RDR Users Manual

Introduction

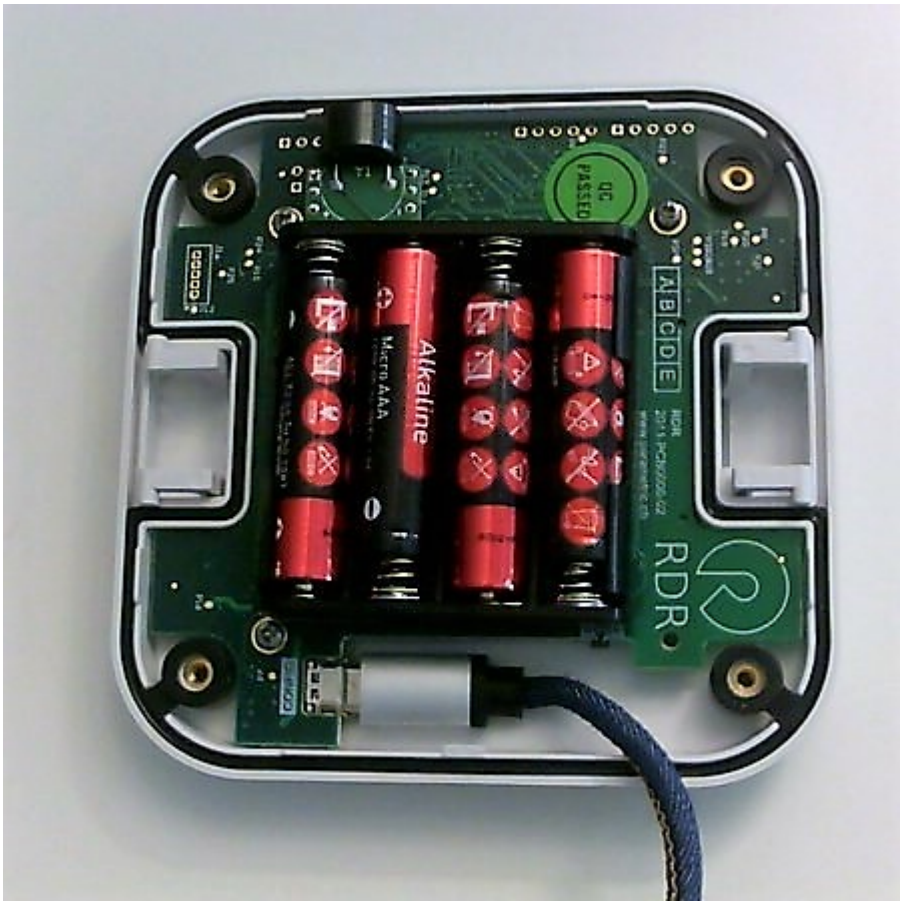
RDR is a compact LoRa NFC/RFID Reader that can be used as a RFID-to-LoRa Gateway. The device acts as a transparent gateway by sending the tag ID and the content of the raw data of the first NDEF file found on the tag.

Setup

This chapter describes the initial setup of a RDR NFC/RFID Reader.

Connect USB cable

Open the four screws on the backside of your device to access battery slots and the CONFIG port.



The device is a so called USB slave that emulates a serial port over its USB socket. Windows 10 should automatically install a Virtual-Com-Port Driver (VCP).

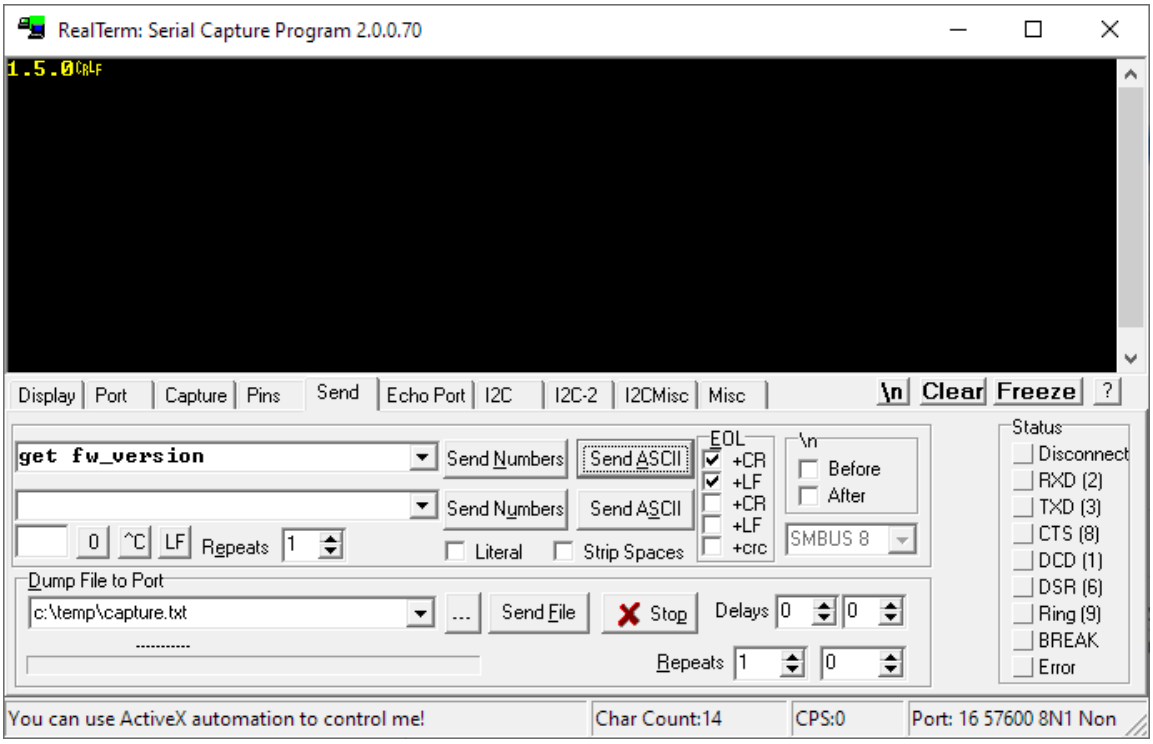
Use Standard USB cable (USB-A to Micro-USB) to establish a connection between the device and your PC. Do do not need batteries at this stage as the device is powered via USB.

Using the CLI (Optional)

However you could communicate directly with the device by using command line interface commands.

See the RDR CLI Documentation for a list of all commands available.

You need an emulation software such as RealTerm to send / receive commands over a serial link.



Use following communication settings:

- Baudrate: **19200**
- Data Bits: **8**
- Parity: **None**
- Stop Bits: **1**

> Note: all commands need to be terminated by **CRLF**. Therefore check the boxes **'+CR'** and **'+LF'**

The main settings

AppKey

Operation

Startup Sequence

After power up the device will check for a valid AppKey. If the AppKey has not been set, the left LED (LR LED) will start to blink red. (See CLI command `lora set appkey` and `save` for more information)

If AppKey is set the device will send a Join Request and waits for the Join ACK from the LoRaWAN® server. During this the left LED (LR LED) will slowly blink green. You will hear a double-beep on successful join and the LED will go off - **the device is now ready to read NFCs!**

> A restart will be triggered if there is no answer from the network after 5 minutes.

Reading NFCs

RDR is able to read a wide range of ISO14443A/B NFC Tags. NFC tags can be formatted to contain an NDEF file system with one or more NDEF Records.

> Contact us if you need a recommendation and get a list of devices we have successfully tested.

As soon as the device is initialized you can can start to read NFC tags. Hold the Tag to the centre of the device. You will hear a short beep and the RD LED will go on green.

Up to 50 readings are queued in a buffer including read timestamps. RD LED will go on red when buffer is full.

> Note that maximum NDEF file length must not exceed 28 bytes. Otherwise it can not be transferred over LoRaWAN® on low data rates.

Sending Data

As soon as there are readings in the buffer, the device starts sending data. (LR LED is slowly blinking green)

The strategy is to pack as many NFC readings as possible into the payload. Therefore payload length depends on the following parameters:

- Actual data rate
- NDEF record data length

It might take some time to transfer all the NFC readings as device respects LoRaWAN® duty cycle (ETSI) regulations.

All data has been transferred when LR LED goes off.

USB Reader Mode

RDR can be operated as a connected LoRaWAN® device or alternatively as a NFC reader connected via USB.

To enable the offline mode use the CLI command `set rdmode 1`. Readings will be transferred over USB VCP in the following format.

```
<NFC_Serial>:<NDEF_File0_Payload>
```

Following table shows the difference between both modes.

	Online Mode (Default)	**Reader Mode**
LoRaWAN® Modem	enabled AppKey must be set	disabled
NFC Reader	enabled	enabled
Data Buffer	yes (50 Readings)	No
Data Output	LoRaWAN® Uplinks	Console Output (USB VCP)
LR LED	**on** for 1s after power up	always off
RD LED	**on** for 1s after power up	**on** for 1s after power up

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LED Signalisation

RDR devices are equipped with two dual colour LEDs to signal status and error conditions.

Battery Powered

Following table shows all LED codes when device is powered by 4xAAA internal batteries. This is a power optimized setting as LEDs are nasty power guzzlers.

Left LED (Reader)	Right LED (LoRaWAN)	Meaning	What To Do
green	green	Device is initializing	Wait up to 10s
-	green blinking slow	LoRaWAN® Communication active	
-	red blinking slow	LoRaWAN® Communication error	Check LoRaWAN® registration
red	red blinking fast	oRaWAN® Keys not set	Please set LoRaWAN® keys
-	-	LoRaWAN® Network connected	Device ready to scan tags
green	-	RFID tag reading sucessful	Remove RFID Tag
red	-	RFID reader not ready	Try different RFID Tag
red blinking slow	-	RFID read buffer is full	Wait for data uplinks
red	red blinking	Battery low	Replace or

blinking slow	slow		recharge batteries
red blinking fast	red blinking fast	Hardware error	Contact Support

DC Powered (USB)

LED codes are slighly different when powered by a constant external power supply.

Left LED (Reader)	Right LED (LoRaWAN)	Meaning	What To Do
green	green	Device is initializing	Wait up to 10s
-	green blinking slow	LoRaWAN® Communication Active	
-	red blinking slow	LoRaWAN® Communication Error	Check LoRaWAN® registration
red	red blinking fast	LoRaWAN® Keys not set	Please set LoRaWAN® keys
-	**green**	LoRaWAN® Network connected	Device ready to scan tags
green	-	RFID tag reading sucessful	Remove RFID Tag
red	-	RFID reader not ready	Try different RFID Tag
red blinking slow	-	RFID read buffer is full	Wait for data uplinks
red	red blinking	Battery low	Replace or

blinking slow	slow		recharge batteries
red blinking fast	red blinking fast	Hardware error	Contact Support

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Technical Specs

LoRaWAN

- LoRaWAN: **V1.0.3**
- Band: **EU868**
- Activation Method: **OTAA**
- ADR: **On**
- DevEUI: **Read from device via CLI**
- AppEUI/JoinEUI: **8CAE49CFFFFFFF05**
- AppKey: **Printed on the LoRaWAN® Keys Slip**

NFC Tag Compatibility

The following list of NFC / RFID chips have been tested and are known to work nicely. We will add more chips from time to time as soon as they have been tested.

NFC Type	Standard	Data Format
NTAG210	ISO 14443A 1-3	NDEF
NTAG213	ISO 14443A 1-3	NDEF
NTAG216	ISO 14443A 1-3	NDEF
MIFARE Ultralight EV1	ISO 14443A 1-3	NDEF
ICODE SLIX	ISO15693	Other

NTAG®

NFC Tags with NTAG chip are compatible with every NFC device. The NTAG IC are last generation chips, which offer better performance of data transmission speed and reading range. There are different types of NTAGs, from NTAG203 to the more recent NTAG21x (NTAG212, NTAG213, NTAG216, etc.). NTAGs are the most suitable for marketing campaigns, because they are compatible with the different mobile operating systems: Android, Windows Phone and BlackBerry.

MIFARE Ultralight® EV1

Fully compliant with the international standard ISO/IEC 14443A, data transfer of 106 Kbit/s, field programmable ‘Read only’ locking function per page, up to 100.000 single write operations.

ICODE®

ICODE® is the industry standard for high-frequency (HF) smart label solutions operating on 13,56Mhz supporting ISO 15693/ISO 18000-3 compliant infrastructure