

TechTrends



Vision:

To empower girls of diploma computer engineering to excel in IT Industries and serve the society.

Mission:

- To strive for academic excellence and professional competence among students and staff.
- To encourage innovative ideas among students to enhance their entrepreneurship skills.
- To provide high tech educational resources and supportive infrastructure.

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1. Introduction

Wireless sensors network is the network of distributed sensors that are used for monitoring and collecting physical condition of environment and gather it at central location. Wireless sensors are easier to install as compared to wired sensors as they cut down cost of wiring to 80%. But again there is a limitation to it, wireless sensors require more power. IEEE 802.15.4 standard formalized Zigbee technology is the solution to it to transfer the data. Zigbee node requires power less than 1mW with the range upto 150 m using DSSS (Direct Sequence Spread Spectrum) technique. ZigBee is developed by ZigBee alliance and task group, which include hundreds of member companies like Ember, Freescale, Chipcon, Invensys, Mitsubishi, CompXs, AMI Semiconductors, ENQ Semiconductor etc from semiconductor and software developers to original equipment manufacturers[1].

The reasons [2] for using Zigbee are:

- Reliable and self healing
 - Supports large number of nodes.
 - Easy to deploy
 - Very long battery life
 - Secure
 - Low cost
 - Can be used globally
 - Vibrant industry support with thirty or more vendors supplying products and services
- Open Standards protocol with no or negligible licensing fees
 - Chipsets available from multiple sources
 - Remotely upgradeable firmware
 - No new wires.
 - Low power (ability to operate on batteries measured in years)
 - Low maintenance (meshing, self organizing)
 - Standards based security [AES128]
 - Ability to read gas meter

2. Zigbee Standard

ZigBee device are the combination of application (such as light sensor, lighting control etc), ZigBee logical (coordinator, router, end device), and ZigBee physical device types (Full Function Device and Reduced Function Device) [2].

2.1. Physical Devices

Two types of zigbee physical devices are mentioned in IEEE 802.15.4 based on processing capabilities: Full Function Devices (FFD) and Reduced Function Devices(RFD).

2.1.1. Full Function Devices (FFD)

Full Function Devices can perform all available operations within the standard, including routing mechanism, coordination tasks and sensing task[1]. It plays role of coordinator, router or end devices depending on the intended application.

2.1.2. Reduced Function Devices (RFD)

RFD implements limited version of IEEE 802.15.4 protocol that do not route protocol and must be associated with FFD. The primary purpose of RFD is to search for an available network in order to transfer the data, check if there is any pending data, and send request to the network coordinator for the data[1]. When not transmitting data, RFDs go to sleep mode which in turn reduces battery consumption.

2.2. Zigbee Logical Devices

There are three types of logical devices in zigbee system: coordinators, routers and end devices.

2.2.1. Coordinators

It forms root of the network which allows bridging and interacting with the other network. The main purpose of coordinator is to set various network parameters such as radio frequency, packet size, unique network identifier, topology and other operational parameters. There is only one coordinator in each network which manages all nodes of the network.

2.2.2. Routers

Routers are the intermediate nodes that routes the data from source to destination in the network as well as sense the data from surrounding. It can relay data from other devices, can connect to an already existent network, also able to accept connections from other devices and be some kind of re-transmitters to the network.

2.2.3. End devices

It can be low-powered or battery-powered that can collect data from switches and sensors. They have sufficient functionality to talk to their parents (i.e., either router or coordinator) but cannot transmit data from other devices. This reduced capability leads to low cost. Apart from that, they don't require to stay awake all the time like routers and coordinators that tends to better low power wireless model. Each end device can have up to 240 end nodes which are separate applications sharing the same radio [2].

2.3. Access Modes

There are two modes of multi-access in zigbee protocols: Beacon and Non-Beacon. In Non-Beacon mode, every node can transmit data whenever the channel is free. In Beacon mode, coordinator assigns time slots to each and every node. These nodes can send data in their pre-assigned time slots only. This requires synchronization and the coordinator is responsible for it. Battery life of Non-Beacon enabled network is better as compared to Beacon enabled network as nodes wake up less often.

2.4. Topologies

Zigbee supports various network topologies but mostly used topologies are star, tree and mesh topologies.

2.4.1. Star

In this topology, there is one coordinator in network responsible for initiating and managing the devices over network. All other devices are end devices which directly communicate to coordinator. This topology is used where all devices require communication with the central controller. This topology is easy to deploy.

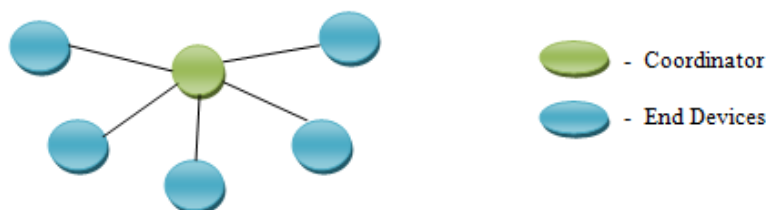


Fig 1: Star Topology

2.4.2. Tree

In this kind of topology, network is extended with routers with coordinators watching them. Routers are communicate with each other to transmit data and also can be connected to more FFDs/ RFDs end devices which results in geographical expansion of network.

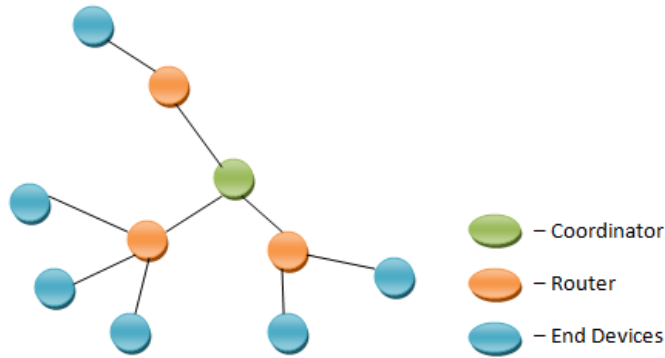


Fig 2: Tree Topology

2.4.3. Mesh Topology

In this topology, every node can transmit data to any other node within its range. Beaconing is not applied in this kind of topology. It is more complex compared to other topologies but is more robust and fault-tolerant.



Fig 3: Mesh Topology

3. Applications

Some of its applications are [3]:

Home Automation

- Security Systems
- Meter Reading Systems
- Light Control Systems
- HVAC Systems

Consumer Electronics

- Gaming Consoles
- Wireless Mouse

- Wireless Remote Controls

Industrial Automation

- Asset Management
- Personnel Tracking
- Livestock Tracking

Healthcare

Hotel Room Access

Fire Extinguishers

References :

1. “A Review Paper on Zigbee (IEEE 802.15.4) Standard”, ParneetDhillon, Research Scholar,CSE,RIMT , Mandigobindgarh, PTU; Dr. Harsh Sadawarti, Director, RIMT Mandigobindgarh, PTU. International Journal of Engineering Research & Technology (IJERT), ISSN: 2278-0181, Vol. 3 Issue 4, April – 2014.
2. STUDY ON ZIGBEE TECHNOLOGY, MuthuRamya.C M.E. Pervasive Computing Technologies/CCT, Anna University of Technology, Tiruchirappalli, India; Shanmugaraj.M M.E. Pervasive Computing Technologies/CCT, Anna University of Technology, Tiruchirappalli, India; Prabakaran.R Assistant Professor(EEE), Pervasive Computing Technologies/CCT, Anna University of Technology, Tiruchirappalli, India, Conference Paper · April 2011, DOI: 10.1109/ICECTECH.2011.5942102.
3. Electronics Hub - <https://www.electronicshub.org/zigbee-technology-architecture-applications/>



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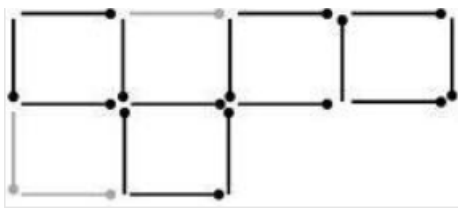


QUIZ (7)

1. Which of the following is the application of zigbee?
A. Home automation B. Gaming consoles C. Healthcare D. All of Above
2. Which of the following physical devices acts as a bridge between networks?
A. Coordinator B. Routers C. End Devices D. None of Above
3. Which of the following topology is robust and fault – tolerant?
A. Star B. Mesh C. Tree D. None of Above

Answer of Last Quiz (6)

1. 4 squares can be made if 3 matches can be moved in the following ways.

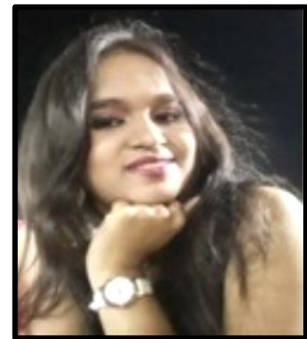


2. 40 socks : If he takes out 38 socks, although it is very unlikely, it is possible they could all be blue and red. To make 100 percent certain that he also has a pair of black socks he must take out a further two socks.
3. They will never appear together in the same corner as in a heptagon three corners clockwise is the same as four corners anticlockwise.

GIRL

A GIRL IS LIKE A BIRD
GODS MOST PRETTIEST
CREATION IN THE WORD
THE CHILDHOOD OF GIRL IS
THEIR GOLDEN AGE
AFTER THAT WOULD KEEP THEM
ONTO A BEAUTIFUL CAGE
THIS INNOCENT CREATURE
LOOKS LIKE A FAIRY,
WHO LOVES HER FEATHER
WHEN SHE MARRY
SHE LEADS ALL HER LIFE IN
SERVING OTHERS....
SHE ALSO HAS A HEART,
BUT NOT BOTHERS.
A DRESS OF HAPPINESS AND
PLEASURE SHE WEARS...
BUT IN EVERY CORNER,
YOU FIND A GIRL SHEDDING TEARS.

MORAL : TRY TO GIVE THE DUE RESPECT TO GIRL CHILD THAT THEY DESERVE.



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Events of the Month

Name of Event : **CAITEE** Inauguration of college yearly e-Newsletter

Venue : Vivekanand Hall, Government Polytechnic for Girls, Surat.

Date : 11th. March 2020



Name of Event : Technical Event : Web Pad

Venue : Laxmi Institute Of Technology, Sarigam, Vapi

