



# STM32MP15 ecosystem release note

## - v1.1.0



## Contents

1. STM32MP15 ecosystem release note - v1.1.0 .....	3
2. STM32MPU Embedded Software distribution for Android .....	15
3. Which Package better suits your needs .....	16
4. STM32CubeMP1 Package .....	16
5. How to assign an internal peripheral to a runtime context .....	16
6. STM32MP15 distribution for Android release note - v1.0.0 .....	16
7. STM32MP15 ecosystem errata sheet .....	16
8. STM32MP1 Developer Package .....	16
9. OpenSTLinux distribution .....	17
10. OpenEmbedded - devtool .....	17
11. Git .....	17
12. STM32MP1 Distribution Package .....	17
13. STM32MP15 OpenSTLinux release note - v1.1.0 .....	17
14. STM32CubeMP1 Package release note - v1.1.0 .....	17
15. STM32MP15 microprocessor .....	18
16. STM32MP15 Evaluation boards - getting started .....	18
17. STM32MP15 Discovery kits - getting started .....	18
18. STM32CubeIDE release note .....	18
19. STM32CubeProgrammer release note .....	18
20. KeyGen release note .....	19
21. Signing tool release note .....	19
22. U-Boot overview .....	19



# STM32MP15 ecosystem release note - v1.1.0

Stable: 02.04.2020 - 09:29 / Revision: 02.04.2020 - 09:24

This article aims to describe the content of the release **STM32MP15-Ecosystem-v1.1.0** for *STM32MPU Embedded Software distributions* and its associated ecosystem.

## Contents

1 Delivery purpose and scope .....	3
2 Intended audience .....	4
3 Licensing .....	4
4 Main features / main highlights .....	5
<b>4.1 Boards .....</b>	<b>5</b>
<b>4.2 Embedded software .....</b>	<b>6</b>
4.2.1 OpenSTLinux (Cortex <sup>®</sup> -A7) .....	6
4.2.2 STM32CubeMP1 (Cortex <sup>®</sup> -M4) .....	7
4.2.3 STM32MP15 distribution for Android (Cortex <sup>®</sup> -A7) - <b>NEW</b> .....	7
<b>4.3 STM32CubeProgrammer, Signing tool, Keygen .....</b>	<b>7</b>
<b>4.4 STM32CubeMX .....</b>	<b>8</b>
<b>4.5 STM32CubeIDE - NEW .....</b>	<b>8</b>
<b>4.6 Miscellaneous .....</b>	<b>8</b>
5 Recommendations of use .....	9
<b>5.1 Safe .....</b>	<b>9</b>
<b>5.2 Not recommended .....</b>	<b>9</b>
6 Main restriction list .....	9
7 Minor release updates .....	9
<b>7.1 v1.1.1 .....</b>	<b>10</b>
8 Reference documents .....	10
9 How to get the software and start with this release? .....	13
10 STM32MPU Embedded Software distribution detailed release notes .....	13
11 Referenced tools release notes .....	14
12 References .....	14

## 1 Delivery purpose and scope

The new STM32MP15-Ecosystem-v1.1.0 release, dedicated to STM32MP15 microprocessors, is an evolutive maintenance release, including minor evolutions but also the first version for STM32MPU Embedded Software distribution for Android and the first version for STM32CubeIDE.

The release, as the previous one, aims:

- to provide a full ecosystem for STM32MP15x devices.
- to work efficiently with STM32MP15 boards, using one of the packages (Starter Package, Developer Package, Distribution Package) developed by STMicroelectronics for STM32MPUs.



See [Which Package better suits your needs](#) for more information on these packages.

This ecosystem release is constituted by:

- **Two STM32MPU distributions**
  - The *STM32MPU Embedded Software distribution*
  - The *STM32MPU Embedded Software distribution for Android - NEW* versus STM32MP15-Ecosystem-v1.0.0 release
- **The STM32 referenced tools**
  - SW4STM32
  - STM32CubeIDE - New STM32 IDE targeted to replace SW4STM32 (STM32-CoPro-MPU Eclipse plugin) - **NEW** versus STM32MP15-Ecosystem-v1.0.0 release
  - STM32CubeMX
  - STM32CubeProgrammer
  - Keygen tool
  - Signing tool

(more details in [chapter](#) below)

- **Documentation**
  - This user guide (wiki format)
  - Documentation package (more details in [chapter](#) below)
- **Supported STM32MP15 boards**
  - STM32MP15 Evaluation board ( for "STM32MPU Embedded Software distribution" and "STM32MPU Embedded Software distribution for Android")
  - STM32MP15 Discovery kit (for *STM32MPU Embedded Software distribution*)

(more details in [chapter](#) below)

## 2 Intended audience

---

The targeted audience consists in STMicroelectronics customers.

## 3 Licensing

---

This software package is licensed under SOFTWARE LICENSE AGREEMENT, the "SLA". Customer may not use this package except in compliance with the [software license agreement \(SLA\)](#).

## 4 Main features / main highlights

### 4.1 Boards

Boards supported with this STM32MP15-Ecosystem-v1.1.0 release are the same than those supported with the STM32MP15-Ecosystem-v1.0.0.

Boards	PCBs list	Content	Availability
EVAL Rev.C	<ul style="list-style-type: none"> <li>• MB1263C (Daughter)</li> <li>• MB1262C (Mother)</li> <li>• MB1230C (Display)</li> <li>• MB1379A (Camera)</li> </ul>	<ul style="list-style-type: none"> <li>• STM32MP1 STM32MP157AAA3 Rev.B</li> <li>• PMIC STPMIC1APQR cut1.2</li> <li>• External oscillator</li> </ul>	Jan'19
DISCO Rev.C	<ul style="list-style-type: none"> <li>• MB1272C (Mother)</li> <li>• MB1407B (Display)</li> </ul>	<ul style="list-style-type: none"> <li>• STM32MP1 STM32MP157CAC3 Rev.B</li> <li>• PMIC STPMIC1APQR cut1.2</li> <li>• External oscillator</li> </ul>	Jan'19



STLINK in EVAL and DISCO Rev.C boards integrates the latest firmware STLINK (V2J32M22) which requires upgraded USB PC drivers - [Windows USB driver](#)

## 4.2 Embedded software

### 4.2.1 OpenSTLinux (Cortex<sup>®</sup>-A7)

**Openstlinux-4.19-thud-mp1-19-10-09** is the new version delivered with STM32MP15-Ecosystem-v1.1.0 release. This software set is constituted with following components :

- Build process
  - OpenEmbedded Thud (v2.6)
  - GCC version v8.2
- Software components
  - Kernel version LTS v4.19.49 - **NEW** version versus STM32MP15-Ecosystem-v1.0.0 release
  - TF-A version v2.0
  - U-Boot version v2018.11
  - OP-TEE version v3.3.0
  - OpenOCD version v0.10.0
- Applicative components
  - Weston version v5.0.0
  - GStreamer version v1.14.4 - **NEW** version versus STM32MP15-Ecosystem-v1.0.0 release
  - GCnano version v6.2.4
- Main **NEW** features coming with STM32MP15-Ecosystem-v1.1.0 release
  - DDRPERFM support via perf tool
  - RCC PLL Spread Spectrum mode
  - Audio 16-bits records
  - U-boot ENV
  - U-boot SPI driver
  - USB OTG Device/host on STM32MP157A-DK1/STM32MP157C-DK2
  - STM32MP157A-DK1/STM32MP157C-DK2 Arduino connector definition
  - GPU stack 6.2.4p4
  - GPU suspend/resume
  - LPLV-Stop support
  - FMC NAND 2CS
  - SPI NAND kernel
  - DFSDM fast mode support
  - Yocto Extensible SDK support

- **Internal peripherals assignment at boot time**

At boot, you can select two kernel configurations:

- Configuration 1: All internal peripherals assigned to Cortex-A7 for Linux drivers, Cortex-M4 coprocessing firmware TTY executed by default.
- Configuration 2: Some internal peripherals assigned to Cortex-M4 to execute Cortex-M4 delivered examples on the board (EVAL or DISCO) see ([How to run Cortex-M4 examples](#)).

Configuration 1 is activated by default if you do not specify "2" in the U-Boot console.

More information can be found in [How to assign an internal peripheral to a runtime context](#) article.



#### 4.2.2 STM32CubeMP1 (Cortex<sup>®</sup>-M4)

- **Main NEW features coming with STM32CubeMP1-v1.1.0 version, delivered with STM32MP15-Ecosystem-v1.1.0 release :**
  - KEIL Project
    - Integration of "Templates", "FreeRTOS\_ThreadCreation" and "OpenAMP\_raw" examples
  - IAR Project :
    - Integration of "Templates", "FreeRTOS\_ThreadCreation" and "OpenAMP\_raw" examples
  - STM32CubeIDE Project
    - Integration of "Templates", "FreeRTOS\_ThreadCreation", "OpenAMP\_raw", and "GPIO\_EXTI" examples
  - New LL drivers (I2C, EXTI, DMA, LPTIM, TIM, WWDG, PWR, SPI, HSEM)
  - New Examples
    - Basic PWR CSTOP example and UART Transmit & Receive in console
  - CMSIS V5.4.0
  - New OpenAMP structure
  - New Application (OpenAMP Dynamic Resources Manager example)

#### Features already available in previous version

- - The *STM32Cube HAL*, *STM32 abstraction layer embedded software* ensuring maximized portability across the STM32 portfolio. HAL APIs are available for all peripherals.
  - Low-layer APIs (LL) offering a fast lightweight expert-oriented layer that is closer to the hardware than the HAL. LL APIs are available only for a set of peripherals.
  - A consistent set of middleware components such as FreeRTOS, OpenAMP.
  - All embedded software utilities, delivered with a full set of examples.

#### 4.2.3 STM32MP15 distribution for Android (Cortex<sup>®</sup>-A7) - NEW

*STM32MP15 distribution for Android™* v1.0.0 (**st-android-9.0.0-2019-09-27** tag) is the version delivered with STM32MP15-Ecosystem-v1.1.0 release

Aim of this release:

- **Android™ 9.0.0** porting on OpenSTLinux BSP v1.1.0 (TF-A, U-Boot, OP-TEE, Linux kernel), provided as **demonstrator**
- Android™ certifications are not ensured

See [STM32MP15 distribution for Android release note](#) for more details.

## 4.3 STM32CubeProgrammer, Signing tool, Keygen

STM32CubeProgrammer v2.2.0 is the version delivered with STM32MP15-Ecosystem-v1.1.0 release. This is an evolutive maintenance release for STM32CubeProgrammer.

#### Features already available in previous version

- STM32CubeProg installer includes STM32CubeProgrammer, Keygen and Signing tools
- Flashload SDCard, eMMC, NAND, NOR images through USB and UART for STM32MP157C-EV1, STM32MP157A-DK1, STM32MP157C-DK2 boards
- Private and public keys generation

- Images signature with hash public key
- Flashlayout file format change
- STM32MP1 fuses management (with console interface only)
- PMIC NVM management (with console interface only)

## 4.4 STM32CubeMX

STM32CubeMX-v5.4 is the version delivered with STM32MP15-Ecosystem-v1.1.0 release

- **Main NEW features coming with STM32CubeMX-v5.4 version, delivered with STM32MP15-Ecosystem-v1.1.0 release**
  - For Cortex-M4 projects, IAR support, Keil support and CubeIDE project support
  - RCC with PLL spread spectrum mode support in device tree
  - Device tree compliance with Openstlinux-4.19-thud-mp1-19-10-09 version
  - Compliant with STM32CubeMP1-v1.1.0
  - LL drivers (DMA, SYS, LPTIM, SPI, RCC, GPIO, PWR, WWDG, USART, I2C)

## 4.5 STM32CubeIDE - NEW

**STM32CubeIDE V1.1.0** release is the new version delivered with STM32MP15-Ecosystem-v1.1.0 release.

**STM32CubeIDE tool is now the Eclipse IDE ST reference.**

The STM32CubeIDE V1.1.0 release supports same features set than SW4STM32 IDE V2.9.0. **The main features are**

- Cortex-M4 STM32CubeMP1 in "Production mode" and "Engineering mode"
- Cortex-M4 Firmware compilation, Load, Debug
- PC Linux with Ethernet (recommended) or serial link
- PC Windows with Ethernet or Ethernet over USB link
- Cortex-M4 Firmware installation directory configurable



Customers can continue to use SW4STM32 IDE but the ST Eclipse reference is STM32CubeIDE. In case of support, ST will focus and recommend STM32CubeIDE tool. SW4STM32 projects can be imported in STM32CubeIDE V1.1.0

## 4.6 Miscellaneous

- Detailed features are available in the release notes of the different items constituting this delivery.
- See sections [STM32MPU Embedded Software distribution detailed release notes](#), [Referenced tools release notes](#) and [Reference documents](#)





---

## 5 Recommendations of use

---

### 5.1 Safe

- Prototype some applications based on ST boards
- Develop Linux application, libraries, kernel modules based on OpenSTLinux distribution
- Develop Android™ applications, libraries, kernel modules based on STM32MPU distribution for Android
- Develop STM32Cube application with coprocessing link based on STM32CubeMP1 delivery
- Active application using low power modes (Stop and Standby)
- Flashload and boot from all flashes SDCard, eMMC, NAND ONFI, NOR
- Develop board based on STM32MP15x Lines

### 5.2 Not recommended

None

---

## 6 Main restriction list

---

Restrictions lists are available in each sub-component release note, accessible from the following chapters in this same article:

- [STM32MPU Embedded Software distribution detailed release notes](#)
- [Referenced tools release notes](#)

Moreover, the software workarounds implemented in the ecosystem to answer to the STM32MPU device errata are listed in [STM32MP15 ecosystem errata sheet](#).

---

## 7 Minor release updates

---

STMicroelectronics regularly delivers updates through [github®](#) components which are [tf-a](#), [u-boot](#), [optee-os](#), [Linux kernel](#). You can decide to incorporate them into your developer package (please refer to [STM32MP1 Developer Package](#)) or Distribution package (see below).

To update the Distribution package please proceed as follow:

1. Switch your Distribution package [reference source code](#) to [github mode](#)
2. Use the command `devtool modify <recipe name>` to have direct access to the source code git repository used by the build process
3. In the freshly cloned source code, checkout the revision you want to start from via `git checkout -b WORK <github® TAG>`



More rarely and independently, STMicroelectronics also delivers fixes on layers through github®. These changes can be integrated (via git commands) into your local STM32MP1 Distribution Package environment. Please find below the github® links of the quoted layers :

- [meta-st-stm32mp](#)
- [meta-st-openstlinux](#)
- [meta-st-stm32mp-addons](#)

## 7.1 v1.1.1

[OpenSTLinux updates v1.1.1](#)

[STM32CubeMP1 updates v1.1.1](#)

## 8 Reference documents

All the resources for the STM32MP1 Series are in the Resources area of the [STM32MP1 Series web page](#).

The resources below are referenced in some of the articles in this user guide for the STM32MP1 Series.



The different **STM32MP15** microprocessor **part numbers** available (with their corresponding internal peripherals, security options and packages) are described in the [STM32MP15 microprocessor part numbers](#).









means that the document (or its version) is new compared to what was delivered for the previous ecosystem release.

Reference	Name	Link	Version
<b>Application notes</b>			
AN 4803	High-speed SI simulations using IBIS and board-level simulations using HyperLynx® SI on STM32 MCUs and MPUs	<a href="#">AN4803.pdf</a>	v2.0
AN 4860	DSI Host on STM32F469/479, STM32F7x8/x9 and STM32L4R9/S9 MCUs	<a href="#">AN4860.pdf</a>	v2.0
AN 5027	Interfacing PDM digital microphones using STM32 MCUs and MPUs	<a href="#">AN5027.pdf</a>	v2.0
AN5031	Getting started with STM32MP15 Series hardware development	<a href="#">AN5031.pdf</a>	v1.0
AN 5036	Thermal management guidelines for STM32 applications	<a href="#">AN5036.pdf</a>	v3.0
AN5109	STM32MP1 Series using low-power modes	<a href="#">AN5109.pdf</a>	v3.0



Reference	Name	Link	Version
<b>Application notes</b>			
AN5122	STM32MP1 Series DDR memory routing guidelines	<a href="#">AN5122.pdf</a>	v3.0
AN5168	STM32MP1 series DDR configuration	<a href="#">AN5168.pdf</a>	v1.0
AN5225	USB Type-C™ Power Delivery using STM32xx Series MCUs and STM32xxx Series MPUs	<a href="#">AN5225.pdf</a>	v2.0
AN5253	Migration of microcontroller applications from STM32F4x9 lines to STM32MP151, STM32MP153 and STM32MP157 lines microprocessor	<a href="#">AN5253.pdf</a>	v1.0
AN5256	STM32MP151, STM32MP153 and STM32MP157 discrete power supply hardware integration	<a href="#">AN5256.pdf</a>	v1.0
AN5275	USB DFU/USART protocols used in STM32MP1 Series bootloaders	<a href="#">AN5275.pdf</a>	v1.0
AN5284	STM32MP1 series system power consumption	<a href="#">AN5284.pdf</a>	v1.0
AN5348	FDCAN peripheral on STM32 devices	<a href="#">AN5348.pdf</a>	v1.0
<b>Datasheets<sup>[1]</sup></b>			
DS12505	STM32MP157C datasheet (secure)	<a href="#">DS12505.pdf</a>	v2.0
DS12504	STM32MP157A datasheet (basic)	<a href="#">DS12504.pdf</a>	v2.0
DS12503	STM32MP153C datasheet (secure)	<a href="#">DS12503.pdf</a>	v2.0
DS12502	STM32MP153A datasheet (basic)	<a href="#">DS12502.pdf</a>	v2.0
DS12501	STM32MP151C datasheet (secure)	<a href="#">DS12501.pdf</a>	v2.0
DS12500	STM32MP151A datasheet (basic)	<a href="#">DS12500.pdf</a>	v2.0
DS12792	STPMIC1 datasheet	<a href="#">stpmic1.pdf</a>	v2.0
<b>Errata sheets</b>			



Reference	Name	Link	Version
<b>Application notes</b>			
ES0438	STM32MP15xx device errata	ES043 8.pdf	 v2.0
<b>Reference manuals<sup>[1]</sup></b>			
RM0436	STM32MP157 reference manual (STM32MP157xxx advanced Arm <sup>®</sup> -based 32-bit MPUs)	RM043 6.pdf	 v3.0
RM0442	STM32MP153 reference manual (STM32MP153xxx advanced Arm <sup>®</sup> -based 32-bit MPUs)	RM044 2.pdf	 v3.0
RM0441	STM32MP151 reference manual (STM32MP151xxx advanced Arm <sup>®</sup> -based 32-bit MPUs)	RM044 1.pdf	 v3.0
<b>Boards schematics</b>			
MB1262 schematics	STM32MP157C-EV1 motherboard schematics MB1262-C01 board schematic (Evaluation board)	MB126 2-C01. pdf	v1.0
MB1263 schematics	STM32MP157C-EV1 daughterboard schematics MB1263-C01 board schematic (Evaluation board)	MB126 3-C01. pdf	v1.0
MB1230 schematics	DSI 720p LCD display daughterboard schematics MB1230-C board schematic (Evaluation board)	MB126 3-C.pdf	 v1.1
MB1379 schematics	Camera daughterboard schematics MB1379-A01 board schematic (Evaluation board)	MB137 9-A01. pdf	v1.0
MB1272 schematics	STM32MP157x-DKx motherboard schematics MB1272-DK2-C01 board schematic (Discovery kit)	MB127 2-C01. pdf	v1.0
MB1407 schematics	STM32MP157x-DKx daughterboard schematics MB1407-LCD-C01 board schematic (Discovery kit)	MB140 7-C01. pdf	v1.0
<b>Boards user manuals</b>			
UM2535	STM32MP157x-EV1 evaluation board user manual	UM253 5.pdf	 v2.0
UM2534	STM32MP157x-DKx discovery board user manual	UM253 4.pdf	v1.0



## 9 How to get the software and start with this release?

The list of embedded software packages available for download depends on the selected package.

The table below provides the available board part numbers and the source of information in order to:

- Get started with one of the three available Packages (Starter, Developer or Distribution Packages)
- Get started with the board
- Find the associated embedded software distributions
- **Download** source code
- **Build** an embedded software

Board part number	Jump to
STM32MP157C-EV1 Evaluation board	<a href="#">STM32MP15 Evaluation boards - getting started, including software download</a>
STM32MP157X-DKX Discovery kit	<a href="#">STM32MP15 Discovery kits - getting started, including software download</a>

## 10 STM32MPU Embedded Software distribution detailed release notes

The table below lists the software packages available in the STM32MPU Embedded Software distributions, and provides the corresponding release notes.

The release notes provide more information and details about the features and content of each package.

The release notes does not explain how to get software. For that, refer chapter [How to get the software and start with this release](#)

Firmware	Release note	Version
OpenSTLinux Distribution	<a href="#">STM32MP15 OpenSTLinux release note - v1.1.0</a>	openstlinux-4.19-thud-mp1-19-10-09
STM32Cube MPU Package	<a href="#">STM32CubeMP1 Package release note - v1.1.0</a>	STM32CubeMP1-v1.1.0
STM32 MPU Distribution for Android	<a href="#">STM32MP15 distribution for Android release note - v1.0.0</a>	st-android-9.0.0-2019-09-27

## 11 Referenced tools release notes

The table below lists the available tools, and provides links to the respective release notes.

Each release note provides information on how to install and use the corresponding tool.

The set of tools to be downloaded depends on the Package to be used (double check [Which Package better suits your needs](#) article to find more information on each Package).

Tools	Release notes	Host PC		Which Package may need the tool ?		
		Linux version	Windows version	Starter Package	Developer Package	Distribution Package
STM32CubeIDE	<a href="#">STM32CubeIDE_release_note</a>	1.1.0	1.1.0			
STM32CubeMX	<a href="#">STM32CubeMX_release_note</a>	from 5.4	from 5.4			
STM32CubeProgrammer	<a href="#">STM32CubeProgrammer_release_note</a>	2.2.0	2.2.0			
Keygen	<a href="#">KeyGen_release_note</a>	1.0.0	1.0.0			
Signing tool	<a href="#">Signing tool_release_note</a>	1.0.0	1.0.0			

## 12 References

- 1.01.1 The part numbers are specified in [STM32MP15 microprocessor part numbers](#)

(Software)Integrated development/design/debugging environment

Microprocessor Unit

Evaluation board

Power Management Integrated Circuit

Discovery kit



Trusted Firmware for Arm Cortex-A

Das U-Boot -- the Universal Boot Loader (see [U-Boot\\_overview](#))

Open Portable Trusted Execution Environment

Reset and Clock Control

Serial Peripheral Interface

USB On-The-Go (Capability/type of USB port, acting primarily as USB device, to also act as USB host. Also known as USB OTG.)

Graphics Processing Units

Digital Filter for Sigma-Delta Modulator

Software development kit (A programming package that enables a programmer to develop applications for a specific platform.)

TeleTYpewriter

General-Purpose Input/Output (A realization of open ended transmission between devices on an embedded level. These pins available on a processor can be programmed to be used to either accept input or provide output to external devices depending on user desires and applications requirements.)

External Interrupt

Low layer of STM32Cube

Inter-Integrated Circuit (Bi-directional 2-wire bus standard for efficient inter-IC control.)

Direct Memory Access

low-power timer (STM32 specific)

Hardware Semaphore

Universal Asynchronous Receiver/Transmitter

Cortex Microcontroller Software Interface Standard

Hardware Abstraction Layer

Board support package

former spelling for eMMC ('e' in italic)

Non Volatile Memory, like a flash memory

Universal Synchronous/Asynchronous Receiver/Transmitter

Open NAND Flash interface (The ONFI working group, acronym for Open NAND Flash Interface, was founded in 2005. The group's mission consists in creating a common industry standard for NAND Flash interfaces, to simplify integration of NAND Flash memory into consumer electronics (CE) devices and computing platforms. ST is one of the co-founder companies together with Hynix, Intel, Micron, Phison and Sony.)

Display Serial Interface (MIPI® Alliance standard)

Doubledata rate (memory domain)

USB port or connector

Device Firmware Upgrade

## Permission error



*Stable: 09.10.2019 - 12:44 / Revision: 08.10.2019 - 08:12*

You do not have permission to read this page, for the following reason:

The action "Read pages" for the draft version of this page is only available for the groups ST\_editors, ST\_readers, Selected\_editors, sysop, reviewer

## Permission error

---

*Stable: 03.04.2020 - 07:39 / Revision: 26.03.2020 - 13:06*

You do not have permission to read this page, for the following reason:

The action "Read pages" for the draft version of this page is only available for the groups ST\_editors, ST\_readers, Selected\_editors, sysop, reviewer

## Permission error

---

*Stable: 21.02.2020 - 08:38 / Revision: 18.02.2020 - 08:01*

You do not have permission to read this page, for the following reason:

The action "Read pages" for the draft version of this page is only available for the groups ST\_editors, ST\_readers, Selected\_editors, sysop, reviewer

## Permission error

---

*Stable: 22.01.2020 - 16:08 / Revision: 22.01.2020 - 10:33*

You do not have permission to read this page, for the following reason:

The action "Read pages" for the draft version of this page is only available for the groups ST\_editors, ST\_readers, Selected\_editors, sysop, reviewer

## Permission error

---

*Stable: 02.04.2020 - 08:52 / Revision: 02.04.2020 - 08:49*

You do not have permission to read this page, for the following reason:

The action "Read pages" for the draft version of this page is only available for the groups ST\_editors, ST\_readers, Selected\_editors, sysop, reviewer

## Permission error

---

*Stable: 25.02.2020 - 08:56 / Revision: 25.02.2020 - 08:37*

You do not have permission to read this page, for the following reason:

The action "Read pages" for the draft version of this page is only available for the groups ST\_editors, ST\_readers, Selected\_editors, sysop, reviewer





## Permission error

---

*Stable: 21.02.2020 - 09:24 / Revision: 20.02.2020 - 13:59*

You do not have permission to read this page, for the following reason:

The action "Read pages" for the draft version of this page is only available for the groups ST\_editors, ST\_readers, Selected\_editors, sysop, reviewer

## Permission error

---

*Stable: 10.10.2019 - 12:43 / Revision: 10.10.2019 - 12:42*

You do not have permission to read this page, for the following reason:

The action "Read pages" for the draft version of this page is only available for the groups ST\_editors, ST\_readers, Selected\_editors, sysop, reviewer

## Permission error

---

*Stable: 25.09.2019 - 13:39 / Revision: 25.09.2019 - 13:38*

You do not have permission to read this page, for the following reason:

The action "Read pages" for the draft version of this page is only available for the groups ST\_editors, ST\_readers, Selected\_editors, sysop, reviewer

## Permission error

---

*Stable: 26.09.2019 - 14:30 / Revision: 26.09.2019 - 12:48*

You do not have permission to read this page, for the following reason:

The action "Read pages" for the draft version of this page is only available for the groups ST\_editors, ST\_readers, Selected\_editors, sysop, reviewer

## Permission error

---

*Stable: 29.01.2020 - 15:30 / Revision: 29.01.2020 - 15:26*

You do not have permission to read this page, for the following reason:

The action "Read pages" for the draft version of this page is only available for the groups ST\_editors, ST\_readers, Selected\_editors, sysop, reviewer

## Permission error

---

*Stable: 02.04.2020 - 10:09 / Revision: 02.04.2020 - 10:06*

You do not have permission to read this page, for the following reason:

The action "Read pages" for the draft version of this page is only available for the groups ST\_editors, ST\_readers, Selected\_editors, sysop, reviewer



## Permission error

---

*Stable: 18.12.2019 - 14:34 / Revision: 18.12.2019 - 14:28*

You do not have permission to read this page, for the following reason:

The action "Read pages" for the draft version of this page is only available for the groups ST\_editors, ST\_readers, Selected\_editors, sysop, reviewer

## Permission error

---

*Stable: 21.02.2020 - 08:35 / Revision: 12.02.2020 - 11:01*

You do not have permission to read this page, for the following reason:

The action "Read pages" for the draft version of this page is only available for the groups ST\_editors, ST\_readers, Selected\_editors, sysop, reviewer

## Permission error

---

*Stable: 22.11.2019 - 07:46 / Revision: 20.11.2019 - 16:05*

You do not have permission to read this page, for the following reason:

The action "Read pages" for the draft version of this page is only available for the groups ST\_editors, ST\_readers, Selected\_editors, sysop, reviewer

## Permission error

---

*Stable: 27.01.2020 - 11:06 / Revision: 27.01.2020 - 11:05*

You do not have permission to read this page, for the following reason:

The action "Read pages" for the draft version of this page is only available for the groups ST\_editors, ST\_readers, Selected\_editors, sysop, reviewer

## Permission error

---

*Stable: 21.02.2020 - 10:24 / Revision: 20.02.2020 - 08:39*

You do not have permission to read this page, for the following reason:

The action "Read pages" for the draft version of this page is only available for the groups ST\_editors, ST\_readers, Selected\_editors, sysop, reviewer

## Permission error

---

*Stable: 21.02.2020 - 13:31 / Revision: 12.02.2020 - 08:10*

You do not have permission to read this page, for the following reason:



The action "Read pages" for the draft version of this page is only available for the groups ST\_editors, ST\_readers, Selected\_editors, sysop, reviewer

## Permission error

---

*Stable: 16.01.2020 - 14:45 / Revision: 16.01.2020 - 14:42*

You do not have permission to read this page, for the following reason:

The action "Read pages" for the draft version of this page is only available for the groups ST\_editors, ST\_readers, Selected\_editors, sysop, reviewer

## Permission error

---

*Stable: 27.01.2020 - 11:09 / Revision: 27.01.2020 - 11:08*

You do not have permission to read this page, for the following reason:

The action "Read pages" for the draft version of this page is only available for the groups ST\_editors, ST\_readers, Selected\_editors, sysop, reviewer

## Permission error

---

*Stable: 23.01.2020 - 13:52 / Revision: 23.01.2020 - 13:46*

You do not have permission to read this page, for the following reason:

The action "Read pages" for the draft version of this page is only available for the groups ST\_editors, ST\_readers, Selected\_editors, sysop, reviewer