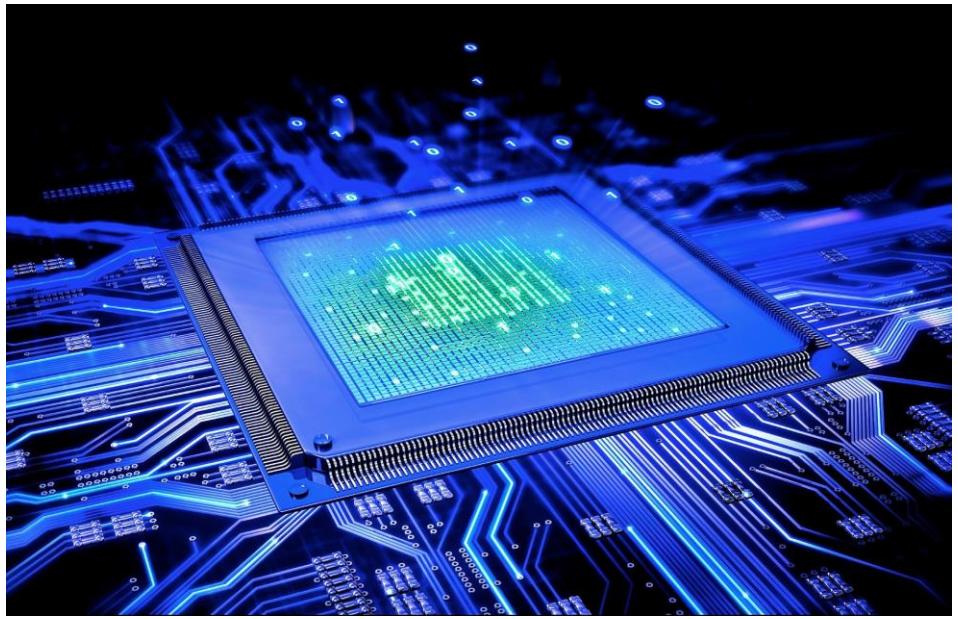
MAC protocols dedicated to WSN and IoT



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Channelization

- FDMA

Advantages	Disadvantages
It allocates dedicated frequencies to different stations. Moreover, there are separate bands for both uplink and downlink. Hence stations transmit and receive continuously at their allocated frequencies.	In FDMA, frequencies are allocated permanently and hence spectrum will be wasted when stations are not transmitting or receiving.
It is simple to implement with respect to hardware resources.	Network and spectrum planning are cumbersome and time consuming.
FDMA is efficient when constant traffic is required to be managed with a smaller number of user population.	It uses guard bands to prevent interference. This wastes frequency resources.

Channelization

- TDMA

Advantages	Disadvantages
The operational costs of TDMA networks are lower compare to traditional FDMA network. ⇨ **The different types of traffic such as voice, data and video are transmitted using TDMA technique as this require different data rates which can be easily achieved using allocation of multiple time slots.**	Network and spectrum planning require more efforts.

Channelization

- CDMA

Advantages	Disadvantages
The CDMA does not require any synchronization.	The system is more complicated.
It has a greater number of users can share the same bandwidth	As the number of users increases, the overall quality of services decreases.
Due to code word allocated to each user, interference is reduced.	
Efficient practical utilization of fixed frequency spectrum.	

Protocols

B-MAC

- No Synchronization needed
- Preamble used to alert of an incoming transmission
- Clear Channel Assessment (CCA)

Protocols

S-MAC

- Local synchronization and periodic sleep-listen schedules
- Sleep reduces power consumption but clock drift can cause unsynchronization
- Carrier Sense Multiple Access with Collision Avoidance (CCMA/CA)

Protocols

T-MAC

- Based on S-MAC
- Adaptive active/inactive duty cycle
- Future Request to Send Mechanism

Protocols

WiseMAC

- Adaptive length of the preamble
- Exchange of schedules wetwen neightbours nodes
- Non Persistent Carrier Sense Multiple Access (np-CSMA)

Protocols

TRAMA

- Prevention of Collisions / Overhearing
- Higher sleep percentage / Higher duty cycle because of calculations

Conclusion

	Time Synchronization Needed	Type	Adaptivity to Changes
B-MAC	No	CCA	Medium
S-MAC / T-MAC	Locally or No	CSMA / CA	Good
WiseMAC	No	np-CSMA	Good
TRAMA	Yes	TDMA / CSMA	Good