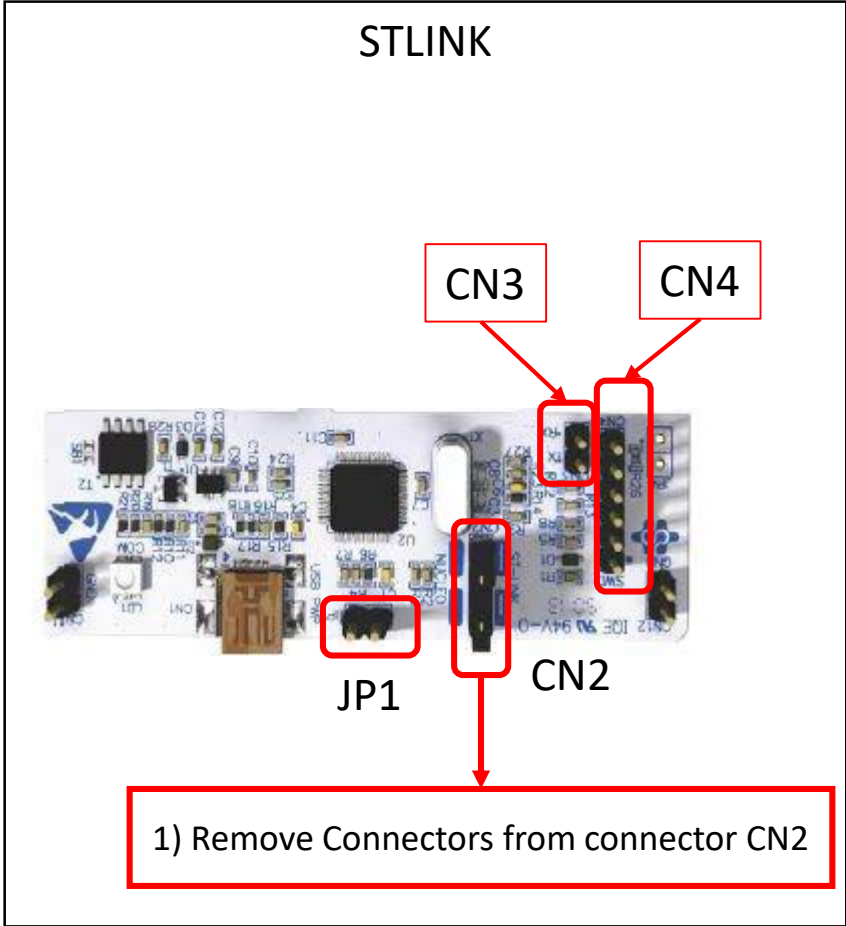


Hardware for the Base Station



X-Nucleo BNRG2A1

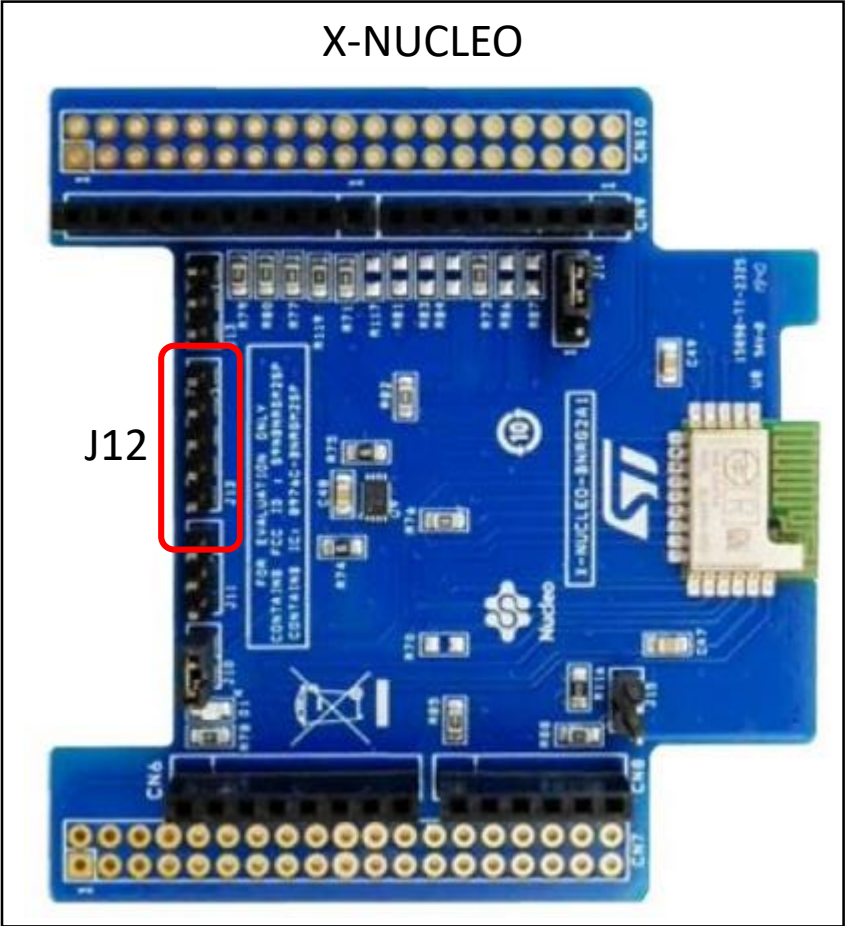
Programming the X-NUCLEO BNRG2A1 Board by using the STLINK option board



STLINK	X-NUCLEO	Function
CN3[TX]	CN5[1]	UART
CN3[RX]	CN9[3]	UART

STLINK	X-NUCLEO	Function
JP1[1]	J12[1]	3V3

STLINK	X-NUCLEO	Function
CN4[2]	J12[2]	SWCLK
CN4[3]	J12[3]	GND
CN4[4]	J12[4]	SWDIO
CN4[5]	J12[5]	RST



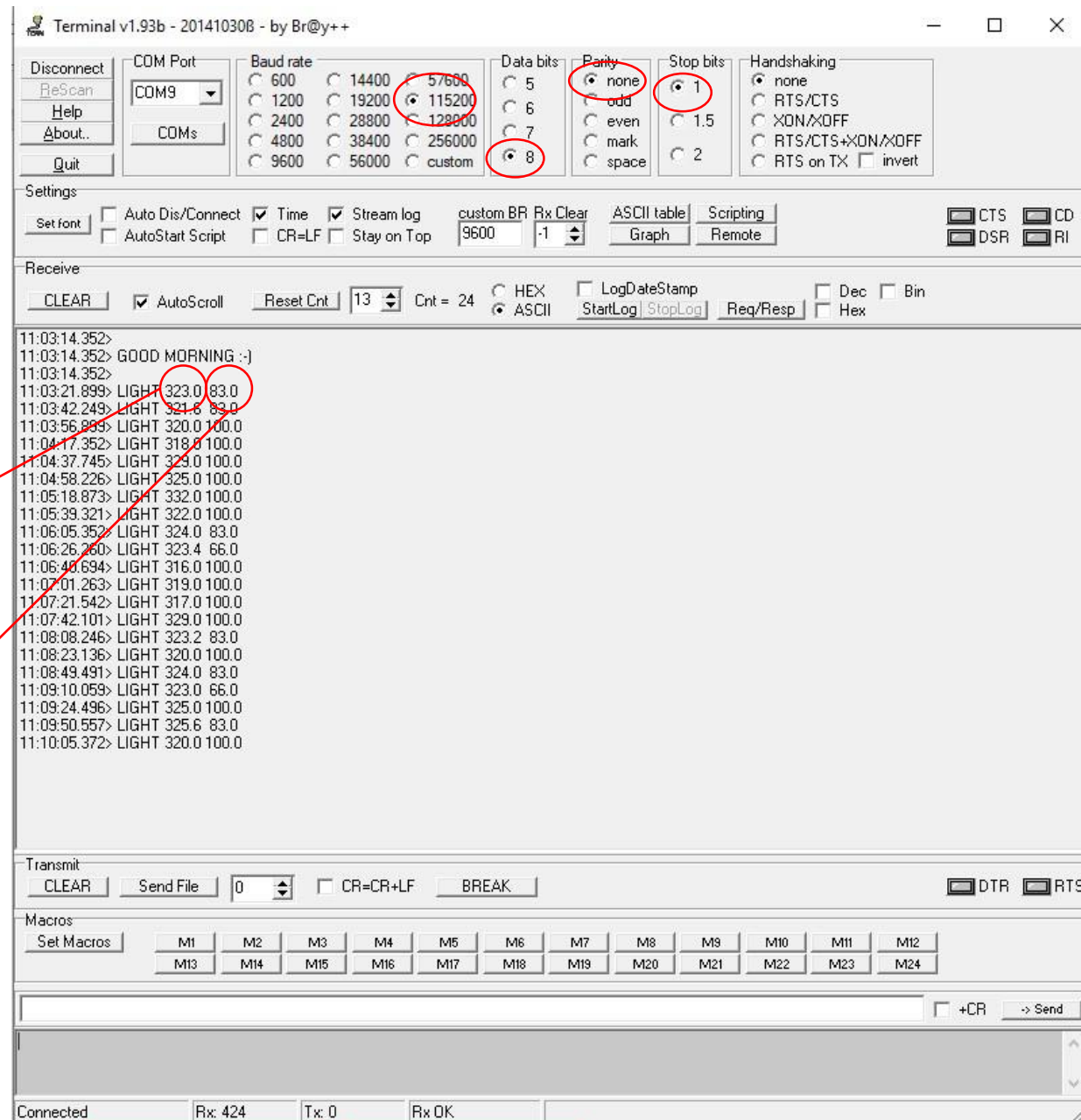
Uart Setup:

- UART Baud Rate = 115200
- Data bits = 8
- Parity = None
- Stop Bits = 1

Measured Time interval
between beacons

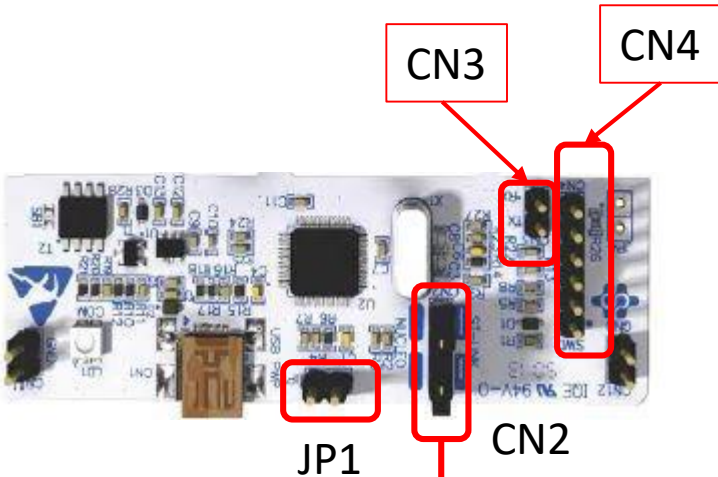
Quality of Communication
Defined as:

$$Q_{oc} = \frac{\text{Number of Received Beacons}}{\text{Number of transmitted beacons}}$$



Programming the STDES-BFTAG01 Board by using the STLINK option board

STLINK



JP1

CN2

CN3

CN4

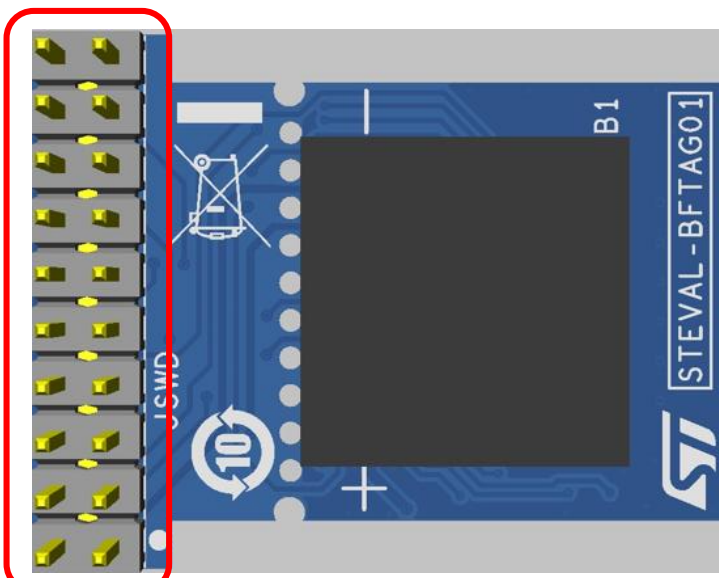
1) Remove Connectors from connector CN2

STLINK	BFTAG01	Function
JP1[1]	JSWD[1]	3V3

STLINK	BFTAG01 MCU	Function
CN4[2]	JSWD[3]	SWCLK
CN4[3]	JSWD[5]	GND
CN4[4]	JSWD[7]	SWDIO
CN4[5]	JSWD[9]	RST

STLINK	BFTAG01 BLE	Function
CN4[2]	JSWD[4]	SWCLK
CN4[3]	JSWD[6]	GND
CN4[4]	JSWD[8]	SWDIO
CN4[5]	JSWD[10]	RST

STDES-BFTAG01



JSWD

STM32 ST-LINK Utility

File Edit View Target ST-LINK External Loader Help

Memory display

Address: 0x08080000 Size: 0x34F8 Data Width: 32 bits

Device: STM32L03x/L04x/L010
Device ID: 0x425
Revision ID: Rev V
Flash size: 16KBytes

Device Memory @ 0x08080000 : File : BFTAG01_STM32L031F4_PVD_SENSOR.bin

Target memory, Address range: [0x08080000 0x080834F8]

Address	0	4	8	C	ASCII
0x08080000	00001406	00000003	000000A7	3E151276	.....5...v...>
0x08080010	0000000A	0000003C	3AC58E47	00000000	....<...GŽÄ:....
0x08080020	00000000	00000000	00000000	00000000	.....
0x08080030	00000000	00000000	00000000	00000000	.....
0x08080040	00000000	00000000	00000000	00000000	.....
0x08080050	00000000	00000000	00000000	00000000	.....
0x08080060	00000000	00000000	00000000	00000000	.....
0x08080070	00000000	00000000	00000000	00000000	.....
0x08080080	00000000	00000000	00000000	00000000	.....

07:55:29 : If the target is in low power mode, please enable "Debug in Low Power mode" option from Target->Settings menu.
07:55:47 : ST-LINK SN : 066EFF535254887767172709
07:55:47 : V2J37M26
07:55:47 : Connected via SWD.
07:55:47 : SWD Frequency = 4,0 MHz.
07:55:47 : Connection mode : Connect Under Reset.
07:55:47 : Debug in Low Power mode enabled.
07:55:47 : Device ID:0x425
07:55:47 : Device flash Size : 16KBytes
07:55:47 : Device family :STM32L03x/L04x/L010

Debug in Low Power mode enabled. Device ID:0x425 Core State : Live Update Disabled

Valori esadecimali:

- 14 = 20 secondi di Idle time (Default)
- 06 = 6 Numero di Beacon trasmessi
- 6 Beacon (Default) trasmessi ogni 20 secondi

STM32 ST-LINK Utility

File Edit View Target ST-LINK External Loader Help

Memory display

Address: 0x08080000 Size: 0x34F8 Data Width: 32 bits

Device STM32L03x/L04x/L010
Device ID 0x425
Revision ID Rev V
Flash size 16KBytes

Device Memory @ 0x08080000 : File : BFTAG01_STM32L031F4_PVD_SENSOR.bin ☐ LiveUpdate

Target memory, Address range: [0x08080000 0x080834F8]

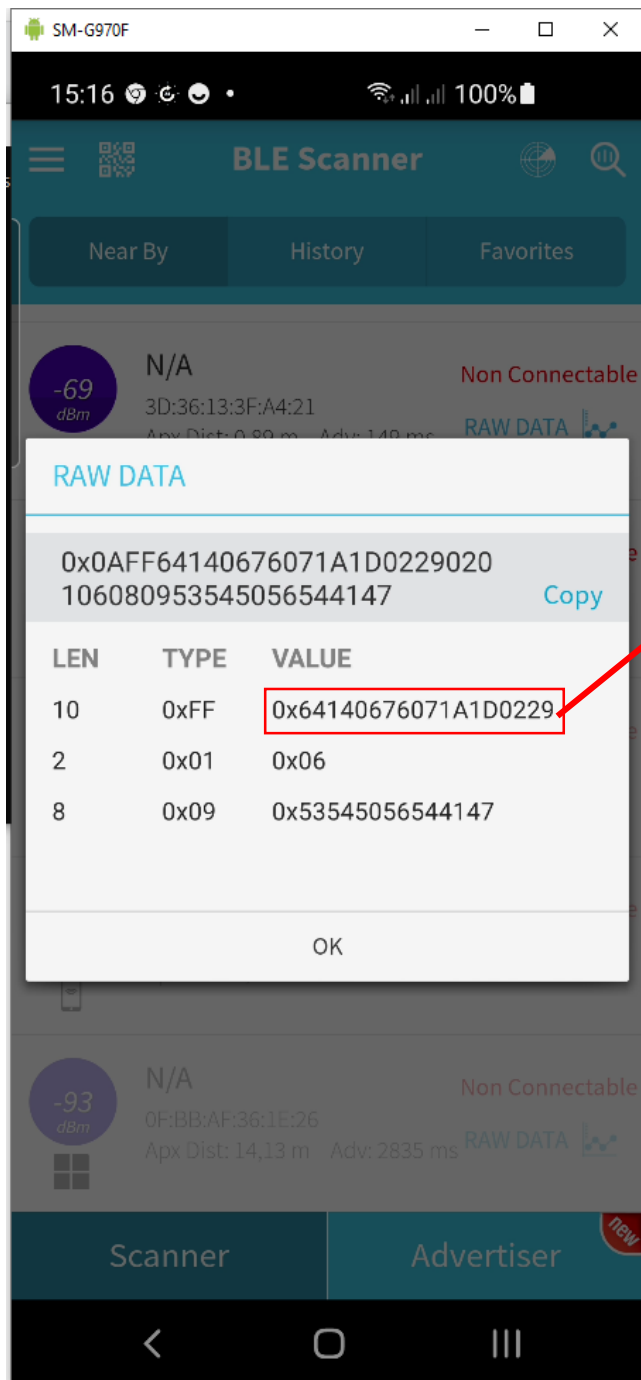
Address	0	4	8	C	ASCII
0x08080000	0000102	00000003	000000A7	3E151276	.....5...v...>
0x08080010	0000000A	0000003C	2AC58E47	00000000	....<...GŽÄ:....
0x08080020	00000000	00000000	00000000	00000000	.....
0x08080030	00000000	00000000	00000000	00000000	.....
0x08080040	00000000	00000000	00000000	00000000	.....
0x08080050	00000000	00000000	00000000	00000000	.....
0x08080060	00000000	00000000	00000000	00000000	.....
0x08080070	00000000	00000000	00000000	00000000	.....
0x08080080	00000000	00000000	00000000	00000000	.....

08:30:27 : ST-LINK SN : 066EFF535254887767172709
08:30:27 : V2J37M26
08:30:27 : Connected via SWD.
08:30:27 : SWD Frequency = 4,0 MHz.
08:30:27 : Connection mode : Connect Under Reset.
08:30:27 : Debug in Low Power mode enabled.
08:30:27 : Device ID:0x425
08:30:27 : Device flash Size : 16KBytes
08:30:27 : Device family :STM32L03x/L04x/L010

Debug in Low Power mode enabled. Device ID:0x425 Core State : Live Update Disabled

Valori esadecimali:

- 01 = 1 secondo di Idle time (Default)
- 02 = 2 Numero di Beacon trasmessi (Default) trasmessi ogni 20 secondi



0x64 → Preamble

14 → RTPS

06 → NTB

76 → CRC

07 → BLE Output Power Level

1A → Temperature (26 Celsius)

1D → Relative Humidity (29 %)

0229 (553) → Counter Value For light sensor

tadv → Advertising Time (sec)

$tadv = 553 / (289 * (NTB-1)) = 553 / (289 * 5)$

$Ev [lux] = 9893 / tadv + 204$