

# SPBTLE-RF

Firmware upgrade options

# FW upgrade procedure

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**Introduction**

Firmware Update for prototyping and validation phase

Firmware Update for production phase

## Why are firmware updates important?

Firmware updates are important because they let module users:

- Take immediate advantage of the latest features while customer projects are still in the development phase
- Control the FW version loaded in a module when the customer application is in production
  - ST always programs the latest version available
  - Modules produced in different timeframes may implement different FW versions
  - Customer could decide to upload in production the latest available FW version or to maintain in production a previously selected FW version

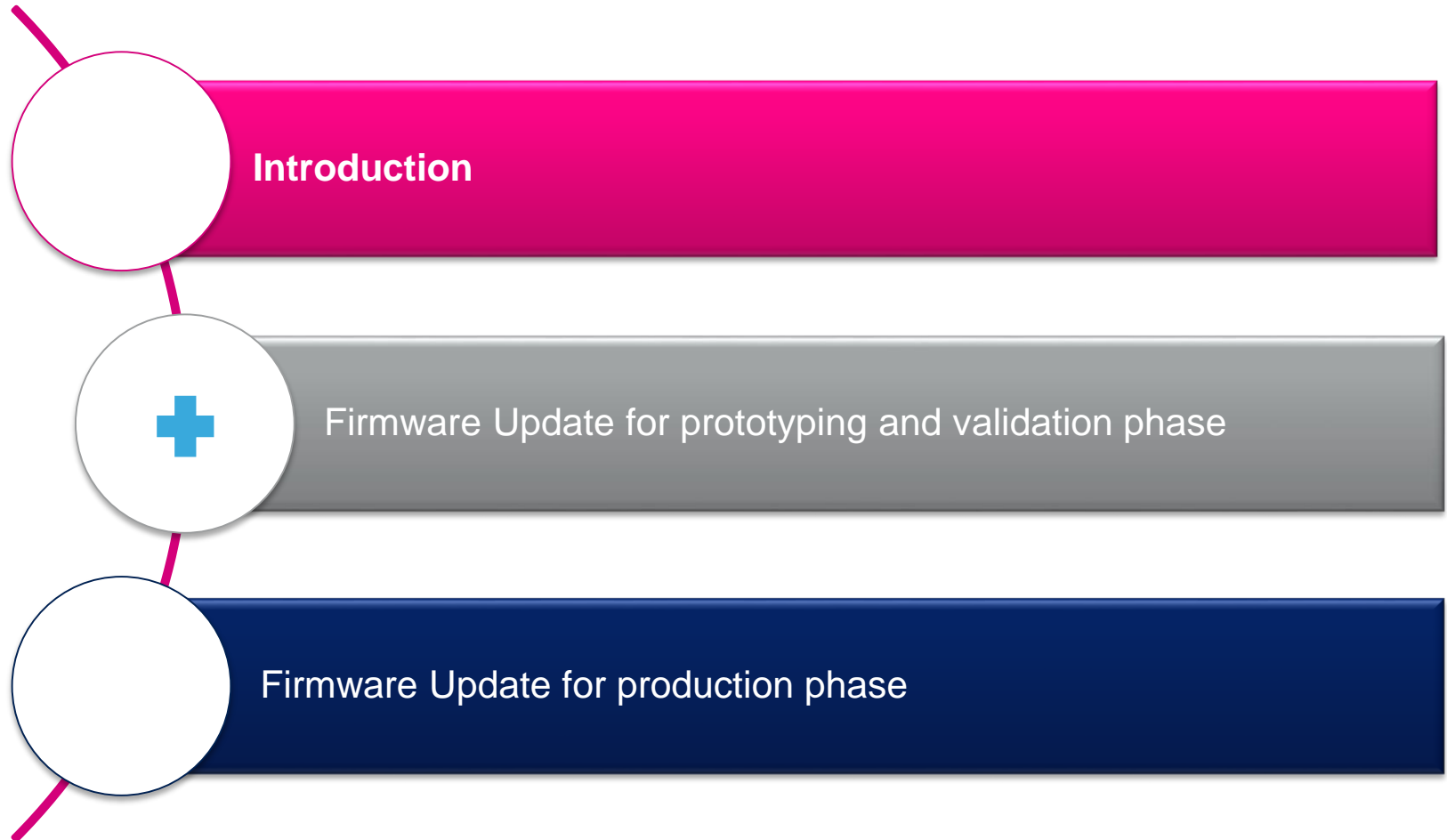


**ST strongly encourages customers to implement a FW update procedure on their production line.**

This presentation shows different methods, from a manual mode that can be easily used during evaluation, to a fully automated mode suitable for customer production.

- ST-Link driver
  - <http://www.st.com/web/catalog/tools/FM147/SC1887/PF260218>
- ST-Link Upgrade utility
  - <http://www.st.com/web/en/catalog/tools/PF260217>
- X-CUBE-BLE1
  - <http://www.st.com/web/catalog/tools/FM147/SC1870/PF261442>
  - Copy the ZIP file content into the “c:\Program Files (x86)\STMicroelectronics\” folder on your PC
  - Package includes the VCOM firmware
- STSW-BLUENRG-DK
  - Package includes the FW image for the SPBTLE-RF in “C:\Program Files (x86)\STMicroelectronics\BlueNRG DK 2.0.0\Firmware\BlueNRG-MS\_stack” folder
  - The SPBTLE-RF stack file is the one with “**32MHz-XO32K**” in the file name.
  - Package includes BlueNRG\_Stack\_IFR\_Updater project
- STSW-BNRGUI
  - Package includes the BlueNRG GUI
  - Package includes the BlueNRG\_Script\_Launcher.exe utility

# FW upgrade procedure



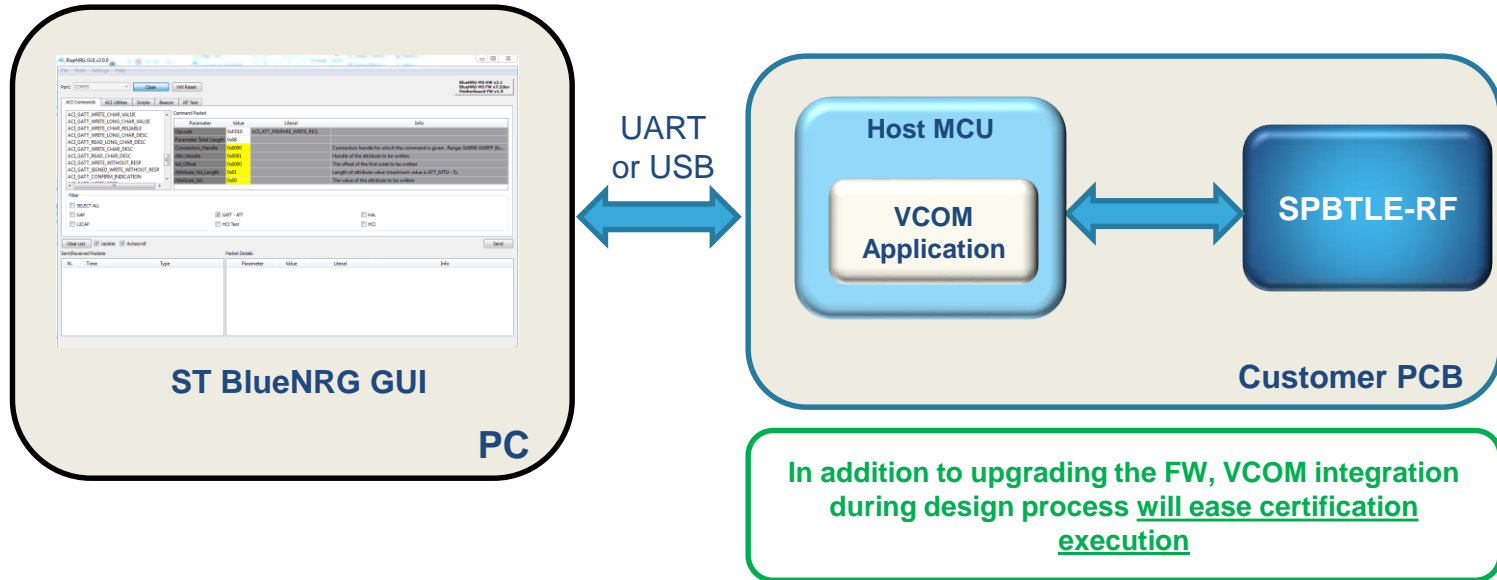
Solution not suitable for production

Recommended for certification and debug

# Firmware Update using BLUENRG GUI

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## Suitable during prototyping & validation phase



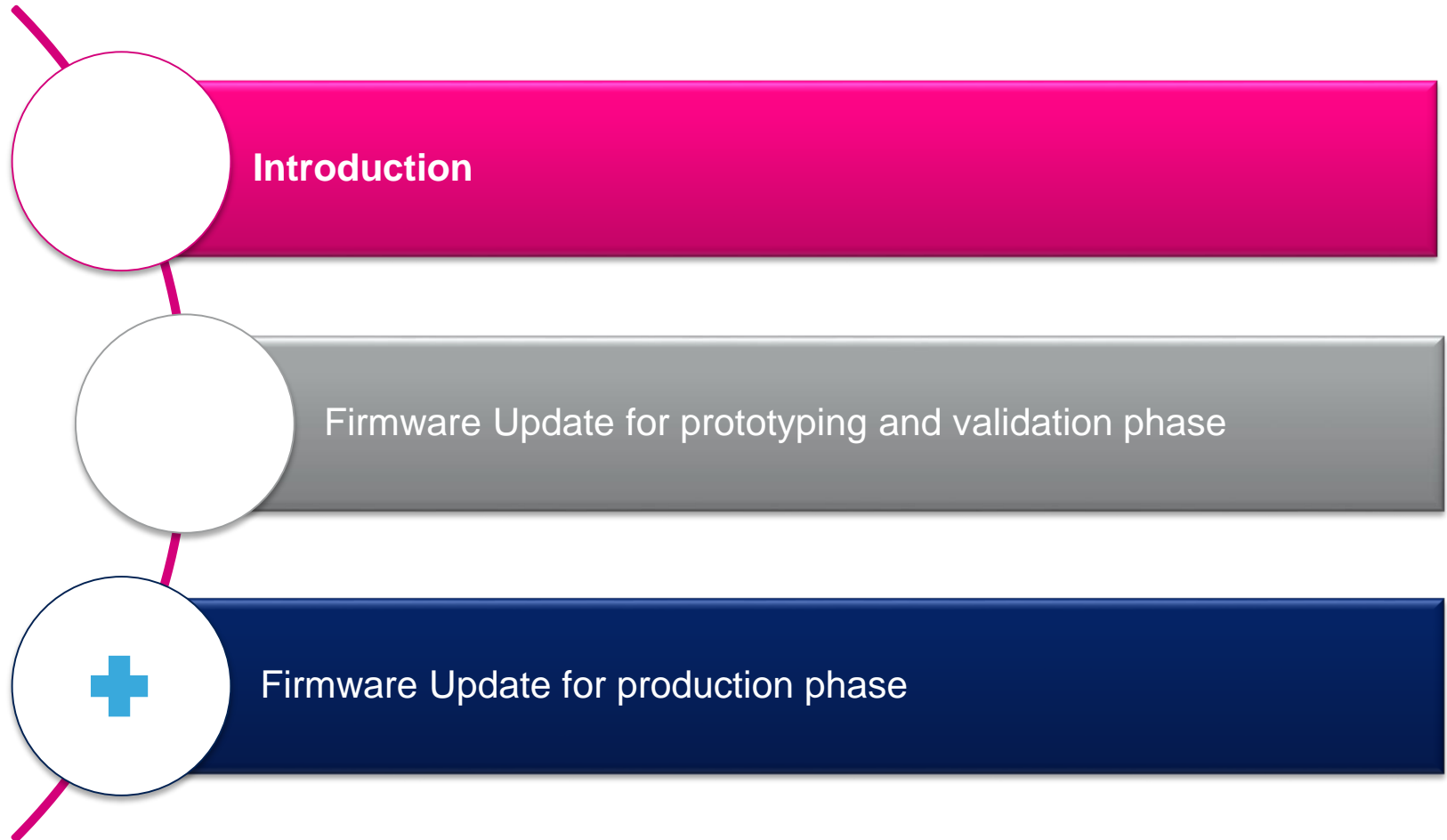
### 1 VCOM integration over your host MCU

- USB interface: refer to the VCOM integration part of [STSW-BLUENRG-DK](http://www.st.com/content/st_com/en/products/embedded-software/evaluation-tool-software/stsw-bluenrg-dk.htm)
- [http://www.st.com/content/st\\_com/en/products/embedded-software/evaluation-tool-software/stsw-bluenrg-dk.htm](http://www.st.com/content/st_com/en/products/embedded-software/evaluation-tool-software/stsw-bluenrg-dk.htm)
- UART interface: refer to the VCOM integration part of [X-CUBE-BLE1](http://www.st.com/content/st_com/en/products/embedded-software/mcus-embedded-software/stm32-embedded-software/stm32cube-expansion-software/x-cube-ble1.html)
- [http://www.st.com/content/st\\_com/en/products/embedded-software/mcus-embedded-software/stm32-embedded-software/stm32cube-expansion-software/x-cube-ble1.html](http://www.st.com/content/st_com/en/products/embedded-software/mcus-embedded-software/stm32-embedded-software/stm32cube-expansion-software/x-cube-ble1.html)

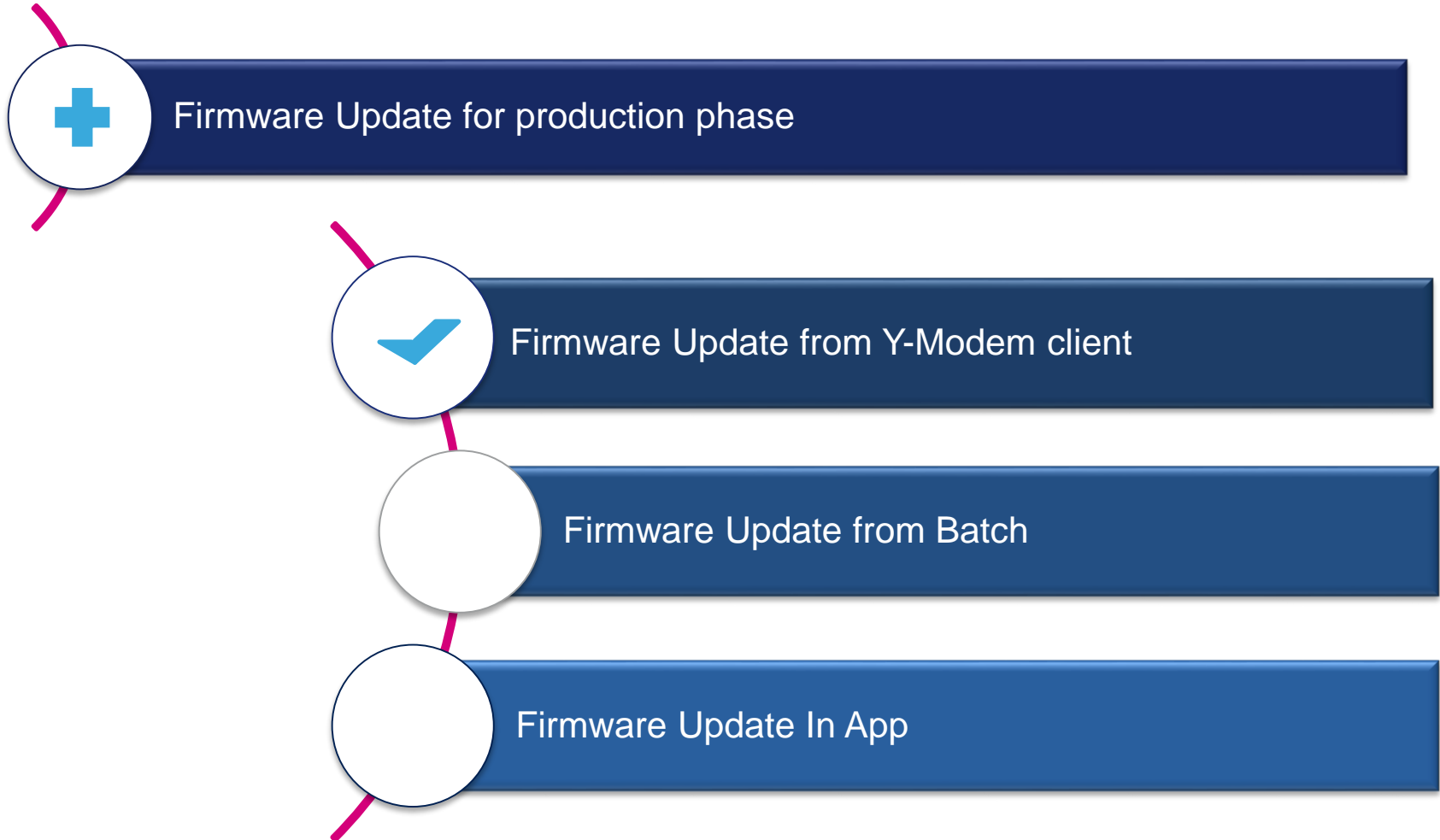
### 2 STSW-BNRGUI

- [http://www.st.com/content/st\\_com/en/products/embedded-software/wireless-connectivity-software/wireless-connectivity-software/stsw-bnrgui.html](http://www.st.com/content/st_com/en/products/embedded-software/wireless-connectivity-software/wireless-connectivity-software/stsw-bnrgui.html)

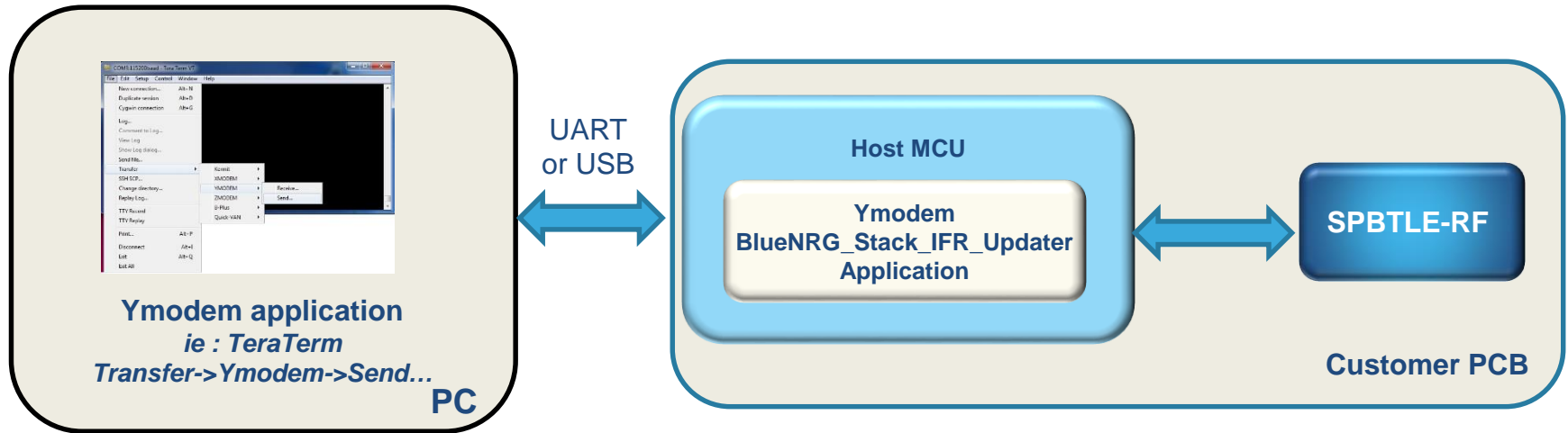
# FW upgrade procedure



# FW upgrade procedure







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## YMODEM IFR\_UPDATER application integration over host MCU

- ymodem.c part of **STSW-BLUENRG-DK** provides the utility APIs for implementing the YMODEM protocol (data transfer over serial, USB interface)
- **STSW-BLUENRG-DK** integrates USB and UART IDE workspace example
  - Stack\_Updater\_UART\_Nucleo (Nucleo L1 compliant)
  - Stack\_Updater\_USB (STEVAL IDB05V1 compliant)

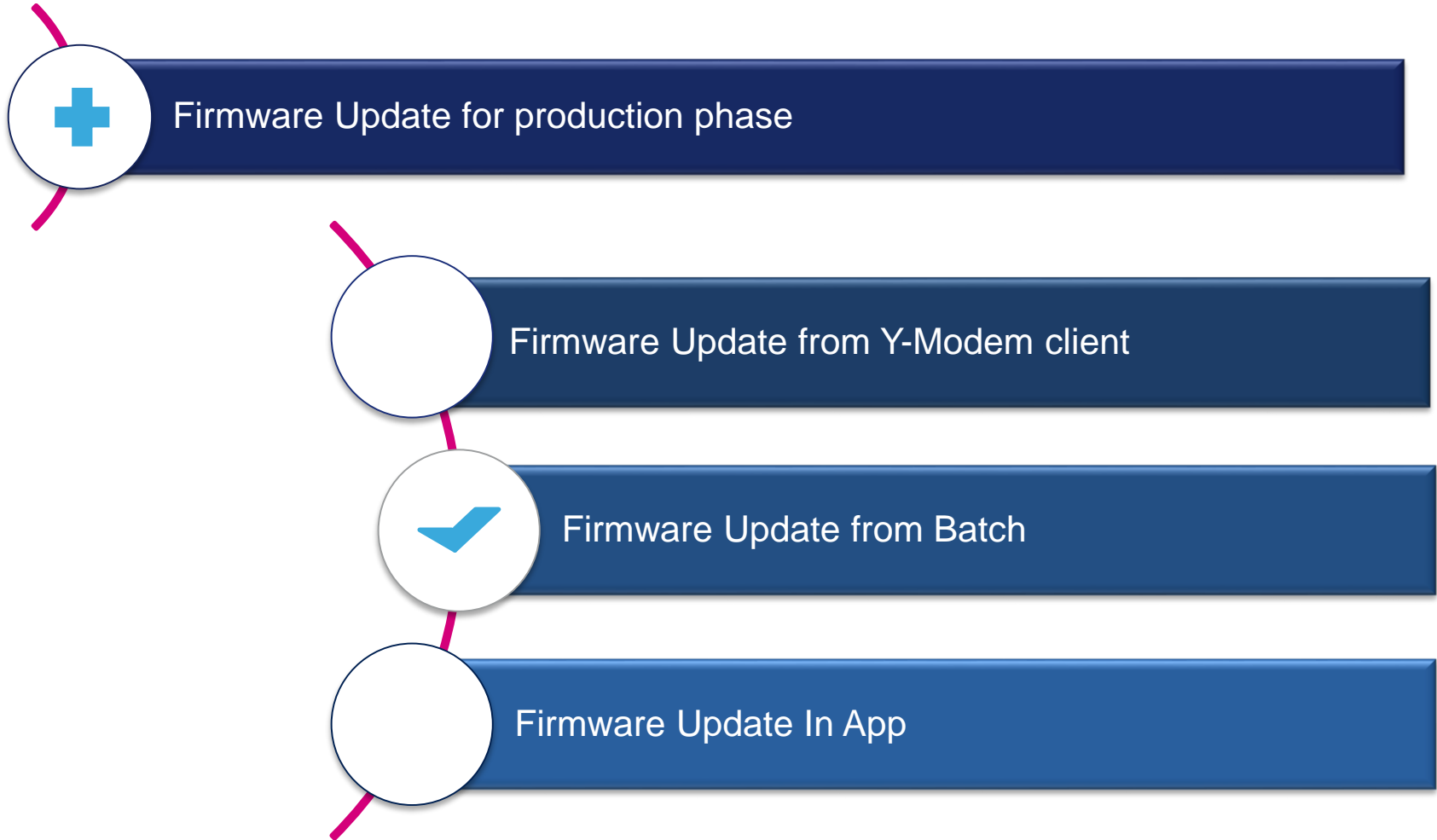
2

- use bluenrg\_img\_converter.exe utility (**STSW-BLUENRG DK**) to convert from .img to .bin
- bluenrg\_img\_converter.exe --output bin input\_file.img output\_file.bin

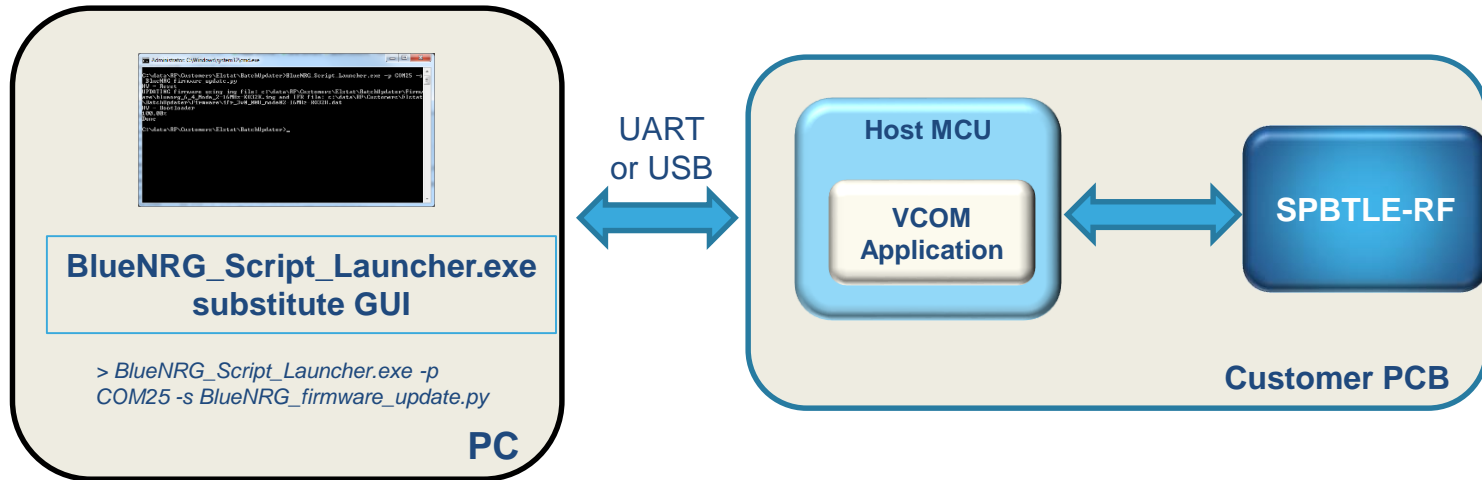
3

- on PCs, use a YMODEM application (such as TeraTerm to transfer the .bin file using the YMODEM protocol)

# FW upgrade procedure



## Suitable during prototyping & production phase



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### VCOM integration over your host MCU

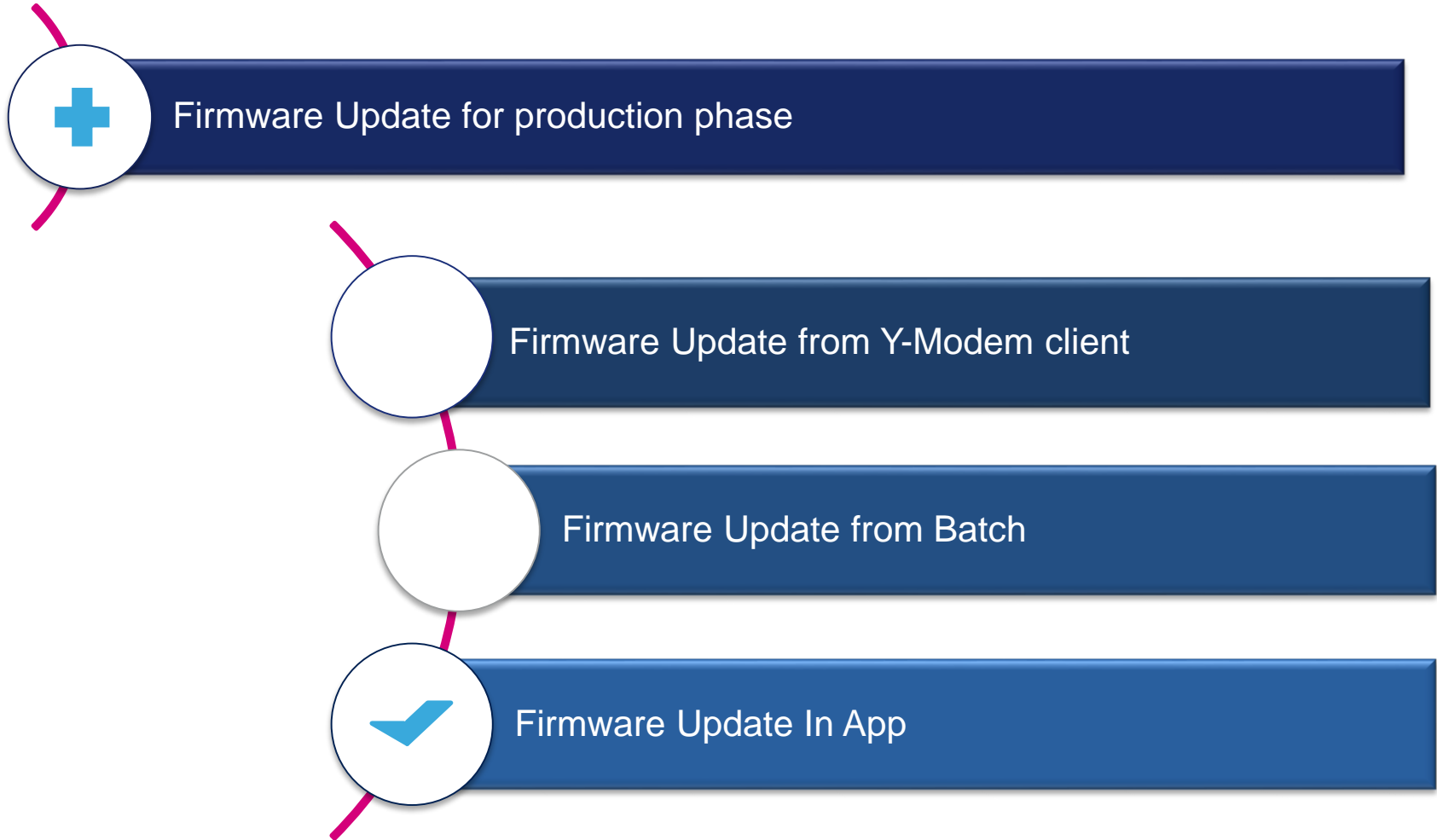
- USB interface: refer to the VCOM integration part of [STSW-BLUENRG-DK](#)
- UART interface: refer to the VCOM integration part of [X-CUBE-BLE1](#)

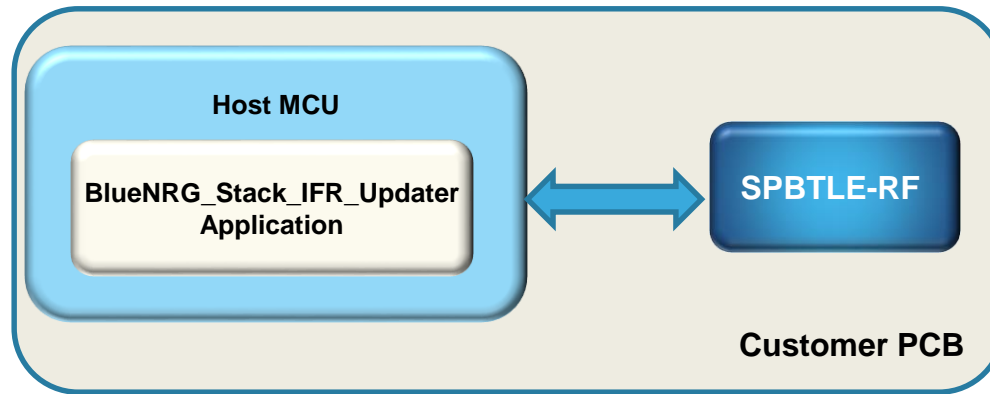
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### Script launcher part of STSW-BNRGUI = GUI automation

- [http://www.st.com/content/st\\_com/en/products/embedded-software/wireless-connectivity-software/wireless-connectivity-software/stsw-bnrgui.html](http://www.st.com/content/st_com/en/products/embedded-software/wireless-connectivity-software/wireless-connectivity-software/stsw-bnrgui.html)
- Edit the `BlueNRG-MS_firmware_update.py` script to select the image to load

# FW upgrade procedure





This approach implies having 64 Kbytes of Flash memory available in the external MCU to host the new FW image

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### IFR\_UPDATER application integration over host MCU

- STSW-BLUENRG-DK integrates code example to implement In-App FW update :
  - Stack\_Updater\_Nucleo (Nucleo L1 compliant)
  - Stack\_Updater (STEVAL IDB05V1 compliant)

2

- Generate the .c file of the image file to download
  - Use bluenrg\_img\_converter.exe utility (STSW-BLUENRG DK) to convert from .img to .bin
  - bluenrg\_img\_converter.exe --output C input\_file.img output\_file.c

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- In BlueNRG\_Stack\_IFR\_Updater\_main.c file, include the generated .c image file to download: For example `#include "bluenrg_7_2_Mode_2-32MHz-XO32K_4M.c"`
- For FW 7.2, make sure that FW\_OFFSET is set to 0 in the source code, e.i. `#define FW_OFFSET (0)`

## Executive summary of FW Update approach

FW update procedure	FW update process (timing reference examples)	Usage notes
ST GUI/batch over UART	38 secs @ 115 000	Suitable during prototyping and validation  <div style="border: 1px solid green; border-radius: 10px; padding: 5px; color: green; text-align: center;">                     VCOM integration during design process will ease certification execution                 </div>
Y-Modem application UART	11 secs @ 115 000 6 secs @ 9616000	<u>Preferred</u> and <u>recommended</u> solution for production
ST GUI/batch over USB	13 secs	Suitable solution for production
In App application	4.5 secs	Suitable alternative solution for production <i>Note: 64 Kbytes of additional Flash memory required</i>

UART (test points) or USB required on PCB to ensure FW upgrade process  
 (except if In App application solution selected)