

Channel Access Methods and protocols used in Wireless Sensor Networks



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Protocols for Connected Objects

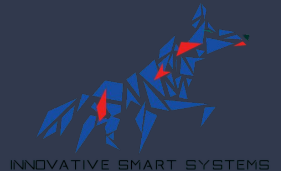


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I. Channel Access Method for the MAC layer

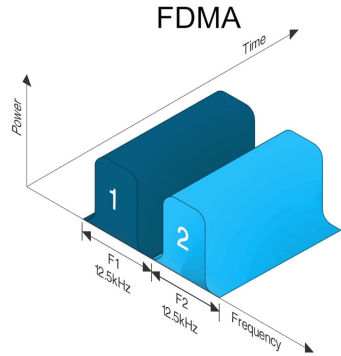
- FDMA
- TDMA
- CDMA

II. MAC protocols dedicated to WSN/IoT

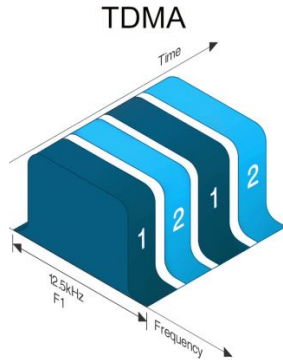
- S-MAC
- T-MAC
- Z-MAC
- ...

I. Channel Access Method for the MAC layer

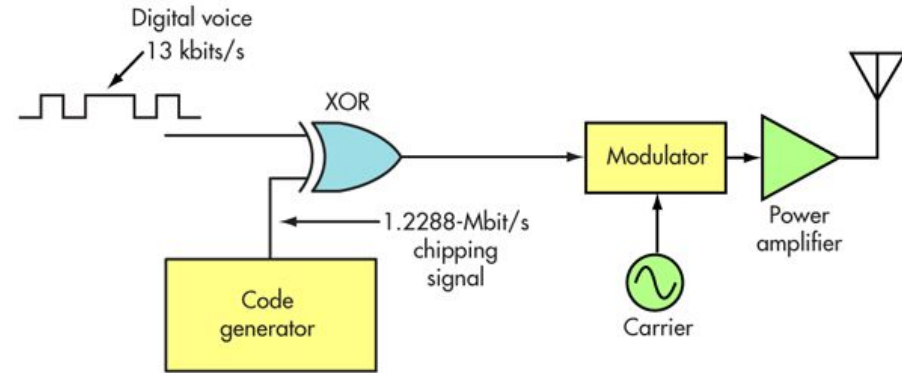
- **FDMA :**



- **TDMA :**



- **CDMA :**



II. MAC protocols dedicated to WSN/IoT

- **S-MAC :**

- Protocol based on periodic “sleep” or “listen” schedules which are handled locally by the sensor network
- Nodes that are close to each other form a virtual cluster and they share the same schedule
- Listening period divided into 3 parts : Synchronization - Send transmission request - Acknowledge
- Then it sends the data and goes back to Sleep mode

| Protocol | Throughput | Energy conservation | Latency | Overhead | Scalability | Security |
|----------|------------|---------------------|---------|----------|-------------|-------------------------|
| S-MAC | Low | Low | High | Low | Low | Low (Jamming Attack) |

II. MAC protocols dedicated to WSN/IoT

- **T-MAC :**

- Very similar to **S-MAC** but with unfixed duration for sleep and listen cycles
- T-MAC reduces the amount of energy wasted during the listening period

| Protocol | Throughput | Energy conservation | Latency | Overhead | Scalability | Security |
|----------|------------|---------------------|---------|----------|-------------|--|
| T-MAC | Low | High | Low | Moderate | Low | Low (Jamming Attack, Adaptive Timeout Attack) |

II. MAC protocols dedicated to WSN/IoT

- **Z-MAC :**

- Hybrid protocol that alternates between CSMA (low channel contention) and TDMA (high channel contention)
- Enables nodes to communicate on channel on the one they are not assigned
- In case of conflict, the nodes that own the channel always have a priority on the others
- Z-MAC is commonly used and is implemented in TinyOS.

| Protocol | Throughput | Energy conservation | Latency | Overhead | Scalability | Security |
|----------|------------|---------------------|---------|----------|-------------|----------|
| Z-MAC | High | High | Low | Moderate | Low | Low |

Conclusion



Thank you for listening, do you have questions ?