



Wireless Networking aka “Wireless for IoT Class”

Course code: CS4222/CS5422

Semester 2, 2022/2023

Instructor: Professor Ambuj Varshney

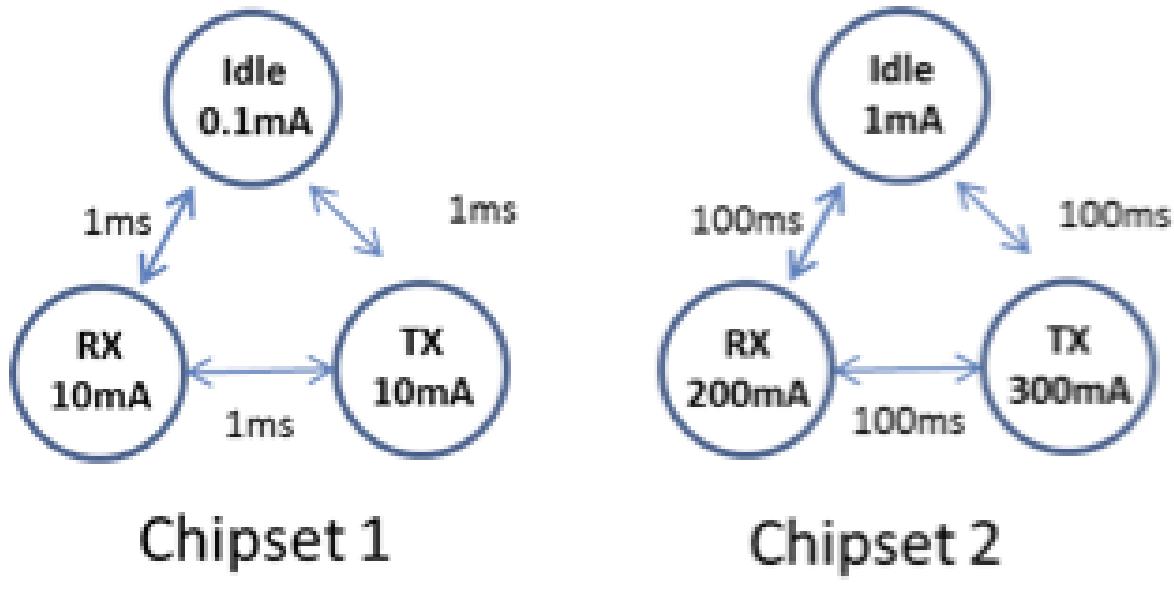
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TUTORIAL 4 for WEEK 6 (Starting 13th of February 2023)

[1] **Question 1:** What is the typical battery capacity of common devices that you use in your daily life such as wearables (Apple Watch/Fitbit), earphones, laptops, and mobile phones?

[2] **Question 2:**

- In the figure representing state transition diagram, which chipset is more suitable for used in Internet of Things applications? Explain your reasoning.
- For the chipset chosen in the question above, assume that the devices are designed to operate at a very low duty-cycle (<0.01%) and you are allowed to reduce the current drawn from only one of the states (idle, receive (RX) or transmit (TX)). Which state would you reduce the current from?



[3] Question 3: Please find specification of following technologies:

Specification	Bluetooth	ZigBee	WiFi	LoRa	LoRea (Backscatter)	Judo (Backscatter)
VDD(V)	1.8	3.0	3.3	3.3	2	0.12
Transmit (mA)	60	30	220	28	0.035	0.7
Receive (mA)	50	25	210	13.8	N.A	N.A
Bitrate (Mb/s)	1.2	0.25	54	0.027	0.003	0.1

- Calculate the energy (in Joule) require to transmit 1 bit for different technologies listed above.
- For low power IoT devices, should you always select the network technology with the lower transmission energy per bit? Explain your answer
- In addition to energy needed to transmit/receive a bit, what other criteria(s) should you take into account when selecting a network technology for use in a low power Internet of Things?
- What kind of applications would choose to use Bluetooth technology?
- What kind of application would choose to use LoRa technology?
- What kind of application would choose to use Backscatter technology?

Q4: TBA