
ESP NOW

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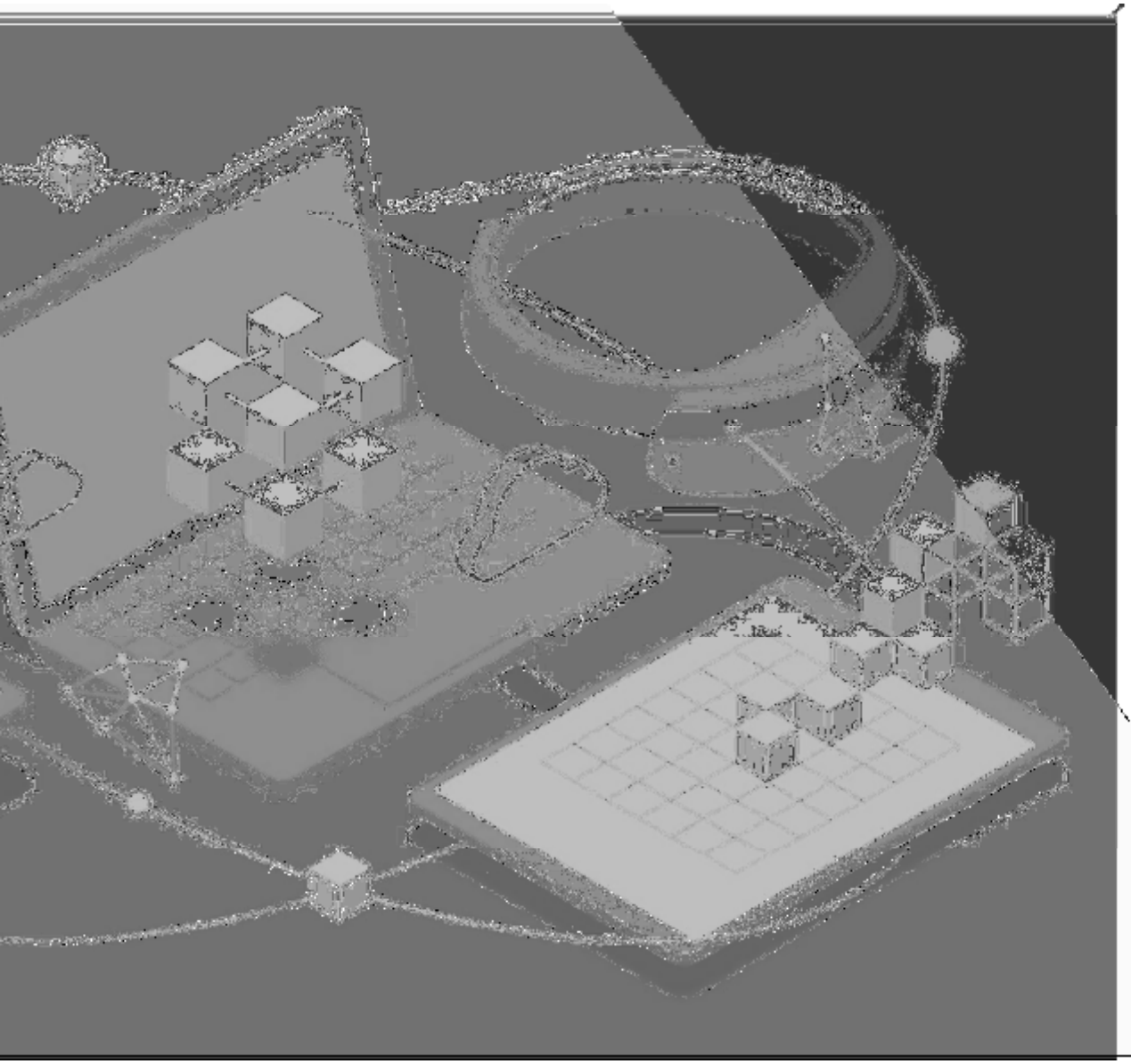


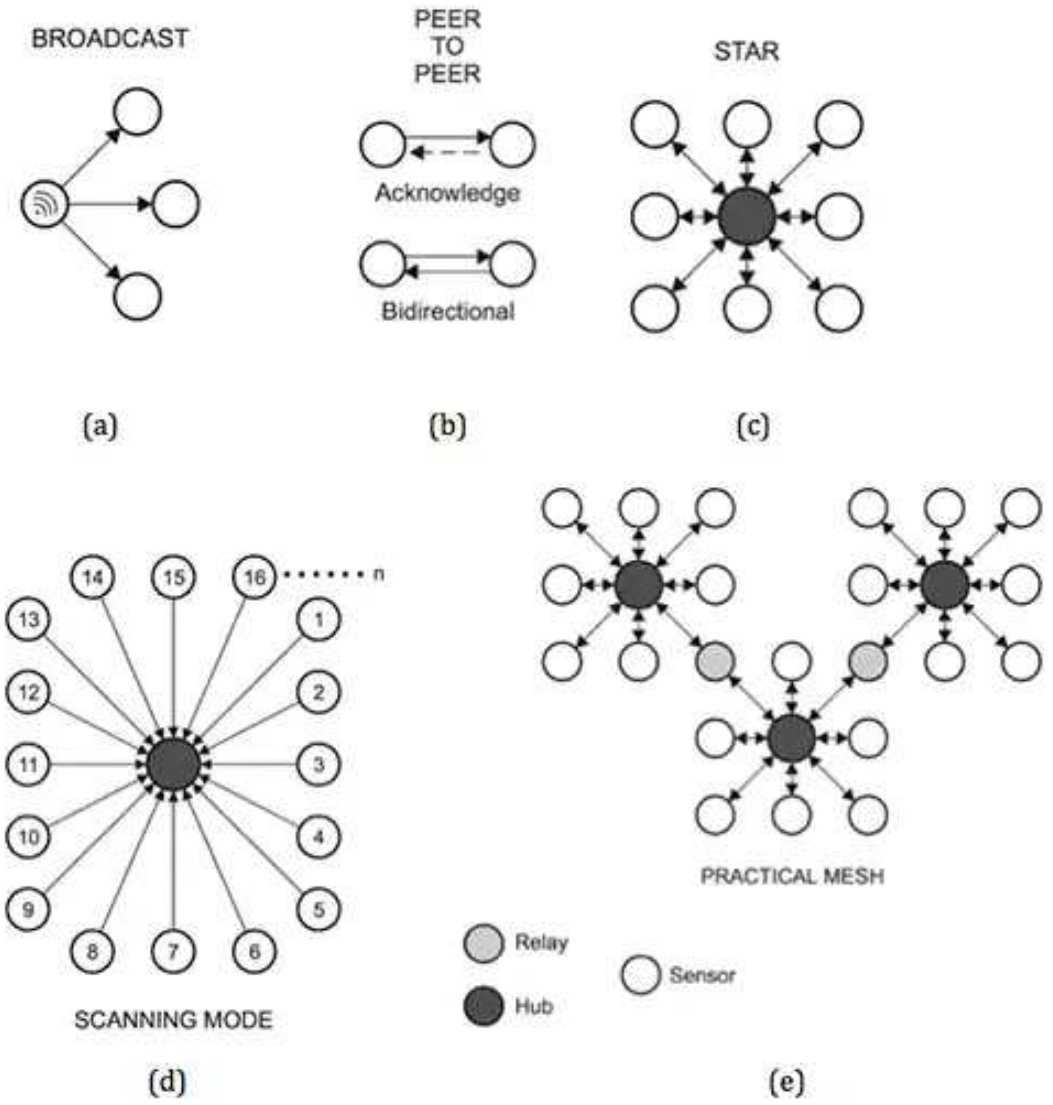
01

Pengenalan

GOAL

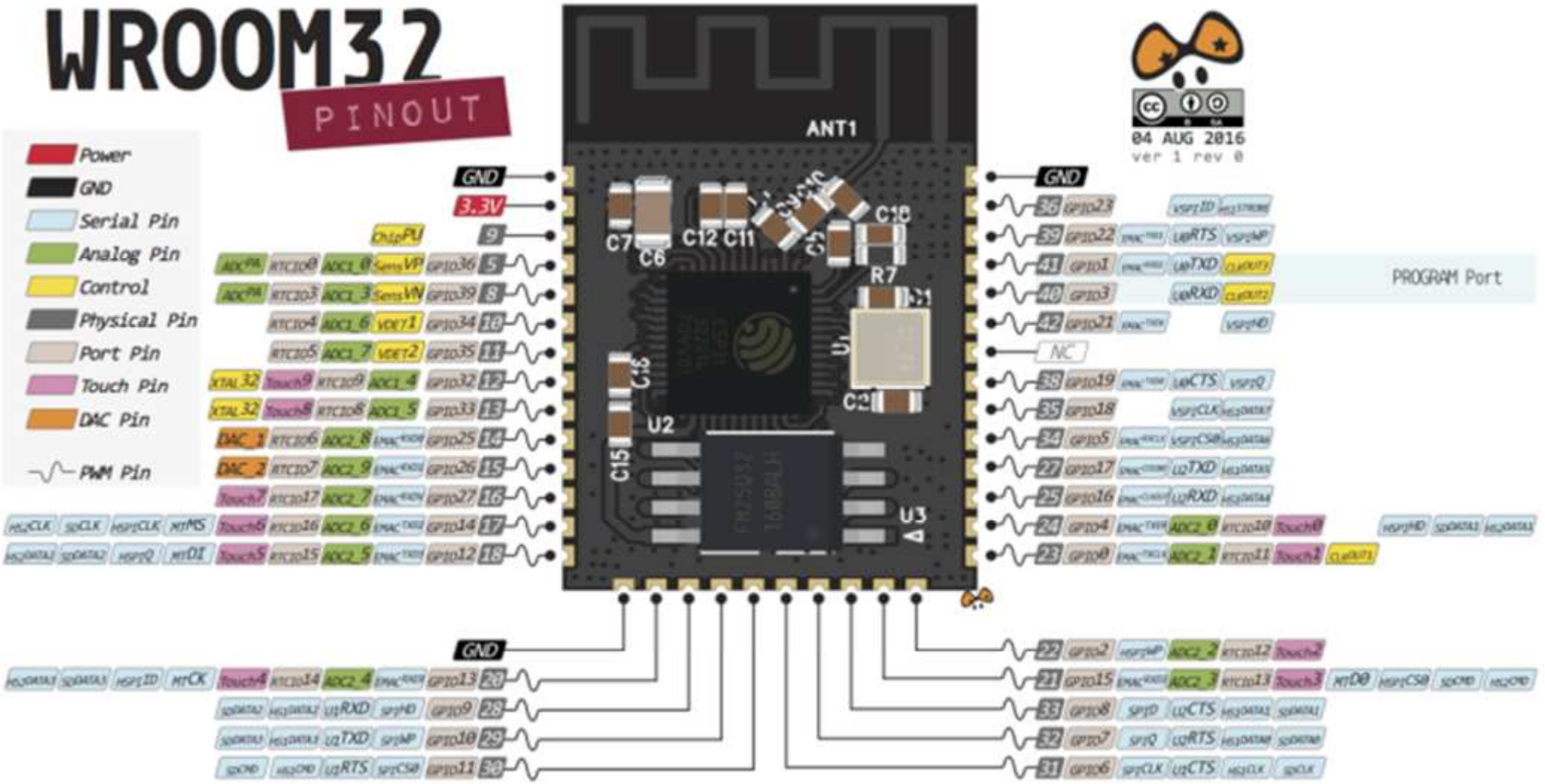
- Memahami sistem ESPNow dan metode koneksinya
- Membuat program sensor node dengan master ESPNOW flooding mesh

Network topology



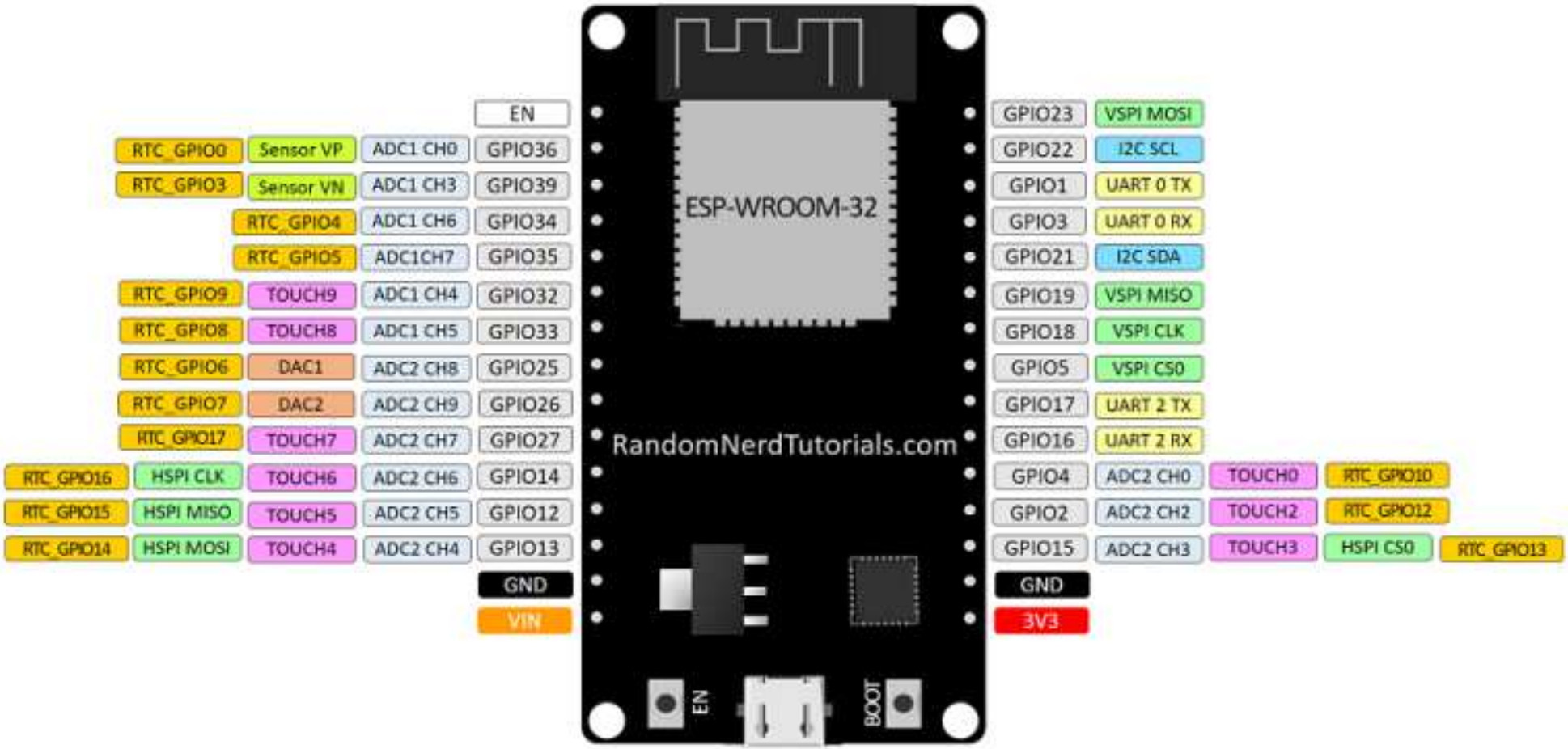
ESPNOW CONNECTION

Tentang ESPNOW


WROOM32
PINOUT
Power
GND
Serial Pin
Analog Pin
Control
Physical Pin
Port Pin
Touch Pin
DAC Pin
PWM Pin
ANT1
04 AUG 2016
ver 1 rev 0
PROGRAM Port
GND
3.3V
ChipPU
GND
NC
GND

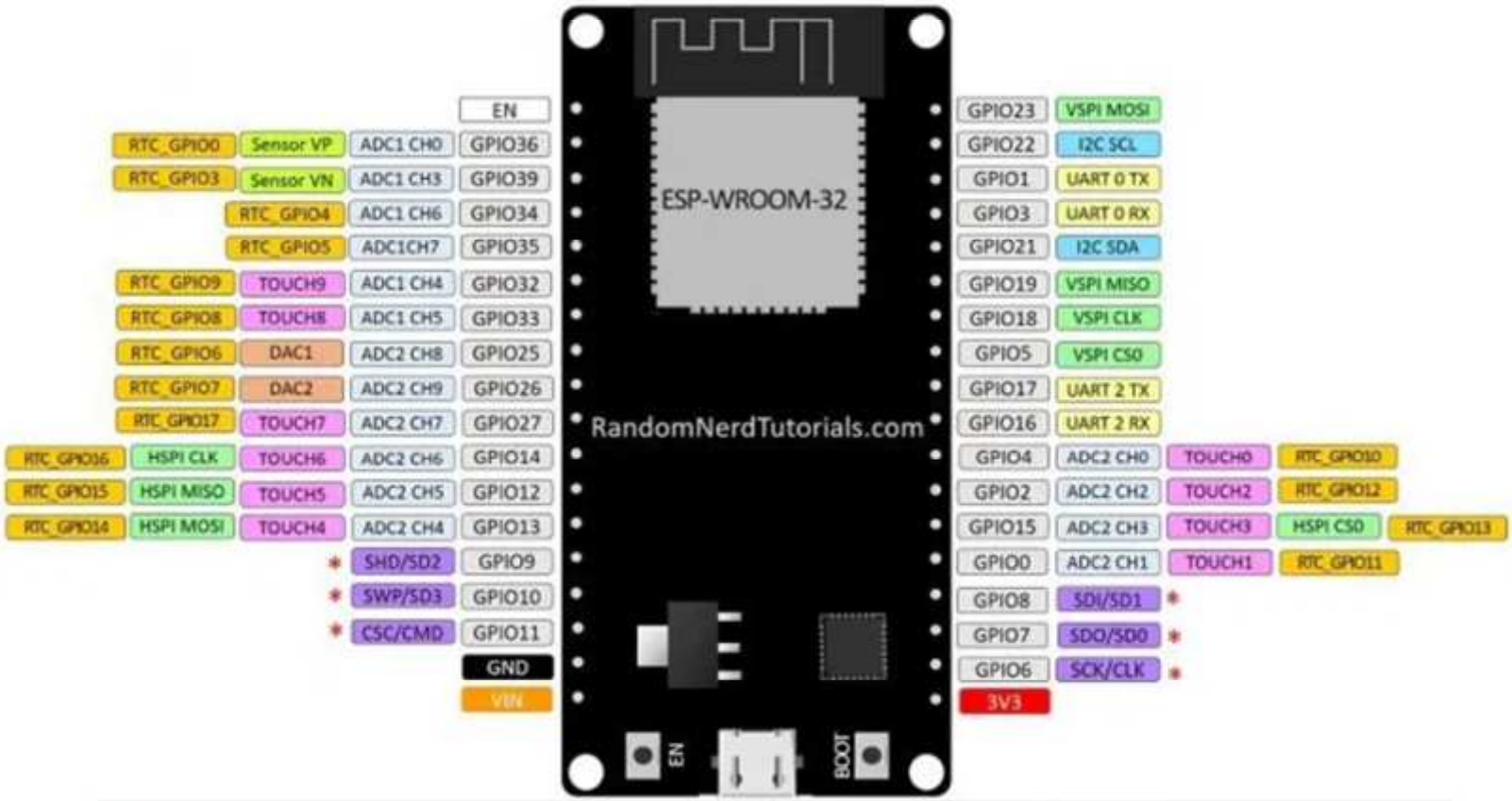
ESP32 DEVKIT V1 – DOIT

version with 30 GPIOs



ESP32 DEVKIT V1 – DOIT

version with 36 GPIOs



* Pins SCK/CLK, SDO/SD0, SDI/SD1, SHD/SD2, SWP/SD3 and SCS/CMD, namely, GPIO6 to GPIO11 are connected to the integrated SPI flash integrated on ESP-WROOM-32 and are not recommended for other uses.

ESP-NOW

ESP-NOW is a kind of **connectionless** Wi-Fi communication protocol that is defined by Espressif. In ESP-NOW, application data is encapsulated in a vendor-specific action frame and then transmitted from one Wi-Fi device to another without connection. CTR with CBC-MAC Protocol(CCMP) is used to protect the action frame for security. ESP-NOW is widely used in smart light, remote controlling, sensor, etc.

ESP-NOW

Connectionless communication protocol developed by espressif

Short packet transmission (up to 250 bytes)

Komunikasi tanpa menggunakan Wi-Fi

Mirip komunikasi 2.4Ghz perangkat low power seperti mouse wireless

System menggunakan pairing tanpa hand shake

Maksimum 20 node open dan 10 node jika dengan enskripsi

No router atau dhcp server

No overhead

No lost time to connect

ESP-NOW ADALAH

Protoocol komunikasi yang cepat yang dapat digunakan untuk pertukaran data kecil (up to 250 bytes) sesame ESP32 board

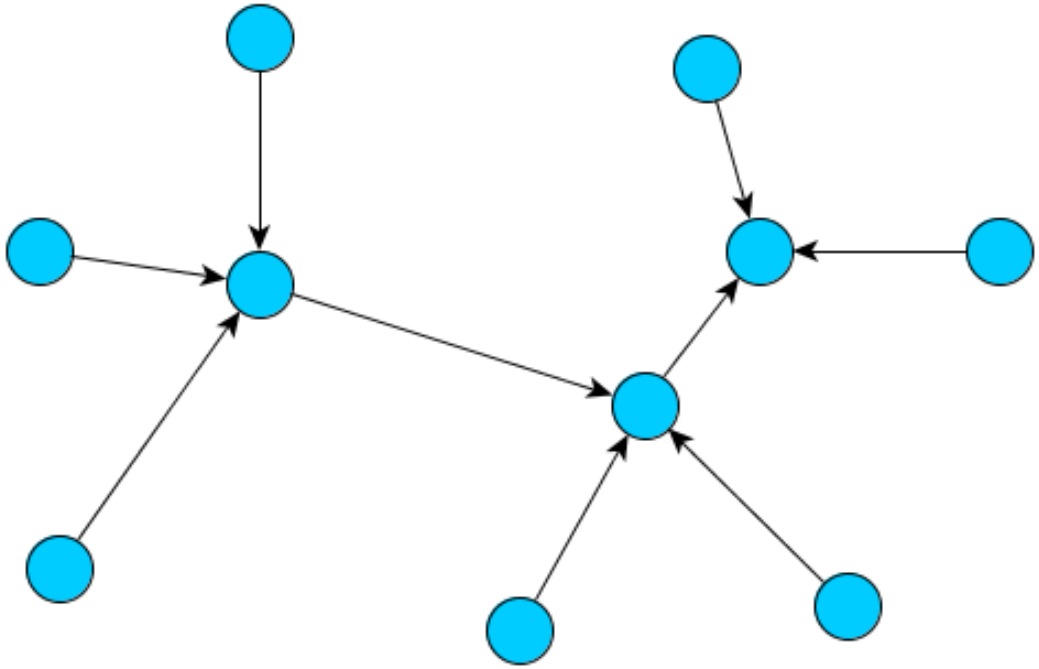
HEADER FILE

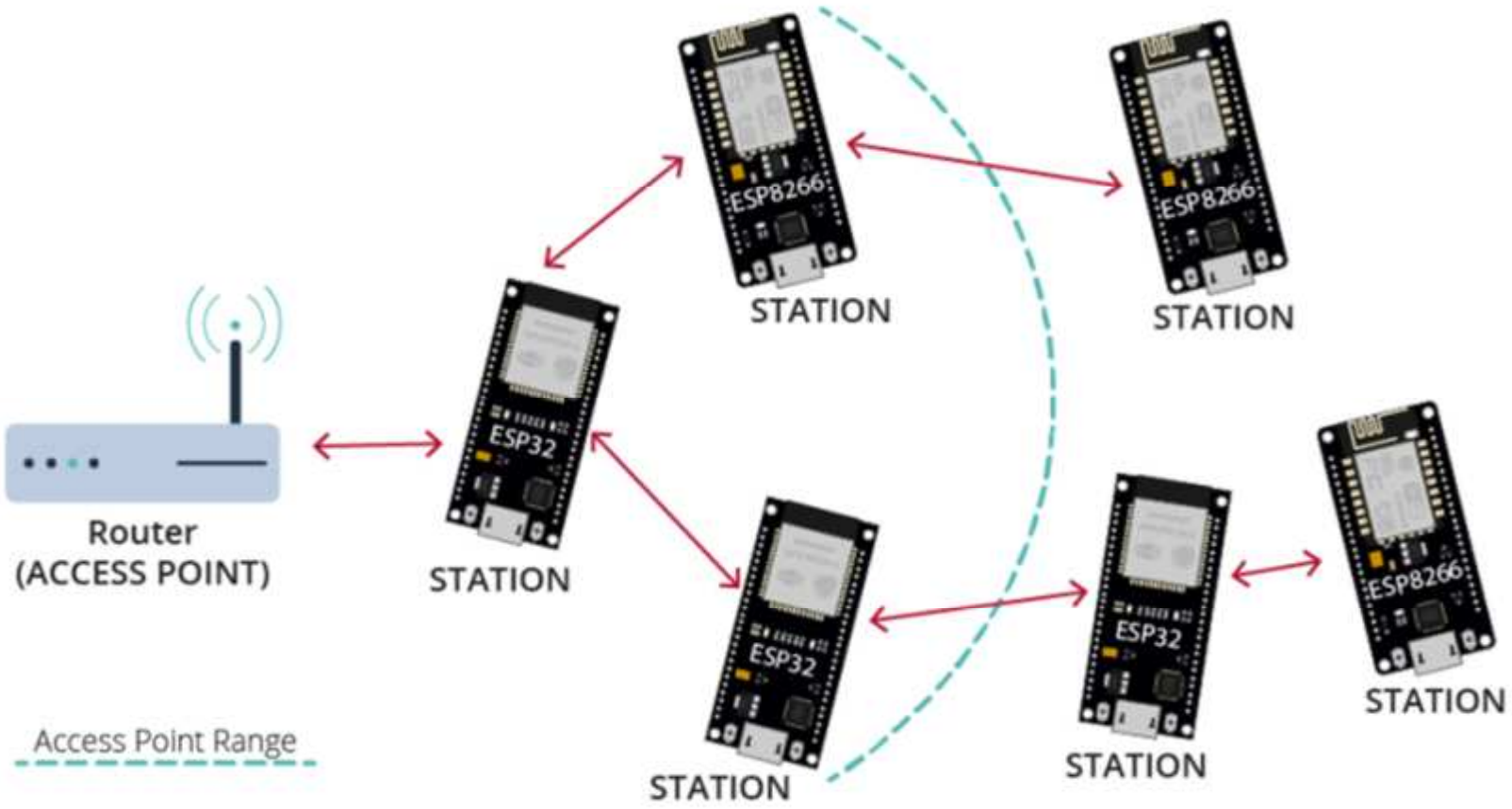
components/esp_wifi/include/esp_now.h

- **esp_now_init()** Initializes ESP-NOW. You must initialize Wi-Fi before initializing ESP-NOW.
- **esp_now_add_peer()** Call this function to pair a device and pass as an argument the peer MAC address.
- **esp_now_send()** Send data with ESP-NOW.
- **esp_now_register_send_cb()** Register a callback function that is triggered upon sending data. When a message is sent, a function is called – this function returns whether the delivery was successful or not.
- **esp_now_register_rcv_cb()** Register a callback function that is triggered upon receiving data. When data is received via ESP-NOW, a function is called.

TEST

Network Layout

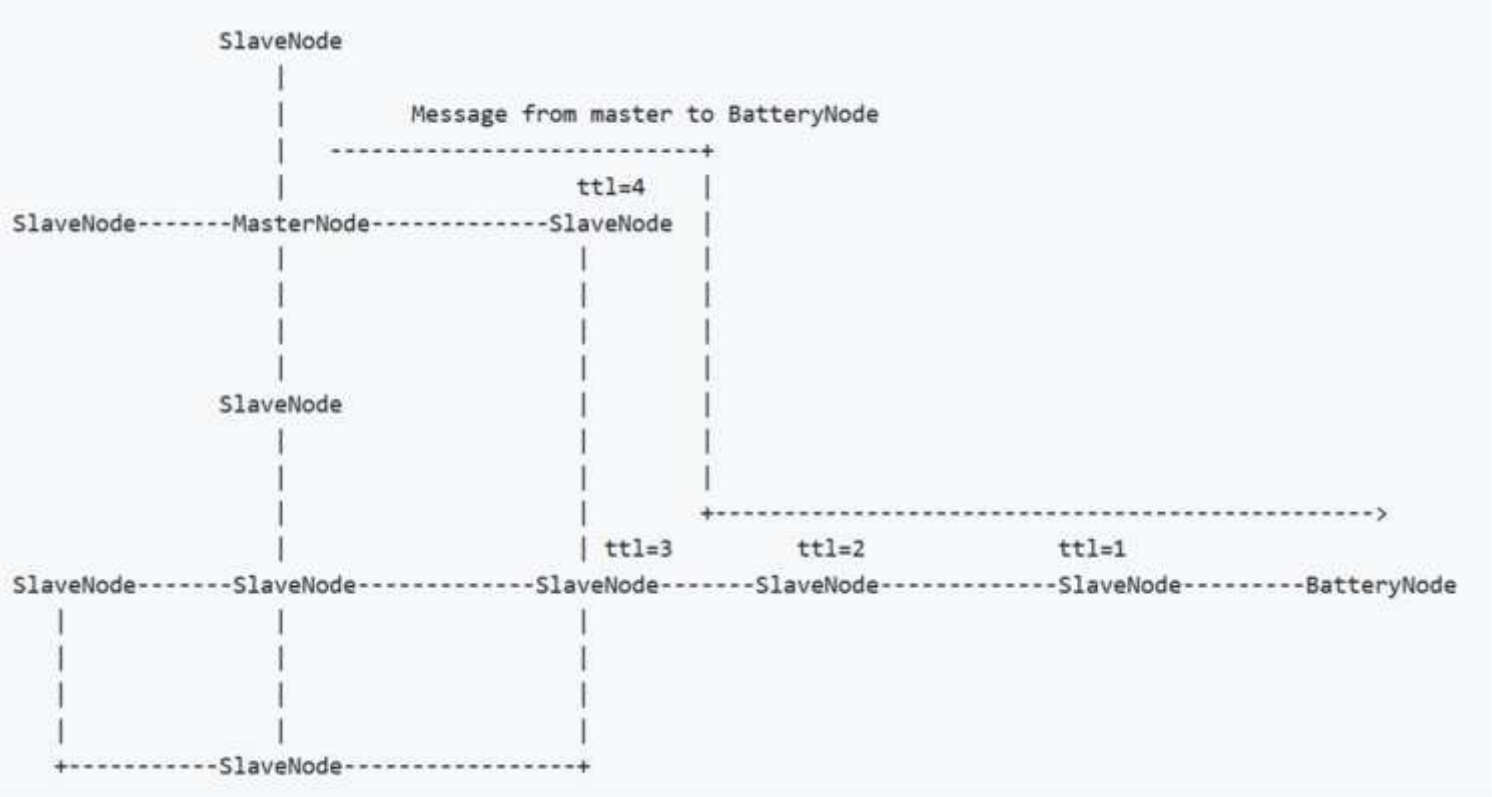



ESP8266
STATION
ESP8266
STATION
ESP32
STATION
Router
(ACCESS POINT)
ESP32
STATION
ESP32
STATION
ESP8266
STATION
Access Point Range

ESPNOW FLOODING MESH LIBRARY

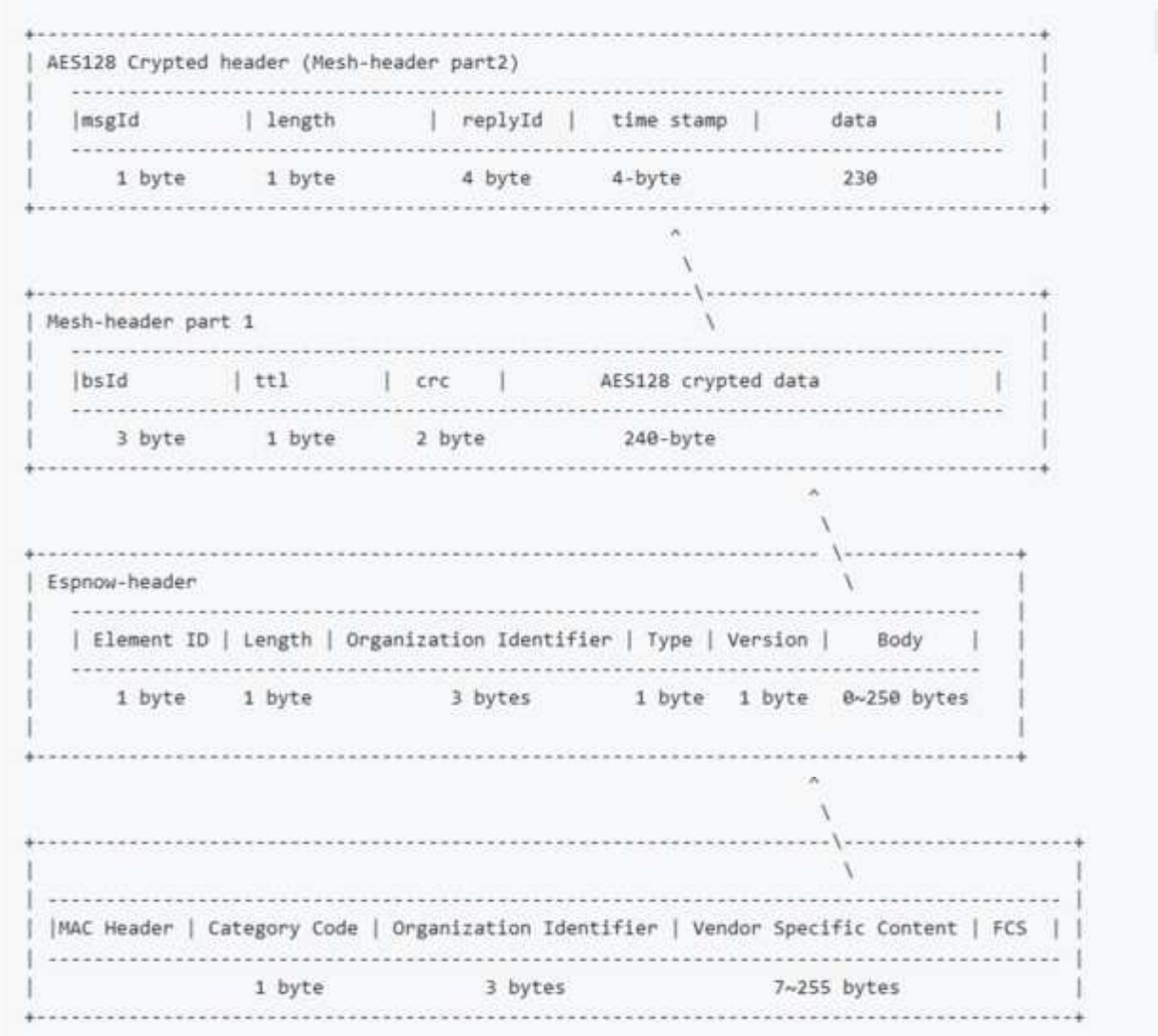
- Maximum number of slave nodes: unlimited
- Number of master nodes: 1
- Master node sends time sync message every 10s to all nodes. (this synchronizes the clocks of the nodes)
- a message cache. If a received packet is already found in the cache --> it will not be retransmitted or handled again
- Every message has a time stamp. If the time stamp is too old (or from the future), the message will be rejected.
- All messages are encrypted (AES128)
- Flooding mesh support
- TTL support (time to live)
- ESP32, ESP8266, ESP01
- Battery node support (Battery nodes do not relay messages)
- Request&Reply support
- Each Nodes can communicate with each other
- Ping about 40-60ms
- Nearly instant connection after power-on
- Retransmission support
- Request/Reply support
- Send and pray support (Send a message to all nodes without reply/ack)
- Easy to configure (Set only the same bsid, iv and secred key to all nodes)
- Works on esp-now broadcast
- Arduino

Mesh Network

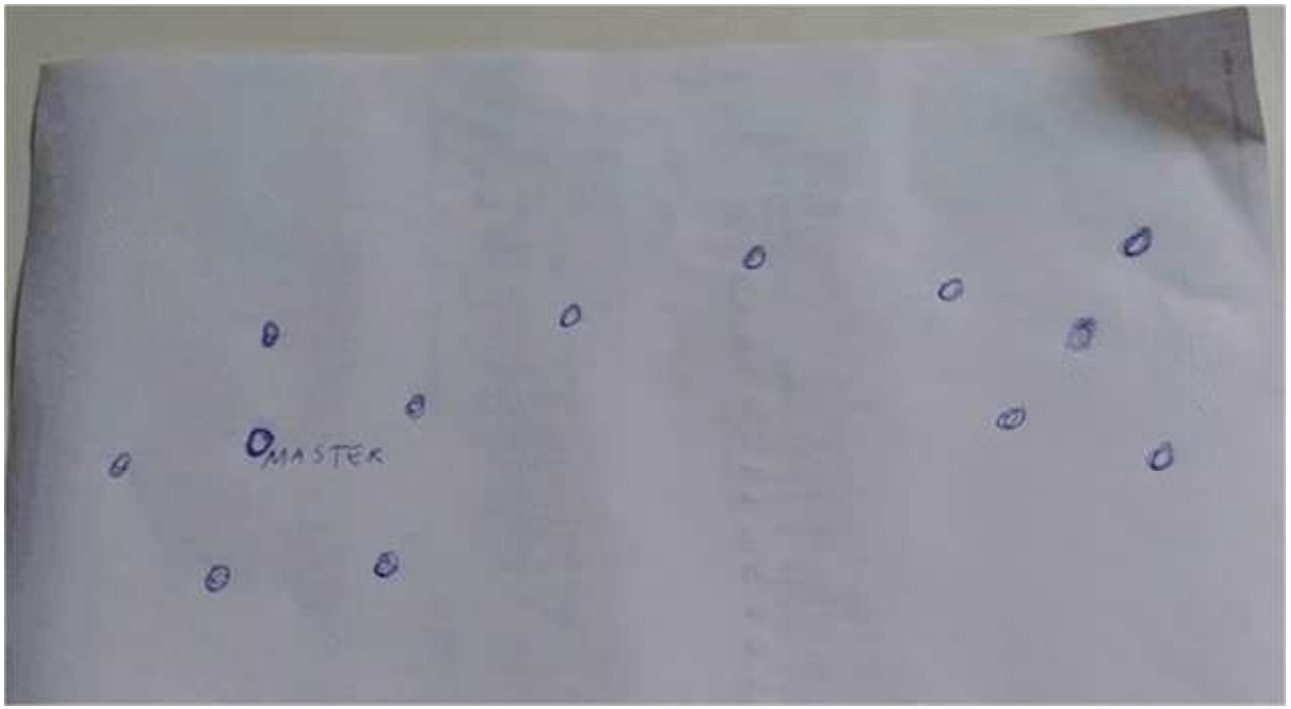


Message Header

```
typedef struct AES128 {
  uint8 msgId;
  uint8 length;
  uint32 replyId;
….
} AES128;
```



Mesh Network



Arduino library

- **Arduino libraries:**
- https://github.com/arttupii/espNowFloodingMeshLibrary
- https://github.com/arttupii/ArduinoCommands
- https://github.com/arttupii/SimpleMqttLibrary

Test Broadcast

```
void loop() {
  // put your main code here, to run repeatedly:
  delay(1000);
  Serial.println("Send");
  espnowBroadcast_send((const uint8_t*)"HELLO22", 6);
}
```

```
Send
Send
Send
Send
Send
Send
Send
Send
Send
Send
Send
Send
Send
Send
Send
```

Test Master Slave

- Master 1
- Slave unlimited

THANKS

Do you have any question?

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