Introduction

The EVALKITSTKNX is a hardware platform to evaluate and to develop applications for the STKNX miniature transceiver with the STM32F103 microcontroller.

This document gives an overview of the demonstration software architecture and describes how to use this software with the evaluation kit.

Figure 1. STKNX evaluation board
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1 Overview

1.1 EVALKITSTKNX development platform overview

1.1.1 Board description

Figure 2. Board description
1.2 Development platform spirit

- The EVALKITSTKNX has been developed in the spirit of the STM32™ Nucleo boards.
- Expansion boards with additional functionality can be plugged directly on top of the Eval Kit development board or stacked on another expansion board.

Figure 3. Building blocks
2 Software overview and setup

2.1 Software components

- The EVALKITSTKNX comes with a complete software package. A sample application is provided.
- Access to hardware features is simplified with the utilization of the **STM32 Standard Peripheral Libraries (SPL)**
- A demonstration version of the **TAPKO’s KNX protocol stack** is provided as a binary file.
- The software package is compatible STM32CubeIDE. Versions of this IDE exist for Windows®, Linux®, and macOS®.

*Note:* As an alternative, Tapko© also provide a demonstration firmware for the EVALKITSTKNX: https://www.tapko.de/fr/products/detail/detail/News/kaistack-evalkitstknx/

![Figure 4. System architecture](image-url)
2.2 Software overview

2.2.1 STSW-KITSTKNX software description

- This software, running on the STM32F103, demonstrates the STKNX capabilities.
- It is built on the top of the STM32 Standard Peripheral Libraries (SPL) that eases access to STM32 features.
- It uses a demonstration version of the TAPKO KNX protocol stack.
- Example to demonstrate actuator and sensor.

Figure 5. Overall software architecture

2.3 Software prerequisites

- A Linux computer, a Windows computer or a Mac OSX computer with STM32CubeIDE development environment.
- EVALKITSTKNX firmware example
- ST-LINK/V2-1 USB driver in case of Windows® OS
- ST-LINK/V2-1 firmware upgrade
- KNX ETS5 (Engineering Tool Software) Application
  - Official tool, provided by KNX.org, used to configure KNX network
  - For the demonstration, version 5.6.3 is used

Warning: You must register to have access to download page
2.4 Install and build firmware with STM32CubeIDE

1. Download the STSW-KITSTKNX package and extract it in your file system.

Open STM32CubeIDE and when requested to select a directory as workspace, browse to: <your path>/STM32F103RB-STKNX/Project/<Project example>/SW4STM32 with <Project example> that can be STM32F10x_STKNX_inOut4, STM32F10x_STKNX_LedLevel or STM32F10x_STKNX_PseudoLedDimmer

Figure 6. Workspace selection

2. In the Project Explorer panel, right click and select Import → General → “Existing Projects into Workspace”.

Figure 7. Import project
3. In the **Import** windows, click on *Browse* and on *OK* in the next window.

   **Figure 8. Select project directory**

4. The project to import has been automatically selected. You can now click on *Finish*. The project is imported.

   **Figure 9. Select project to import**
Select the project name in the **Project Explorer**, and select **Clean Project** in the contextual menu.

Click on the build icon or select **Build Project** in the contextual menu.

**Figure 10. Console view**

Once build is finished, you can start debugging the project. Click on the Debug icon or select **Debug As → Embedded C/C++ Application** in the contextual menu.

Or you can drag and drop the binary (**EvalKitSTKNX_LedLevel.bin**), available in **Debug**, to the virtual drive that is mounted when you connect the EVALKITSTKNX board to your computer. The name of this virtual drive is STKNX.
2.5 Hardware prerequisites for all examples

The following hardware is required for all examples.

- One KNX power supply

Figure 11. KNX power supply

- One KNX TP interface (USB-KNX interface)

Figure 12. KNX TP interface

- A type A to type B USB cable

Figure 13. USB cable
3 Setup and demonstration examples

3.1 LedLevel example

3.1.1 Hardware prerequisites

In addition to the hardware described in Section 2.5, hardware prerequisites for this example are:

- One EVALKITSTKNX board
- One KNX sensor: Apricum TAI-KNX 4

![Figure 14. TAI-KNX 4 module sensor](image)
3.1.2 Setup the simple KNX network

1. Setup the KNX network in accordance to description in Figure 15.

![Figure 15. LEDLevel demonstration network](image)

3.1.3 Network configuration with ETS5.

In the ETS5 application, import the project STKNX_LedLevel_Demo.knxproj available in STSW-KITSTKNX/Project/STM32F10x_STKNX_LedLevel/ETS5_ProjectFile

Download the full configuration in the two EVALKITSTKNX devices

1. Select the device
2. In Download menu, select “Download all”
3. When asked in the ETS5 application, press the "KNX PROG" button of the EVALKITSTKNX board.

3.1.4 Tests:
- ON button of the sensor is used to increase the number of the LED switched on.
- OFF button of the sensor is used to decrease the number of the LED switched on.
3.2 **4in – 4out exam**

3.2.1 **Hardware prerequisites**
In addition of hardware descibed in Section 2.5, hardware prerequisites for this example is:
- Two STSW-KITSTKNX boards

3.2.2 **Setup the simple 4in-4out KNX network**
Setup the KNX network in accordance to description in *Figure 20.*
3.2.3 Network configuration with ETS5

- In the ETS5 application, import the project STKNX_4in4out_Demo.knxproj available in STSW-KITSTKNX/Project/STM32F10x_STKNX_LedLevel/ETS5_ProjectFile
- Once opened, in the Project workspace, select the Devices view. In this view, you can display the functions configured for the demonstration application as show in Figure 21.

- In Device configuration:
  - LEDs D1 to D4 are linked to functions “in0” to “in3”
– Keys K1 to K4 are linked to functions “Out 0” to “Out 3”

**Figure 21. Group address description**

- Download the full configuration in the two EVALKITSTKNX devices
  1. Select the device
  2. In Download menu, select “Download all”

**Figure 22. ETS5 download devices configuration**

- To start download, the tool request you to press the “KNX PROG” key on the board.
3.2.4 Tests

Figure 24. Test description
3.3 Pseudo LED dimmer example

3.3.1 Hardware prerequisites

In addition to the hardware described in Section 2.5, hardware prerequisites for this example are:

- One EvalKitSTKNX board
- One Led Driver Nucleo board X-NUCLEO-LED16A1

Figure 25. Nucleo board X-NUCLEO-LED16A1

- One KNX sensor : Apricum TAI-KNX 4

Figure 26. TAI-KNX 4 module sensor

- One KNX bulb actuator (optional). Example : MTN629993
3.3.2 Setup the simple Pseudo LED Dimmer KNX network

- Setup the KNX network in accordance to description in Figure 28

Figure 28. Pseudo LED dimmer demonstration network

3.3.3 Network configuration with ETS5

- In the ETS5 application, import the project STKNX_PseudoDimmer_Demo.knxproj available in STSWKITSTKNX/Project/STM32F10x_STKNX_PseudoLedDimmer/ETS5_ProjectFile
• Refer to previous example for more information on how to import a KNX project in ETS5 and how to download the full configuration in both STI and EVALKITSTKNX devices

3.3.4 Tests

• Use the Light level and Color level connected to the Apricum sensor to change LED display on X-NUCLEO-LED16A1 board.
• Use the key 1 of the EvalKitSTKNX board to switch on/off the light.
4 Revision history

Table 1. Document revision history

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<th>Revision</th>
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<td>Initial release.</td>
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<tr>
<td>28-May-2020</td>
<td>2</td>
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