

GAINSTRONG

**Minibox-LoRa V1.0\_User Manual\_EN**

*Specification Version 1.0.3*

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Rev.	Date	Contents of Revision Change	Remark
1.0.0	2018-06-08	Initial release	James
1.0.1	2018-06-30	Update the picture	Kary
1.0.2	2018-07-02	Update the picture	Kary
1.0.3	2022-05-18	Fix source URL	Joe Guo

## INTRODUCTION

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Minibox-LoRa V1.0 is a smart LoRa solution for IOT application. MT7688AN + SX1276 (433MHz 470 MHz or 868MHz or 915MHz. Can update local data to Internet(Server). We intend to make this product open source software product and expose our software code and provide user manual.

### **MT7688:**

MT7688 family integrates a 1T1R 802.11n Wi-Fi radio, a 580MHz MIPS® 24KEc™ CPU, 1-port fast Ethernet PHY,USB2.0 host, PCIe, SD-XC, I2S/PCM and multiple slow IOs.

MT7688 provides two operation modes – IoTgateway mode and IoT device mode. In IoT gateway mode, the PCI Express interface can connect to 802.11ac.chipset for 11ac dual-band concurrent gateway. The high performance USB 2.0 allows MT7688 to add 3G/LTE modem support or add a H.264 ISP for wireless IP camera. For the IoT device mode, MT7688 supports eMMC,SD-XC and USB 2.0. MT7688 can support the WiFi high quality audio via 192Kbps/24bits I2S interface and VoIPapplication through PCM. In IoT device mode, it further supports PWM, SPI slave, 3rd UART and more GPIOs.For IoT gateway, it can connect to touch panel and BLE, Zigbee/Z-Wave and sub-1G RF for smart home control.

### **SX1276:**

The SX1276/77/78/79 transceivers feature the LoRa™ long range modem that provides ultra-long range spread spectrum communication and high interference immunity whilst minimising current consumption.

These devices also support high performance (G)FSK modes for systems including WMBus, IEEE802.15.4g. The SX1276/77/78/79 deliver exceptional phase noise, selectivity, receiver linearity and IIP3 for significantly lower current consumption than competing devices.

- Automated Meter Reading.
- Home and Building Automation.
- Wireless Alarm and Security Systems.
- Industrial Monitoring and Control
- Long range Irrigation Systems

## INTERFACE INSTRUCTIONS

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## CONNECTION

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Then you can telnet to access to the board system,default IP is 192.168.1.1

```
$ telnet 192.168.1.1
```

If you closed the telnet port 23,you can use SSH protocol to access to the board system

```
$ ssh root@192.168.1.1
```

## FIRMWARE BUILD

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### Download Openwrt source code:

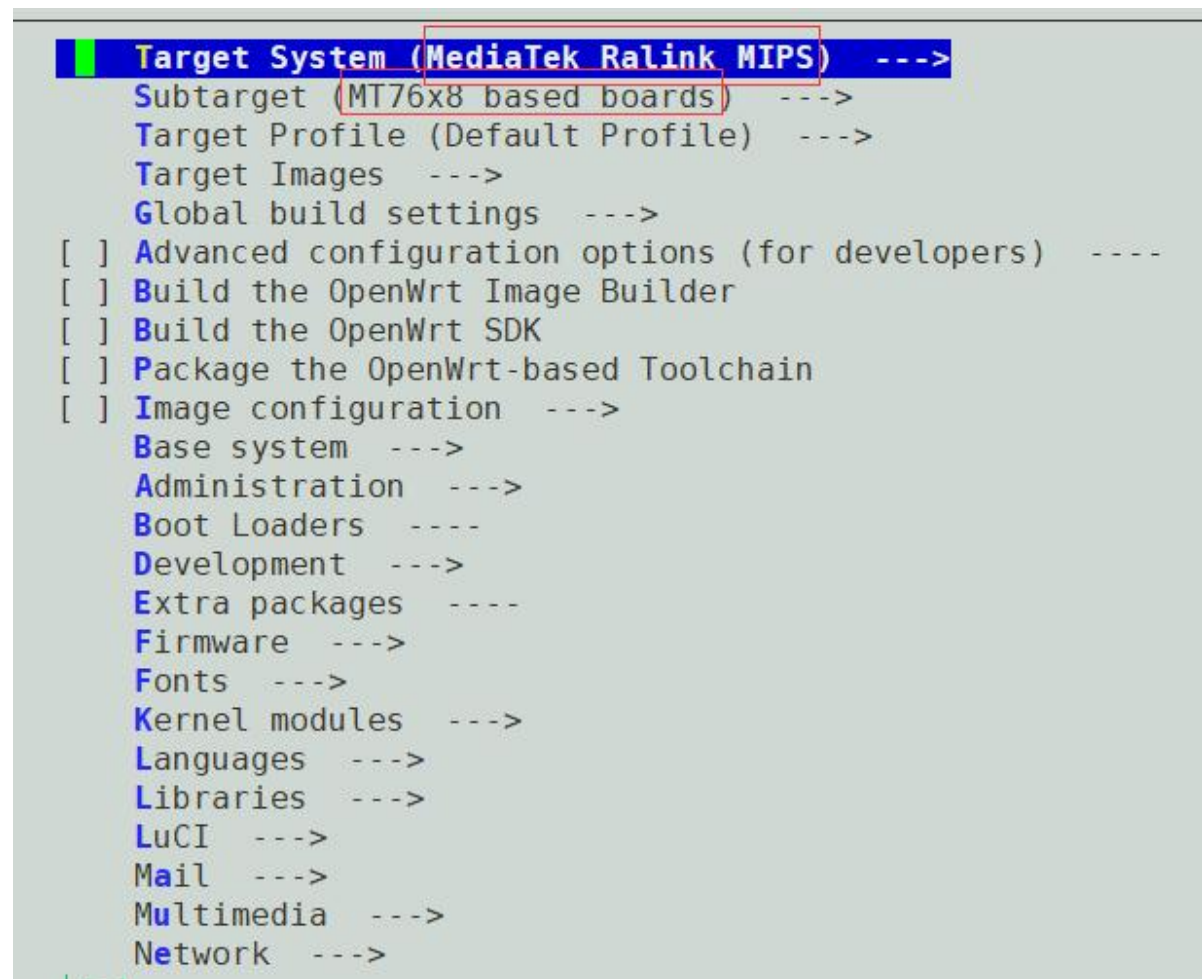
```
$ git clone https://github.com/GainStrongService/openwrt.git -b 1806/mt76x8-minibox-lora openwrt-minibox-lora
```

```
$ cd openwrt-minibox-lora
```

```
$ ./scripts/feeds update -a
```

```
$ ./scripts/feeds install -a
```

```
$ make menuconfig
```



```
Target System (MediaTek Ralink MIPS) --->
Subtarget (MT76x8 based boards) --->
Target Profile (Default Profile) --->
Target Images --->
Global build settings --->
[ ] Advanced configuration options (for developers) ----
[ ] Build the OpenWrt Image Builder
[ ] Build the OpenWrt SDK
[ ] Package the OpenWrt-based Toolchain
[ ] Image configuration --->
Base system --->
Administration --->
Boot Loaders ----
Development --->
Extra packages ----
Firmware --->
Fonts --->
Kernel modules --->
Languages --->
Libraries --->
LuCI --->
Mail --->
Multimedia --->
Network --->
```

\$ make -j8 V=s

## FIRMWARE UPDATE:

Please reference this document:

<https://oolite.cn/minibox-lora-v1-0-upgrade-instruction.html>

## SX1276 FREQUENCY

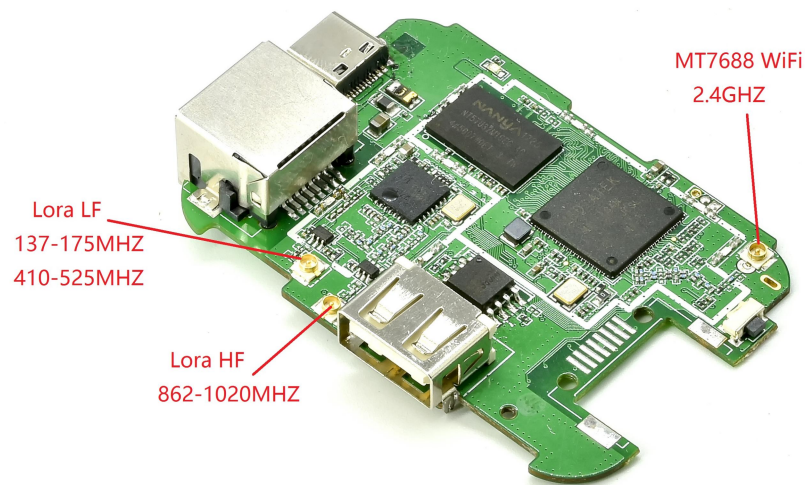
Minibox-LoRa V1.0 can support 433MHz/868MHz,915MHz,but they not use the same RF circuit.

- HF:support 862-1020MHz,Tx power can be 20dBm,
- LF:support 137-175MHz and 410-525MHz,Tx power can be 14dBm.

Part Number	Frequency Range	Spreading Factor	Bandwidth	Effective Bitrate	Est. Sensitivity
SX1276	137 - 1020 MHz	6 - 12	7.8 - 500 kHz	.018 - 37.5 kbps	-111 to -148 dBm
SX1277	137 - 1020 MHz	6 - 9	7.8 - 500 kHz	0.11 - 37.5 kbps	-111 to -139 dBm
SX1278	137 - 525 MHz	6- 12	7.8 - 500 kHz	.018 - 37.5 kbps	-111 to -148 dBm
SX1279	137 - 960MHz	6- 12	7.8 - 500 kHz	.018 - 37.5 kbps	-111 to -148 dBm

### Frequency Bands

Name	Frequency Limits	Products
Band 1 (HF)	862 (*779)-1020 (*960) MHz	SX1276/77/79
Band 2 (LF)	410-525 (*480) MHz	SX1276/77/78/79
Band 3 (LF)	137-175 (*160)MHz	SX1276/77/78/79



## LORA-TEST COMMADN

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We have offer a test tool(lora-test) to test the LoRa chip,you can use help command to look detail use manual.Here are some example:

- Set fixed frequency use " -f val " , eg: set frequency to 433MHz,use " -f 433000000"
- Set fixed TX power use " -p val " , eg: set Tx Power to 14dBm, " -p 14" (default 20dBm, 433MHz mac Tx power is 14dBm)
- Set Mode to Receive Mode use " -r "
- 868MHz Test :  
lora-test -f 868000000 -p 20  
lora-test -f 868000000 -r
- 433MHz Test :  
lora-test -f 433000000 -p 14  
lora-test -f 433000000 -r



