An Effective Survey on Cluster Based Routing Protocols

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Abstract

Wireless Sensor Network consists of distributed sensors for monitoring environmental and physical conditions such as temperature, sound and pressure etc. Ad hoc network is a decentralized type of network without any pre-existing infrastructure. Routing is a technique used to determine appropriate path from source to destination. In case of wireless sensor network routing is an important problem. There are several routing protocols available (E.g. AODV, PEACH, CBRP, LEACH etc.). Clustering is a technique that divides the major network into interconnected sub networks that is called as clusters. Each cluster has a cluster head. The main aim of the clustering protocols is to increase the network lifetime and reduce the energy consumption of the sensor nodes. This paper presents a survey on various routing protocols.

Index Terms – Ad-hoc network, Routing Protocol Wireless sensor network, Clustering, Cluster head.

1. Introduction

Wireless Sensor Network (WSN's) consists of sensor nodes for monitoring environmental conditions, health, commercial and home applications. Wireless impromptu network may be a suburbanized form of wireless network. The network is alleged to impromptu then it doesn't consider a pre existing infrastructure like routers in wired networks or access points in managed wireless networks. WSN has many applications such as civilian and military applications. The usually used application of MANET (Mobile ad-hoc networks) is military communications including emergency response, and search/rescue maneuvers [12-16]. The

WSNs consist of small sensor nodes, the nodes are small, lightweight, battery-powered devices, it has less or limited energy. Hence in WSNs consumption of energy is an important issue. In the ad hoc network for routing every node participates by forwarding knowledge for different nodes, therefore the determination of that nodes forwarding knowledge is formed dynamically on the idea of network property. Circumstantial network uses flooding additionally to the classic routing for forwarding the information. For both sensor networks and ad-hoc networks, the most popular technique is clustering for locality-preserving network organization [8]. Architectures based on clusters are effectively reducing energy consumption and enable data aggregation [9, 10] and security mechanisms [11]. The wireless circumstantial networks have kind of applications because of the decentralized nature of the network. Negligible configuration and fast readying makes the circumstantial network appropriate for emergency things like natural disasters or military conflicts. Because of the presence of dynamic and reconciling routing protocols circumstantial networks may be fashioned quickly. There are different types of ad hoc routing protocols such as table-driven or proactive routing, on-demand or reactive routing and hierarchical routing protocol.

2. Study of Routing Protocol

This section describes various routing protocols for ad-hoc network. There are different types of ad hoc routing protocols are there such as table-driven or proactive routing, on-demand or reactive routing and hierarchical routing protocol.

2.1 Ad-Hoc On-Demand Distance Vector Routing

An ad hoc network is a collection of mobile nodes without any centralized access point or existing infrastructure. It is an on-demand or reactive type ad hoc routing protocol. Ad-hoc On Demand Vector Routing (AODV) algorithm can be used for ad hoc networks [1]. It is suitable for self-starting dynamic network. It provides loop-free routes even if the broken links are repairing. Global periodic advertisements are not required for this type of protocols so that the overall bandwidth availability of the mobile nodes is less than other protocols that needs such advertisements. The basic objectives of the algorithm's are: (1) broadcast the discovery packets only when necessary, (2) distinguish between local connectivity management and general topology maintenance and (3) to disseminate information about changes in local connectivity. AODV uses a broadcast route discovery mechanism. It can find route quickly and efficiently. The features of AODV are the following: (1) it stores only the needed routes, (2) need for broadcast is minimized, (3) memory requirement is reduced, (4) fast response to link breakage and (5) it is scalable for large population of nodes. The drawback is it has longer latency for route establishment.

2.2 Energy-Driven Adaptive Clustering Hierarchy (Edach) for Wireless Sensor Networks

Wireless Sensor Network (WSNs) consists of sensors which has less battery power. Hence energy consumption is a major issue in WSNs. There are different methods for improving the network lifetime. A new approach called energy-driven adaptive clustering hierarchy (EDACH) evenly distributes the energy among the sensor nodes to increase the network lifetime [2]. The proposed system has two phases (1) set-up phase, (2) self-organizes data collection and transmission phase. Compare with Low-Energy Adaptive Clustering Hierarchy (LEACH) and Proxy-Enabled Adaptive Clustering Hierarchy (PEACH) the proposed approach increases the network lifetime. This proposed model is not suitable for multi-level cluster hierarchy.

2.3 Peach: Power-Efficient and Adaptive Clustering Hierarchy Protocol for Wireless Sensor Network

The Wireless Sensor Network clustering is a technique which is used to minimize the energy consumption and maximize the lifetime of the network. But in many cases the clustering consumes large amount of energy because of fixed clustering and cluster formation overhead. A protocol called Power-Efficient and Adaptive Clustering hierarchy (PEACH) [3]. This proposed system supports adaptive multi-level clustering and form clusters without additional overhead. It can be used for location-aware and location unaware wireless sensor network. Even with the energy constraints the network lifetime can be maximized with energy-aware clustering protocol. Low and balanced energy consumption of each node and long term connectivity to the network are the few properties provided by the clustering protocol; these properties are closely related to the network lifetime of the WSNs. This system increases the network lifetime and minimizes the energy consumption compared with existing clustering protocols.

2.4 Enhanced Cluster Based Routing Protocol for Manets

Wireless Sensor Networks are composed of collection of devices that communicate with each other over wireless medium [7]. The routing protocols suffer in their performance due to the resource constraints and the nodes mobility. In case of MANETs, the protocols based on clustering suffer in many cases due to the failure of cluster head; it decreases the stability of the cluster. An enhanced cluster based routing protocol (CBRP) was proposed to increase the performance of traditional CBRP [4]. By using weighted clustering algorithm (WCA) they are electing better cluster head. In the hierarchical network structure each cluster has a leader, which is also called the cluster head (CH).

2.5 Modified Leach Algorithm for Wireless Sensor Network

Wireless Sensor Network (WSNs) consists of large number of sensor nodes which are deployed in a certain area for collection of data. The major issues in Wireless Sensor Network are resource

constraints. The main aim is to increase the network lifetime of the network. To achieve this goal clustering the sensor nodes is a good technique. An energy efficient clustering algorithm for sensor networks based on the LEACH (Low Energy Adaptive Clustering hierarchy) protocol was proposed [5]. When compared to LEACH the proposed system decreases the consumption of the network resource.

2.6 A Management of Ad Hoc Network Model for Rescue and Emergency Senarios

The main problem of the Mobile Ad-hoc Networks (MANETs) is the availability of the network. Clustering is a technique which is used in the ad hoc network. A Backup Cluster head (BCH) was proposed in order to improve the hierarchical routing and for the convergence of the clusters [6]. Backup Cluster Head protocol (BCHP) is used in order to improve the availability and convergence of the network. The BCHP is better when compared with the existing protocols such as AODV and CBRP. Here the cluster formation is done by the variant of WCA.

3. Conclusion

Clustering is a technique which is used to divide the entire network into sub network. The main aim is to improve the network lifetime. In this above survey many clustering protocols are discussed to improve the network lifetime. Among those protocols BCHP (Backup Cluster Head Protocol) is efficient as it improve the availability and convergence of the network when compared to the previously existing protocols.

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