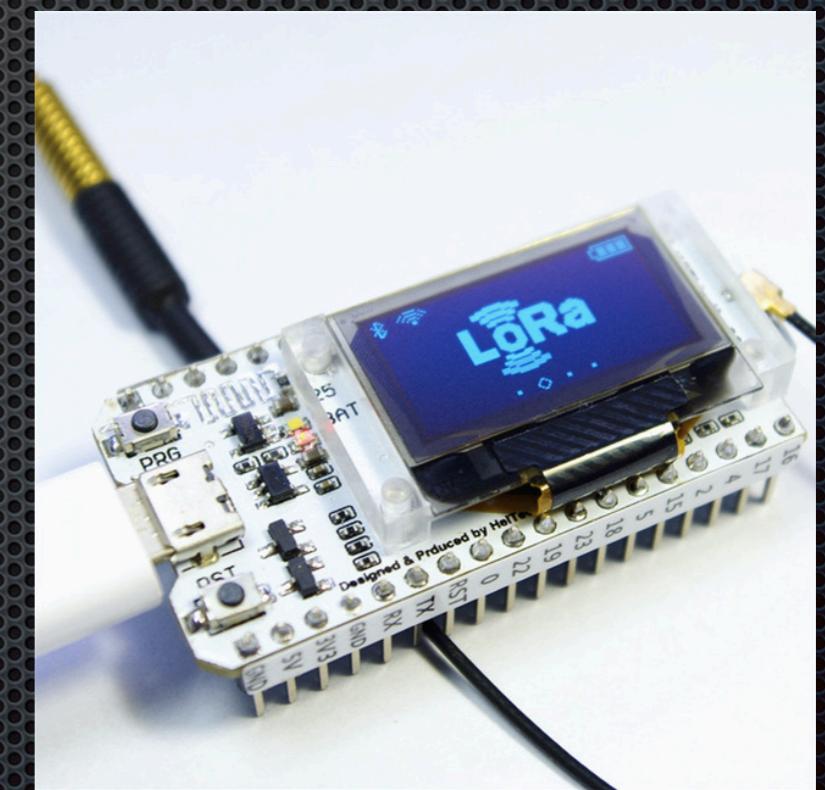


Peer to peer LoRa

Intelligent communications



Graham Cottew
github.com/zendata/SDR

@zenmountainman

what is LoRa

LoRa stands for Long Range and it is a technology that uses unlicensed spectrum below 1GHz along with a form of direct sequence spread spectrum modulation that provides signal detection below the noise level.

LoRa, essentially, is a clever way to get very good receiver sensitivity and low bit error rate (BER) from inexpensive chips using smart modulation to encode information using a chirped, multi-symbol format.

Based on SX1272 and SX1276 chips from Semtech

These are great links:

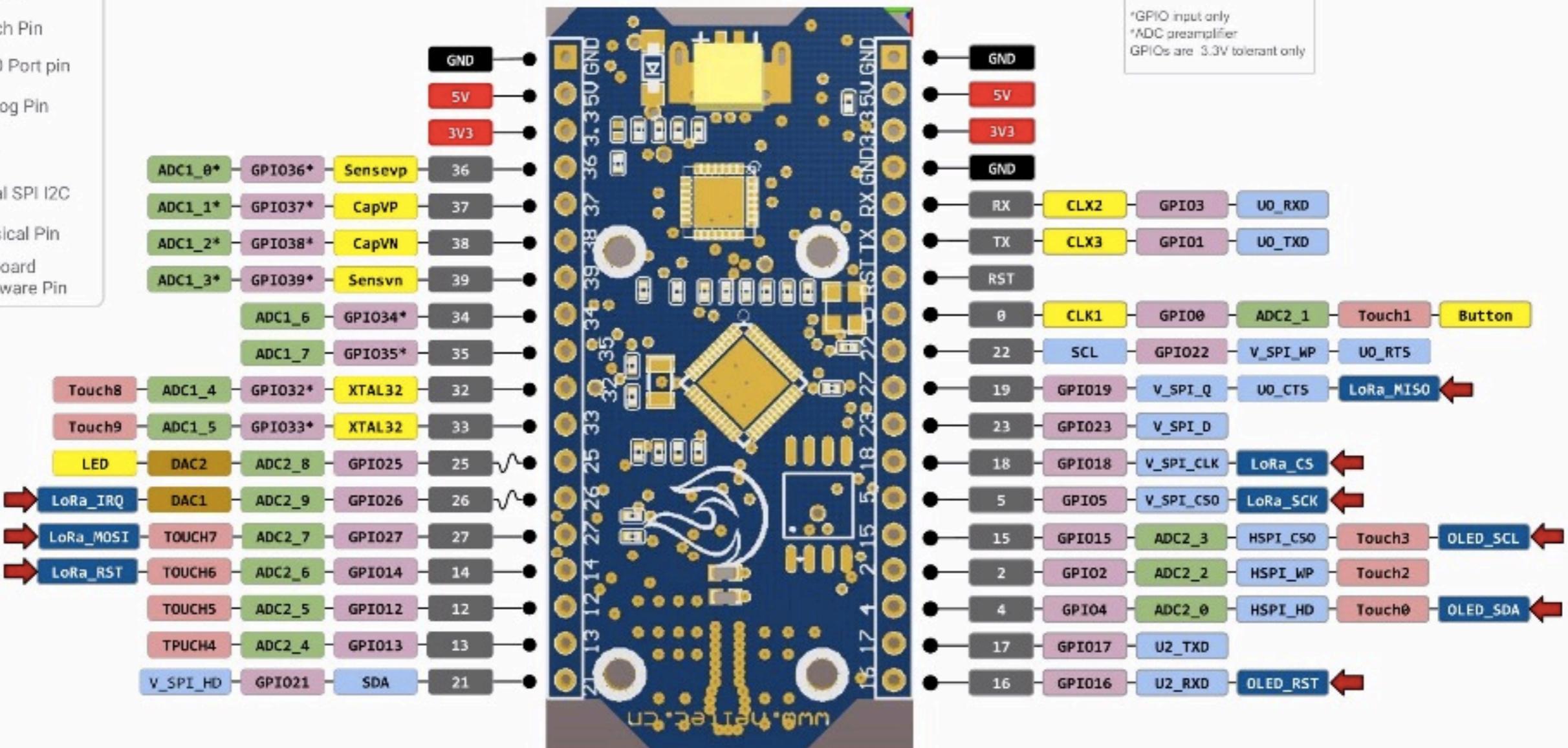
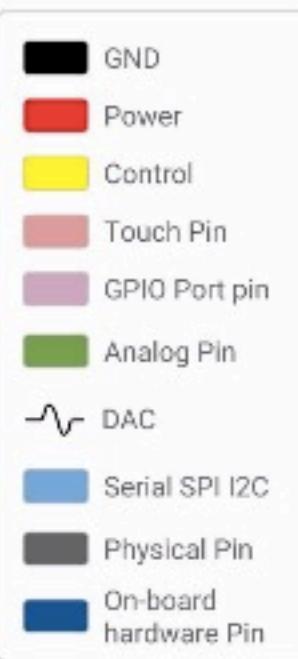
<https://www.link-labs.com/blog/what-is-lora>

<http://esp32.net/>

Where to get them

- <https://www.aliexpress.com/item/SX1278-ESP32-LoRa-0-96-Inch-Blue-OLED-Display-Bluetooth-WIFI-Lora-Kit-32-Module-IOT/32825749403.html>
- About \$20

WIFI LoRa 32 Pinout Diagram

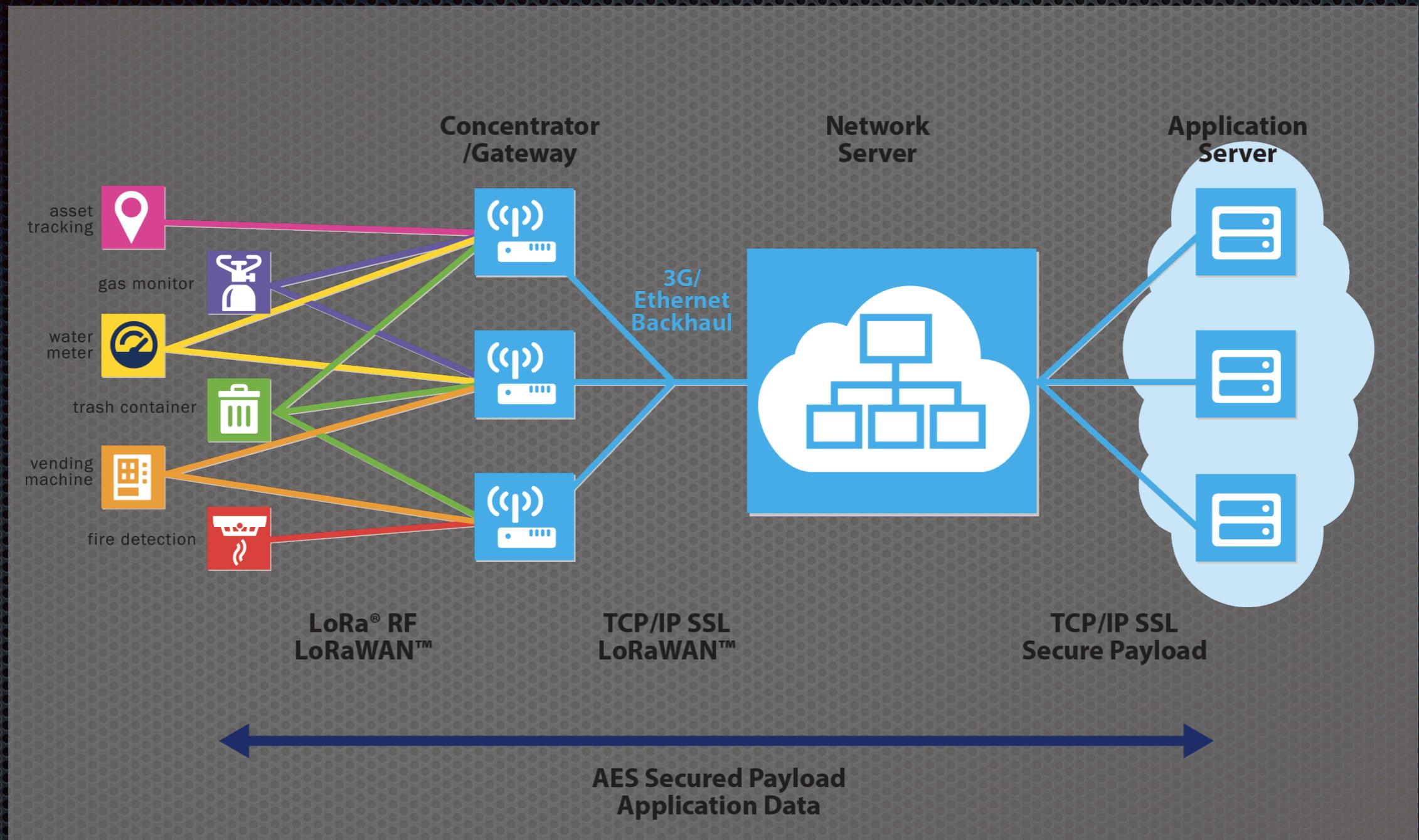


Notes:

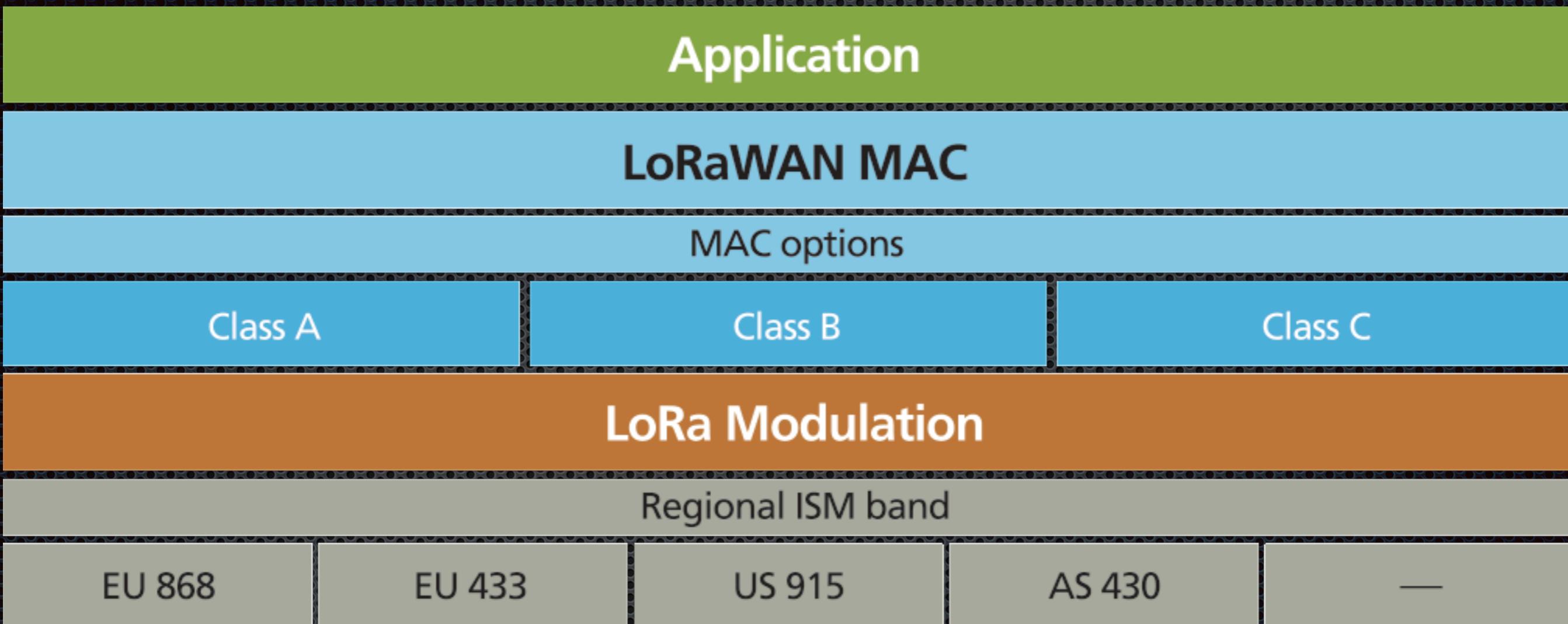
*GPIO input only
*ADC preamplifier
GPIOs are 3.3V tolerant only

→ Pins with this arrow are used by on-board OLED or LoRa, they must not be used for other purpose unless you know what you are doing!

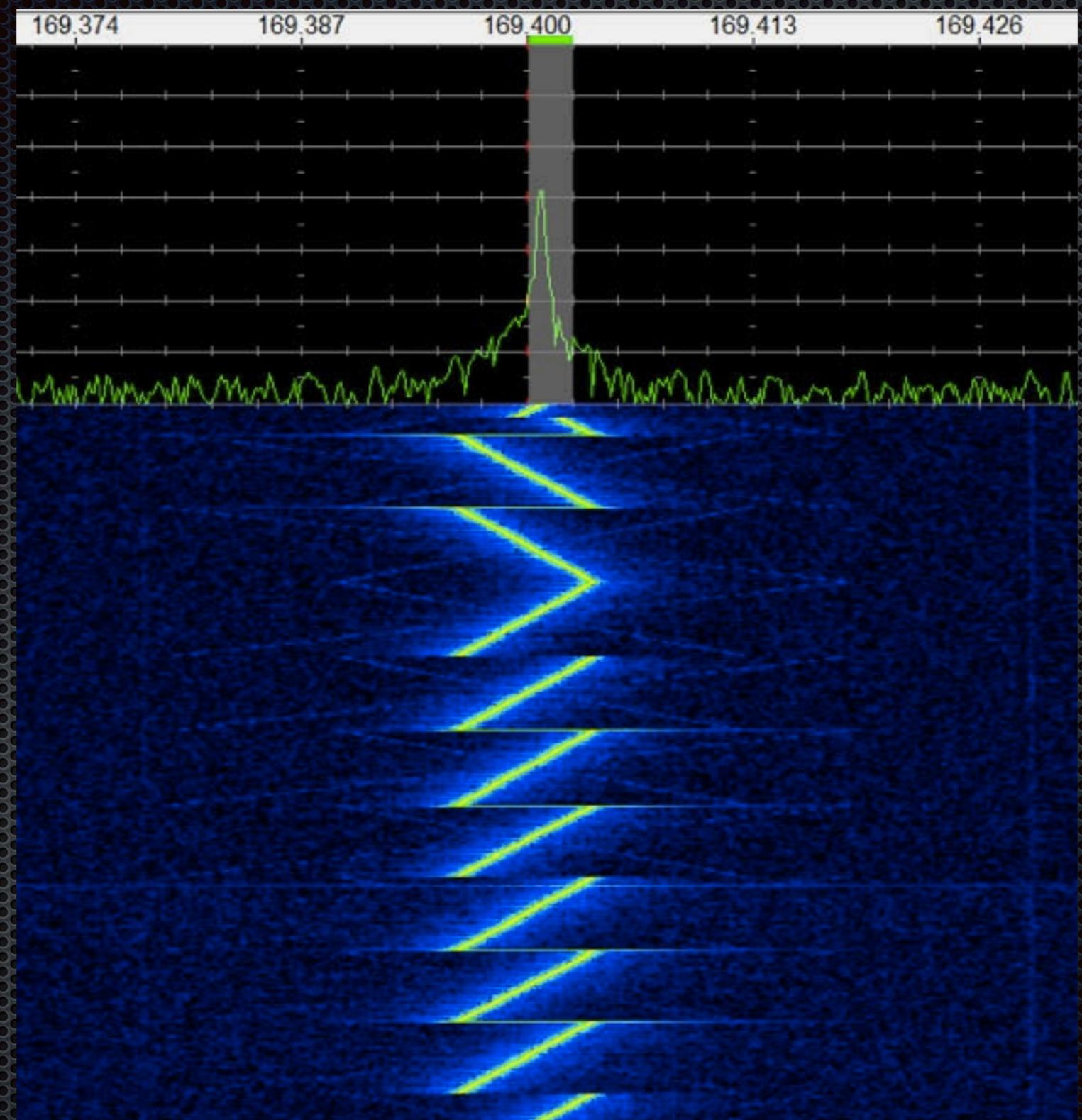
Network Topology

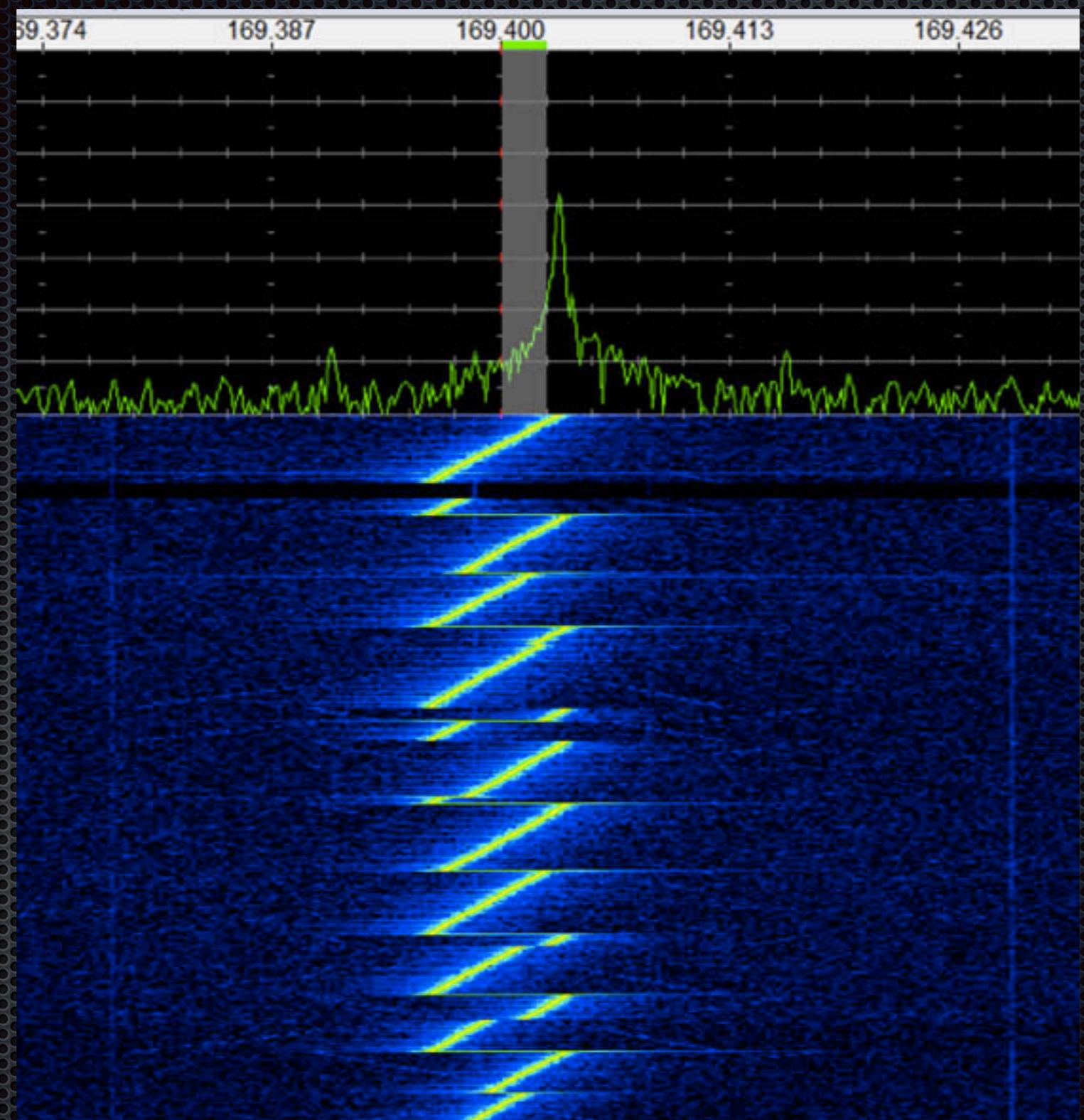


Protocol stack



- #define BAND 915.00E6
- #define spreadingFactor 9
- #define SignalBandwidth 31.25E3
- #define preambleLength 8





Modulation explained

https://mirrors.dotsrc.org/cdn.media.ccc.de//congress/2016/h264-hd/33c3-7945-eng-Decoding_the_LoRa_PHY.mp4

my demo

- Showing two LoRa devices talking asynchronously
- Displaying each other's received signal strength and signal to noise ratio
- Currently using the ISM band at 915MHz
- I have tested TX/RX between 168MHz and 1000MHz



Code

- Arduino development environment well supported
- My code is on github at [https://github.com/zendata/
SDR](https://github.com/zendata/SDR)
- Additional features coming include:
- Hardware peripheral interfacing for remote sensing and external object control

LoRa peer to peer comms

Long Range smart communications

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