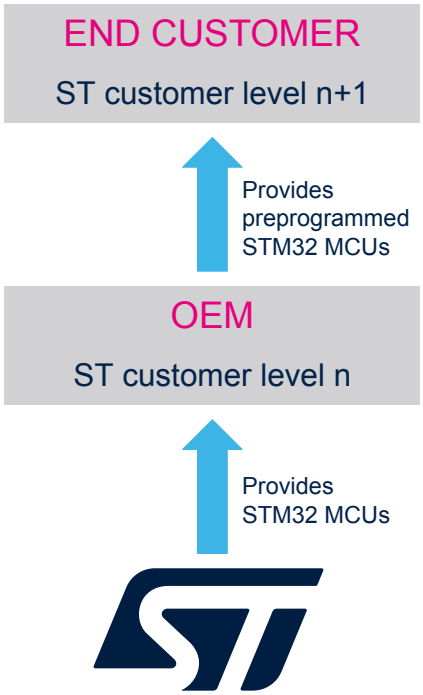
X-CUBE-PCROP

Data brief

Proprietary code read-out protection (PCROP) software expansion for STM32Cube



Product status link
X-CUBE-PCROP

Features

- PCROP
- Read protection
- Write protection

Description

X-CUBE-PCROP illustrates the practical usage of the proprietary code read-out protection feature on microcontrollers in the STM32F4, STM32F7 and STM32L4 Series. The Expansion Package is provided with two projects: Project 1 called STEP1-ST_Customer_level_n, and Project 2 called STEP2-ST_Customer_level_n+1.

The first project, STEP1-ST_Customer_level_n, shows how an STMicroelectronics customer level n can generate execute-only IP-Code (using compiler options), place it in a preferred Flash memory sector, protect it using PCROP, and generate the IP-Code related files, such as the header file and the symbols definition file to be provided to STMicroelectronics customer level n+1.

This project includes two project configurations: PCROP-IP-Code-XO and PCROP-IP-Code.

In the PCROP-IP-Code-XO configuration the compiler is configured to generate execute-only IP-Code, avoiding any data read-out (avoiding literal pools and branch tables).

In the PCROP-IP-Code configuration no special compiler option is used. It is just for test purposes to show that avoiding data in code (such as literal pools and branch tables) is mandatory for PCROP-ed codes.

The second project, STEP2-ST_Customer_level_n+1, shows how an STMicroelectronics customer level n+1 having a preprogrammed microcontroller from the STM32F4, STM32F7 or STM32L4 Series, with a PCROP-ed IP-Code, can create his own end-user application, using these protected IP-Code functions.

The application used for demonstration is the FIR filter example provided in the CMSIS library. The example is provided with the IAR Systems® IAR Embedded Workbench®, Keil® MDK-ARM, and STMicroelectronics STM32CubeIDE and SW4STM32 toolchains. It can be easily ported to any other toolchain.

For more details on PCROP implementation in microcontrollers, refer to the corresponding application note: *Proprietary code read-out protection on microcontrollers of the STM32F4 Series* (AN4701), *Proprietary code read out protection (PCROP) on STM32F72xxx and STM32F73xxx microcontrollers* (AN4968) or *Proprietary code read-out protection on STM32L4, STM32L4+, STM32G4 and STM32WB Series MCUs* (AN4758).

1 General information

The X-CUBE-PCROP Expansion Package runs on STM32 microcontrollers based on Arm® cores.

Note: Arm is a registered trademark of Arm Limited (or its subsidiaries) in the US and/or elsewhere.

1.1 Ordering information

X-CUBE-PCROP is available for free download from the *www.st.com* website.

1.2 License

X-CUBE-PCROP is delivered under the *Mix Ultimate Liberty+OSS+3rd-party V1* software license agreement (SLA0048).

1.3 What is STM32Cube?

STM32Cube is an STMicroelectronics original initiative to significantly improve designer's productivity by reducing development effort, time, and cost. STM32Cube covers the whole STM32 portfolio.

STM32Cube includes:

- A set of user-friendly software development tools to cover project development from conception to realization, among which are:
  - STM32CubeMX, a graphical software configuration tool that allows the automatic generation of C initialization code using graphical wizards
  - STM32CubeIDE, an all-in-one development tool with peripheral configuration, code generation, code compilation, and debug features
  - STM32CubeProgrammer (STM32CubeProg), a programming tool available in graphical and command-line versions
  - STM32CubeMonitor (STM32CubeMonitor, STM32CubeMonPwr, STM32CubeMonRF, STM32CubeMonUCPD) powerful monitoring tools to fine-tune the behavior and performance of STM32 applications in real-time
- STM32Cube MCU and MPU Packages, comprehensive embedded-software platforms specific to each microcontroller and microprocessor series (such as STM32CubeL4 for the STM32L4 Series), which include:
  - STM32Cube hardware abstraction layer (HAL), ensuring maximized portability across the STM32 portfolio
  - STM32Cube low-layer APIs, ensuring the best performance and footprints with a high degree of user control over hardware
  - A consistent set of middleware components such as FAT file system, RTOS, USB Host and Device, TCP/IP, Touch library, and Graphics
  - All embedded software utilities with full sets of peripheral and applicative examples
- STM32Cube Expansion Packages, which contain embedded software components that complement the functionalities of the STM32Cube MCU and MPU Packages with:
  - Middleware extensions and applicative layers
  - Examples running on some specific STMicroelectronics development boards

Revision history

Table 1. Document revision history

Date	Version	Changes
23-Jul-2015	1	Initial release.
22-Dec-2015	2	Updated *Description* to include STM32L4 Series.
19-Jan-2017	3	Updated *Description* to include the STM32F7 Series.
30-Nov-2020	4	Added STM32CubeIDE support in Description.