the available resources are utilized effectively along with minimizing interference to the licensed users.This thesis focussed on some functionalities of cognitive radio networks for the development of efficient channel assignment techninques. Different functions of cognitive radio networks depend upon each other for its effective performance. Therefore, this thesis focussed on various cognitive functions like spectrum sensing,

spectrum sharing and spectrum handoff to develop channel assignment methods such that the overall network performance is improved. To achieve this objective, the proposed research applied the concept of economics, contract theory, game theory and markov chain to address the various issues of spectrum channel assignment.In this thesis, the performance of the proposed channel assignment strategies in cognitive radio networks based wireless regional area networks have been compared against the existing techniques. Further, there related advantages and performance tradeoffs have also been discussed. The results showed that the proposed schemes performed comparatively well against the considered benchmark schemes.

Contents