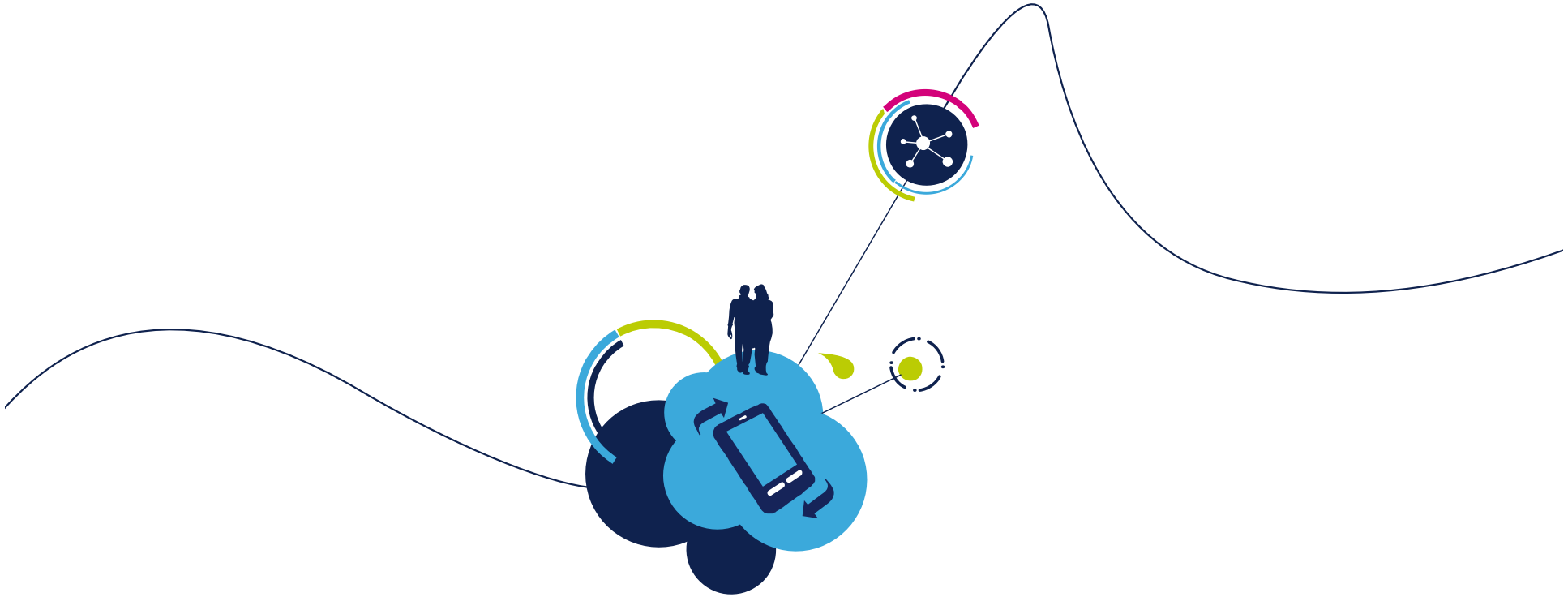

# SPIRIT1 Development Kit
# Software Package

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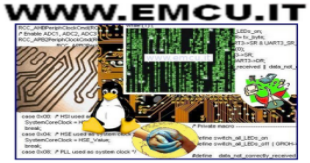

# SPIRIT1 Development Kit content [1/3]

- SPIRIT1 Library (STM32L, STM8L)
  - Spirit1 low level drivers: APIs to manage the features the device offers (platform independent
    - Radio, GPIO, IRQ, Calibration, CSMA etc.
  - SDK_EVAL Libraries: APIs to manage the main features of the motherboard
  - Examples: BasicGeneric, LDCGeneric, StackGeneric, …
- WMBUS Library (Binary for STM32L)
  - library files with the PHYSICAL and LINK layer of the WMBUS STACK
  - Examples: The example has four configurations to differentiate between these combination : 169 or 868 bands and meter or concentrator
- SPIRIT1 SDK Virtual Com port
  - VirtualCom Libraries for the STM32L motherboard.
- MCU Standard Peripheral Library
  - standard peripheral library for the STM32L + STM8L microcontroller
- STM32 USB-FS-Device Library:
  - USB library for STM32L microcontroller

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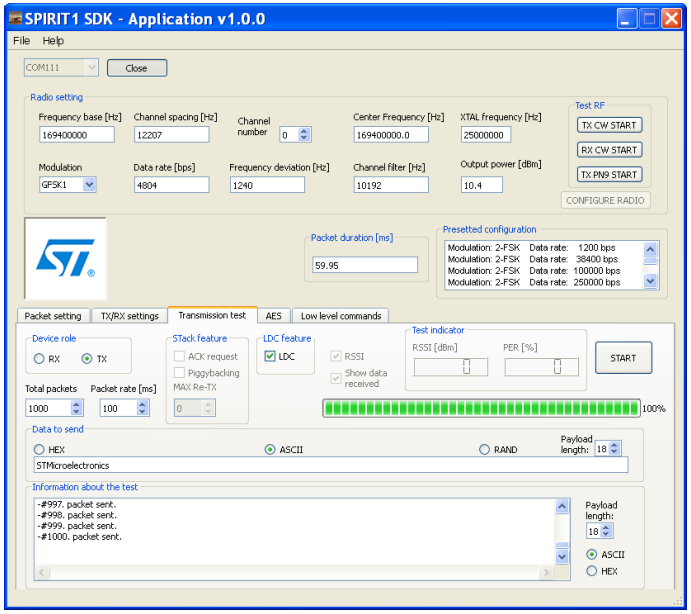
# SPIRIT1 Development Kit content [3/3]

## SPIRIT1 SDK Suite GUI

- SPIRIT1 SDK contains PC application (GUI) allowing:
  - Radio configuration
  - RF tests (TX of unmodulated carrier, TX PN9 sequence, RX activation)
  - Packet transmission/reception test with PER evaluation
  - AES engine encryption/decryption tests
  - Register read/write and dump
  - Store/load radio and packet configuration
  - Automatic Firmware Upgrade
  - Windows XP, 7

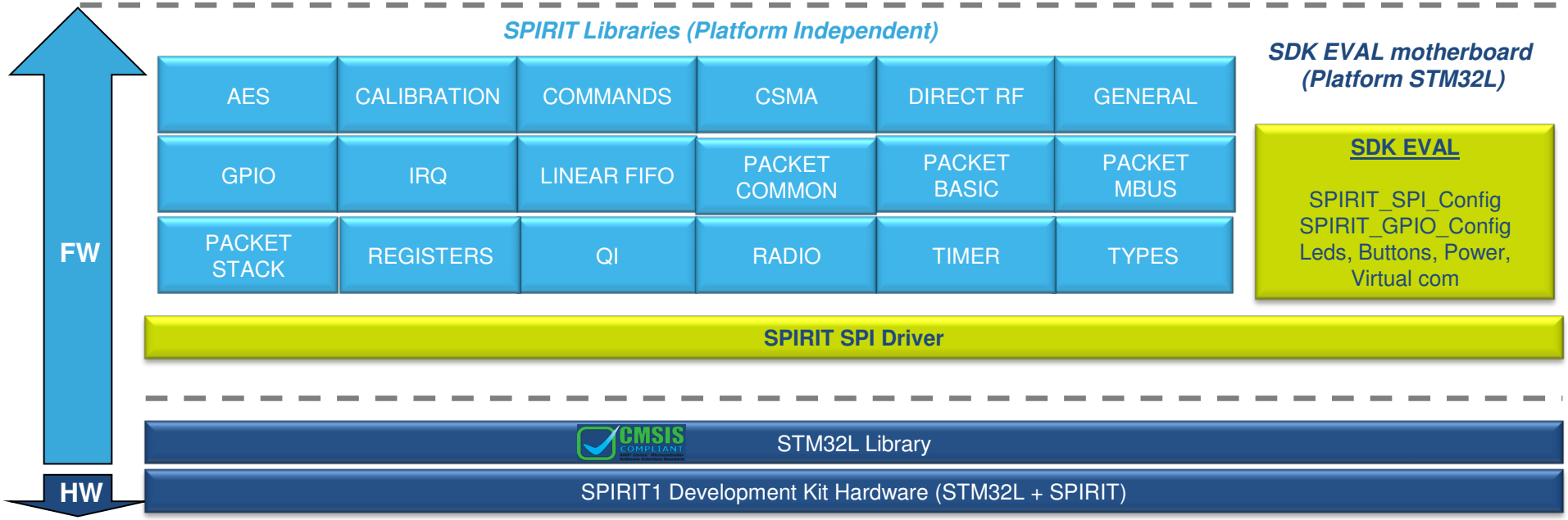
SPIRIT1 RF performance evaluation




# STM32L SPIRIT1 SDK Firmware Package Architecture

The firmware package of the Spirit Development Kit provides in addition to the SPIRIT1 Library:

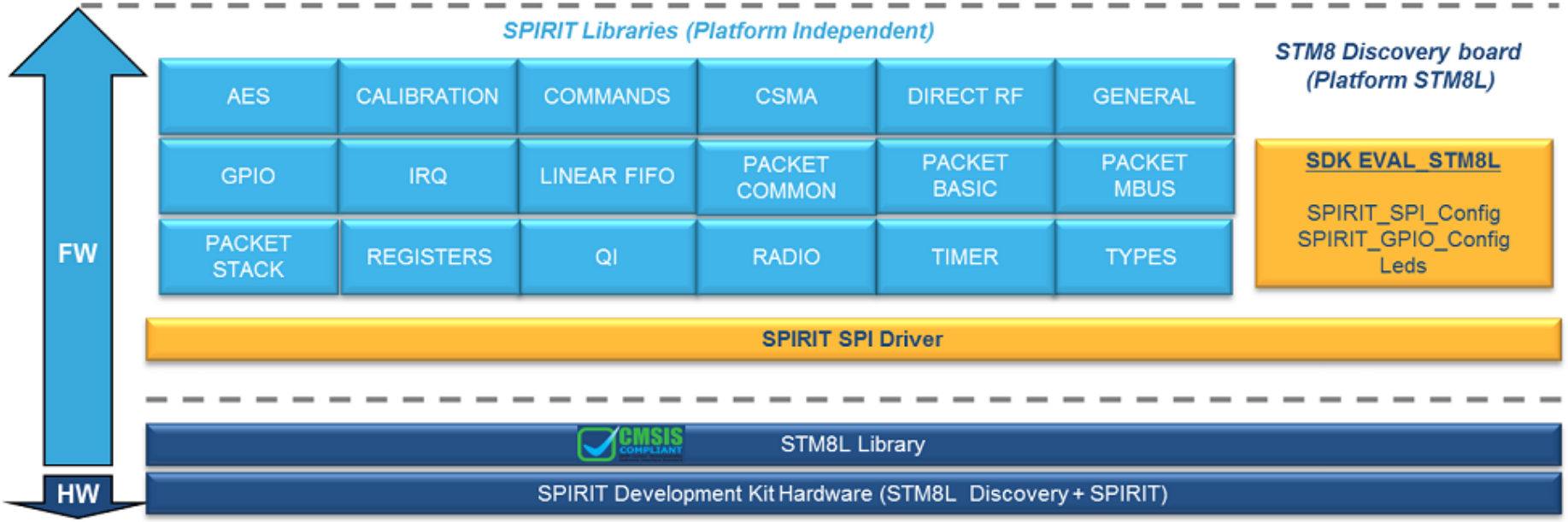
- SDK Eval: a set of API functions to manage the motherboard of the SDK (STM32L microcontroller) including USB library and DFU project files for firmware upgrade
- STM32L library: the standard peripheral library for the STM32L microcontroller.
- SPIRIT1 Examples: BasicGeneric, LDCGeneric, StackGeneric etc.
- Developed under EWARM IAR v.6.40 IDE (ST-Link, J-Link required for debugging)



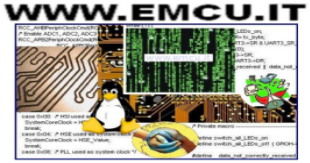

# STM8L SPIRIT1 SDK Firmware Package Architecture

The firmware package of the Spirit Development Kit provides in addition to the SPIRIT1 Library:

- SDK Eval: a set of API functions to manage the STM8L discovery board (STM8L microcontroller) STM8L library: the standard peripheral library for the STM8L microcontroller.
- SPIRIT1 Examples: BasicGeneric, LDCGeneric, StackGeneric etc.
- Developed under EWARM IAR v.6.40 IDE (ST-Link, J-Link required for debugging)




STM8L Firmware architecture



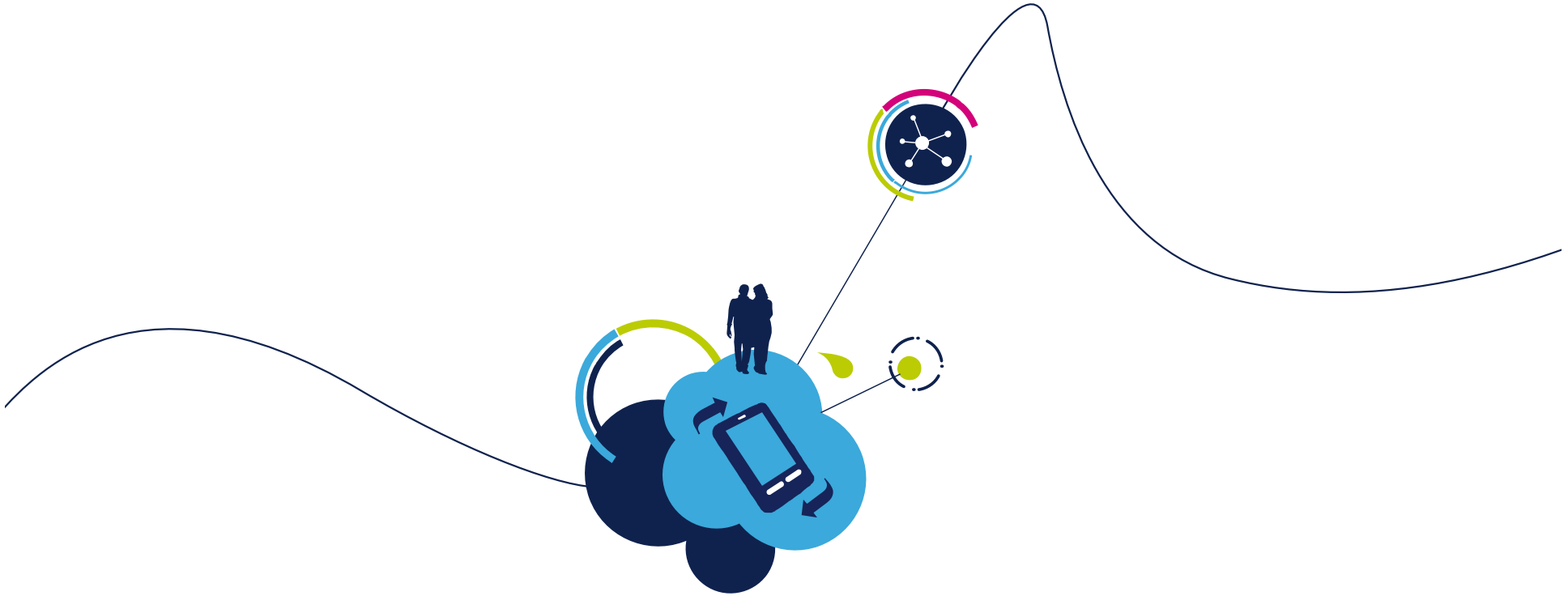
# SPIRIT1 library Memory Foot print STM32L

| | Flash (KBytes) | Ram (Bytes) |
|---|---|---|
| **SPIRIT1 Library (on STM32L)** | 20 | 28 |

- Maximum usage using all the driver features (Typical application will use much lower flash, e.g 4K)
- Preliminary data

| | Flash (KBytes) | Ram (Bytes) |
|---|---|---|
| **WM-BUS protocol stack** | 9.1 | 2148 |

- Maximum usage of the Wireless M-Bus library
- Both data are reffered from libraries in SPIRIT1 Dev Kit version 1.0.6 compiled with IAR with high optimization on the code size



# Getting Started with the SPIRIT1 Development Kit (DK)

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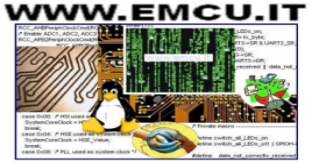
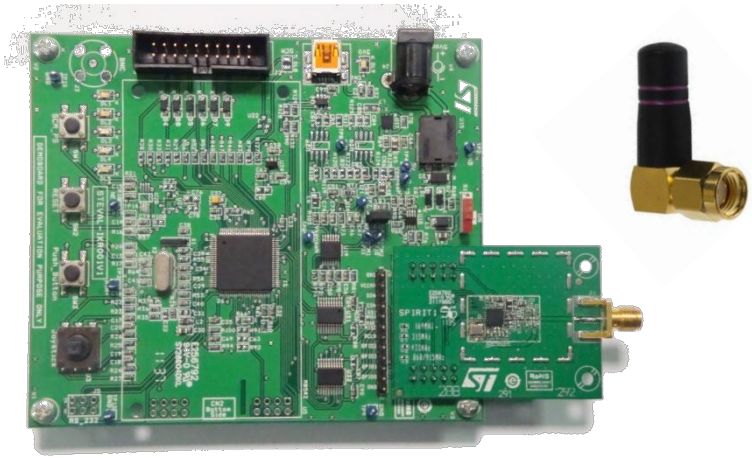
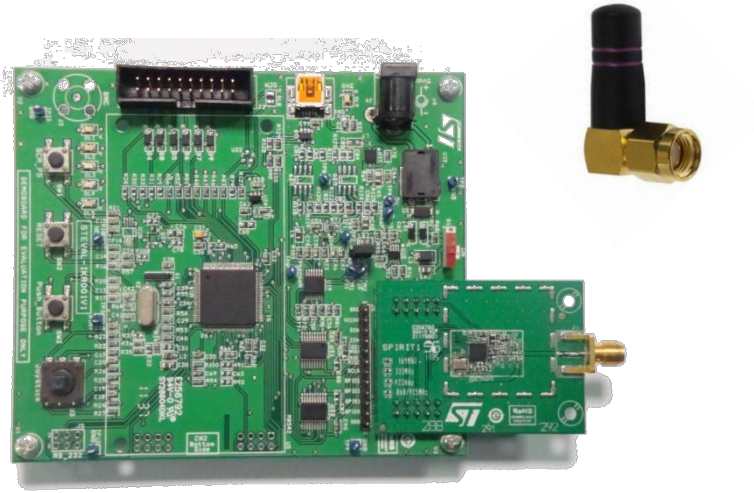


# SPIRIT1 DK content



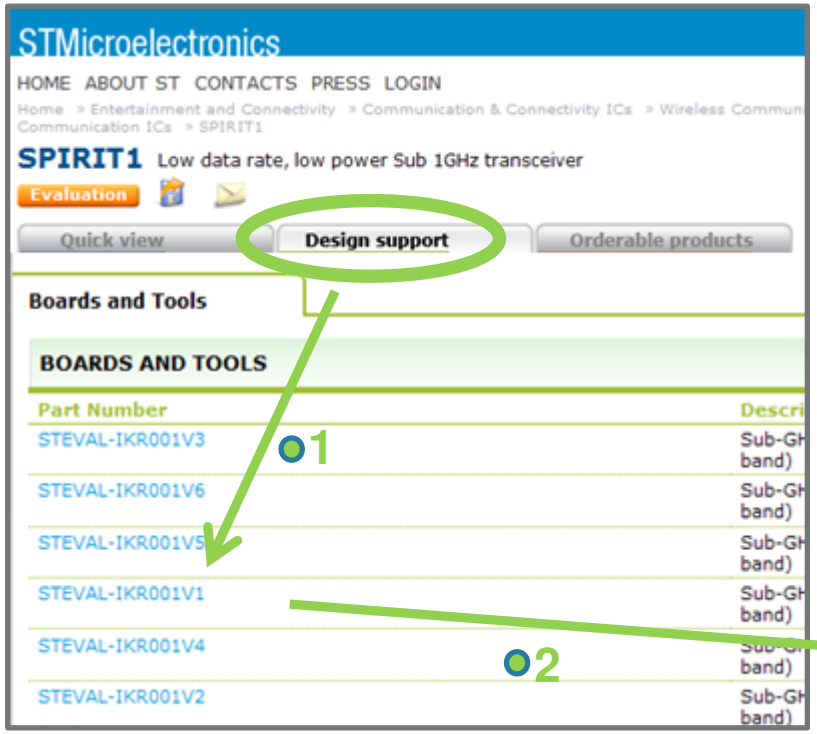


## SPIRIT1 Development Kits

**STEVAL-IKR001V1 – 169 MHz**
**STEVAL-IKR001V2 – 315 MHz**
**STEVAL-IKR001V3 – 433 MHz**
**STEVAL-IKR001V4 – 868MHz**
**STEVAL-IKR001V5 – 915 MHz**
**STEVAL-IKR001V6 – 920 MHz**

***DK – Development Kit**

# SDK Download

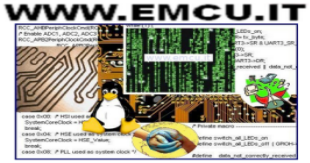



- **Go to SPIRIT1 website**

http://www.st.com/internet/imag_video/product/253167.jsp

- **Under Design Support TAB 1 click on the link of the board you have,**
  - **i.e. STEVAL-IKR001V1 2**

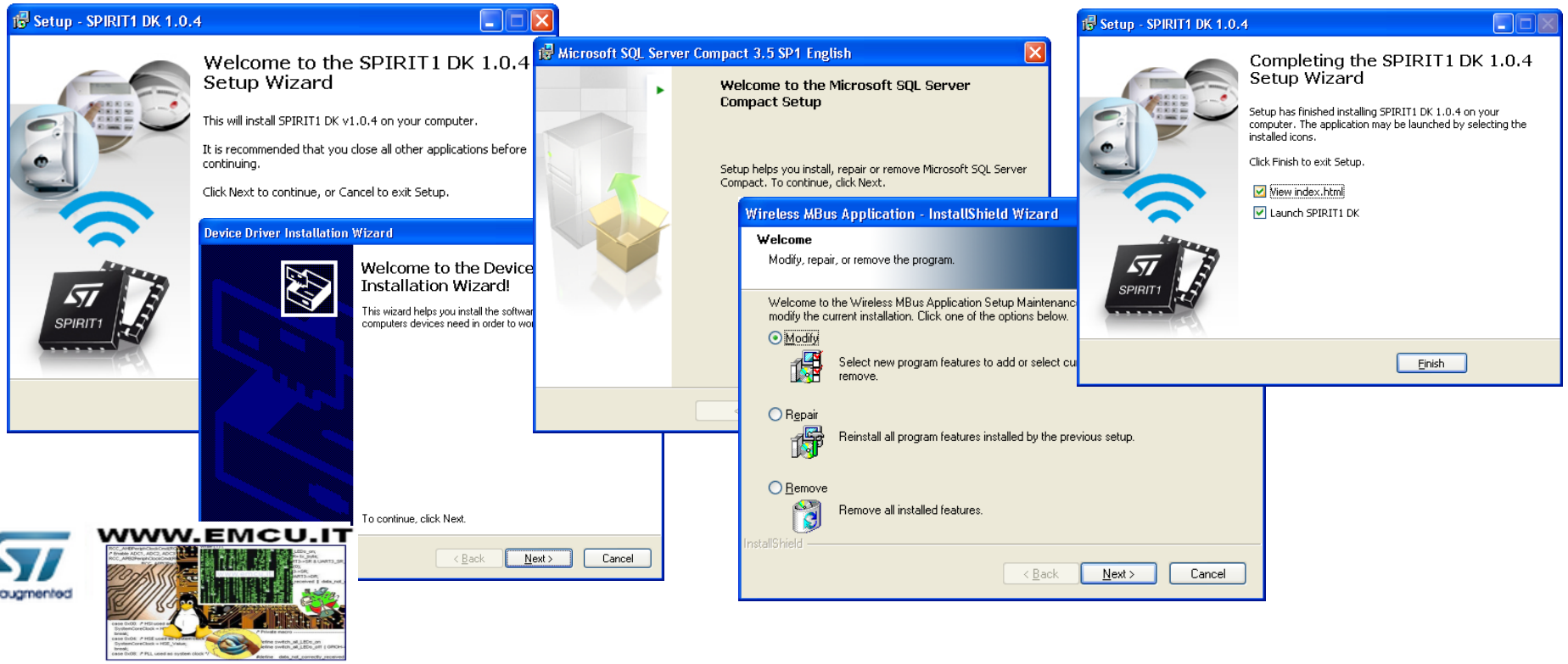

- **In the Design Support TAB click download and install the latest SPIRIT1 DK Setup 3**



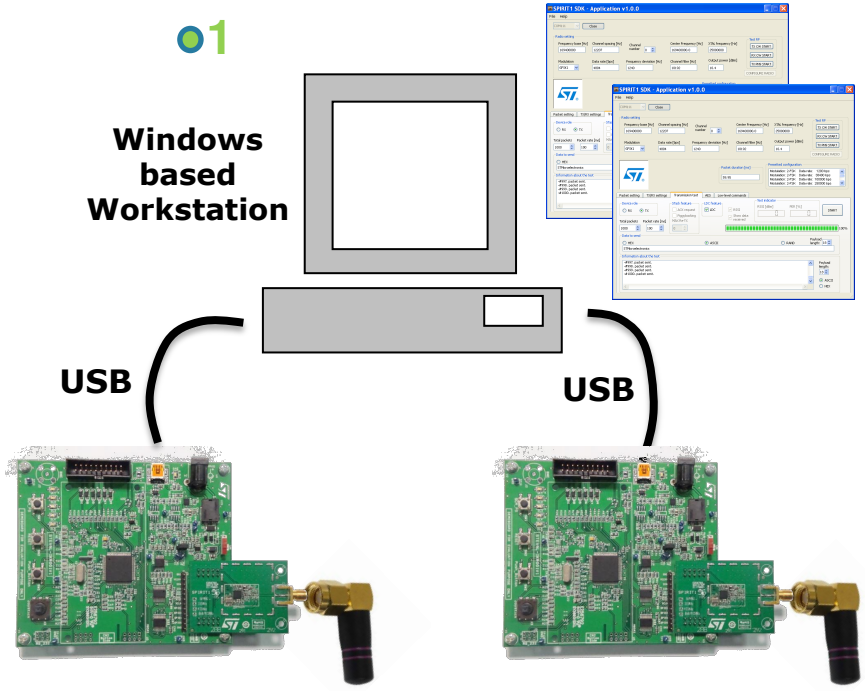

***SDK – Software Development Kit**

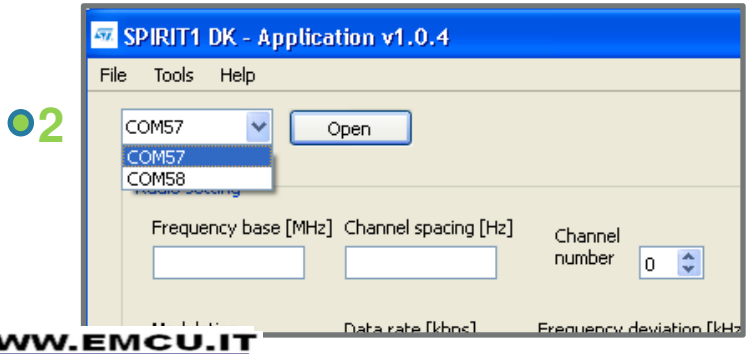
# SDK installation

- **Run the SPIRIT1 DK-Setup-1.0.x.exe downloaded from www.st.com**
  - **Follow the instruction given in the dialog box**
  - **You will be prompted to accept device driver installation (VCOM driver). Click next and follow the instructions to install it**
  - **Microsoft SQL Server Compact installation will be started automatically. Proceed with the installation in case you want to use the W-Mbus (optional)**
  - **Finally, accept to install the W-Mbus Application (optional)**

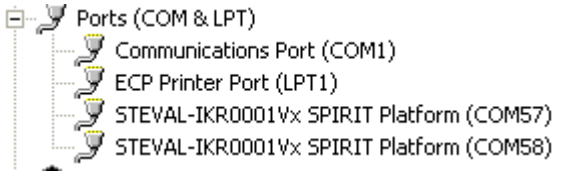


# HW & SW set-up

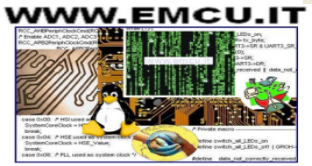



- Connect both STM32L motherboards to the PC 1
- Check the device manager, two devices with different VCOM numbers should be visible




- Run two instances of the SPIRIT1 DK GUI (Start -> Programs-> STMicroelectronics -> SPIRIT DK_1.0.x -> SPIRIT1 DK)
- In each SPIRIT1 DK GUI, select one of the COM ports 2
  - Click Open port in both GUIs -> you are ready to test SPIRIT1



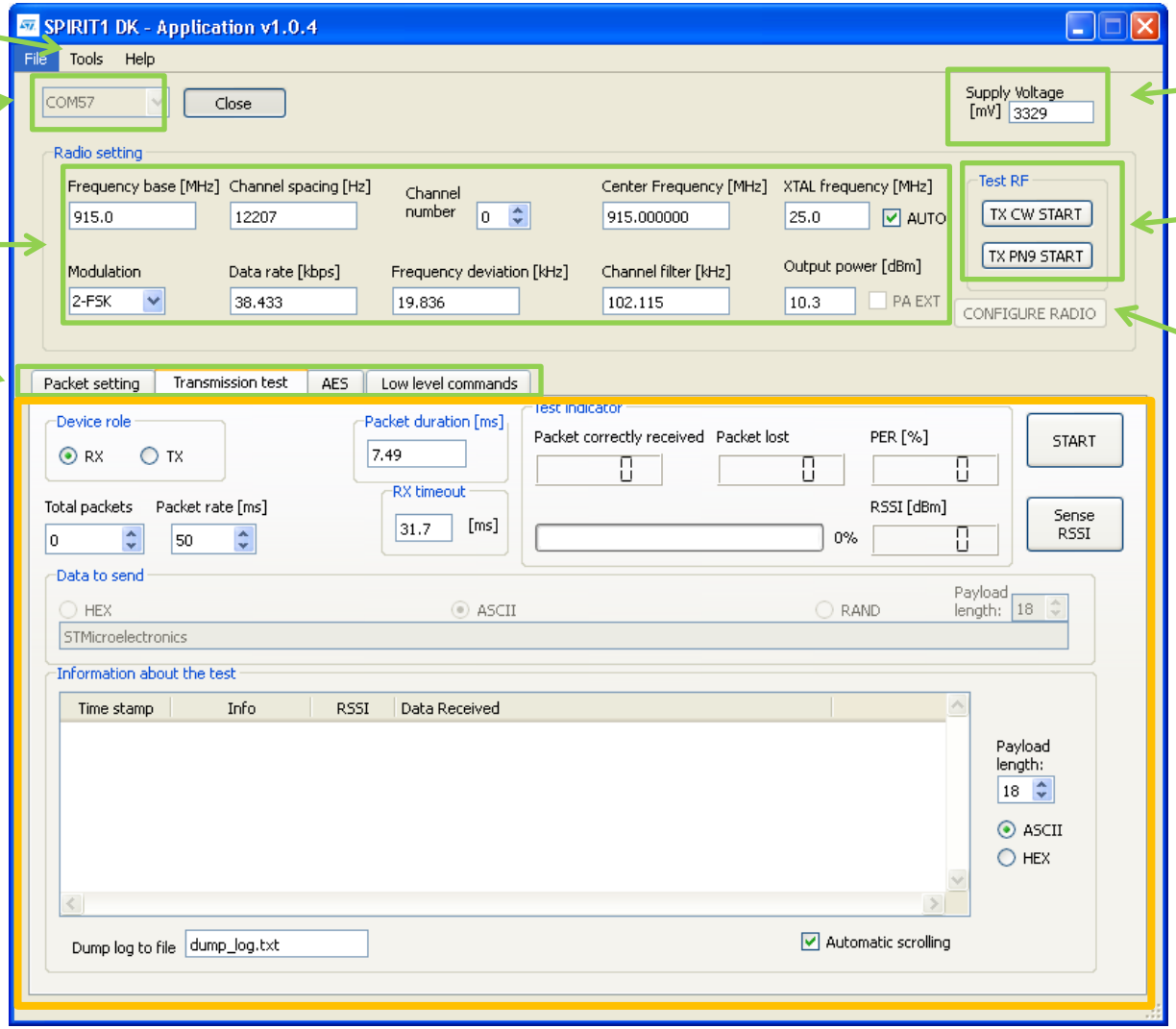
# SPIRIT1 DK GUI - 1/5

Tools, firmware flasher

Connection panel COM port

Radio settings

Non-RADIO SPIRIT1 set-up, register access, Communication test

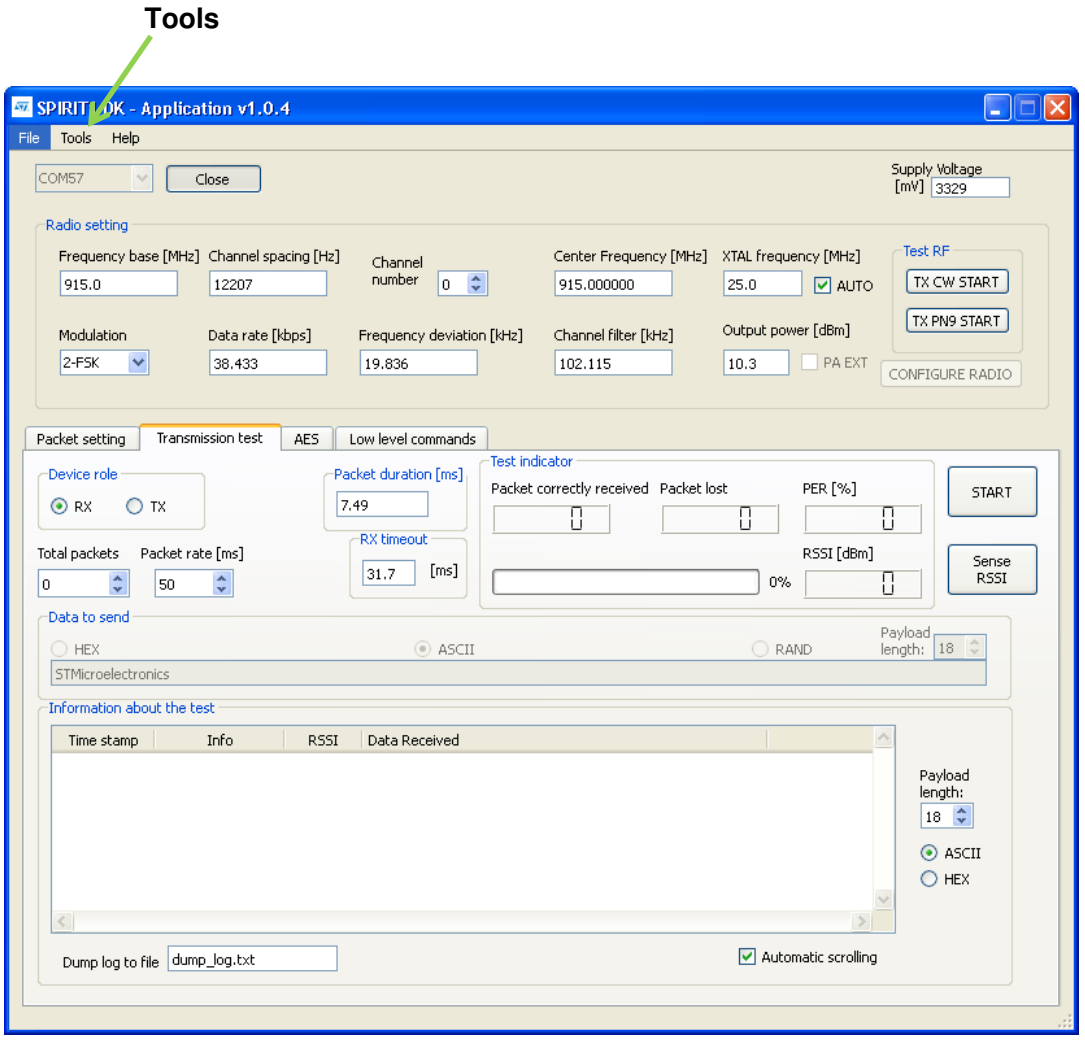



SPIRIT1 supply voltage

Test RF – generates Carrier Wave or pseudorandom binary sequence

Click CONFIGURE RADIO button when you change any Radio settings

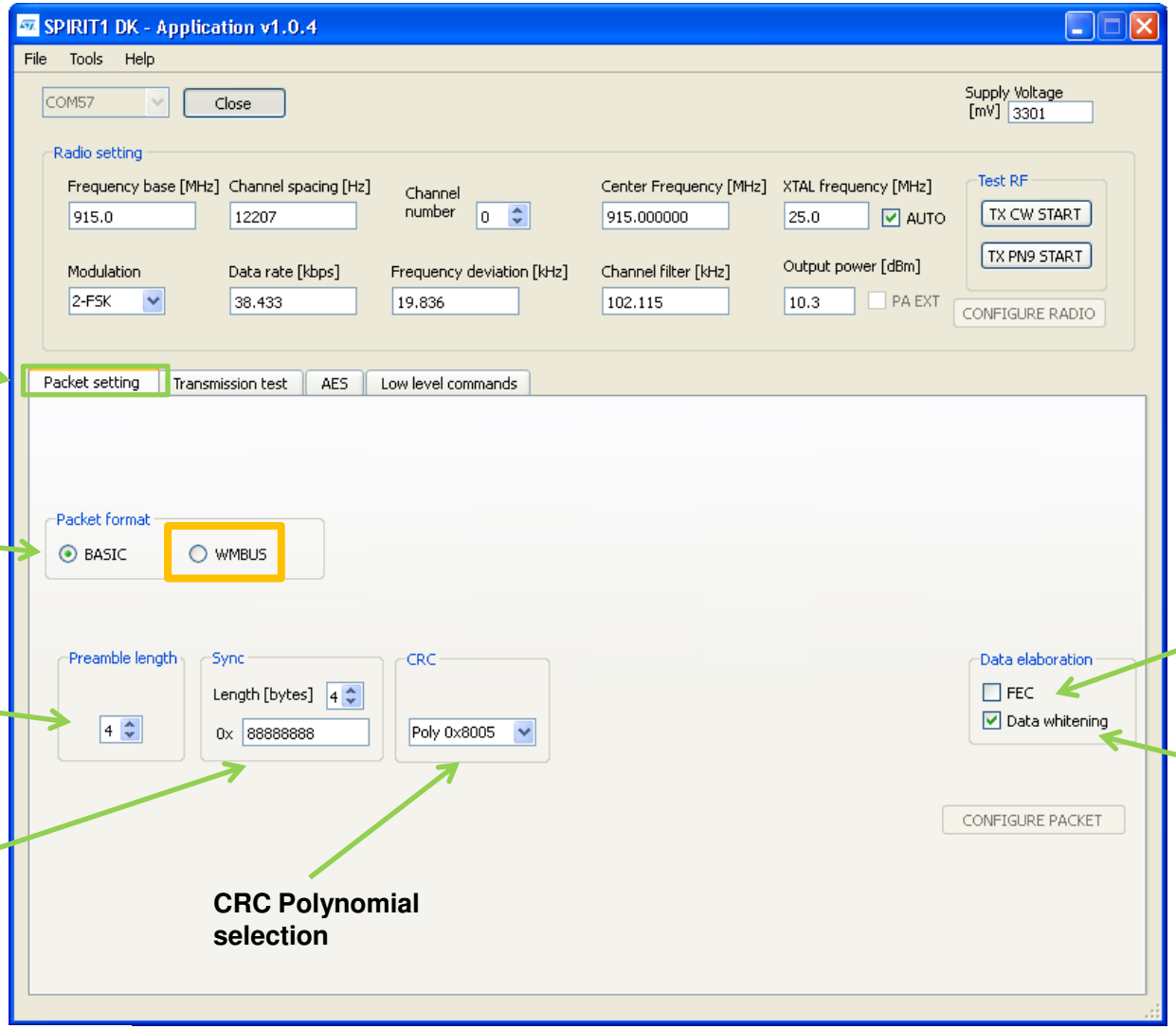
# SPIRIT1 DK GUI - 2/5




## Tools

- **Firmware Upgrade**
  - Uses DFU boot loader (read details in the board user manual about how to put DK board in the DFU mode)
- **Firmware Version**
  - Reads the board firmware version, in case it does not correspond to the DK GUI version, it is recommended to flash the corresponding one (you can find it at …\Firmware\Binary file\SPIRIT1_DK.hex) - Firmware Upgrade
- **Save the Current Configuration**
  - Stores the SPIRIT1 DK GUI configuration you made
- **Load the Saved Configuration**

# SPIRIT1 DK GUI - 3/5




**Packet Setting**

**Packet Format**

**Preamble Length; 1 – 32 Bytes**

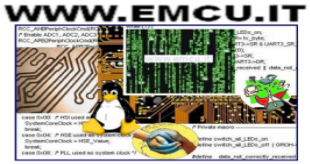
**Sync Word, Length (1- 4 Bytes)**

**CRC Polynomial selection**

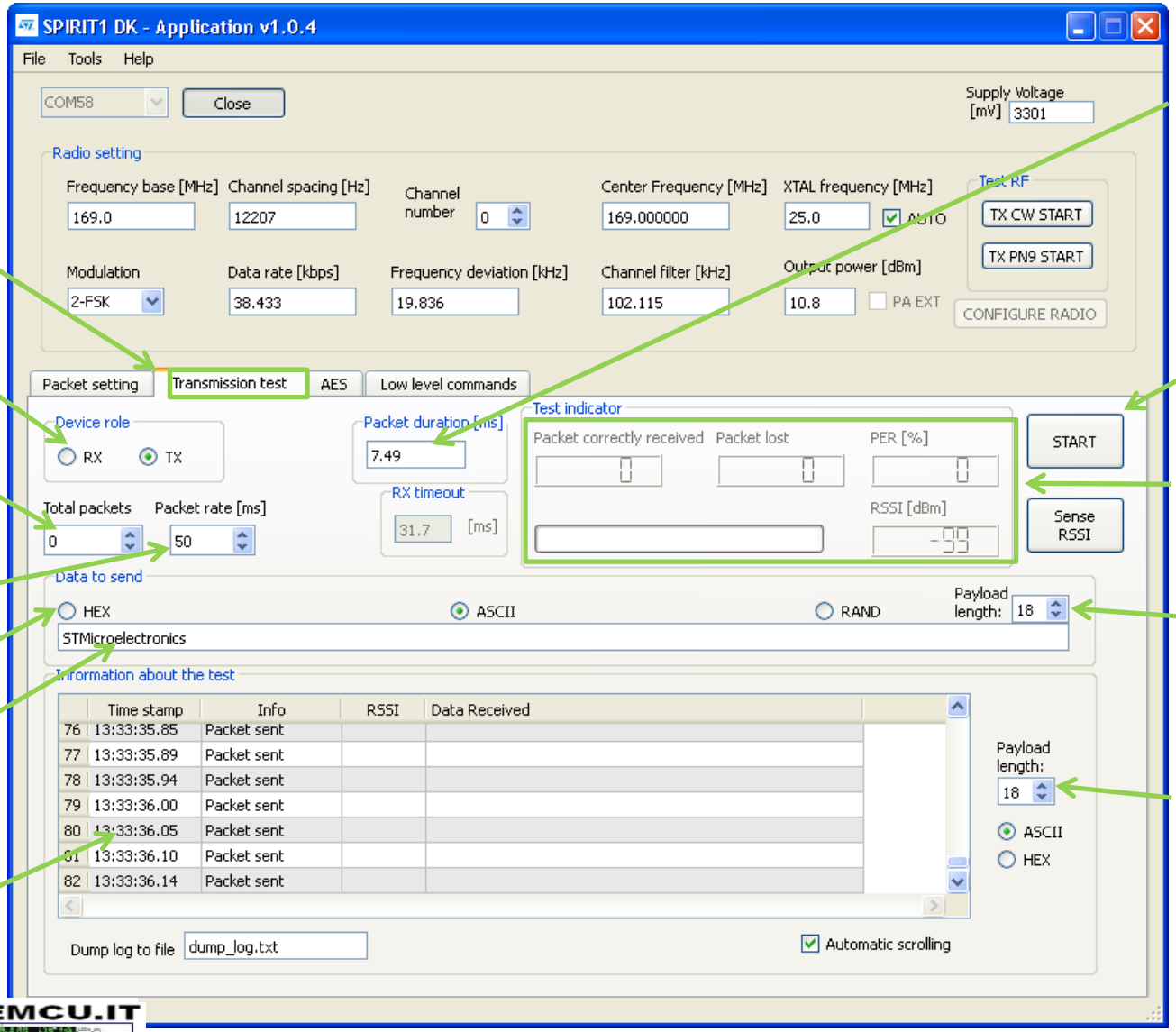
**Forward Error Correction**

**Data Whitening**

**Similar for WMBUS packet format**



# SPIRIT1 DK GUI - 4/5




**Transmission Test**

**Select the device Role (different for each board)**

**Number of packets to transmit (0 = infinite nbr)**

**Packet rate; set the same for TX and RX role**

**Payload data format**

**Payload data for transmitting**

**Overview of the received or transmitted packets**

**Packet duration – calculated from the data rate and number of bytes transmitted**

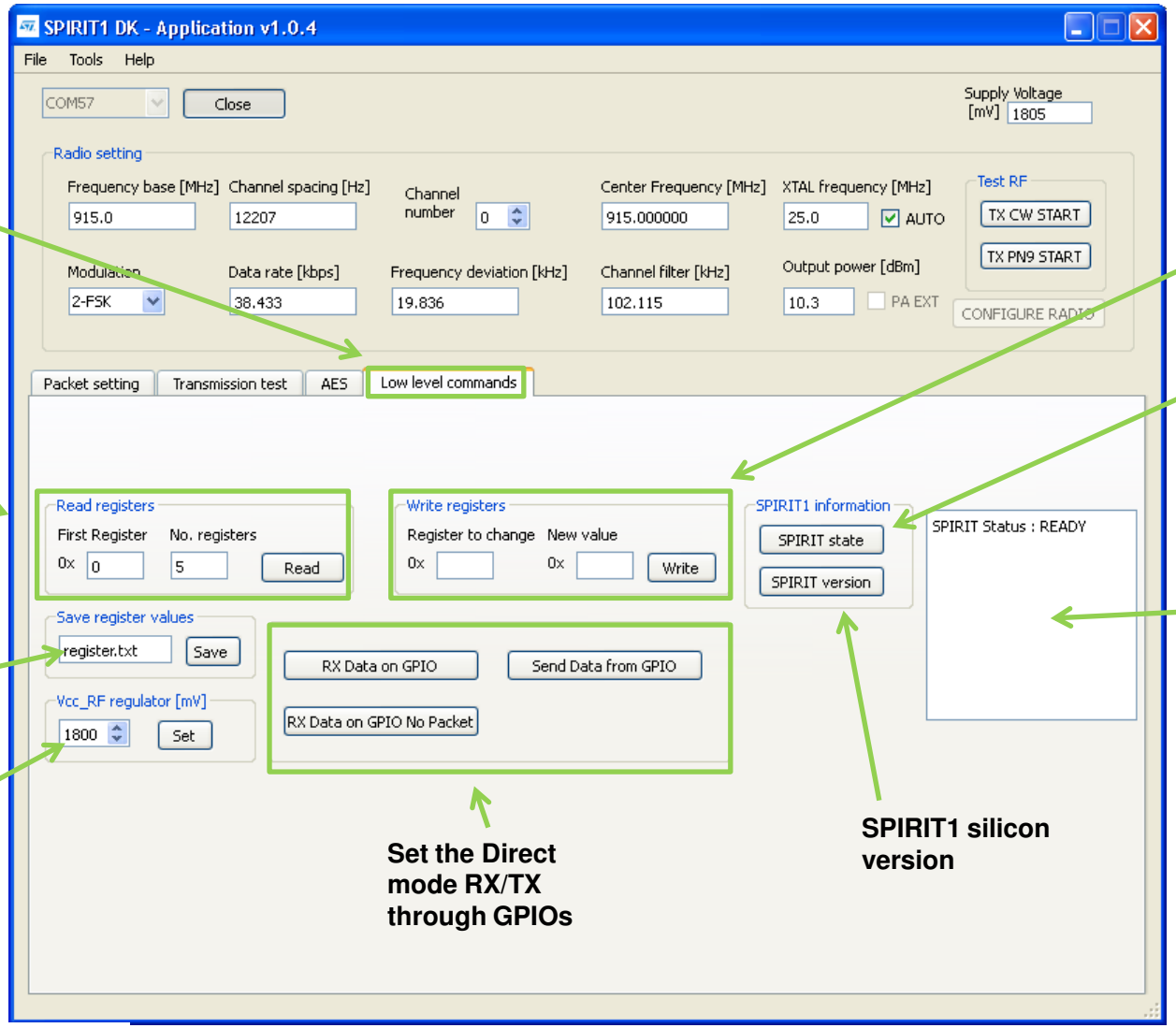
**Start Receiving or transmitting**

**Packet Error Rate Statistic**

**Number of Bytes to send as payload**

**Number of Bytes expected in the receiver**

# SPIRIT1 DK GUI - 5/5




**Low level Commands**

**Write any particular register**

**Read the register content**

**Reads the current state of SPIRIT1**

**Save register content (e.g. to copy it to your C code)**

**Information block**

**Set the supply voltage (1.8 – 3.4V)**

**Set the Direct mode RX/TX through GPIOs**

**SPIRIT1 silicon version**