Wireless Communication: Bluetooth Technology

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Outline

Objectives

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- Concept of Bluetooth
- Characteristics of bluetooth
- Topology of Bluetooth network

Introduction[1]

Introduction

- Method of short range data communication
- Basically, Wireless connection was required between PADs and notebook PCs
- Bluetooth is a short-range and low power wireless technology, creating Personal Area Networks (PANs).
- Short-range radio frequency technology that operates at 2.4 GHz (free ISM band)
- Effective range of Bluetooth devices is 10 meters.
- Supports data rate of 1 Mb/s(originally).
- The Bluetooth specifications are developed and licensed by the Bluetooth Special Interest Group (SIG).

Wireless Techniology

Wireless Techniology

- Wireless alternatives of RS-232 cable
- Bluetooth uses a radio technology called frequency-hopping spread spectrum.
- Bluetooth Special Interest Group (SIG) was formed in 1998 to develop the standard of IEEE 802.15

Standard Specification

- Developed by : J.Haarsten and S.Mattisson in Sweden (1994)
  Standard : IEEE 802.15
  ISM band frequency : 2.4 GHz
  Range : 10 - 100 meters.
  Channel Band width : 1 Mbps

Topology

Bluetooth Topology

Type of connection between various devices, topologies are

- PICONET Topology
- SCATTERNET Topology

To any topology, prime components are

- MASTER Device
- SLAVE Device.

Piconets

- Piconet is a bluetooth network connection
- Two or more units (upto 8) share information via a common channel
- One acts as a master and all other (max 7 device) works as slave
- Slaves must be in discoverable modes
- Master works as switch and control other devices data sharing timing
- Master sets frequesncy hoping pattern and slave synchronize with it
- Different piconet has different frequency pattern
- A piconet connection is established followed by an inquiry procedure between master and slave

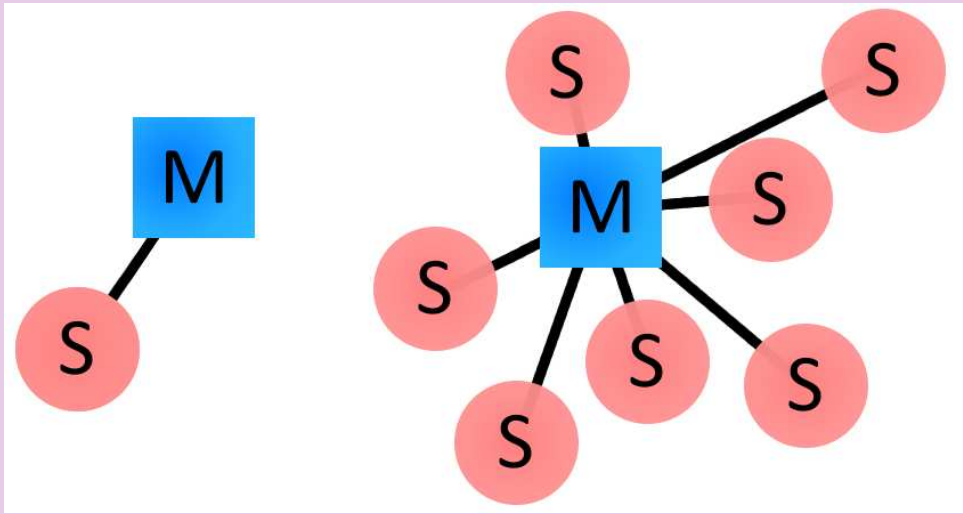

Figure 1: Piconet Topology of Bluetooth [Source: Internet]

Scatternets

- A set of two or more interconnected piconets form scatternets
- A device may connect with other piconet(max 7) and work as slave, but master is for only one piconet
- A common device in piconets network work as a gateway
- Advantage of scatternet is multiple hop-route and higher throughput
- Inside scatternet, piconets are identified by master's identity(clock/frequency)
- A device communicate with a single piconet at a time by time sharing manner

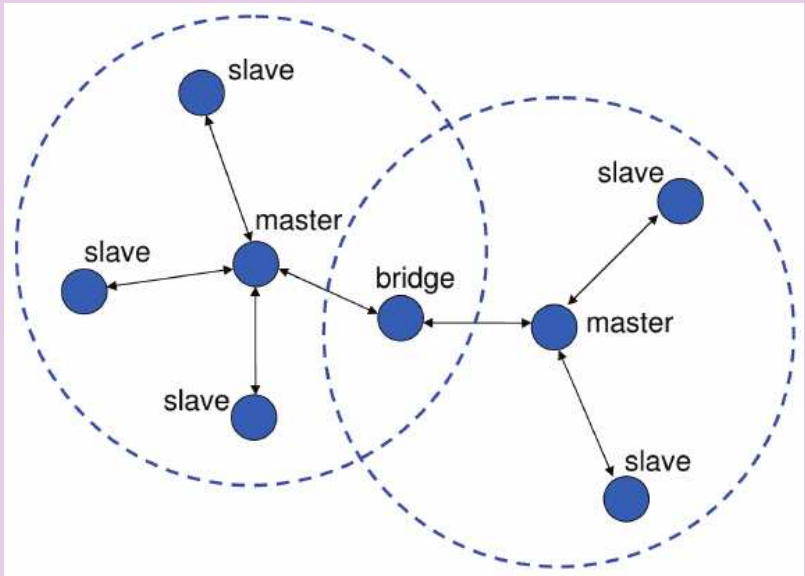

Figure 2: Scatternet Topology of Bluetooth [Source: Internet]

Applications

Applications

- Healthcare: Stethoscopes, glucose monitors, pulse oximeters
- Electronics: watch, mobile comminucation(speaker, microphone) free of cost

Advantage

Advantage

- Eliminates wires and facilitates wireless communication
- Low power consumptions
- Easy to use
- Free of cost
- Inexpensive
- Reasonable throughput
- Low maintenance cost

Disadvantage

Disadvantage

- Works in relatively short range (10-100 meters)
- Comparatively less secure

Conclusion

Conclusion

- A new global standard of wireless communication in short distance
- Used by low power, low range network devices

Future Scope

- Protocol is being improving to support large ad hoc network
- Latest version of Bluetooth is improving its security
- Ultra wide band has been chosen by the Bluetooth Special Interest Group
- Latest version will provide high speed and large range

Exercise

Exercise

- What are the characteristics of a bluetooth communication.
- Describe about bluetooth communication among different electronic devices.
- What are the advantages and disadvantages of bluetooth technology.
- What are the future scopes of bluetooth technology?

References I

Y. Bo, *Bluetooth: Technology and Applications*. ITU CAICT, 2017.

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Thank You...