

## SUSE Linux Enterprise Server for SAP Applications 15 SP5 (prerelease)

# Release Notes

This document provides guidance and an overview to high-level general features and updates for SUSE Linux Enterprise Server for SAP Applications 15 SP5 (prerelease). In addition to architecture- or product-specific information, it also describes the capabilities and limitations of SUSE Linux Enterprise Server for SAP Applications 15 SP5 (prerelease).

*This product will be released in June 2023.* The latest version of these release notes is always available at <https://www.suse.com/releasenotes> . Drafts of the general documentation can be found at <https://susedoc.github.io/docs/slesforsap/main> .

Publication Date: 2023-04-12, Version: 15.5.20230412

## Contents

- 1 About the release notes 3
- 2 SUSE Linux Enterprise Server for SAP Applications 3
- 3 Modules, Extensions, and Related Products 9
- 4 Changes affecting all architectures 11
- 5 New Features, Changes & Fixes 11
- 6 Known Issues & Workarounds 13
- 7 Removed and Deprecated Features and Packages 14
- 8 Obtaining source code 15

- 9 Legal notices **15**
- A Changelog for 15 SP5 (prerelease) **17**

# 1 About the release notes

These Release Notes are identical across all architectures, and the most recent version is always available online at <https://www.suse.com/releasenotes> .

Entries are only listed once but they can be referenced in several places if they are important and belong to more than one section.

Release notes usually only list changes that happened between two subsequent releases. Certain important entries from the release notes of previous product versions are repeated. To make these entries easier to identify, they contain a note to that effect.

However, repeated entries are provided as a courtesy only. Therefore, if you are skipping one or more service packs, check the release notes of the skipped service packs as well. If you are only reading the release notes of the current release, you could miss important changes.

## 2 SUSE Linux Enterprise Server for SAP Applications

SUSE Linux Enterprise Server for SAP Applications 15 SP5 (prerelease) is the leading Linux platform for SAP HANA, SAP NetWeaver, and SAP S/4HANA applications that provides optimized performance, reduced downtime, and faster SAP landscape deployments. It includes features to secure SAP HANA systems and ease the transition to SAP S/4HANA for systems administrators. SUSE Linux Enterprise Server for SAP Applications combines SUSE Linux Enterprise Server and SUSE Linux Enterprise High Availability Extension with additional software specifically meant to simplify running and managing SAP applications. This document provides an overview of high-level general features, capabilities, and limitations of SUSE Linux Enterprise Server for SAP Applications 15 SP5 (prerelease) and important product updates.

## 2.1 What Is New?

### 2.1.1 General Changes

#### Media Changes

The Unified Installer and Packages DVDs known from SUSE Linux Enterprise Server for SAP Applications 15 SP1 are deprecated and have been replaced by the following media:

- **Online Installation Media:** All SUSE Linux Enterprise 15 products can be installed with this stand alone media, after entering a registration key. The necessary packages are fetched from online repositories only. For information about available modules, see [https://www.suse.com/releasenotes/x86\\_64/SUSE-SLES/15-SP2#Intro.ModuleExtensionRelated](https://www.suse.com/releasenotes/x86_64/SUSE-SLES/15-SP2#Intro.ModuleExtensionRelated) ↗
- **Full Installation Media:** All SUSE Linux Enterprise Server for SAP Applications 15 products can be installed without network connection with this media, for offline installation scenarios. The media contains all necessary packages. It consists of directories with module repositories which need to be added manually as needed. RMT (Repository Mirroring Tool) and SUSE Manager provide additional options for disconnected or managed installation.

#### Extended Package Search

Use the new Zypper command `zypper search-packages` to search across all SUSE repositories available for your product even if they are not yet enabled. This functionality makes it easier for administrators and system architects to find the software packages needed. To do so, it leverages the SUSE Customer Center.

#### Software Development Kit

With SLE 15, the Software Development Kit is now integrated into the products. Development packages are packaged alongside regular packages. In addition, the *Development Tools* module contains the tools for development.

#### RMT Replaces SMT

SMT (Subscription Management Tool) has been removed. Instead, RMT (Repository Mirroring Tool) now allows mirroring SUSE repositories and custom repositories. You can then register systems directly with RMT. In environments with tightened security, RMT can also proxy other RMT servers.

## Kernel

SLE 15 SP5 (prerelease) will come with Kernel 5.3. This new kernel release includes upstream features like 16 million new IPv4 addresses, utilization clamping support in the task scheduler, power efficient userspace waiting with the umwait x86 instructions and many more.

## MAJOR UPDATES TO THE SOFTWARE SELECTION:

## Salt

SLE 15 SP5 (prerelease) can be managed via salt to help integration into up-to-date management solutions, such as SUSE Manager.

## Python 3

As the first enterprise distribution, SLE 15 offers full support for Python 3 development in addition to Python 2.

## Directory Server

389 Directory Server replaces OpenLDAP to provide a sustainable directory service.

## 2.2 Important Sections of This Document

If you are upgrading from a previous SUSE Linux Enterprise Server for SAP Applications release, you should review at least the following sections:

- *Section 2.6, “Support statement for SUSE Linux Enterprise Server for SAP Applications”*

## 2.3 Security, Standards, and Certification

SUSE Linux Enterprise Server for SAP Applications 15 SP5 (prerelease) has been submitted to the certification bodies for:

- Common Criteria Certification, see <https://www.commoncriteriaportal.org/> 
- FIPS 140-2 validation, see <http://csrc.nist.gov/groups/STM/cmvp/documents/140-1/140InProcess.pdf> 

For more information about certification, see <https://www.suse.com/security/certificates.html> .

## 2.4 Documentation and other information

### 2.4.1 Available on the product media

- Read the READMEs on the media.
- Get the detailed change log information about a particular package from the RPM (where *FILENAME.rpm* is the name of the RPM):

```
rpm --changelog -qp FILENAME.rpm
```

- Check the ChangeLog file in the top level of the installation medium for a chronological log of all changes made to the updated packages.
- Find more information in the docu directory of the installation medium of SUSE Linux Enterprise Server for SAP Applications 15 SP5 (prerelease). This directory includes PDF versions of the SUSE Linux Enterprise Server for SAP Applications 15 SP5 (prerelease) Installation Quick Start Guide.

### 2.4.2 Online documentation

- For the most up-to-date version of the documentation for SUSE Linux Enterprise Server for SAP Applications 15 SP5 (prerelease), see <https://susedoc.github.io/doc-slesforsap/main> (draft version).
- Find a collection of White Papers in the SUSE Linux Enterprise Server for SAP Applications Resource Library at <https://www.suse.com/products/server#resources>.

## 2.5 Support and life cycle

SUSE Linux Enterprise Server for SAP Applications is backed by award-winning support from SUSE, an established technology leader with a proven history of delivering enterprise-quality support services.

SUSE Linux Enterprise Server for SAP Applications 15 has a 13-year life cycle, with 10 years of General Support and 3 years of Extended Support. SUSE Linux Enterprise Server for SAP Applications comes with Extended Service Pack Overlap Support by default, this means SP5 will be fully maintained and supported until 3.5 years after the release of SUSE Linux Enterprise Server for SAP Applications 15 SP6.

For more information, check our Support Policy page <https://www.suse.com/support/policy.html> or the Long Term Service Pack Support Page <https://www.suse.com/support/programs/long-term-service-pack-support.html>.

## 2.6 Support statement for SUSE Linux Enterprise Server for SAP Applications

To receive support, you need an appropriate subscription with SUSE. For more information, see [https://www.suse.com/support/programs/subscriptions/?id=SUSE\\_Linux\\_Enterprise\\_Server\\_for\\_SAP\\_Applications](https://www.suse.com/support/programs/subscriptions/?id=SUSE_Linux_Enterprise_Server_for_SAP_Applications).

The following definitions apply:

### L1

Problem determination, which means technical support designed to provide compatibility information, usage support, ongoing maintenance, information gathering and basic troubleshooting using available documentation.

### L2

Problem isolation, which means technical support designed to analyze data, reproduce customer problems, isolate problem area and provide a resolution for problems not resolved by Level 1 or prepare for Level 3.

### L3

Problem resolution, which means technical support designed to resolve problems by engaging engineering to resolve product defects which have been identified by Level 2 Support.

For contracted customers and partners, SUSE Linux Enterprise Server for SAP Applications is delivered with L3 support for all packages, except for the following:

- Technology Previews, see [Section 2.7, “Technology Previews”](#)
- Sound, graphics, fonts and artwork

- Some packages shipped as part of the module *Workstation Extension* are L2-supported only
- Packages with names ending in `-devel` (containing header files and similar developer resources) will only be supported together with their main packages.

SUSE will only support the usage of original packages. That is, packages that are unchanged and not recompiled.

### 2.6.1 General support

To learn about supported features and limitations, refer to the following sections in this document:

- *Section 5, "New Features, Changes & Fixes"*
- *Section 6, "Known Issues & Workarounds"*
- *Section 7, "Removed and Deprecated Features and Packages"*

### 2.6.2 Software requiring specific contracts

Certain software delivered as part of SUSE Linux Enterprise Server for SAP Applications may require an external contract. Check the support status of individual packages using the RPM metadata that can be viewed with `rpm`, `zypper`, or YaST.

Major packages and groups of packages affected by this are:

- PostgreSQL (all versions, including all subpackages)

### 2.6.3 SAP Support Statement

Make sure to also review the [SAP Product Availability Matrix \(https://apps.support.sap.com/sap/support/pam\)](https://apps.support.sap.com/sap/support/pam) and/or [SAP Note 2235581 - SAP HANA: Supported Operating Systems \(https://launchpad.support.sap.com/#/notes/2235581\)](https://launchpad.support.sap.com/#/notes/2235581) for official SAP support and certification statements.



## 2.6.4 Software under GNU AGPL

SUSE Linux Enterprise Server for SAP Applications 15 SP5 (prerelease) (and the SUSE Linux Enterprise modules) includes the following software that is shipped *only* under a GNU AGPL software license:

- Ghostscript (including subpackages)

SUSE Linux Enterprise Server for SAP Applications 15 SP5 (prerelease) (and the SUSE Linux Enterprise modules) includes the following software that is shipped under multiple licenses that include a GNU AGPL software license:

- MySpell dictionaries and LightProof
- ArgyllCMS

## 2.7 Technology Previews

Technology previews are packages, stacks, or features delivered by SUSE which are not supported. They may be functionally incomplete, unstable or in other ways not suitable for production use. They are included for your convenience and give you a chance to test new technologies within an enterprise environment.

Whether a technology preview becomes a fully supported technology later depends on customer and market feedback. Technology previews can be dropped at any time and SUSE does not commit to providing a supported version of such technologies in the future.

Give your SUSE representative feedback about technology previews, including your experience and use case.

# 3 Modules, Extensions, and Related Products

This section comprises information about modules and extensions for SUSE Linux Enterprise Server for SAP Applications 15 SP5 (prerelease). Modules and extensions add functionality to the system.

## 3.1 Modules in the SLE 15 SP5 (prerelease) Product Line

The SLE 15 SP5 (prerelease) product line is made up of modules that contain software packages. Each module has a clearly defined scope. Modules differ in their life cycles and update timelines. The modules available within the product line based on SUSE Linux Enterprise 15 SP5 (prerelease) at the release of SUSE Linux Enterprise Server for SAP Applications 15 SP5 (prerelease) are listed in the *Modules and Extensions Quick Start* at <https://susedoc.github.io/doc-sle/main/html/SLES-modulesquick/>  (draft version).

Not all SLE modules are available with a subscription for SUSE Linux Enterprise Server for SAP Applications 15 SP5 (prerelease) itself (see the column *Available for*).

For information about the availability of individual packages within modules, see <https://scc.suse.com/packages> .

## 3.2 Available Extensions

Extensions add extra functionality to the system and require their own registration key, usually at additional cost. Most extensions have their own release notes documents that are available from <https://www.suse.com/releasesnotes> .

The following extensions are available for SUSE Linux Enterprise Server for SAP Applications 15 SP5 (prerelease):

- SUSE Linux Enterprise Live Patching: <https://www.suse.com/products/live-patching> 

The following extension is not covered by SUSE support agreements, available at no additional cost, and without an extra registration key:

- SUSE Package Hub: <https://packagehub.suse.com/> 

## 3.3 Derived and Related Products

This sections lists derived and related products. Usually, these products have their own release notes documents that are available from <https://www.suse.com/releasesnotes> .

- SUSE Linux Enterprise Server: <https://www.suse.com/products/server> 
- SUSE Linux Enterprise JeOS: <https://www.suse.com/products/server/jeos> 

- SUSE Linux Enterprise Desktop: <https://www.suse.com/products/desktop> ↗
- SUSE Linux Enterprise for High-Performance Computing: <https://www.suse.com/products/server/hpc> ↗
- SUSE Linux Enterprise Real Time: <https://www.suse.com/products/realtime> ↗
- SUSE Manager: <https://www.suse.com/products/suse-manager> ↗

## 4 Changes affecting all architectures

Information in this section applies to all architectures supported by SUSE Linux Enterprise Server for SAP Applications 15 SP5 (prerelease).

## 5 New Features, Changes & Fixes

Information in this section applies to all architectures supported by SUSE Linux Enterprise Server for SAP Applications 15 SP5 (prerelease) unless noted otherwise.

### 5.1 Silence `KillMode=None` messages

The log level of the deprecation warnings regarding `killmode=None` have been reduced. Instead of warning, they are now logged at the debug log level.

### 5.2 Enriched system visibility in the SUSE Customer Center (SCC)

SUSE is committed to helping provide better insights into the consumption of SUSE subscriptions regardless of where they are running or how they are managed; physical or virtual, on-prem or in the cloud, connected to SCC or Repository Mirroring Tool (RMT), or managed by SUSE Manager. To help you identify or filter out systems in SCC that are no longer running or decommissioned, SUSEConnect now features a daily “ping”, which will update system information automatically. For more details see the documentation at <https://documentation.suse.com/subscription/suseconnect/single-html/SLE-suseconnect-visibility/> ↗.

## 5.3 SAP native systemd support

In the past for Linux the systemV init service `sapinit` was starting the SAP Host Agent and all the `sapstartsrv` processes listed in `/usr/sap/sapservices`. A real systemd integration was not available.

Now the native integration of SAP Host Agent is started via the `saphostagent.service` unit. Adaptations to the `saphostagent.service` unit must be done by adding a so-called drop-in file. For any native integrated SAP instance a systemd unit with name schema `SAP<SID>_<IN0>` (for example, `SAPEN1_10`) is added. Adaptations should be done using a drop-in file. It is highly recommended to still use the `sapcontrol` functions which guarantees also the functionality of cluster integration like the `sap-suse-cluster-connector`.

Before you start your new installation or update to the native systemd integration, make sure you update the resource agent packages to the newest available versions. The native SAP systemd integration is supported starting with the following package versions for SUSE Linux Enterprise Server for SAP Applications 15:

- resource-agents 4.10.0
- sapstartsrv-resource-agents 0.9.0 + git.1645795466.55a8cca-1.12.1
- SAPHanaSR 0.155.0
- SAPHanaSR-ScaleOut 0.181.0

For details please refer to the manual pages `ocf_suse_SAPStartSrv(7)`, `SAPHanaSR(7)`, and `SAPHanaSR-ScaleOut(7)`.

## 5.4 SAP HANA HADR provider hook script `susCostOpt.py`

The RPM `SAPHanaSR` now contains an HANA HADR provider hook script for the method `postTakeover()`. This script can be used to change HANA memory limits and table preload for the replicated HANA database in the scale-up cost-optimized setup. For details please refer to manual page `susCostOpt.py(7)`.

## 5.5 SAP HANA HADR provider hook script `susTkOver.py`

The RPM `SAPHanaSR` now contains an HANA HADR provider hook script for the method `preTakeover()`. This script can be used to block manual HANA `sr_takeover` as long as the SUSE cluster is controlling the HANA database. Manual `sr_takeover` will be allowed only in context of the described maintenance procedures. For details please refer to manual pages `susTkOver.py(7)` and `SAPHanaSR_maintenance_examples(7)`.

## 5.6 5.6 SAPHanaSR-angi: SAP HANA SR - An Next Generation Interface

`SAPHanaSR-angi` is "SAP HANA SR - An Next Generation Interface" for SUSE high availability clusters to manage SAP HANA databases with system replication. Goal of `SAPHanaSR-angi` is consolidating and finally replacing the `SAPHanaSR` and `SAPHanaSR-ScaleOut` packages. The current version of `SAPHanaSR-angi` 1.001 is targeting SAP HANA SR scale-up setups. Nevertheless, CIB attributes are not backward compatible between `SAPHanaSR-angi` and `SAPHanaSR`. So there is currently no easy migration path. `SAPHanaSR-angi` is shipped as technology preview.

# 6 Known Issues & Workarounds

This is a list of known issues for this release.

## 6.1 Workarounds to Enable SAP HANA Workloads on Intel Optane DC Memory

SUSE Linux Enterprise Server for SAP Applications 15 supports Intel Optane DC persistent memory. This enables SAP workloads, such as SAP HANA to benefit from persistent memory. This shortens start times of the system and provides better system stability.

From a file system perspective, the XFS file system is supported for persistent memory, with SAP HANA running in DAX mode. Make sure to also check the SAP instructions for using persistent memory with SAP HANA. SUSE is working closely with SAP on future developments.

If there are pmem namespaces, these need to be destroyed before the installation. To mount persistent memory directly on boot, the respective entries need to be added to `/etc/fstab`, for example:

```
/dev/pmem0    /mnt/pmem0    xfs    dax    0    0
/dev/pmem1    /mnt/pmem1    xfs    dax    0    0
```

Namespaces need to be created individually. Execute the following command for each namespace you want to create:

```
ndctl create-namespace --mode=fsdax --map=dev
```

Because the systemd and udev default timeout may be too short for large memory setups to become usable, your system may run into a timeout and the boot process may stop with an emergency shell. To prevent this from happening, increase the timeout to 1200 seconds. Create the file `/etc/systemd/system/systemd-udev-settle.service.d/00-override.conf` with the following content:

```
[Service]
TimeoutSec=1200s
ExecStart=/usr/bin/udevadm settle -t 300
```

## Important

In an earlier version of this document, we recommended mounting persistent memory with the `nofail` option in `/etc/fstab`. Unfortunately this frequently required a manual mount of pmem devices on reboot. To automatically mount pmem file systems after reboot, we strongly recommend removing the `nofail` option and modifying the timeout value as described above.

## 7 Removed and Deprecated Features and Packages

This section lists features and packages that got removed from SUSE Linux Enterprise Server for SAP Applications or will be removed in upcoming versions.

### 7.1 Removed Features and Packages

The following features and packages have been removed in this release.

### 7.1.1 `yast2-saptune` has been removed

The `yast2-saptune` module has been removed.

## 7.2 Deprecated Features and Packages

The following features and packages are deprecated and will be removed with a future service pack of SUSE Linux Enterprise Server for SAP Applications.

### 7.2.1 `sapwmp` has been deprecated

The `sapwmp` package has been deprecated and will be removed in SLES-SAP 15 SP6.

## 8 Obtaining source code

This SUSE product includes materials licensed to SUSE under the GNU General Public License (GPL). The GPL requires SUSE to provide the source code that corresponds to the GPL-licensed material. The source code is available for download at <https://www.suse.com/download/sle-sap/> on Medium 2. For up to three years after distribution of the SUSE product, upon request, SUSE will mail a copy of the source code. Send requests by e-mail to [sle\\_source\\_request@suse.com](mailto:sle_source_request@suse.com) ([mailto:sle\\_source\\_request@suse.com](mailto:sle_source_request@suse.com)). SUSE may charge a reasonable fee to recover distribution costs.

## 9 Legal notices

SUSE makes no representations or warranties with regard to the contents or use of this documentation, and specifically disclaims any express or implied warranties of merchantability or fitness for any particular purpose. Further, SUSE reserves the right to revise this publication and to make changes to its content, at any time, without the obligation to notify any person or entity of such revisions or changes.

Further, SUSE makes no representations or warranties with regard to any software, and specifically disclaims any express or implied warranties of merchantability or fitness for any particular purpose. Further, SUSE reserves the right to make changes to any and all parts of SUSE software, at any time, without any obligation to notify any person or entity of such changes.

Any products or technical information provided under this Agreement may be subject to U.S. export controls and the trade laws of other countries. You agree to comply with all export control regulations and to obtain any required licenses or classifications to export, re-export, or import deliverables. You agree not to export or re-export to entities on the current U.S. export exclusion lists or to any embargoed or terrorist countries as specified in U.S. export laws. You agree to not use deliverables for prohibited nuclear, missile, or chemical/biological weaponry end uses. Refer to <https://www.suse.com/company/legal/> for more information on exporting SUSE software. SUSE assumes no responsibility for your failure to obtain any necessary export approvals.

Copyright © 2010-2023 SUSE LLC.

This release notes document is licensed under a Creative Commons Attribution-NoDerivatives 4.0 International License (CC-BY-ND-4.0). You should have received a copy of the license along with this document. If not, see <https://creativecommons.org/licenses/by-nd/4.0/>.

SUSE has intellectual property rights relating to technology embodied in the product that is described in this document. In particular, and without limitation, these intellectual property rights may include one or more of the U.S. patents listed at <https://www.suse.com/company/legal/> and one or more additional patents or pending patent applications in the U.S. and other countries.

For SUSE trademarks, see the SUSE Trademark and Service Mark list (<https://www.suse.com/company/legal/>). All third-party trademarks are the property of their respective owners.



## A Changelog for 15 SP5 (prerelease)



### A.1 2023-04-12

#### A.1.1 New

- **Added** *Section 5.6, “5.6 SAPHanaSR-angi: SAP HANA SR - An Next Generation Interface”* (Bugzilla ([https://bugzilla.suse.com/show\\_bug.cgi?id=1210005](https://bugzilla.suse.com/show_bug.cgi?id=1210005)) )

### A.2 2023-02-01

#### A.2.1 New

- *Section 7.1.1, “yast2-saptune has been removed”* (Jira (<https://jira.suse.com/browse/jsc-PED-330>) )
- *Section 5.1, “Silence KillMode=None messages”* (Jira (<https://jira.suse.com/browse/jsc-PED-407>) )



## A.3 2022-11-30

### A.3.1 Removed

- Removed section about SAP HANA HADR provider hook script `susChkSrv.py` because it was incorrectly added to SP5 release notes

## A.4 2022-10-18

### A.4.1 New

- Added *Section 7.2.1, "sapwmp has been deprecated"* (Bugzilla ([https://bugzilla.suse.com/show\\_bug.cgi?id=1201401](https://bugzilla.suse.com/show_bug.cgi?id=1201401)) )
- Added *Section 5.2, "Enriched system visibility in the SUSE Customer Center (SCC)"* (Jira (<https://jira.suse.com/browse/SLE-24988>) )

## A.5 2022-07-14

### A.5.1 New

- Added *Section 5.4, "SAP HANA HADR provider hook script `susCostOpt.py`"* (Bugzilla ([https://bugzilla.suse.com/show\\_bug.cgi?id=1200271](https://bugzilla.suse.com/show_bug.cgi?id=1200271)) )
- Added *Section 5.5, "SAP HANA HADR provider hook script `susTkOver.py`"* (Bugzilla ([https://bugzilla.suse.com/show\\_bug.cgi?id=1200271](https://bugzilla.suse.com/show_bug.cgi?id=1200271)) )

## A.5.2 Removed

- Removed the section about Trento Agent and Server from the Technology Previews (Bugzilla ([https://bugzilla.suse.com/show\\_bug.cgi?id=1201315](https://bugzilla.suse.com/show_bug.cgi?id=1201315)) )

## A.6 2022-05-11

### A.6.1 New

- Added this changelog

### A.6.2 Updated

- Changed the link in the section about Trento Agent and Server

## A.7 2022-04-21

### A.7.1 New

- Added *Section 5.3, "SAP native systemd support"* (Bugzilla ([https://bugzilla.suse.com/show\\_bug.cgi?id=1197511](https://bugzilla.suse.com/show_bug.cgi?id=1197511)) )

## A.8 2022-03-23

### A.8.1 Updated

- Changed wording in the section about Trento Agent and Server

-If you want to use the components of Trento (packages ``trento-agent`` as well...

```
+If you want to use the components of Trento (the agent in package `trento-premium` as well...
```


## A.9 2022-02-16

### A.9.1 New

- Added a section about Trento Agent and Server (Jira (<https://jira.suse.com/browse/PM-3168>) )

## A.10 2022-01-19

### A.10.1 New

- Added note about yast2-saptune deprecation (Jira (<https://jira.suse.com/browse/SLE-21647>) )
- Removed with the addition of *Section 7.1.1, “yast2 - saptune has been removed”* in *Section A.2, “2023-02-01”*

## A.11 2021-11-03

- Initial 15 SP5 (prerelease) release

### A.11.1 Updated

- Changed support length to 3.5 years in *Section 2.5, “Support and life cycle”*