Redes de datos LPWA

RFC https://tools.ietf.org/wg/lpwan/
https://github.com/sftcd/lpwan-ov/blob/master/draft-farrell-lpwan-overview.txt lo otro es que deberia estar ak https://www.lora-alliance.org/what-is-lora al final de la pagina dice que mande un correo pa que se lo envien . . ..
https://docs.wixstatic.com/ugd/eccc1a_20fe760334f84a9788c5b11820281bd0.pdf es como un resumen muy completo los modulos chinos son OTAA y los sigfox ABP por eso se comportan diferente ak mas humano el RFC https://tools.ietf.org/id/draft-ietf-lpwan-overview-04.html

Sigfox

https://partner.sigfox.com/
https://backend.sigfox.com/device/2885103/messages
https://backend.sigfox.com/apidocs/event-callback?configSource=0
Workshop Sigfox

20170628_-_smt_bogota_workshop.pdf

LoRaWan

Explicación del protocolo → https://revspace.nl/DecodingLora Debug del protocolo → https://static1.squarespace.com/static/54cecce7e4b054df1848b5f9/t/57489e6e07eaa0105215dc6c/1464376943218/Reversing-Lora-Knight.pdf

https://www.lora-alliance.org/technology

Fabricante chino RAK - Gateway RAK831
https://www.aliexpress.com/store/product/RAK831-LoRa-LoRaWAN-Gateway-Module-base-on-SX1301-433-868-915MHz-range-of-up-to-49200ft/2805180_32821411294.html?spm=2114.12010612.0.0.5bdadf47Uf6gic
https://github.com/RAKWireless/RAK831_LoRaGateway
http://docs.rakwireless.com/en/RAK831%20LoRa%20Gateway/Software%20Development/RAK831%20Datasheet%20V1.2.pdf
http://docs.rakwireless.com/en/RAK831%20LoRa%20Gateway/Software%20Development/RAK831%20Quick%20Start%20GuideV1.0.pdf
http://docs.rakwireless.com/en/RAK831%20LoRa%20Gateway/Application%20Notes/Getting%20started%20with%20the%20RAK%20831%20Lora%20Gateway%20and%20RPi3.pdf
http://docs.rakwireless.com/en/RAK831%20LoRa%20Gateway/Hardware%20Design/Raspberry%20Pi%20Switchboard%20SCH_20171218.PDF

Módulo que agrega GPS y la conexión con una raspberry como shield

Converter Board (Raspberry)

With Max-7Q GPS Module and GPS Antenna

Enlace para la configuración en ttn que funcionó
https://www.thethingsnetwork.org/labs/story/rak831-lora-gateway-from-package-to-online

Conexión a raspberry pi 3
https://www.hackster.io/naresh-krish/getting-started-with-the-rak-831-lora-gateway-and-rpi3-e3351d

https://github.com/TheThingsNetwork/gateway-conf

RAK 831 Pin	Description on silk screen	RPi physical pin
	+5V	2
	GND	6
9	RST (Resent pin)	22
8	SCK (SPI Clock)	23
7	MISO	21
6	MOSI	19
5	CSN (Chip Select)	24

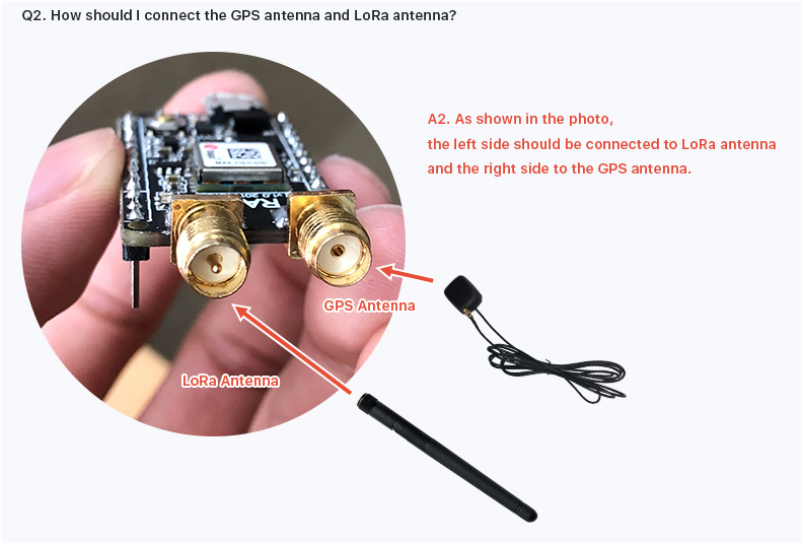
rpi v3 to rak 831 pin connection

Otros enlaces para la configuración
https://www.hackster.io/naresh-krish/getting-started-with-the-rak-831-lora-gateway-and-rpi3-e3351d
https://www.thethingsnetwork.org/labs/story/rak831-lora-gateway-from-package-to-online
https://www.thethingsnetwork.org/docs/gateways/troubleshooting/semtech-udp.html#logs
https://github.com/TheThingsNetwork/packet_forwarder/blob/master/docs/INSTALL_INSTRUCTIONS/IMST_RPI.md
https://www.thethingsnetwork.org/docs/gateways/packet-forwarder/semtech-udp.html
https://github.com/TheThingsNetwork/packet_forwarder/blob/master/docs/INSTALL_INSTRUCTIONS/IMST_RPI.md

Referentes

https://github.com/IRNAS/ttn-irnas-gw
https://github.com/worrajak/RAK831_LoRaGateway
https://github.com/kuanyili/rak831-gateway

Módulo RAK811



http://wiki.rakwireless.com/doku.php?id=wisnode_series:wisnode-lora&s[]=rak811
http://wiki.rakwireless.com/lib/exe/fetch.php?media=rak811_lora_at_command_v1.2.pdf
http://wiki.rakwireless.com/lib/exe/fetch.php?media=wisnode-lora_evb_quick_start_guide.pdf

RAKTracker programming with platformio https://github.com/jcaridadhdez/RAK811-tracker/wiki
https://github.com/sabas1080/RAK811WithCoreArduino
https://github.com/SVTSolder/RAK811-AT-Arduino
https://github.com/jcaridadhdez/RAK811-tracker
https://github.com/Ebiroll/RAK811_BreakBoard

Compilando herramientas del repositorio https://github.com/RAKWireless/RAK831_LoRaGateway

en archlinux instalar libftdi_compat
+#include <sys/types.h> –>
https://www.linuxquestions.org/questions/slackware-14/what-include-am-i-missing-for-types-like-u_int8_t-4175454407/
PATH_MAX –>
https://stackoverflow.com/questions/9449241/where-is-path-max-defined-in-linux#9449307

Comparación de Gateways

precio	link	características
U$ 289	https://www.seeedstudio.com/LoRa%2FLoRaWAN-Gateway-915MHz-for-Raspberry-Pi-3-p-2821.html	gps+lorawangateway
	https://www.multitech.com/products/gateways-routers-modems	
U$147	https://www.aliexpress.com/store/product/RAK831-LoRa-LoRaWAN-Gateway-Module-433-868-915MHz-base-on-SX1301-Wireless-Spread-Spectrum-Transmission-range/2805180_32832894046.html?spm=2114.12010608.0.0.48e93588W3ovtQ	
U$199	https://www.aliexpress.com/store/product/RAK831-Pilot-Gateway-SX1301-Raspberry-Pi3-GPS-with-complete-enclosure-for-professional-demonstration-set-up/2805180_32883987457.html?spm=2114.12010615.8148356.3.282c326cRrlqpB	Raspberry+gps+lorawangateway
	https://www.cisco.com/c/en/us/products/collateral/se/internet-of-things/datasheet-c78-737307.html	
U$325	http://www.newark.com/the-things-network/ttn-gw-915/accessory-type-wireless-gateway/dp/05AC1807	
US$910	http://www.newark.com/microchip/dv164140-2/lorawan-network-evaluation-kit/dp/97Y9193?st=lorawan	

Lora con RF96 y esp8266

Dragino https://encrypted.google.com/search?hl=es&q=dragino %2B esp8266
https://www.youtube.com/watch?v=hMOwbNUpDQA&list=PL3XBzmAj53Rkkogh-lti58h_GkhzU1n7U
https://github.com/hallard/NodeMCU-Gateway
https://www.thethingsnetwork.org/forum/t/single-channel-gateway-part-1/798/339
https://github.com/squix78/esp8266-oled-ssd1306
https://github.com/things4u/ESP-1ch-Gateway-v2.0
https://github.com/things4u/ESP-1ch-Gateway-v3.0
https://github.com/JaapBraam/LoRaWanGateway
http://www.hoperf.com/upload/docs/rf/AN2003-LoRa%20communication%20example.pdf

LoRa Server

https://www.loraserver.io/
http://piratas.cu.cc/doku.php?id=iot:lorawan:server

https://github.com/ttn-zh/packet_forwarder

RN2903

http://blog.trifork.com/2016/03/04/from-the-trenches-lora-lorawan-with-the-lorabee/
http://ww1.microchip.com/downloads/en/DeviceDoc/40001784B.pdf
https://github.com/alinmechenici/LoRa-projects
https://github.com/HF0/LoRaWAN-for-Arduino-RN2483
https://www.thethingsnetwork.org/labs/

- sys get ver
- radio set freq 903000000 a 928000000
- radio get freq
- radio set pwr 14
- mac pause
- radio tx <a random number>
- radio rx 0

Amplificadores de bajo ruido

http://lna4all.blogspot.com.co/

Otras aplicaciones

https://ukhas.org.uk/guides:ssdv
http://www.timzaman.nl/?page_id=1106
https://www.youtube.com/watch?v=BfugrVBCA98
https://www.rtl-sdr.com/creating-a-fsk-video-data-system-for-high-altitude-balloons/
Beeper LoRa → http://www.snaponair.com/
Sensor de calidad del aire con LoRa → http://e.pavlin.si/2018/07/03/particle-sensor-with-lora/