↳ Addressing assignment in a Zigbee network

In Zigbee, network addresses are assigned to devices by a distributed address assignment scheme.

↳ Zigbee routing protocols

Tree network: use address assignment to obtain the routing paths.

Mesh network: two options: — reactive routing
— tree routing

↳ Zigbee profiles

Describes common language for data exchange, offered services, contain device descriptions.

→ Zig Bee and BLE

Business: Zigbee is older, not on PCs on mobile phones.

Technical: Zigbee is low power, BLE is even lower. BLE/GATT stack is simpler than Zigbee stack

Going forward: Zigbee has a lead on developing apps. BLE low energy has improved tech and commanding presence in mobile devices. Replacing 'classic bluetooth' with 'dual mode' devices will

bootstrap this manner quickly.

→ Wide Area Wireless Sensor Networks (WWSN)

LPWAN, LTE, NB-IoT, SigFox

→ LoRa (long range)

Used in long lived battery-powered
devices scenarios

Means two things: physical layer that
uses CSS and LoRa WAN: mac layer protocol.

↳ Lora (Physical layer)

low-range, low-power, low throughput
Uses CSS, tries to increase range by
sending info with more power, allows forwar
error correction techniques.

The bandwidth, spreading Factor and
Coding rate are design variables that allow
the trade-off between:
  - occupied bandwith
  - data rate
  - link budget
  - interference immunity

↳ LORaWAN

MAC mechanism for controlling communication between end devices and LoRaWAN gateways, managing: - communication freqs.
- data rate
- power

Components:

→ End-device: devices (low-power) that communicate with the LoRa Gateway, not associated to a particular gateway, but associated with network server.

→ Gateway: intermidiate devices that relay packets between end-devices and network server. Add info about quality of reception from end-device to network server. There are multiple gateways in a network.

→ Network server: decodes and de-duplicate packets sent from devices, generates packets to send to devi and choses the appropriate gateway to send packets to a specific end-device

End-Devices classes

Class A: listens only after end device transmission, most economic class.

Class B: listens at a regularly adjustable

Class B: ...... frequency, consumption optimized.

Class C: module always listening, no power constraints.

Features

- Mac commands, checks (link status, battery, SNR), settings.
- End-device connection to a network (activation), security based on 802.15.4.
- Activation works over the air (OTAA) or by personalization.
- Adaptive data rate (maximise nw capacity and power consumption
- Tipically, there is no node-to-node communication however LoRaWAN allows this by having 2 gateways and a network server in between the nodes.