RN0093
Release note

Firmware upgrade for ST-LINK, ST-LINK/V2, ST-LINK/V2-1
and STLINK-V3 boards

About this release note

This release note contains information about the latest versions of the firmware for
ST-LINK, ST-LINK/V2, ST-LINK/V2-1, and STLINK-V3 boards. It can be used to identify the
version of the firmware currently running and, if necessary, upgrade the firmware through
the USB port.

The part number of the firmware upgrade application for ST-LINK, ST-LINK/V2,
ST-LINK/V2-1, and STLINK-V3 is STSW-LINK007.

1 Host PC system requirements

PC and compatibles running with:

- Windows® 7, 8 and Linux® 32-bit operating systems
- Windows® 7, 8, 10, Linux® and macOS®(a) 64-bit operating systems

The application requires to install the Java Runtime Environment 7u51 (or more recent)[b]. On Windows® operating system, the ST-LINK board requires to install a dedicated USB driver (STSW-LINK009). In case the STSW-LINK009 driver is not installed by the used toolset, it can be downloaded from the *www.st.com* web site.

On Linux®, the application relies on *libusb-1.0*, which must be installed separately. For instance on Ubuntu®(c), this is done through the command
`"sudo apt-get install libusb-1.0"`.

On Linux®, users must be granted rights for accessing the ST-LINK USB devices. To do that, it might be necessary to add rules into */etc/udev/rules.d* (*49-stlinkv2.rules*, *49-stlinkv2-1.rules*, and *49-stlink-v3.rules* are provided in the package). For instance on Ubuntu®, this is done through the command
`"sudo cp 49-stlinkv2-1.rules /etc/udev/rules.d"`.

Note: *STLINK-V3 boards can be recognized by Windows® 10 without any driver installation. However, ST-LINK driver installation is required for previous ST-LINK generations, or for STLINK-V3 boards on previous versions of Windows®.*

The ST-LINK boards feature a STM32 32-bit microcontroller based on the Arm®(d) Cortex®-M processor.

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2 Changes in ST-LinkUpgrade.exe 2.5.1 and STLinkUpgrade.jar 3.3.1

- On STLINK-V3SET, upgrade firmware to the version V3J4M2B3S1.
- On ST-LINK/V2-1 boards, upgrade firmware to the version V2J34M25 (STM32) or V2M25S7 (STM8).
- On ST-LINK/V2 boards, upgrade firmware to the version V2J34S7.
- On ST-LINK boards, upgrade firmware to the version V1J13S4.

New features

- Manage the Flash drag-and-drop programming on STM32L552 and STM32L562 microcontrollers when TrustZone® for Armv8-M is enabled.

Enhancements and corrections:

- On STLINK-V3SET, the baud rate for the Virtual COM port can exceed 12 MHz.
- On STLINK-V3SET, improved SWV (Serial Wire Viewer) and Virtual COM port performance (reduced the probability of data loss).
- On STLINK-V3SET, reduced the ST-LINK consumption when in idle state.

3 Known problems and limitations

- On targets running at low CPU frequencies (less than 250 kHz), the SWD clock frequency must also be reduced for correct communication.
- The SWD maximum clock frequency (4 MHz approximately) is not functional on targets powered under 2.8 V. Such targets must use lower SWD clock frequency (to configure from the toolset using the ST-LINK).
- ST-LINK (V1) boards are not supported on Linux® and macOS® operating systems. Only ST-LINK/V2, ST-LINK/V2-1, and STLINK-V3 boards can be updated from these operating systems.
- Applications programmed through the mass-storage interface (drag-and-drop to disk) must fulfill both constraints listed below. Applications not respecting one of these constraints are not programmed through the mass-storage interface (but they could be programmed through other tools, such as ST-LINK utility):
  - a stack pointer value (first entry of the vector table) in the range of the microcontroller RAM range
  - a reset vector value (second entry of vector table) in the range of the microcontroller flash range
- On STLINK-V3SET, high SWD and JTAG frequencies are sensitive to the target connection environment; in case of communication issues, firstly try to reduce such frequencies in the settings of the tool being used.
- On STLINK-V3SET, the STM32 target Flash memory programming with drag-and-drop action requires the target to be connected to the STLINK-V3SET (SWD/JTAG link)

before the STLINK-V3SET being plugged to the host (USB cable). Moreover this functionality is not available for STM8 targets.

- On STLINK-V3SET, limitations on SPI bridge interface:
  - STLINK as SPI slave: mode not supported
  - SPI half duplex: mode not supported
  - Limited full-duplex support
    (cannot simultaneously send and receive, but sequentially)
- On STLINK-V3SET, limitations on I^2C bridge interface:
  - STLINK as I^2C slave: mode not supported
  - Digital Noise Filter (DNF): not tested
  - 10-bit addressing: not tested
- On STLINK-V3SET, limitations on CAN bridge interface:
  - Only standard and loop-back modes supported
- On STLINK-V3SET in high-performance mode, the minimal baud rate for Virtual COM port is 2931 baud/s.

4 Release information for previous releases

4.1 Summary of changes in ST-LinkUpgrade.exe 2.5.0 and STLinkUpgrade.jar 3.3.0

- On STLINK-V3SET, upgrade firmware to the version V3J3M2B3S1.
- On ST-LINK/V2-1 boards, upgrade firmware to the version V2J33M25 (STM32) or V2M25S7 (STM8).
- On ST-LINK/V2 boards, upgrade firmware to the version V2J33S7.
- On ST-LINK boards, upgrade firmware to the version V1J13S4.

New features

- Added the possibility to hide the mass-storage interface on ST-LINK/V2-1 and STLINK-V3 boards (requires to update the USB driver: STSW-LINK009 on Windows®, *49-stlinkvxxx.rules* files on Linux®). Moreover, it might be also necessary to update the host application so that it identifies correctly this new ST-LINK version, especially on Linux® and macOS®.
- On STLINK-V3SET, allows the replacement of the mass-storage interface by a second Virtual COM port (VCP2), using the Bridge UART signals of the MB1440B.CN9 connector. This VCP2 implements hardware-flow control (CTS/RTS) if the signals are physically connected to the target. The hardware-flow control can be disabled by removing the physical connection of signals to the target. It cannot be disabled by software (the hardware-flow control configuration parameter available in some hyper-terminal applications has no effect on Virtual COM port).

Corrections:

- Fixed some instabilities during mass-storage disk refresh after drag-and-drop programming on ST-LINK/V2-1 and STLINK-V3 boards.
- Immediately report error (if any) after a memory-access command done in 8-bit mode to an STM32 target.
- Fixed an issue with some targets (STM32L4x2, STM32G0x1): an application programmed by drag and drop to a fully erased target does not start immediately (power-down sequence required to make it run).
- Virtual COM port reception is no more started with default parameters at ST-LINK start-up, but waits for host command.
- On STLINK-V3SET, fixed a possible loss of data in the Virtual COM port downstream (host to target).
- The STLINK-V3SET can enumerate on Windows® 10 without any specific USB driver installation; however, the USB driver installation is still required for older ST-LINK versions, or for STLINK-V3SET on older versions of Windows®.

4.2 Summary of changes in ST-LinkUpgrade.exe 2.4.12 and STLinkUpgrade.jar 3.2.12

On ST-LINK/V2-1 boards, upgrade firmware to the version V2J32M22 (STM32) or V2M22S7 (STM8).

On ST-LINK/V2 boards, upgrade firmware to the version V2J32S7.
On ST-LINK boards, upgrade firmware to the version V1J13S4.

Corrections:

- Fixed mass storage interface issue with NUCLEO-8L152R8 and NUCLEO-8S208RB on Windows® 10 (operating system files corrupting the STM8 Flash). Currently, a binary file dropped into the mass storage virtual disk is programmed into the STM8 Flash only if it starts with code 0x82 and if the following 3 bytes (reset vector value) point to an address in Flash.

4.3 Summary of changes in ST-LinkUpgrade.exe 2.4.11 and STLinkUpgrade.jar 3.2.11

On ST-LINK/V2-1 boards, upgrade firmware to the version V2J31M21 (STM32) or V2M21S7 (STM8).
On ST-LINK/V2 boards, upgrade firmware to the version V2J31S7.
On ST-LINK boards, upgrade firmware to the version V1J13S4.

Corrections (for STM32 debug with ST-LINK/V2-1 and ST-LINK/V2):

- Fixed wrong management of STM32 target hardware reset pin by firmware V2J30M21 in SWD mode

4.4 Summary of changes in ST-LinkUpgrade.exe 2.4.10 and STLinkUpgrade.jar 3.2.10

On ST-LINK/V2-1 boards, upgrade firmware to the version V2J30M21 (STM32) or V2M21S7 (STM8).
On ST-LINK/V2 boards, upgrade firmware to the version V2J30S7.
On ST-LINK boards, upgrade firmware to the version V1J13S4.

Corrections (for ST-LINK/V2-1 only):

- Bugfix against mass storage disk refresh loop after drag-and-drop on Windows® 10
- Bugfix against SWV issues (Serial Wire trace through SWO pin)

4.5 Summary of changes in ST-LinkUpgrade.exe 2.4.9 and STLinkUpgrade.jar 3.2.9

On ST-LINK/V2-1 boards, upgrade firmware to the version V2J30M20.
On ST-LINK/V2 boards, upgrade firmware to the version V2J30S7.
On ST-LINK boards, upgrade firmware to the version V1J13S4.

Corrections (for ST-LINK/V2-1 only):

- Bugfix against random refresh of mass storage disk after drag-and-drop on Linux®
- Bugfix of wrong link in *mbed.htm* file (mass storage interface) for NUCLEO-L4A6ZG
- Implemented change request: display *fail.txt* if the dropped application has wrong vector values (stack pointer and reset)
- Manage drag-and-drop Flash programming whatever the value of the single/dual bank option byte on the microcontroller providing it
- Increased USB FIFO size for Virtual COM port (direction host to ST-LINK) from 8 bytes to 16 bytes

4.6 Summary of changes in ST-LinkUpgrade.exe 2.4.8 and STLinkUpgrade.jar 3.2.8

On ST-LINK/V2-1 boards, upgrade firmware to the version V2J30M19.
On ST-LINK/V2 boards, upgrade firmware to the version V2J30S7.
On ST-LINK boards, upgrade firmware to the version V1J13S4.

Corrections (for ST-LINK/V2-1 only):

- Allow application to run even if the readout protection is set on the target microcontroller and the MCO signal from ST-LINK is connected to the target microcontroller (case of the NUCLEO-L073RZ for instance)
- Allow application to run immediately when powered externally to the ST-LINK (evaluation boards), or when power configuration is set in "charger" position (case for some discovery board). In previous releases, a 2-second timeout was awaited in such situations.

4.7 Summary of changes in ST-LinkUpgrade.exe 2.4.5 and STLinkUpgrade.jar 3.2.5

On ST-LINK/V2-1 boards, upgrade firmware to the version V2J29M18.
On ST-LINK/V2 boards, upgrade firmware to the version V2J29S7.
On ST-LINK boards, upgrade firmware to the version V1J13S4.

Corrections (for ST-LINK/V2 and ST-LINK/V2-1):

- Correction against sporadic failure during initialization of debug session on STM32L0xx microcontrollers

Corrections (for ST-LINK/V2-1 only):

- Correction against drag-and-drop programming issue on STM32L432 of an application with initial stack pointer located into RAM2 segment @0x2000 C000
- Correction against the presence of multiple "fail.txt" files on mass storage disk, after failing drag-and-drop programming on evaluation boards

4.8 Summary of changes in ST-LinkUpgrade.exe 2.4.2 and STLinkUpgrade.jar 3.2.2

On ST-LINK/V2-1 boards, upgrade firmware to the version V2J28M18.
On ST-LINK/V2 boards, upgrade firmware to the version V2J28S7.
On ST-LINK boards, upgrade firmware to the version V1J13S4.

Corrections (for ST-LINK/V2-1):

- Add up to 20 Kbytes in virtual mass storage for disk size compared to the target flash size, to have enough space after the host wrote some system files (for instance in a Windows® 10 environment)

- Application on NUCLEO-L452RE did not run automatically after application programming through drag-and-drop

- The file *fail.txt* was missing on the virtual mass storage disk when the target STM32 was readout protected

4.9 Summary of changes in ST-LinkUpgrade.exe 2.4.0 and STLinkUpgrade.jar 3.2.0

On ST-LINK/V2-1 boards, update the firmware to the version V2J28M16.
On ST-LINK/V2 boards, update the firmware to the version V2J28S6.
On ST-LINK boards, update the firmware to the version V1J13S4.

Corrections (for ST-LINK/V2-1):

- Fixed file fail.txt missing in some cases after target communication failure

- Fixed issue with mass storage disk on Windows® 10 version 1607

- Reworked the refresh sequence of the mass storage disk after drag-and-drop programming

Modified the description size of the USB Virtual COM port

4.10 Summary of changes in ST-LinkUpgrade.exe 2.3.30 and STLinkUpgrade.jar 3.1.0

On ST-LINK/V2-1 boards, update firmware to the version V2J27M15.
On ST-LINK/V2 boards, update the firmware to the version V2J27S6.
On ST-LINK boards, update the firmware to the version V1J13S4.

Corrections:

- Fixed a regression which made the V2J26M15 not functional on few host systems.

- Failing boards may be recovered either by upgrading the firmware to V2J27M15 from another host, not presenting the incompatibility with the V2J26M15 or by forcing manually the upgrade mode of the board, when possible. For instance on Nucleo-64 boards, make a little shortcut between 'RST' and 'SB11' pads behind the board. In this way the firmware may be upgraded afterwards, even on host presenting the incompatibility with the V2J26M15. On other ST-LINK/V2-1 boards, refer to the

schematics of the board to find how to reset the STM32F103CB microcontroller (solder bridge on 'STM_RST' signal).

4.11 Summary of changes in ST-LinkUpgrade.exe 2.3.28 and STLinkUpgrade.jar 3.0.7

On ST-LINK/V2-1 boards, update firmware to the version V2J26M15.
On ST-LINK/V2 boards, update the firmware to the version V2J26S5.
On ST-LINK boards, update the firmware to the version V1J13S4.

Enhancements:

- Virtual COM port latency reduced from 5ms to 1ms (approximatively average values) in target Tx / ST-LINK/V2-1 Rx direction.

Corrections:

- On ST-LINK/V2-1 discovery and Nucleo boards, the target application is now able to run even if the target read-out protection is set. It is the case on ST-LINK/V2-1 of the evaluation boards, but only if the ST-LINK/V2-1 USB cable is not connected to any enumerating host.
- On all ST-LINK/V2-1 boards, the target application is now able to run even if the ST-LINK/V2-1 is either not connected to an USB host, or is powered through a USB charger (or through a not-enumerating USB host).
- Removed risk of loosing the Virtual COM port interface if reprogramming the application (by drag-and-drop) while the Virtual COM port is intensely used. Fixed wrong contents of mbed.html file in some cases (wrong shortcut to "ST unknown board" page).

4.12 Summary of changes in ST-LinkUpgrade.exe 2.3.27 and STLinkUpgrade.jar 3.0.6

On ST-LINK/V2-1 boards, update firmware to the version V2J25M14.
On ST-LINK/V2 boards, update the firmware to the version V2J25S4.
On ST-LINK boards, update the firmware to the version V1J13S4.

Enhancements:

- Fixed USB communication failures on Mac OS X 10.11 after ClearFeature (ENDPOINT_STALL)
- Removed risk of lockups when using the Virtual COM port intensively in both directions (Rx/Tx) simultaneously

Large applications are now fully programmed through drag-and-drop on evaluation boards (on evaluation boards applications with sizes greater than the target Flash memory size minus 4 Kbytes were not totally programmed).

4.13 Summary of changes in ST-LinkUpgrade.exe 2.3.26 and STLinkUpgrade.jar 3.0.5

On ST-LINK/V2-1 boards, update firmware to the version V2J25M13.
On ST-LINK/V2 boards, update the firmware to the version V2J25S4.
On ST-LINK boards, update the firmware to the version V1J13S4.

Enhancements:

• Implementation of retry loops for better behavior in case of noisy SWD communication

New features:

• Added support for NUCLEO-F410RB, NUCLEO-F446RE and NUCLEO-L011K4 boards
• Added support for 32F746GDISCOVERY and 32F469IDISCOVERY boards

4.14 Summary of changes in ST-LinkUpgrade.exe 2.3.24 and STLinkUpgrade.jar 3.0.3

On ST-LINK/V2-1 boards, update firmware to the version V2J24M11.
On ST-LINK/V2 boards, update the firmware to the version V2J24S4.
On ST-LINK boards, update the firmware to the version V1J13S4.

Corrections:

• Bugfix SWV not working withV2J23Mx firmware on some recent PCs

New features:

• Provide a command for JTAG clock frequency selection
• Added support for management 32L053DISCOVERY and 32F3348DISCOVERY boards
• Added support for STM32F746

4.15 Summary of changes in ST-LinkUpgrade.exe 2.3.21 and STLinkUpgrade.jar 3.0.0

On ST-LINK/V2-1 boards, update firmware to the version V2J23M10.
On ST-LINK/V2 boards, update the firmware to the version V2J23S4.
On ST-LINK boards, update the firmware to the version V1J13S4.

Corrections:

• Bugfix Mass Storage interface badly connecting on OS-X Yosemite operating system
• Modification of flash programming algorithm for STM32F4, STM32F7 and STM32L4 microcontroller families
• Added check against the validity of the application, when it is programmed through the mass storage interface (validity algorithm based on Reset and Stack Pointer values in the vector table)
• Set default SWCLK to 4 MHz for a better performance

New features:

- Added support for recent boards (NUCLEO-F070RB, NUCLEO-L073RZ and NUCLEO-L476RG)
- Added support for Linux and Mac OS-X operating systems (see *Section 1* for details)

4.16 Summary of changes in ST-LinkUpgrade.exe 2.3.16

On ST-LINK/V2-1 boards, update firmware to the version V2J23M6.
On ST-LINK/V2 boards, update the firmware to the version V2J23S4.
On ST-LINK boards, update the firmware to the version V1J13S4.

Corrections:

- In the Virtual COM port, suppressed a possible delay in data reception by the host (like a cache-flush issue)
- In the Virtual COM port, suppressed a possible communication failure during data emission by the host, on some USB3 ports
- Modified the mass storage interface enumeration after a programming of the target application, reducing the risk to lose the VCP communication during such operation
- Suppressed one target reset sequence during the power on sequence
- Modified SWD communication to reduce the noise generated by SWD signals

4.17 Summary of changes in ST-LinkUpgrade.exe 2.3.14

On ST-LINK/V2-1 boards, update firmware to the version V2J22M5.
On ST-LINK/V2 boards, update the firmware to the version V2J22S4.
On ST-LINK boards, update the firmware to the version V1J13S4.

New functionalities:

- Added support for NUCLEO-F411RE
- Added command for SWCLK frequency selection

4.18 Summary of changes in ST-LinkUpgrade.exe 2.3.11

On ST-LINK/V2-1 boards, update firmware to the version V2J21M5.
On ST-LINK/V2 boards, update the firmware to the version V2J21S4.
On ST-LINK boards, update the firmware to the version V1J13S4.

Corrections:

- Set NRST pin high, when exiting the firmware update mode

4.19 Summary of changes in ST-LinkUpgrade.exe 2.3.10

On STM32 Nucleo boards, update firmware to V2J20M4.
On ST-LINK/V2 boards, update the firmware to the version V2J20S4.
On ST-LINK boards, update the firmware to the version V1J13S4.

Corrections:

- Suppressed "high speed device" notification, when plugging to a non-high speed USB port or to an USB3 port
- Keep the Virtual COM port session valid (if any opened), when reprogramming the application
- Fixed potential lockup condition in SWV trace management and Virtual COM port management

4.20 Summary of changes in ST-LinkUpgrade.exe 2.3.7

On STM32 Nucleo boards, update firmware to V2J19M3.
On ST-LINK/V2 boards, update the firmware to the version V2J19S4.
On ST-LINK boards, update the firmware to the version V1J13S4.

Corrections:

- Fixed the issue about the application sometimes not running after being programmed (STM32Fxx targets, programmed through a "save as" action with long filename).

5 Customer support

For more information or help concerning ST-LINK, ST-LINK/V2, ST-LINK/V2-1 and STLINK-V3 boards, contact the nearest sales office. For the complete list of STMicroelectronics offices and distributors, refer to the *www.st.com* webpage.

6 Revision history

Table 1. Document revision history

Date	Revision	Changes
13-Feb-2014	1	Initial release.
14-Apr-2014	2	Added content for new version 2.21.4
02-June-2014	3	Added content for new version 2.21.5.
10-July-2014	4	Added content for new version 2.22.5
22-Sept-2014	5	Added content for new version 2.23.6
02-April-2015	6	Added content for new version 2.23.7
25-May-2015	7	Added content for new version 2.24.11
09-Nov-2015	8	Added content for new version 2.25.13
11-Dec-2015	9	Added content for new version 2.25.14
26-Jan-2016	10	Added content for new version 2.26.15

Table 1. Document revision history (continued)

Date	Revision	Changes
07-Mar-2016	11	Added content for new version 2.27.15.
28-Sep-2016	12	Title and content changes to cover the firmware update for ST-LINK, ST-LINK/V2 and ST-LINK/V2-1 boards.
4-Jan-2017	13	Added *Section 2: Changes in ST-LinkUpgrade.exe 2.4.2 and STLinkUpgrade.jar 3.2.2*.
13-Sep-2017	14	Updated *Section 2: Changes in ST-LinkUpgrade.exe 2.4.5 and STLinkUpgrade.jar 3.2.5*.
17-Jan-2018	15	Updated *Section 2: Changes in ST-LinkUpgrade.exe 2.4.8 and STLinkUpgrade.jar 3.2.8*.
26-Mar-2018	16	Updated *Section 2: Changes in ST-LinkUpgrade.exe 2.4.9 and STLinkUpgrade.jar 3.2.9*.
27-Apr-2018	17	Updated *Section 2: Changes in ST-LinkUpgrade.exe 2.4.10 and STLinkUpgrade.jar 3.2.10*.
14-Jun-2018	18	Updated *Section 2: Changes in ST-LinkUpgrade.exe 2.4.11 and STLinkUpgrade.jar 3.2.11*.
27-Sep-2018	19	Updated *Section 2: Changes in ST-LinkUpgrade.exe 2.4.12 and STLinkUpgrade.jar 3.2.12*.
24-Jan-2019	20	Document scope extended to STLINK-V3: – Updated document title and *About this release note* – Updated *Section 1: Host PC system requirements* – Updated *Section 2: Changes in ST-LinkUpgrade.exe 2.5.0 and STLinkUpgrade.jar 3.3.0* – Added STLINK-V3SET entries to *Section 3: Known problems and limitations*
30-Apr-2019	21	Updated *Section 2: Changes in ST-LinkUpgrade.exe 2.5.1 and STLinkUpgrade.jar 3.3.1*.

IMPORTANT NOTICE – PLEASE READ CAREFULLY