Point to Point Communication of LT-22222-L

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1. Overview

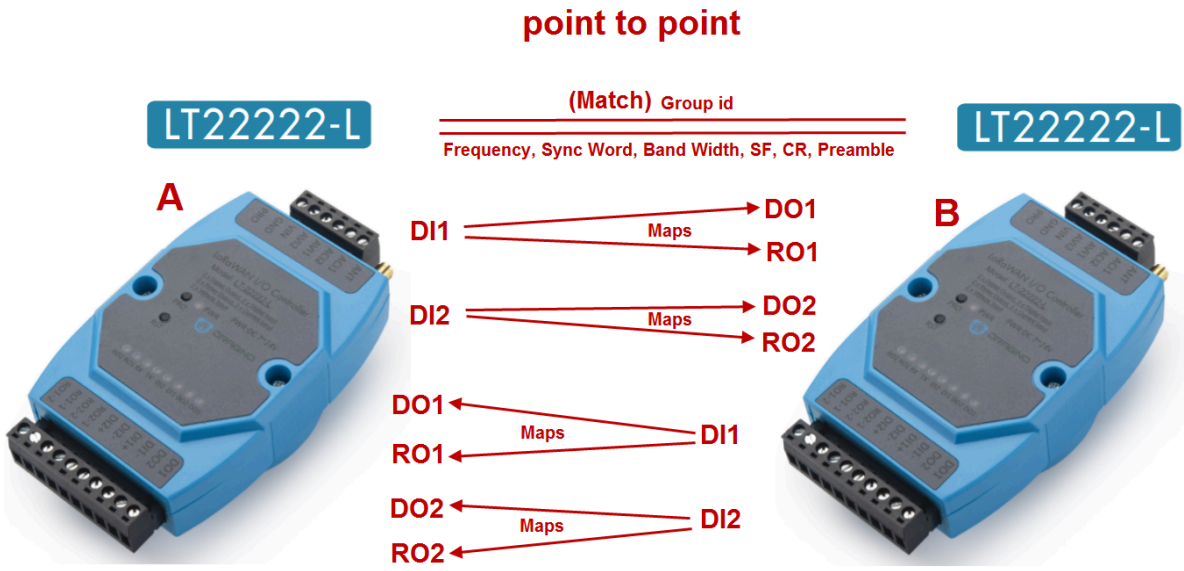
Shipped LT-22222-L is base on LoRaWAN protocol. We also develop a open source Point to Point LoRa protocol for LT-22222-L. The source code and hex file can be found at:

Point to Point Software for LT-22222-L.

2. Features for this firmware

2.1 Point To Point

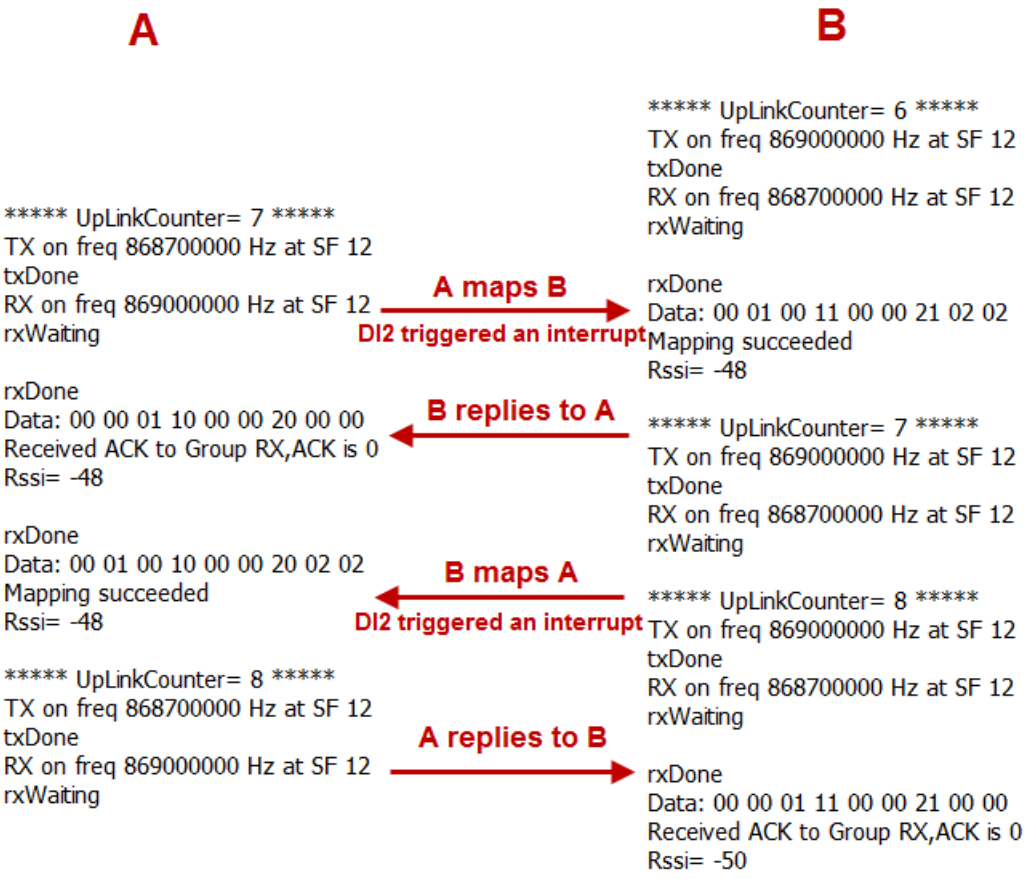
2.1.1 Overview



2.2.2 Configure

A's configuration	B's configuration
AT+GROUPMOD=0	AT+GROUPMOD=0
AT+TXCHS=868700000	AT+TXCHS=869000000
AT+RXCHS=869000000	AT+RXCHS=868700000
AT+TRIG1=2,50	AT+TRIG1=2,50
AT+TRIG2=2,50	AT+TRIG2=2,50
AT+DI1TODO1=2	AT+DI1TODO1=2
AT+DI1TORO1=2	AT+DI1TORO1=2
AT+DI2TODO2=2	AT+DI2TODO2=2
AT+DI2TORO2=2	AT+DI2TORO2=2

2.2.3 Serial port display

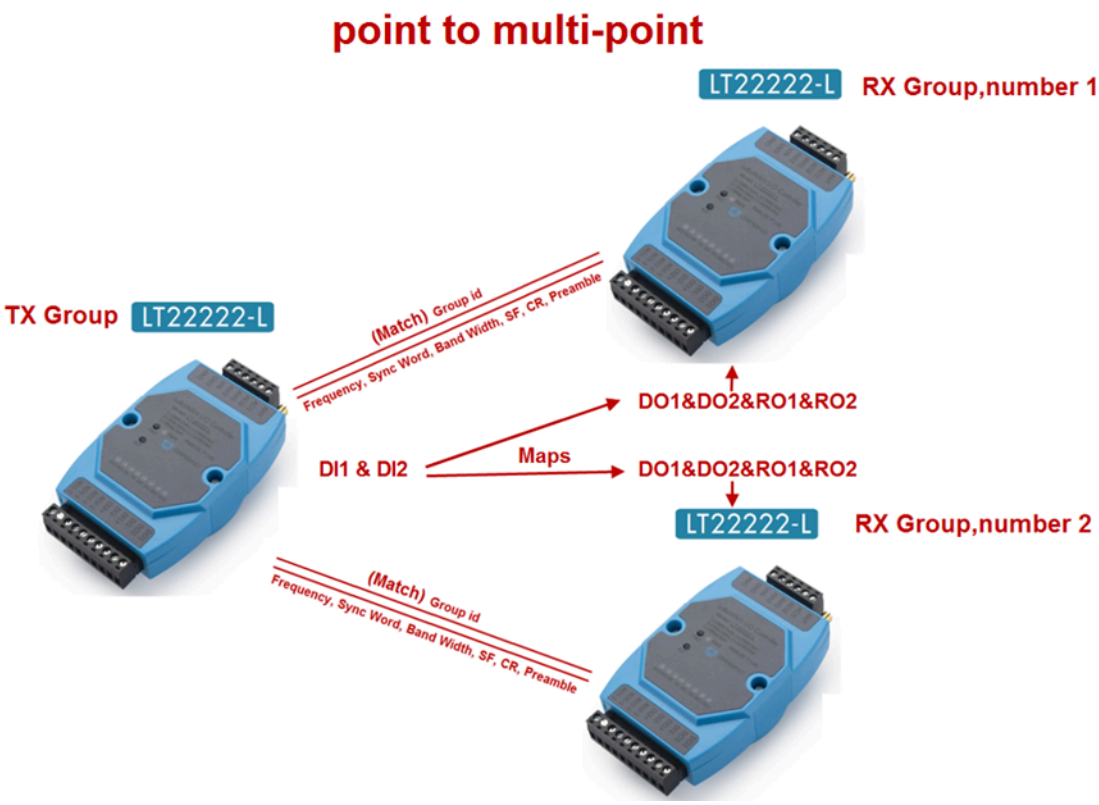

A
B
***** UpLinkCounter= 6 *****
TX on freq 869000000 Hz at SF 12
txDone
RX on freq 868700000 Hz at SF 12
rxWaiting
***** UpLinkCounter= 7 *****
TX on freq 868700000 Hz at SF 12
txDone
RX on freq 869000000 Hz at SF 12
rxWaiting
A maps B
DI2 triggered an interrupt
rxDone
Data: 00 01 00 11 00 00 21 02 02
Mapping succeeded
Rssi= -48
rxDone
Data: 00 00 01 10 00 00 20 00 00
Received ACK to Group RX,ACK is 0
Rssi= -48
B replies to A
***** UpLinkCounter= 7 *****
TX on freq 869000000 Hz at SF 12
txDone
RX on freq 868700000 Hz at SF 12
rxWaiting
rxDone
Data: 00 01 00 10 00 00 20 02 02
Mapping succeeded
Rssi= -48
B maps A
DI2 triggered an interrupt
***** UpLinkCounter= 8 *****
TX on freq 869000000 Hz at SF 12
txDone
RX on freq 868700000 Hz at SF 12
rxWaiting
***** UpLinkCounter= 8 *****
TX on freq 868700000 Hz at SF 12
txDone
RX on freq 869000000 Hz at SF 12
rxWaiting
A replies to B
rxDone
Data: 00 00 01 11 00 00 21 00 00
Received ACK to Group RX,ACK is 0
Rssi= -50

```
***** UpLinkCounter= 1 *****
TX on freq 868700000 Hz at SF 12
txDone
RX on freq 869000000 Hz at SF 12
rxWaiting

***** UpLinkCounter= 1 *****
TX on freq 868700000 Hz at SF 12
txDone
RX on freq 869000000 Hz at SF 12
rxWaiting

***** UpLinkCounter= 1 *****
TX on freq 868700000 Hz at SF 12
txDone
RX on freq 869000000 Hz at SF 12
rxWaiting

***** UpLinkCounter= 1 *****
TX on freq 868700000 Hz at SF 12
txDone
RX on freq 869000000 Hz at SF 12
rxWaiting

***** UpLinkCounter= 1 *****
TX on freq 868700000 Hz at SF 12
txDone
RX on freq 869000000 Hz at SF 12
rxWaiting
```

If the sender does not get the ACK reply from the receiver, it will retransmit up to 4 times, each interval is 6 seconds, and the UplinkCounter of the retransmission will not increase.

2.2 Point To Mult-Point

2.2.1 Overview



2.2.2 Configure

Configuration of the TX group:

AT+GROUPMOD=0,2

AT+TXCHS=868700000

AT+RXCHS=869000000

AT+TRIG1=2,50

AT+TRIG2=2,50

AT+DI1TODO1=1

AT+DI1TORO1=1

AT+DI2TODO2=1

AT+DI2TORO2=1

Configuration for RX group number 1:

AT+GROUPMOD=1,1

AT+TXCHS=869000000

AT+RXCHS=868700000

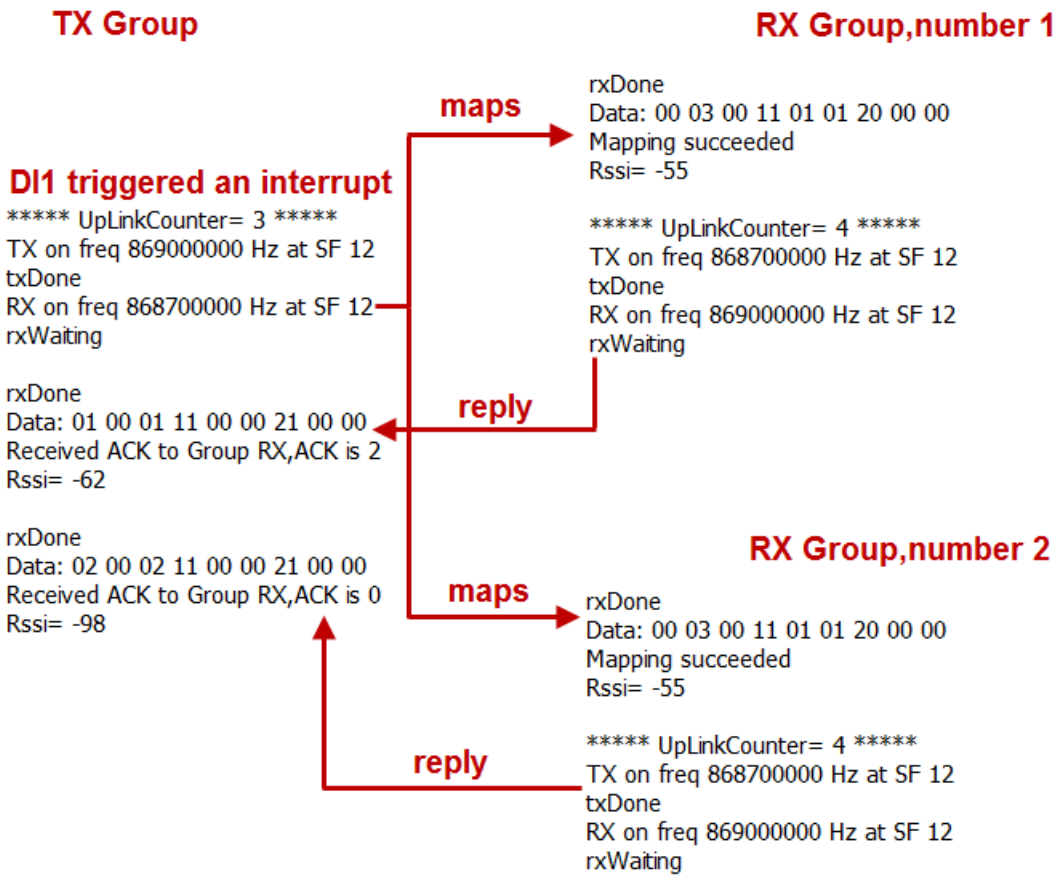
Configuration for RX group number 2:

AT+GROUPMOD=1,2

AT+TXCHS=869000000

AT+RXCHS=868700000

2.2.3 Serial port display



```
***** UpLinkCounter= 1 *****
TX on freq 868700000 Hz at SF 12
txDone
RX on freq 869000000 Hz at SF 12
rxWaiting

***** UpLinkCounter= 1 *****
TX on freq 868700000 Hz at SF 12
txDone
RX on freq 869000000 Hz at SF 12
rxWaiting

***** UpLinkCounter= 1 *****
TX on freq 868700000 Hz at SF 12
txDone
RX on freq 869000000 Hz at SF 12
rxWaiting

***** UpLinkCounter= 1 *****
TX on freq 868700000 Hz at SF 12
txDone
RX on freq 869000000 Hz at SF 12
rxWaiting

***** UpLinkCounter= 1 *****
TX on freq 868700000 Hz at SF 12
txDone
RX on freq 869000000 Hz at SF 12
rxWaiting
```

If the TX group does not receive all the ACK replies from the RX group, it will retransmit up to 4 times, each time interval is 30 seconds, and the retransmission UplinkCounter will not increase.

2.3 AT command

ATZ : Trig a reset of the MCU

AT+FDR : Reset Parameters to Factory Default, Keys Reserve

AT+FCU : Get or Set the Frame Counter Uplink

AT+FCD : Get or Set the Frame Counter Downlink

AT+TXP : Get or Set the transmit power, the maximum is 20dBm (default is 14dBm)

AT+SYNC : Get or Set the Sync word [1:0x34,0:0x12] (default is 1)

AT+PMB : Get or Set the preamble (default:8)

AT+TXCHS : Get or Set the transmit frequency of TX (default:868700000)

AT+TXSF : Get or Set the spreading factor of TX (7 to 12) (default:12)

AT+RXCHS : Get or Set the transmit frequency of RX (default:869000000)

AT+RXSF : Get or Set the spreading factor of RX (7 to 12) (default:12)

AT+BW : Get or Set the bandwidth [0:125khz,1:250khz,2:500khz] (default:0)

AT+CR : Get or Set the coding rate [1: 4/5, 2: 4/6, 3: 4/7, 4: 4/8] (default:1)

AT+TDC : Get or set the application data transmission interval in ms(default 10 minutes)

AT+VER : Get firmware version number

AT+SEND : Set Custom sent hex data

AT+GROUPMOD : Set or Get the grouping mode of the device (default: 0)

AT+GROUPID : Set or Get the password for matching between TX group and RX group, which can be composed of numbers or characters (default: 12345678)

AT+TRIG1 : Set or Get the DI1 pin interrupt trigger mode (default 0,0)

AT+TRIG2 : Set or Get the DI2 pin interrupt trigger mode (default 0,0)

AT+DI1TODO1 : Set or get the mode in which DI1 maps to DO1 (default 0)

AT+DI1TORO1 : Set or get the mode in which DI1 maps to RO1(default 0)

AT+DI2TODO2 : Set or get the mode in which DI2 maps to DO2(default 0)

AT+DI2TORO2 : Set or get the mode in which DI2 maps to RO2(default 0)

Example 1:

AT+SEND=01020304 will send a payload of 01020304

Example 2:

AT+TRIGx=a Trigger directly without triggering time

AT+TRIGx=a,b

a=0: falling edge;

a=1: rising edge;

a=2: falling edge or rising edge;

b: triggering time in milliseconds.

AT+TRIGx=2,50 Falling edge or rising edge trigger, and the trigger time exceeds 50ms.

Example 3:

AT+DI1TODO1= maps value

AT+DI1TORO1= maps value

AT+DI2TODO2= maps value

AT+DI2TORO2= maps value

Maps value	DIx to DOx	DIx to ROx
0	No Action	No Action
1	If DIx is high, control DOx to output low level, If DIx is low, control DOx to output high level	If DIx is high, control ROx if DIx is low, control ROx
2	If DIx is high, control DOx to output high level, If DIx is low, control DOx to output low level	If DIx is high, control ROx if DIx is low, control ROx

3	DOx state flip	ROx state flip

Example 4:

AT+GROUPMOD=0 Set to point to point mode

AT+GROUPMOD=0,aa Set the TX group that controls the number of aa (The maximum value of aa is 8)

AT+GROUPMOD=1,bb Set to the RX group controlled by the TX group, numbered bb(The maximum value of aa is 8)

AT+GROUPMOD=0,2 Set to control the TX group of the two RX groups

AT+GROUPMOD=1,1 Set the RX group numbered 1

AT+GROUPMOD=1,2 Set the RX group numbered 2

2.4 Data Format

8 bytes of GROUPID + 9 bytes of payload + 4 bytes of checksum

Payload:

Size (bytes)	**1**	**1**	**1**	**1**
Value	address	request	ACK	DI1& DI1 level

The first byte: 00 is the broadcast address, 01-08 is the RX group number.

The second byte: send mapping request when not 0, not request when it is 0.

The third byte: ACK returned to the sender after the mapping is completed.

The fourth byte: the high four bits are 1 to represent DI1, and the low four bits are the level of DI1 when the interrupt is triggered.

The Fifth byte: DI1TODO1 when the interrupt is triggered, 0 when the interrupt is not triggered.

The Sixth byte: 0 does not trigger interrupt when DI1TORO1 interrupt is triggered.

The seventh byte: the high four bits are 2 to represent DI2, and the low four bits are the level of DI2 when the interrupt is triggered.

The 8th byte: DI2TODO2 when the interrupt is triggered, 0 when the interrupt is not triggered.

The 9th byte: DI2TORO2 when an interrupt is triggered, 0 when an interrupt is not triggered.