

# Analyzing Cluster Process and Identifying Issues and Solution

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## ABSTRACT:

A wireless sensor network is described to be a grouping of sensor devices that has the capability to sense its environment condition and forward it to respective base station through internet. By analyzing its applications and wide utilization the issue identified in WSN is energy consumption and reliable data delivery. Here a survey has been taken to identify better ways to improve system performance based on parameters considered above. In general, compared to other methods clustering is most efficient method in WSN for minimum energy consumption. Clustering will expand the network lifetime and it also increases scalability of the network. Hence most of the clustering methods used and issues in it are identified. Therefore a better way of clustering with considerable changes is suggested as conclusion.

## I.INTRODUCTION

Wireless sensor network is defined to be a group of sensor nodes that were spread randomly in a particular region which are not a stable environment. These nodes has the ability to detect, measure and forward information to its close nodes and base station (Bs). Anyway these nodes are viewed as little, least memory, low calculation, low preparing and central point is small power unit. To screen a specific area more number of nodes even several nodes will be spread over an enormous zone. The information detected by these nodes would be communicated to BS for additional handling henceforth directing is a significant factor for sending information from node to node or BS individually.

In WSN, number of research and distinctive various leveled procedures have been executed for effective use of accessible assets, for example, battery. Consequently the objective of WSN is to expand network lifetime and to augment network lifetime. In hierarchical routing, clustering is the efficient and famous approach to obtain these goals. Clustering not only increases network lifetime but also it eliminates redundant copies and efficient clusters will create effective CH.

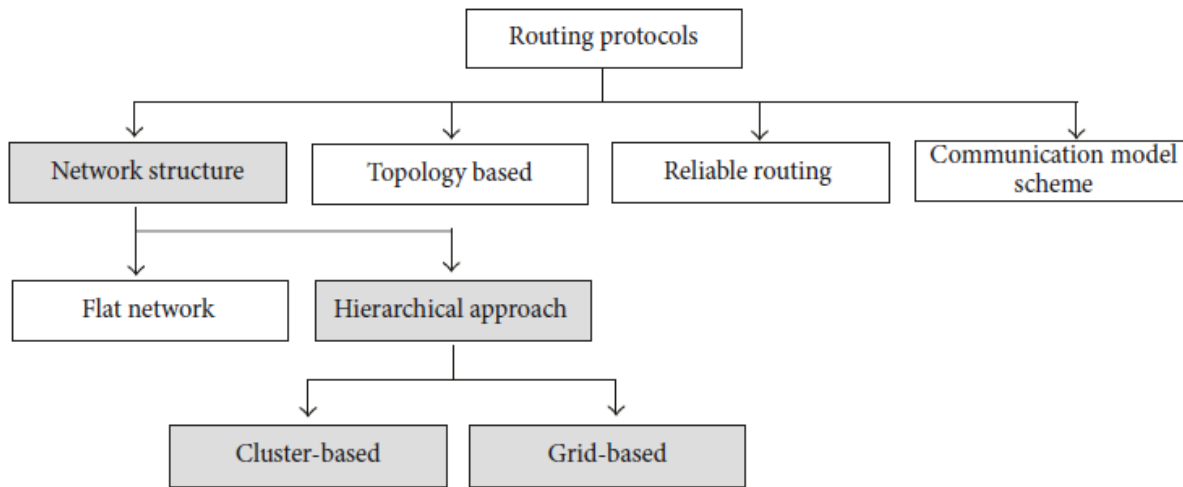


Figure 1: Classification of routing protocols in WSN

By executing clustering a sensor organization will be viewed as versatile. Cluster head (CH) is represented as head of the group. The CH determination is done either by sensor in the locale or clusters allocated by the organization maker. For efficient data transmission, diverse clustering algorithms have been created. Here group-based information transmission is likewise supposed to be energy-productive routing in WSNs. Consequently, in a progressive organization, nodes with high energy will be considered as CH and move the information through low energy hubs which are used to perform detecting measures.

#### Clustering Advantages:

1. By fixing the route set up inside the cluster, clustering reduces the size of routing table that was stored in individual nodes.
2. Clustering can conserve communication bandwidth since it limits the scope of inter-cluster interactions to CHs and avoids redundant exchange of messages among sensor nodes.
3. CH has the responsibility to extending network lifetime by efficient utilization of individual sensors' energy and it also leads to network lifetime by implementing efficient management strategies.
4. Topology maintenance will automatically reduce through implementing clustering because it only cares about CH and communication in it.
5. A CH can perform data aggregation in its cluster and decrease the number of redundant packets.
6. A CH can reduce the rate of energy consumption by scheduling activities in the cluster.

**Heterogeneous wireless sensor networks:**

The greater part of the protocols created for heterogeneous organizations depended on energy efficient and the vast majority of them are grouping methods which can be estimated adequately and energy protection for WSNs. In remote sensor organization, lifetime and reliability of the network is accomplished by heterogeneity. Heterogeneous sensor networks are a lot of valuable in genuine arrangements since they are all the more near genuine circumstances.

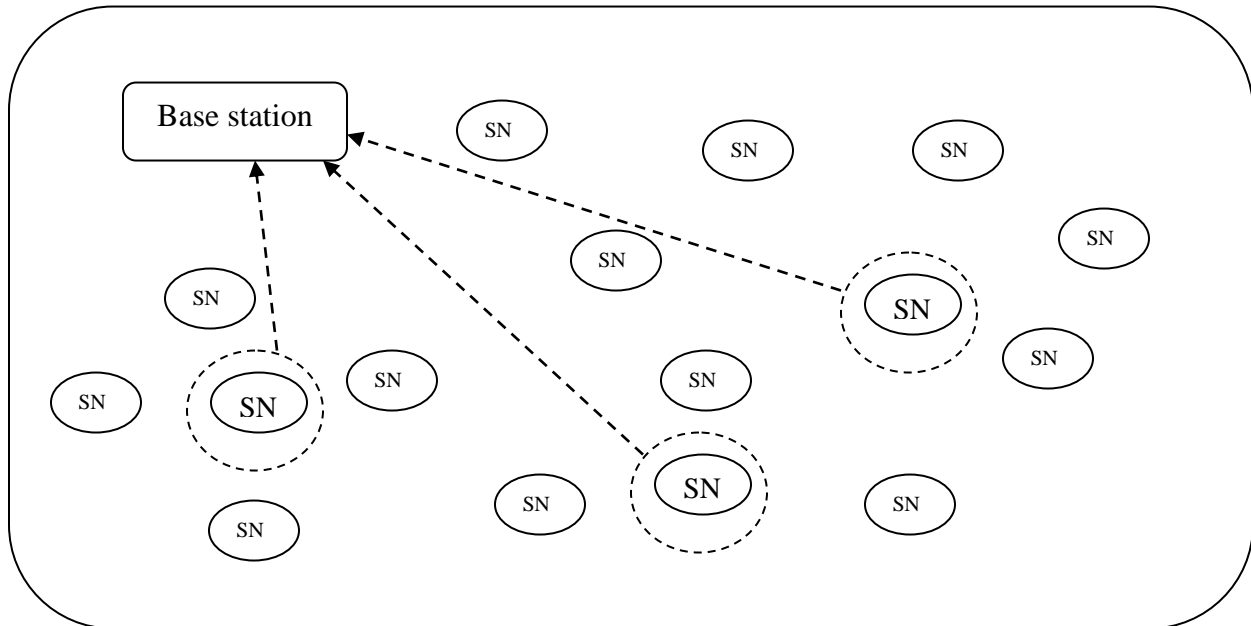
There are three common types of resource heterogeneity in sensor nodes: computational heterogeneity, link heterogeneity and energy heterogeneity.

- Computational heterogeneity is depicted to be all the more impressive in light of the fact that it has great chip and more memory contrasted with ordinary hubs. With these ground-breaking assets, the heterogeneous hubs can give complex information preparing and more stockpiling.
- Link heterogeneity is characterized to be availability network which has high transmission capacity and significant distance organization and handset contrasted with typical hub. Subsequently this achieves more dependable information transmission.
- Energy heterogeneity implies that the heterogeneous hub is line controlled or its battery is replaceable.

In this section, general description of WSN, clustering process and its advantages were discussed. Homogenous network and its types are described and in following section types of clustering and issues were identified.

**II. CLUSTERING**

In WSNs, an outsized range of energy levels are generated thanks to the random choice of channels. Therefore, quantifying additional energy and process completely different possibilities for every energy level can lead to higher performance and improve energy potency. Before bunch method direct communication is processed and its disadvantages are mentioned.

**Direct communication:**

The above chart shows the immediate correspondence of sensor nodes with base station or multi hop correspondence of organization. In reasonable energy utilization in direct correspondence is high which brings about expiry of sensor nodes in prior.

**Issues:**

- Direct correspondence or single-level correspondence isn't attainable for enormous scope network as WSN can't uphold long stretch correspondence.
- Direct correspondence has its weaknesses, for example, high energy utilization, duplication of information, and farthest hubs biting the dust rapidly

**Clustering:**

In clustering protocols the significant boundary to be considered is group arrangement cycle and number of cluster is significant. While framing cluster it should be even and number of messages sent during group should be minimized. In the event, the organization develops then intricacy of the calculation additionally increments linearly. Network performance can be improved by insightful cluster head choice selection. By choosing most ideal nodes the organization steadiness and generally network lifetime should be boosted.

In the majority of the procedures, CH decision depends on numerous boundaries like energy state and furthermore the area of the hub. Information collection is performed on the apparent information got by CH from part hubs; that is the reason it's actually considered on the grounds that the fundamental style challenge. It should even be idea of that the planned agglomeration algorithmic program should have the option to deal with totally extraordinary application necessities, as WSN is application subordinate. Another huge issue is to make positive that

the arranged algorithmic secure enough and may be utilized in applications any spot data is incredibly a huge load of fragile like a military application or prosperity observation.

**Clustering Parameters:** Clustering parameters that can directly or indirectly affect the cluster formation process are discussed below.

**Cluster Count:**

In the majority of existing strategies, number of group to be framed is predefined along these lines bunch development and bunch head choice leads to various group counts. It is a key boundary concerning grouping calculation productivity, which differs relying upon network size.

**Cluster Formation:**

The cluster formation process is incorporated and choice of bunch development is overseen by BS, in dispersed methodology the development of group is managed with no coordination. Subsequently through crossover approach we can use focal points of the two methodologies.

**Intra cluster Communication:**

Within the cluster communication will be held among portable hubs in bunch and CH. The majority of the organization, sensor hubs legitimately speak with CH and it primarily rely upon the separation among hub and CH. at the point when the organization is in huge scope, multi bounce correspondence may likewise executed for intra bunch correspondence.

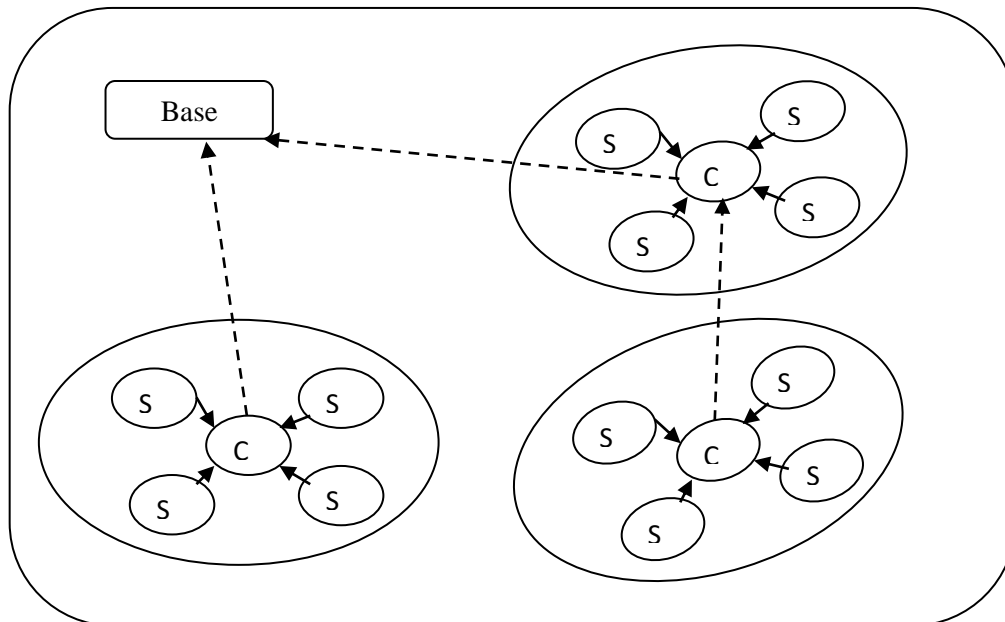


Figure 3: cluster based communication

**Cluster Head Selection:**

In view of organization bunch head choice the general execution of the organization is assessed. In some proposed procedures, the bunch head is predefined (as a rule in heterogeneous conditions). By and large, the CH determination depends on different boundaries (good ways from hubs and focus, energy level, and so forth) or probabilistic methodology is utilized or it is done through any irregular procedure.

**Few clustering algorithms:**

1. Low Energy Adaptive Clustering Hierarchy
2. Low Energy Adaptive Clustering Hierarchy Centralized
3. Cluster Chain Weighted Metrics
4. *K*-Means Algorithm
5. Cluster Head Election Using Fuzzy Logic
6. Unequal Clustering Size Model (UCS)
7. Non uniform Deterministic Node Distribution
8. Energy-Aware Distributed Clustering
9. LEACH-MAC
10. Energy-Aware Distributed Unequal Clustering

**ISSUES IN CLUSTER:**

- A lightweight clustering algorithm is required because of the limited memory. Moreover, with these restrictions, it is very difficult to manage scalability and prolong network lifetime.
- There are more number of clustering algorithm available and few of them were listed above. In most of the algorithms cluster is formed based on energy and distance.
- For every transaction, cluster will be formed and cluster head will be selected based on residual energy.
- Once data transaction is completed cluster formation will be completed. For another transaction again cluster formation should be done.
- For cluster formation and cluster head selection, election process should be done for this more energy will be consumed when clusters are formed frequently.
- Similarly another issue focused is CH should deliver data to base station at the same time it will leads to collision.

**Conclusion:**

In this paper, formation of clustering and various clustering techniques has been identified. Issues in direct communication and to overcome this issue clustering was implemented. It shows that clustering will reduce energy consumption and increases network lifetime. Various clustering algorithms were done based on distance and cluster head selection is done through residual energy. Issues found in clustering is frequent formation of clustering and

cluster head election process. Hence I conclude that instead of frequent cluster formation static cluster head selection should implemented.

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