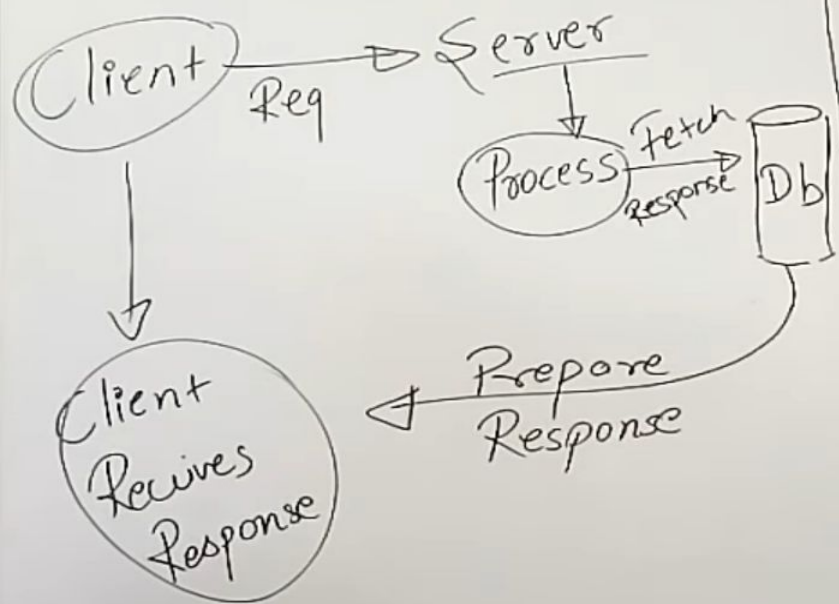
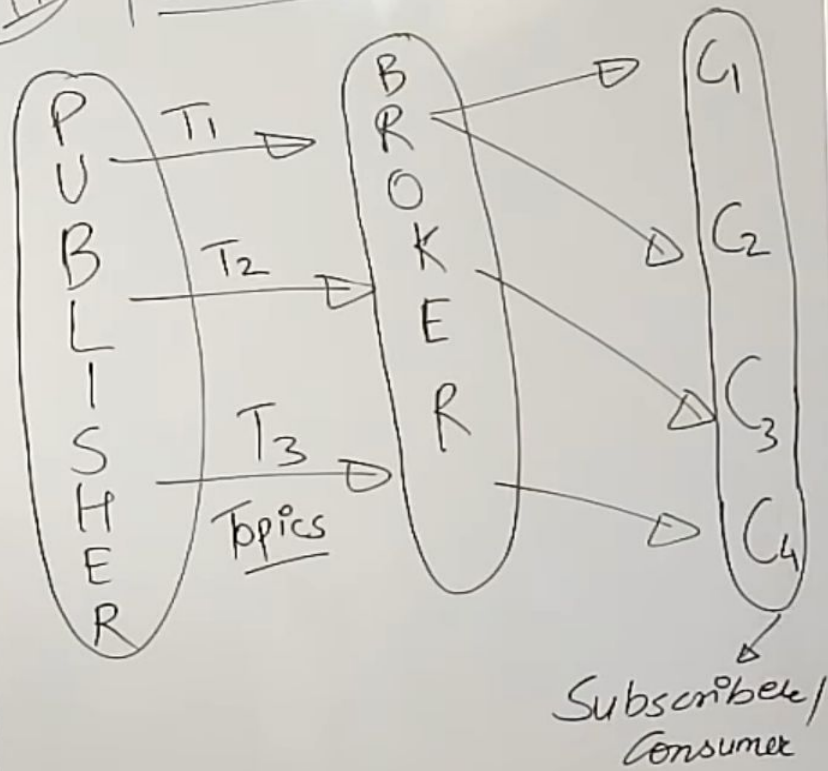


Internet of Things: Communication Models

(I) Request & Response Model

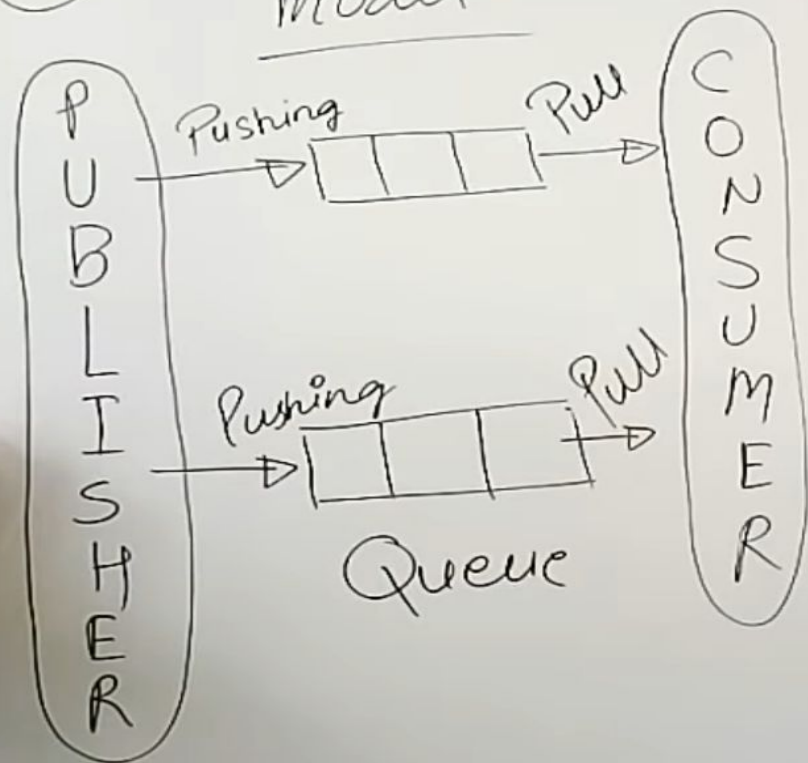


(II) Publisher Subscriber Model

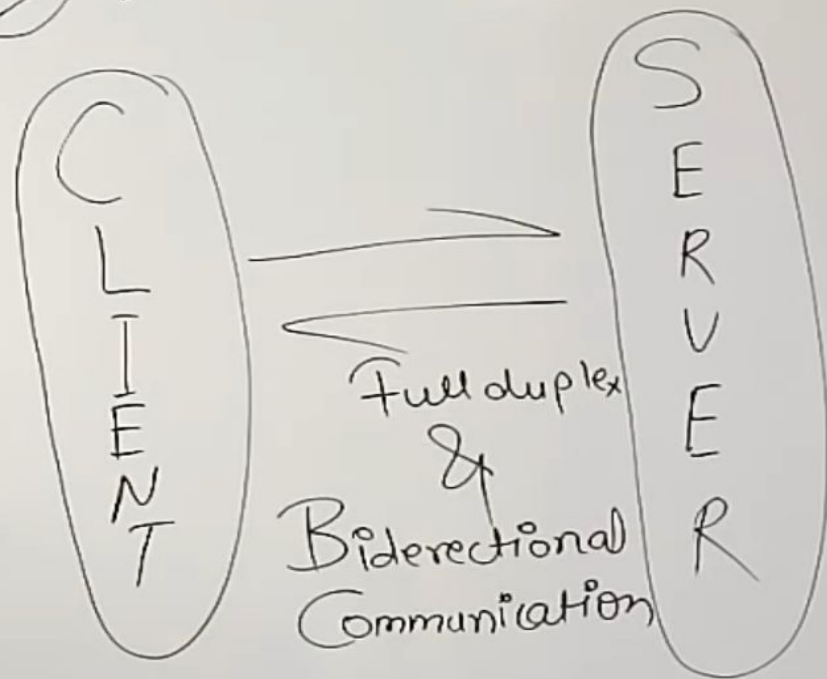


Internet of Things: Communication Models

III) Push-pull model



IV) Exclusive pair



MQTT

- Message Queue
Telemetry Transport
- Publish - Subscribe
- Introduced by IBM
in 1999

MQTT

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Telemetry Transport
- Publish - Subscribe
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MQTT

↳ Components

→ Publisher

→ Subscriber

→ Broker

↳ methods

→ Connect

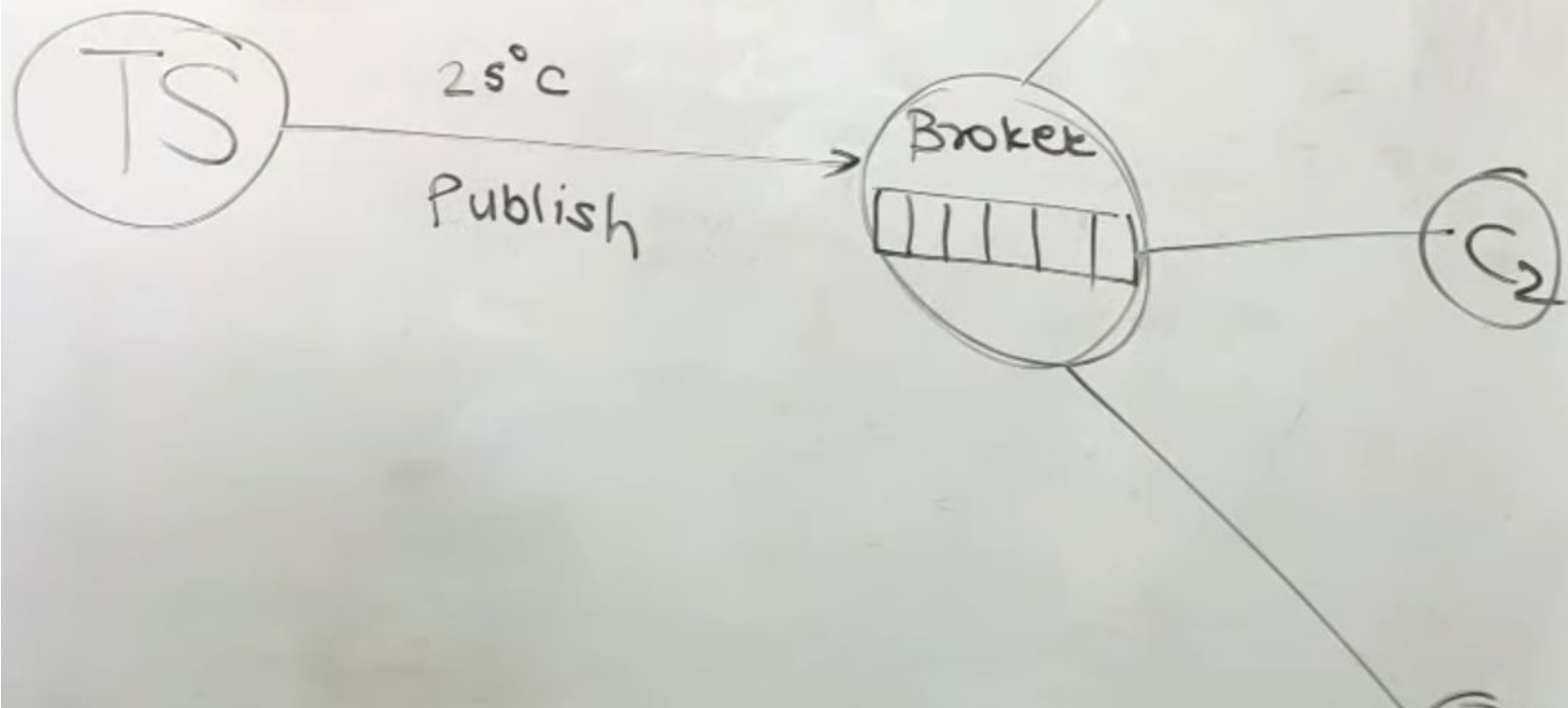
→ disconnect

→ Publish

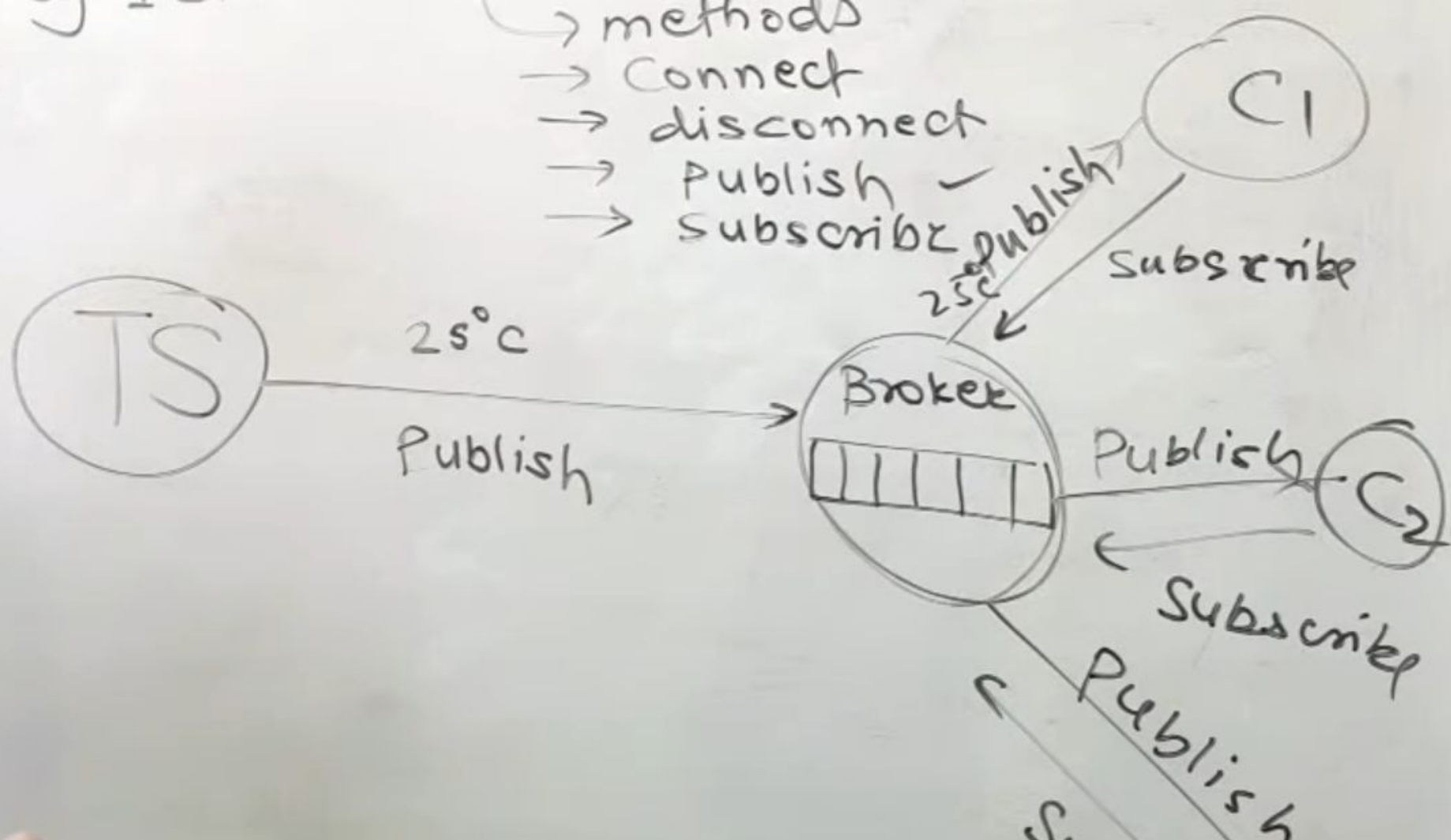
→ Subscribe

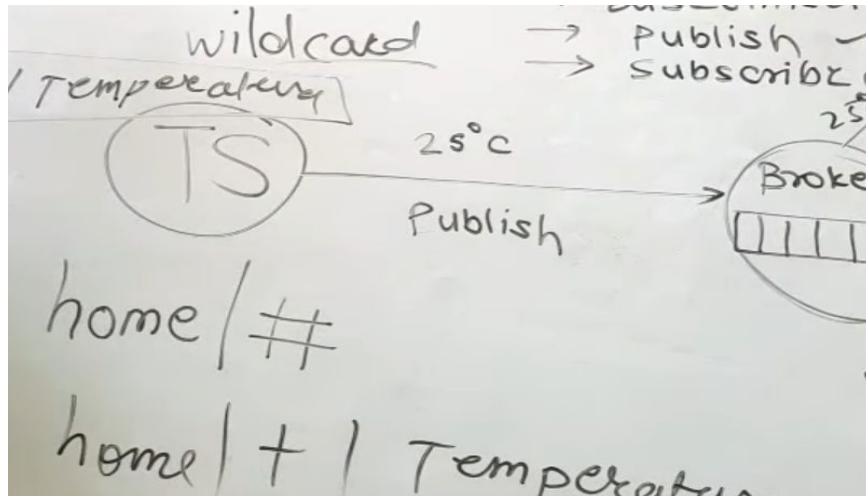
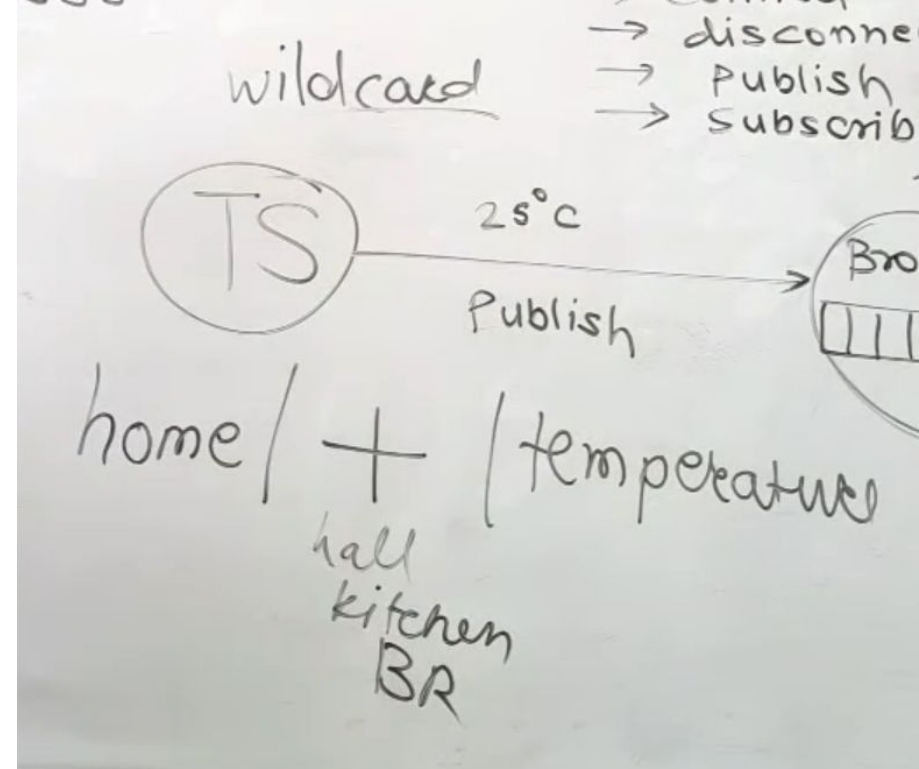
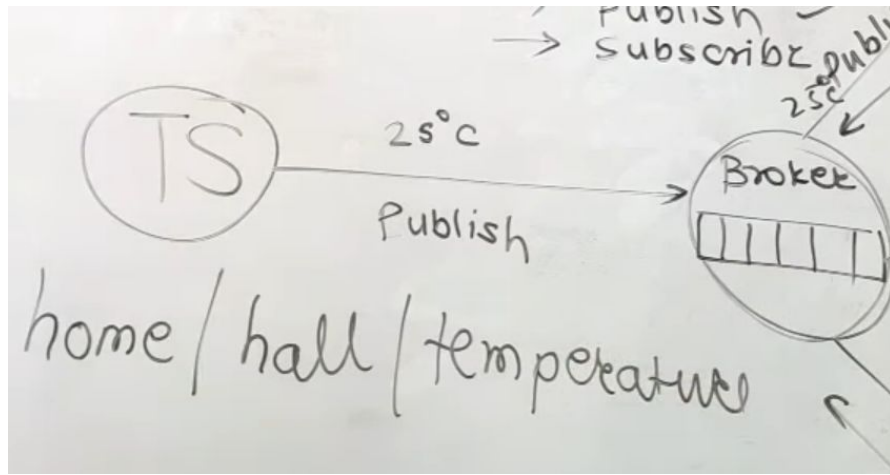
by IBM

- methods
- Connect
- disconnect
- Publish ✓
- Subscribe



- methods
- Connect
- disconnect
- Publish ✓
- Subscribe

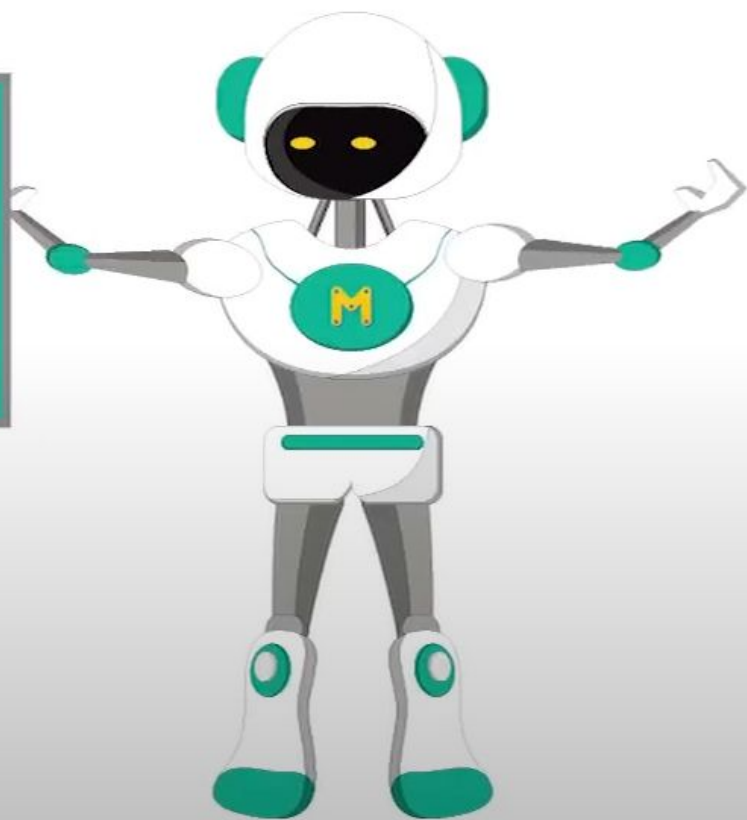


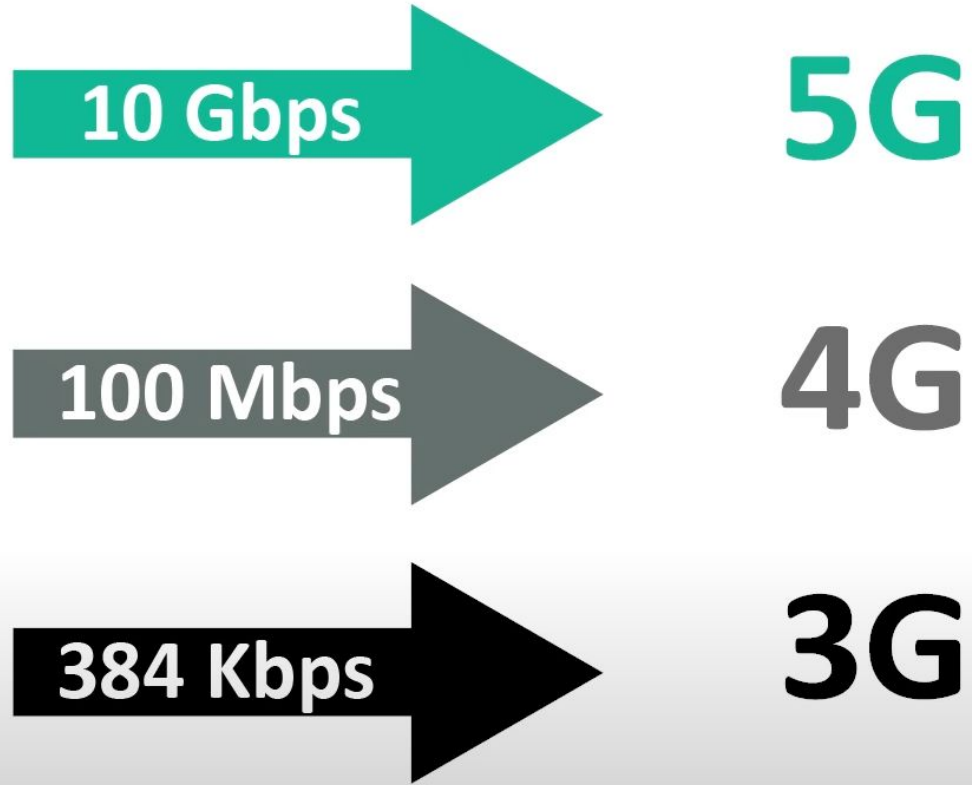


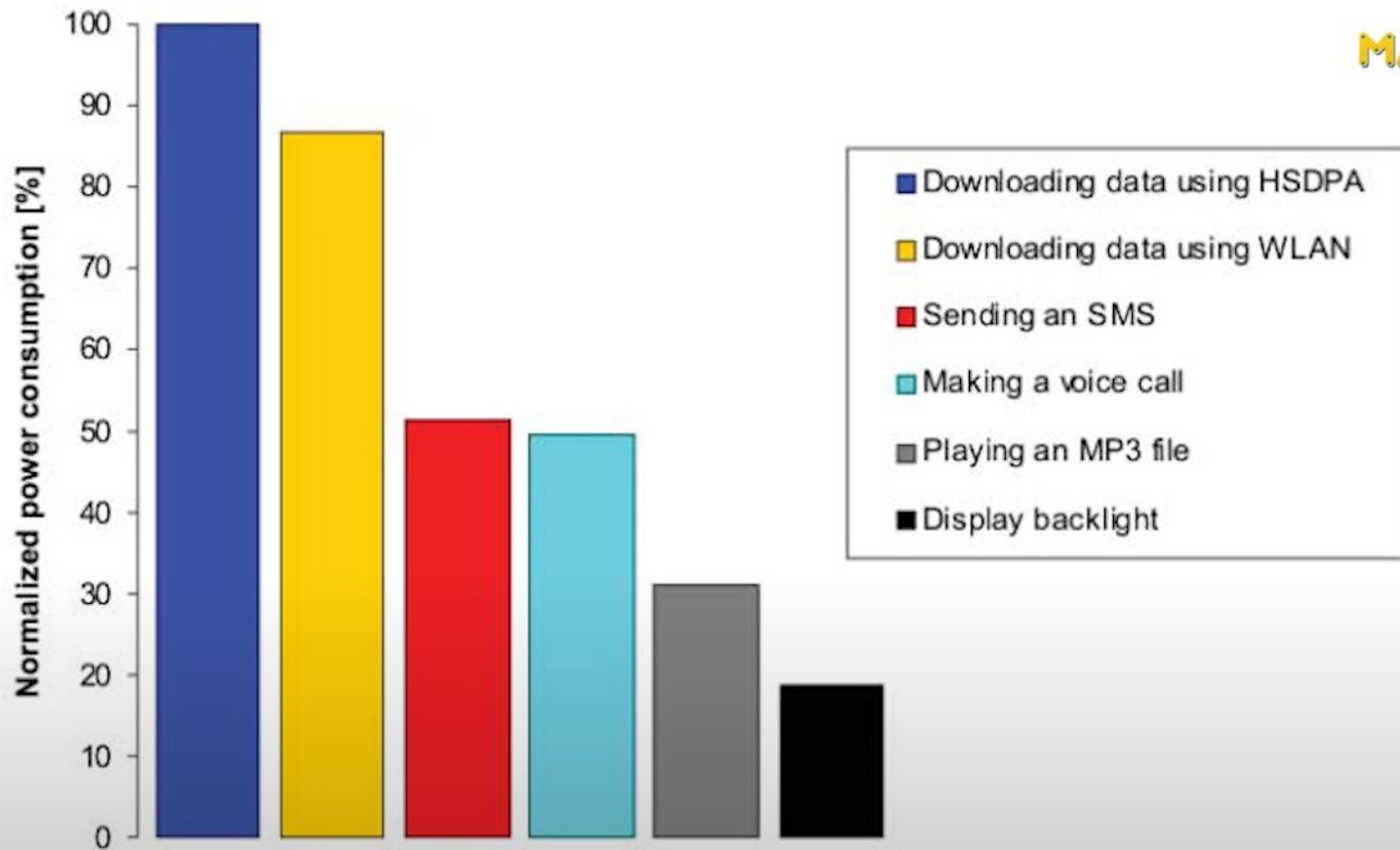
Topics Wildcard :

- Single Hierarchical
- Multiple Hierarchical / Multilevel

What is LoRa?











WIRELESS NETWORK REQUIREMENT

- Low Power
- Wide Area
- Low Data Rate (is acceptable)

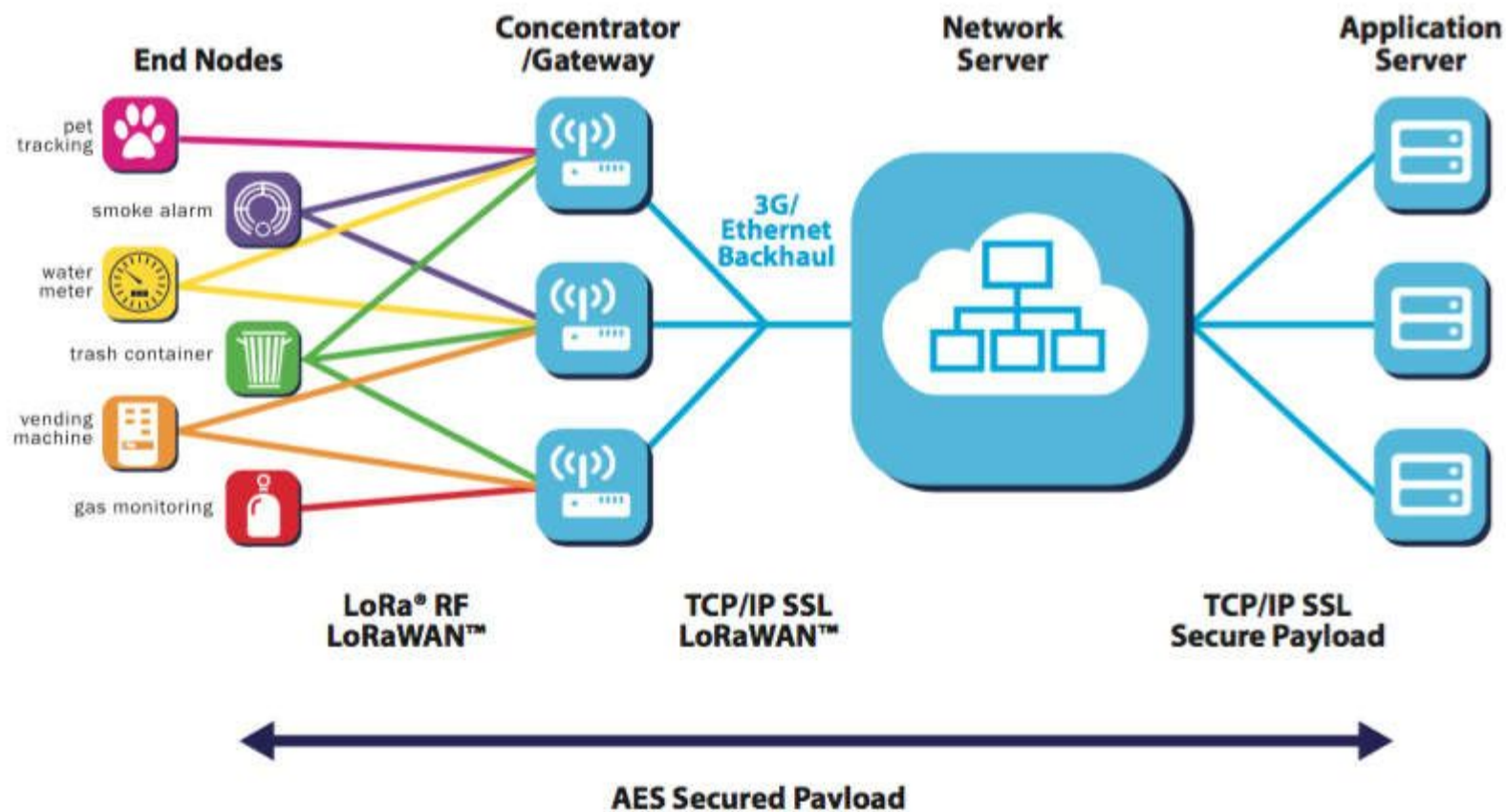


Long Range



- Low Bit Rate
- Large Range
- Low Power

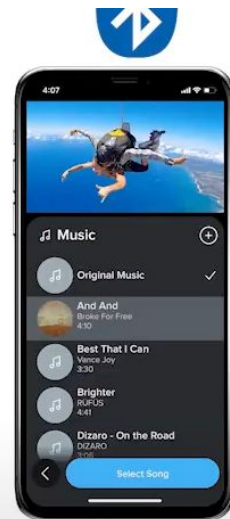




Bluetooth Low Energy



Bluetooth Protocol for IoT





What is Bluetooth?

- Short range
- Wireless
- Personal area network
- Transfers voice and data



Bluetooth SIG

The **Bluetooth** Special Interest Group (**Bluetooth SIG**) is the standards organisation that oversees the development of **Bluetooth** standards and the licensing of the **Bluetooth** technologies and trademarks to manufacturers. ... The **SIG** does not make, manufacture or sell **Bluetooth** enabled products.



Dual Mode Bluetooth Module



RADIO ON ●



RADIO OFF ●



Bluetooth Low Energy

- New technology
- Low power
- Small amount of data
- Designed for IoT



AUDIO STREAMING

BLE is ideal for the following devices





PERIPHERAL DEVICES

CENTRAL DEVICES