

# A Survey of Various Method to improve the throughput of Zigbee Cluster Tree Network

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**Abstract:** IEEE 802.15.4 (Zigbee) is a leading technology for wireless sensor network, it is a medium access control and physical layer standard specially designed for short range wireless communication. Zigbee is used in applications that require low rate, secure networking, low complexity and power saving consumption. Generally Zigbee is typically used for environmental monitoring applications such as remote control monitoring system, health care device, home automation, electrical meter with in home displays, traffic management system etc. Routing protocol in zigbee has been classified on the basis of their route deterministic protocols such as ZRP, AODV and these protocols are designed considering inherent capacity constraint i.e. power, memory, bandwidth etc. In Zigbee Network On increasing the traffic load. The ratio of successfully data delivery is reduced, by which we not get efficient performance and throughput. For enhancing the performance and throughput of Zigbee different researcher has proposed different algorithm and methods which are summaries below in this paper.

**Keywords:** Zigbee cluster tree network, Routing, Topologies

## INTRODUCTION

Zigbee is an 802.15.4 standard which is used as a short communication range to create personal area network. It has also known as zigbee topology and Zigbee cluster tree. It has defined a rate of 250kb/s, which is best suited for periodic or intermediate data routing. Zigbee supports power saving operation and light weight routing to manage the MAC superframe structure.

In zigbee network, we used three different types of devices they are

1. Pan Coordinator – It is a functional device, which is used to investigate all the routes present in the network.
2. Router – It is a full functional device, which is used to route the data between source and destination.
3. End device – It is a reduced functional device, which receives the data from the source.

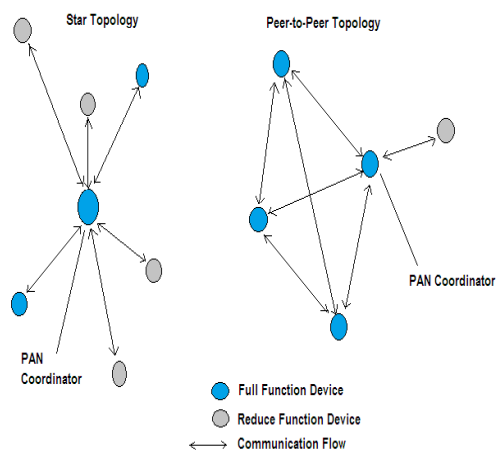
Zigbee Technology focuses on two most common routing protocols that are ZRP and AODV. AODV (ad hoc on demand distance vector) is a reactive routing protocol used to establish the routes between source to destination in mobile ad hoc network and wireless ad hoc network.

## AODV Routing Protocol

Routing protocols specify how routes communicate with each other. Routing algorithms specify the choice of routes from the source to destination. A routing protocol shares the information of the routing first to the neighbor node than to the other nodes of the network. This way routers gain knowledge about the topology of the network. Wireless sensor nodes sense the triggered event and then route the data to the source to destination node. WSN application is a multi-hop communication system in which data is sent via multiple hops to the sink node.

## Topology

The term Topology refers to the network layout either physically or logically. Two more devices connect to a link. The topology of the network is the geometric representation of the relationship of all the links. Zigbee supports three kinds of topology such as star, mesh, and cluster tree topologies. In a star topology multiple zigbee end devices connect directly to the zigbee coordinator. In a cluster tree topology, each zigbee router with its surrounding devices is regarded as a star network. Zigbee cluster tree network is delivered by the guaranteed time slot mechanism for high delivery ratio.



1. Star topology 2. Peer to peer topology

## 2. LITERATURE SURVEY

### 2.1 Time shift grouping access in IEEE 802.15.4 Mac Beacon Mode for Layered-Tree Network.

This paper [Yasushi Yamao, 2009] propose a new method called time shift grouping access (TSGA) in IEEE 802.15.4 Mac beacon mode for cluster tree networks. By dividing top-level router into two groups and used to different time slot for accessing PAN Coordinator. And apply load spreading codes for each Subnet, so that data packet collision is reduced and Throughput is improved.

### 2.2 Distributed algorithm

In this paper [kai, haunag, 2012], proposed a new algorithm to enhanced performance and optimizing a throughput of zigbee cluster tree network. Main problem in this paper traffic load are increased and data delivery ratio are not properly from source and destination. So researcher proposed new algorithm called a distributed algorithm and also used push pull reliable operation to improving a throughput and reduced the traffic. Whenever data delivery from source to destination properly without extra message exchange.

### 2.3 Cozi (coding in zigbee)

Node in zigbee sensor network does not exploit and shared nature of the wireless medium. so in this paper [10] proposed a Cozi method to enhanced the throughput of a cluster tree network. Cozi, a distributed packet scheduling based on simple network coding at intermediate node to increase the throughput and reliable communication with extremely negligible network overhead. Using topology interfering form Zigbee signalization message, our solution perform more optimized coding decisions in order to larger range of decoding node based on routed or dissemination of zigbee sensor network.

### 2.4 Adaptive interference aware clustering algorithm

Zigbee networks have been widely deployed, with heterogeneous system such as WLAN, Bluetooth etc... The coverage are of zigbee network is large and zigbee network is more experiencing interference from neighboring interferences like WLAN aps. In this paper [3] we propose adaptive interference aware multi channel clustering algorithm for a zigbee cluster tree network. In the proposed algorithm based on two types of channels such as inter cluster channel and intra cluster channel managed by cluster head. We propose five effective algorithms to detect the interference and avoid it. And also enhance the performance of network.

### 2.5 A Cluster Based Minimum Battery Cost Aodv Routing Using Multipath Route for Zigbee.

In this Paper [Ashutosh Bhatia, 2008], we proposed a Multipath Energy Aware (ME-AODV) routing to improve the performance of existing Zigbee Routing Protocol. ME-Aodv divided The Zigbee network in to logical cluster. the proposed algorithm exploit this logical cluster information to reduced the routing overhead. Symantienously with the clustering technique a blend of multipath routing and minimum battery cost routing has also been compound to increase life time of network by load balancing of energy consumption Therefore ME-AODV makes an effort for reduction of number of route discovery and contribute on improving the network performance such as network lifetime.

### 2.6 A Distributed and Autonomous Beacon Scheduling Algorithm for ZigBee Networks.

The need for high reliability wireless communication has triggered the interest in mesh network recently. It still tight synchronization of the whole network by means of beacon in the topology mode, the goal of an energy efficient operation required a close synchronization for effective duty cycle management. In this paper [Ralf Buda, 2007] reasecher show that distributed and autonomous algorithm is feasible to be used for beacon scheduling in a practical application. The algorithm introduces only minor overhead in term of network capacity usage and improved the efficeny according to robustness and performance.

### 3. COMPARISON OF PERVIOUS PAPER

Survey paper	Method's and algorithm		Protocol & topology
Time shift grouping access in IEEE 802.15.4 MC beacon mode	New active period method called time shift grouping access	Improved a throughput	Star and cluster tree topology
CoZI, basic coding or bandwidth utilization in zigbee	Cozi(coding in zigbee) Distributed packet sharing ,XOR operation(+)	Bandwidth mutilation	Table driven routing also called AODV routing & cluster tree topology
Distributed throughput optimization for zigbee cluster tree network	Adaptive parent based frame work and distributed algorithm using push pull reliable operation	Enhanced the performance and improved a throughput	AODV protocol, cluster tree and mesh topology
Adaptive interference aware multiple clustering algorithm in a zigbee network in presence of wlan interference	Adaptive interference aware clustering algorithm. Detection and avoidance method	Improve a performance	Aodv protocol

### 4. CONCLUSION AND FUTURE WORK

In this paper we are discussing about various efforts made to enhance performance of the Zigbee network additionally in this paper we also provide the previously designed method and different research approaches. This paper is a we made a Summary of different challenges that are found when we working on performance enhancement Zigbee protocol. And we propose our desired approach to enhance performance of zigbee Protocol our proposed work is implemented in future using NS2 simulator

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