



# **SNS COLLEGE OF TECHNOLOGY**

(An Autonomous Institution)

COIMBATORE-35

Accredited by NBA-AICTE and Accredited by NAAC – UGC with A++ Grade

Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai



## **19EEE305 / EMBEDDED SYSTEMS III YEAR / VI SEMESTER**

### **UNIT-V: EMBEDDED SYSTEM APPLICATION DEVELOPMENT**

## **IEEE STANDARDS - 802.15.4, C12.11.G**



# IEEE 802.15.4 Overview



- Standard for low-rate wireless personal area networks (LR-WPANs)
- Targeted for low-cost, low-speed communication
- Supports star and peer-to-peer topologies
- Operates at 868 MHz, 915 MHz, and 2.4 GHz
- Foundation for ZigBee, Thread, and 6LoWPAN





# IEEE 802.15.4 Device Types



- Full-function device (FFD): can act as coordinator
- Reduced-function device (RFD): limited capabilities
- FFD and RFD roles in network
- Suitable for battery-powered IoT devices
- Flexible for mesh networking





# IEEE 802.15.4 Frame Structure



- Frame types: Beacon, Data, Acknowledgment, MAC command
- Frame fields: Frame control, Sequence number, Addressing fields, FCS
- Supports 16-bit and 64-bit addressing
- Low overhead, optimized for small packets
- Ensures reliability with ACKs and CSMA/CA





# IEEE 802.15.4 Features

- Low power consumption
- Low latency and simple protocol stack
- Robustness against interference
- Security support (AES-128 encryption)
- Time synchronization via beacons





# Applications of IEEE 802.15.4

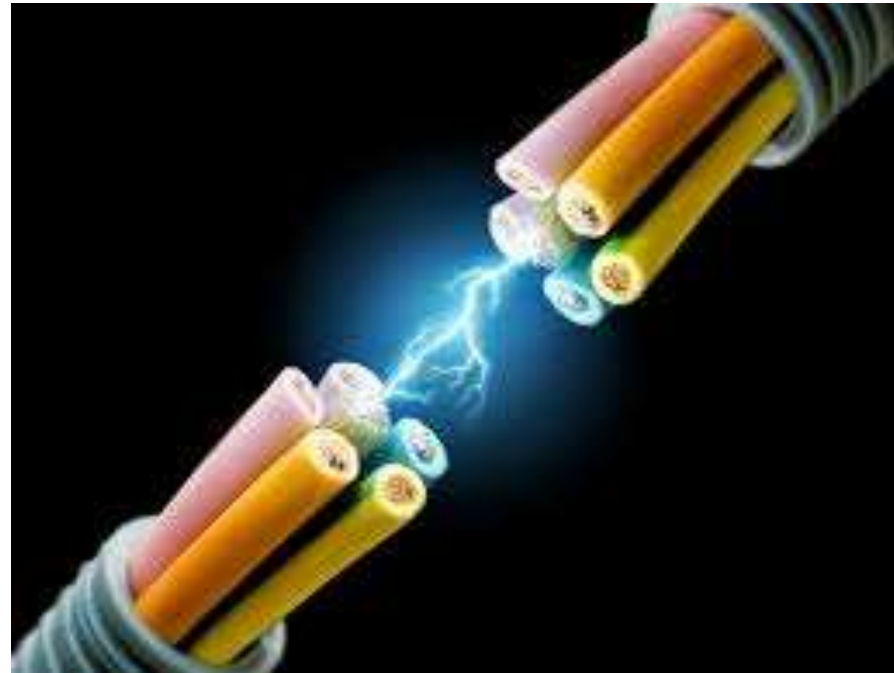


- Home automation
- Smart metering and utility networks
- Wireless sensor networks (WSNs)
- Industrial monitoring
- Healthcare and environmental monitoring





# RECAP....



# ...THANK YOU

