Unbreakable Enterprise Kernel

Unbreakable Enterprise Kernel 8 Update 2 - Release Notes (Version 6.12.0-200)

G44167-04
March 2026

Unbreakable Enterprise Kernel Unbreakable Enterprise Kernel 8 Update 2 - Release Notes (Version 6.12.0-200),

G44167-04

Contents

Preface

Unbreakable Enterprise Kernel 8 Update 2: Release Notes (6.12.0-200) provides a summary of the new features, significant changes, and any known issues in Unbreakable Enterprise Kernel 8 Update 2 (UEK 8U2).

1

About Unbreakable Enterprise Kernel 8 Update 2

This chapter provides an overview of Unbreakable Enterprise Kernel 8 Update 2 (UEK 8U2) and contains important information about this major release.

> **Note**
>
> Upgrading from an Unbreakable Enterprise Kernel Developer Preview release to its later official version isn't supported. If you're running the Developer Preview version, you must reinstall the official UEK release upon its general availability.

UEK 8U2 is initially released with the 6.12.0-200.74.27 version of the kernel. The kernel's source code is available through a public git source code repository at https://github.com/oracle/linux-uek.

The following is a general description of the scope of support for UEK 8U2:

- The kernel is developed, built, and tested on the 64-bit Arm (aarch64), Intel® 64-bit x86_64, and AMD 64-bit x86_64 architectures and is based on the mainline Linux kernel version 6.12 (LTS).
- UEK 8U2 is made available for installation on the latest Oracle Linux 9 update releases and for Oracle Linux 10.
- In UEK 8U2, more features are enabled to provide support for key functional requirements and patches are applied to improve performance and optimize the kernel for use on Oracle operating environments. Note that Oracle actively monitors upstream check-ins and applies critical bug and security fixes to UEK 8U2.
- Although UEK 8U2 uses the same versioning model as the mainline Linux kernel version, it's possible that some applications might not understand the 6.12.0 versioning scheme. Note, however, that regular Linux applications are usually neither aware of nor affected by Linux kernel version numbers.
- A version of UEK 8U2 that enables 64k pages is available for 64-bit Arm (aarch64) platforms for Oracle Linux 9 and later. The `kernel-uek64k` package is available on Oracle Cloud Infrastructure Arm compute shapes only. Use of this kernel outside of Oracle Cloud Infrastructure is only available as a technical preview.

Certification of UEK 8 for Oracle Products

The following important information applies to the certification of Oracle products with UEK 8.

Note that certification of different Oracle products with UEK 8 might not be immediately available at the time of the UEK 8 release. Ensure that the product you're using is certified for use with UEK 8 before upgrading or installing the kernel. You can check for certification information at https://support.oracle.com/epmos/faces/CertifyHome.

Oracle Automatic Storage Management Cluster File System (Oracle ACFS) certification for different kernel versions is described in Document ID 1369107.1, which is available at https://support.oracle.com/epmos/faces/DocumentDisplay?id=1369107.1.

Compatibility

Oracle Linux maintains full user space compatibility with Red Hat Enterprise Linux (RHEL), which is independent of the kernel version that's running underneath the OS. Note that existing applications in user space continue to run unmodified with UEK 8U2; no recertifications are required for RHEL certified applications.

To minimize any impact on interoperability during releases, the Oracle Linux team works with third-party vendors that have hardware and software with dependencies on kernel modules. The kernel ABI for UEK 8U2 remains unchanged in all subsequent updates to the initial release. Customers migrating from UEK R7 must be aware that kernel ABIs have changed in UEK 8U2. If an application is using kernel modules, users must verify the support status with the application vendor.

CVE Fixes

CVEs are continually handled in patch updates that are made available as errata builds for the current release. For this reason, it's critical to keep systems updated with the latest package updates for this kernel release.

You can keep current with the latest CVE information at https://linux.oracle.com/cve .

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New Features and Changes

The following new features, enhancements, and notable changes are introduced in UEK 8U2.

For other features introduced in UEK 8, see Unbreakable Enterprise Kernel 8: Release Notes (6.12.0-0.20.20).

FIPS 140-3 Kernel Module Implementation

A new FIPS 140 standalone kernel module is available as part of an effort to redesign and shrink the FIPS 140-3 cryptographic module boundary by encapsulating a stable kernel crypto API within a standalone `fips140.ko` kernel module.

This change helps to provide separation between the cryptographic module and the rest of the kernel, so FIPS certification can be targeted to the cryptographic module used by the kernel. This implementation means that the cryptographic module boundary doesn't change each time the kernel is compiled, and provides greater confidence in the certification.

The new implementation embeds the `fips140.ko` module and HMAC digest within the `vmlinux` kernel image after compilation. The HMAC is checked when the module is loaded using the HMAC algorithm from within the `fips140.ko` itself. The module and its digest are loaded into memory alongside the rest of the kernel by the boot loader when FIPS mode is enabled. These cryptographic components can easily be extracted from the kernel image for verification purposes.

> **Note**
>
> This change is transparent and you continue to enable FIPS mode in the same way as before.

XFS Online Repair

XFS online file system repair is supported with UEK 8U2 and later. In this release, the experimental tag is removed from the tooling.

You can use this feature to check and repair XFS filesystems while they remain mounted and fully operational. XFS online repair can reduce downtime and improve maintainability for mission-critical and large-scale deployments.

XFS online file system repair is achieved using the `xfs_scrub` utility, which can detect and correct metadata corruption without requiring unmounting or disrupting active workloads. You can run `xfs_scrub` to systematically verify file system metadata such as inodes, directories, and allocation groups. When inconsistencies are detected, the tool provides options to perform targeted repairs while online.

To use this feature, ensure the system is running UEK 8U2 or later, and the latest XFS user-space tools.

See the `xfs_scrub(8)` manual page. See also https://docs.kernel.org/filesystems/xfs/xfs-online-fsck-design.html.

Memory Allocation Profiling

Memory allocation profiling is available in UEK 8U2. This feature tracks memory allocation to help when reviewing where memory is used and when tracking down memory leaks. The feature uses code tagging to track where memory was allocated, when allocated memory is freed, the number of allocations, and the amount of memory still in use.

The option is disabled by default but can be enabled at boot by using the boot parameter:

```
sysctl.vm.mem_profiling=1
```

You access runtime information for memory allocation profiling in `/proc/allocinfo`.

See https://docs.kernel.org/mm/allocation-profiling.html for more information. Note that the compressed option for memory allocation profiling isn't available in UEK 8U2.

Lightweight Guard Pages

This release introduces lightweight guard pages which provide a way to mark regions of virtual memory so that they trigger segmentation faults (SIGSEGV) when accessed. This feature is important for thread stacks and userland memory allocators. The mechanism is designed to remove any memory overhead, by using guard markers rather than creating or splitting Virtual Memory Areas (VMAs).

Before lightweight guard pages, similar functionality was achieved by using `mmap(.., PROT_NONE)`, which incurred memory overhead. As processes and threads scale up using this method, overhead increases. Additionally, memory that's mapped in this way remains unavailable for allocation to user processes. By using lightweight guard pages, the overhead is avoided and significant memory gains are achieved.

The update uses new `madvise()` commands:

- MADV_GUARD_INSTALL installs guard markers and removes existing mappings in the range. Installation applies to anonymous-memory-only and installation isn't allowed for special, huge, or locked (mock'ed) VMAs.
- MADV_GUARD_REMOVE removes only the guard markers, keeping any normal mappings untouched.

Guarded ranges persist over MADV_DONTNEED or MADV_FREE (guaranteed protection until removed), but are cleared with process teardown or explicit unmapping.

AMD Secure Encrypted Virtualization-Secure Nested Paging (SEV-SNP)

AMD Secure Encrypted Virtualization (SEV) and AMD Secure Encrypted Virtualization-Secure Nested Paging (SEV-SNP) are key components in AMD's confidential computing technology. SEV is a hardware-based feature that encrypts the memory of virtual machines running on AMD EPYC processors, to protect the data of the VM from unauthorized access by the hypervisor host, even if the hypervisor host is compromised. SEV uses a dedicated encryption key for each VM, managed by the processor. SEV must be enabled in both the guest OS and the KVM hypervisor host to work.

On Oracle Linux 9 and Oracle Linux 10, UEK 8U2 includes guest and hypervisor support for SEV-SNP, which helps to prevent malicious hypervisor-based attacks such as data replay, and memory remapping, among other vectors such as side channel attacks. SEV-SNP is available on AMD E4 based servers or later (Milan). This functionality requires the latest `edk2-ovmf` and `qemu` package versions.

> **Note**
>
> Confidential computing using SEV-SNP is a technical preview feature when used outside of Oracle Cloud Infrastructure (OCI).

Intel Trust Domain Extensions (TDX)

Intel Trust Domain Extensions (TDX) is Intel's confidential computing technology used to provide Trusted Execution Environments. TDX is used to deploy virtual workloads in trust domains (TDs) to provide hardware-based isolation by managing and encrypting memory to maintain integrity and confidentiality of CPU states within TDs.

On Oracle Linux 9 and Oracle Linux 10, UEK 8U2 includes guest and hypervisor support for TDX.

See https://www.intel.com/content/www/us/en/developer/tools/trust-domain-extensions/overview.html for more information.

> **Note**
>
> Confidential computing using TDX is a technical preview feature when used outside of OCI.

Updated Drivers

Device drivers included in UEK 8U2 are aligned with the drivers in the upstream mainline Linux 6.12 kernel. A few notable updates are included where drivers include functionality or fixes available in later upstream kernel versions.

Many driver modules no longer track version information. Oracle works with vendors to align device drivers included in UEK 8U2 with the code available in upstream kernel versions.

Notable driver updates are presented in the following table:

Table 2-1 Driver Alignment

Driver Module	Driver Description	Aligned Kernel Version	Notable Updates
`amd_hsmp`	AMD HSMP Platform Interface Driver	6.18	Updates from 6.18 were backported to this release. Primarily updates for AMD EPYC Zen6.
`i40e`	Intel Ethernet Connection XL710 Network Driver	6.12	Added mdd-auto-reset-vf option.

Table 2-1 (Cont.) Driver Alignment

Driver Module	Driver Description	Aligned Kernel Version	Notable Updates
idxd	Intel Data Streaming Accelerator and In-Memory Analytics Accelerator Common Driver	-	Bug fix for accel-config enable-wq.
ixgbe	Intel 10 Gigabit PCI Express Network Driver	-	Driver update for Intel E610 Series of network devices.
lpfc	Broadcom Emulex Fibre Channel HBA Driver	-	Driver update for Broadcom Emulex LPe37000/LPe38000 Series 32Gb/64Gb Fibre Channel Adapters (rev 11). Driver versioned at 14.4.0.12.
mlx5	NVIDIA 5th Generation Network Adapters (NVIDIA ConnectX series) Core Driver	6.16	Several fixes and improvements from 6.16 were backported in this release.

Deprecated and Removed Features

The following features are deprecated, removed, or no longer supported in UEK 8U2:

Deprecated Features

- **SHA-1, SHA-224, and SHA3-224 Algorithms**

  The SHA-1, SHA-224, and SHA3-224 algorithms are deprecated in UEK 8U2 while in FIPS mode and will be removed in a future UEK release. These algorithms have been retired by National Institute of Standard and Technology (NIST) because they're no longer considered secure. See Oracle Linux release notes for more details on SHA-1 usage and deprecation.

- **ECB Algorithm**

  The ECB algorithm is deprecated in UEK 8U2 while in FIPS mode and will be removed in a future UEK release.

- **112-bit strength RSA2048 and ffdhe2048(dh) Algorithms**

  112-bit strength RSA2048 and ffdhe2048(dh) algorithms are deprecated in UEK 8U2 while in FIPS mode and will be removed in a future UEK release.

- **Kernel modules moved to the `kernel-uek-modules-deprecated` package are now deprecated.**

  These modules might be removed in a future release of UEK.

  See Module Deprecations (x86_64) and Module Deprecations (aarch64) for a detailed listing.

- **`cgroupsv1` is deprecated**

`cgroupsv1` is deprecated in Oracle Linux 9 and is removed in a Oracle Linux 10.

- **`XFS_SUPPORT_V4` is deprecated**

  The V4 file system format contains known weaknesses in the on-disk format. Therefore, the option is deprecated in UEK 8U2 and will be removed in a future UEK release.

  You can check whether the file system is formatted to use V4, by running the `xfs_db -r -c version` <*device*> command.

  If the feature is enabled, you must backup data, reformat the device, and restore data.

- **`XFS_SUPPORT_ASCII_CI` is deprecated**

  The XFS ASCII case-insensitive name feature is deprecated in UEK 8U2 and will be removed in a future UEK release. The feature provided an option to format an XFS file system with the `ascii-ci` option enabled to disable case-sensitivity.

  You can check whether the feature is enabled by using the `xfs_info` command.

  If the feature is enabled, you must backup data, reformat the device with the option disabled, and restore data.

- **`CONFIG_SECURITY_SELINUX_DISABLE` and `CONFIG_SECURITY_WRITABLE_HOOKS` options are disabled**

  The option to disable SELinux at runtime by using the sysfs interface is removed in this UEK release.

  The preferred method of disabling SELinux is by using the `selinux=0` boot parameter

- **NLM file locking with NFSv3 is deprecated**
  NLM file locking with NFSv3 is deprecated and might be removed in a future release. File locking isn't available in NFSv4.

Removed Features

- **Unrestricted access to the kernel ring buffer is removed.**

  Unprivileged access to the kernel ring buffer through the `dmesg` command output is removed in this release. Use the `sudo` command to escalate to administrator privileges when running the `dmesg` command. See #unique_17.

- **`CONFIG_RPCSEC_GSS_KRB5_ENCTYPES_DES` option for 3DES/DES3 RPCSEC GSS encryption types is disabled**

  The RPCSEC GSS encryption types DES and Triple-DES (3DES/DES3) is removed in this UEK release.

  These encryption types were deprecated by RFCs 6649 and 8429 because they're known to be insecure.

- **`CONFIG_NFS_V2` and `CONFIG_NFSD_V2` options for NFSv2 client and server are disabled**
  Support for NFSv2 clients and NFSv2 servers is removed in this UEK release.

  NFSv2 has long been replaced by NFSv3 and NFSv4, which offer improved functionality, performance, and security.

- **`CONFIG_NFS_DISABLE_UDP_SUPPORT` option for NFSv3 over UDP is enabled**
  Support for NFS version 3 over the UDP network protocol is removed in this UEK release.

  Modern NFS/RPC over TCP and RDMA implementations provide better performance than UDP, and provide reliable ordered delivery of data combined with congestion control.

  Note that NFSv4 is already not supported over UDP, for the same reasons.

- **`CONFIG_STAGING` option is disabled**

The `CONFIG_STAGING` kernel configuration option is disabled in UEK 8U2. The kernel option made available drivers that don't necessarily meet the highest kernel quality level and which were available for test use. The option was deprecated in UEK R7 and is removed in UEK 8U2.

- **`CONFIG_IXGB` option is disabled**
  The `CONFIG_IXGB` for Intel PRO/10GbE hardware is removed in this UEK release.
- **crashkernel=auto removed**

  The `crashkernel=auto` option was deprecated in UEK R7 and unsupported for Oracle Linux 9. The kernel option is removed in UEK 8U2. For more information about configuring the `crashkernel` setting on Oracle Linux 9, see Oracle Linux 9: Managing Kernels and System Boot, and on Oracle Linux 10, see Oracle Linux 10: Managing Kernels and System Boot.
- **`CONFIG_IP_NF_TARGET_CLUSTERIP` option is disabled**
  The `CONFIG_IP_NF_TARGET_CLUSTERIP` option that allowed you to build load-balancing clusters of network servers without a dedicated load-balancing router or switch is removed in favor of functionality already in Netfilter cluster match.
- **`CONFIG_EFI_VARS` option disabled**
  The `CONFIG_EFI_VARS` option that provided the `efivars` sysfs interface to configure UEFI variables is removed from this release of UEK. Replacement functionality has been present in the kernel since 2012. For more information, see https://www.kernel.org/doc/html/latest/filesystems/efivarfs.html.
- **Firewire driver removed**

  The `CONFIG_FIREWIRE` option is disabled in this UEK release.
- **Several Network Scheduler Modules Removed**

  The following network scheduler modules were deprecated in UEK R7 and are now removed in UEK 8U2:

  - `cls_tcindex`
  - `cls_rsvp`
  - `sch_dsmark`
  - `sch_atm`
  - `sch_cbq`
- **`resilient_rdmaip` Module Removed**

  The `resilient_rdmaip` module was deprecated in UEK R7 and is now removed.
- **`oracleasm` Kernel Module Removed**

  The `oracleasm` kernel module is removed in UEK 8U2. Note that this module continues to be supported in the UEK R5 and UEK R6 releases.

  Oracle ASMLib continues to be supported using `io_uring` interfaces. See Oracle Linux: Installing and Configuring Oracle ASMLIB v3 for more information.
- **`sundance` Kernel Module Removed**

  The DLink Sundance (ST201), `sundance`, driver is removed in UEK 8U2. The module was removed in the upstream kernel because it was unmaintained.
- **`cpu5_wdt` Kernel Module Removed**

The `cpu5_wdt` watchdog driver is removed in UEK 8U2. The module was removed in the upstream kernel because it had several issues that were unresolved and lacked maintenance.

- **`i2c-amd756-s4882` and `i2c-nforce2-s4985` Kernel Modules Removed**

  The `i2c-amd756-s4882` and `i2c-nforce2-s4985` legacy muxing drivers are removed in UEK 8U2. The module was removed in the upstream kernel because they're old and contain technically inaccurate code.

- **`CONFIG_CRYPTO_OFB` and `CONFIG_CRYPTO_CFB` cryptographic modes**

  The CFB (Cipher Feedback) mode (NIST SP800-38A) used for TPM2 cryptography and the OFB (Output Feedback) mode (NIST SP800-38A) used to turn a block cipher into a synchronous stream cipher are removed in UEK 8U2, to align with upstream changes.

3
Known Issues

This chapter describes any known issues for Unbreakable Enterprise Kernel 8 Update 2.

Systems With Btrfs Fail to Boot in FIPS Mode

When booted in FIPS mode, a system using Btrfs fails with the following message:

```
FATAL: FIPS integrity test failed
Refusing to continue
```

Booting into UEK 8 using a Btrfs file system with FIPS mode enabled isn't supported.

(Bug ID 36028061)

Unusable or Unavailable Features for Arm Platforms

The following features are known to not work, remain untested, or have issues that render the feature unusable. The following features aren't supported on Arm platforms:

- InfiniBand
- FibreChannel
- RDMA

Xen Hypervisor VM CPU Initialization Failure

On some Xen-based virtualization platforms, such as Oracle VM 3.4, only the first CPU is initialized when the guest VM is started. VM boot is slow, the remaining configured CPUs fail to report an `alive` state, and the following errors might appear in the VM `dmesg` output:

```
...
[   10.190039] CPU1 failed to report alive state
[   20.192038] CPU2 failed to report alive state
...
```

The issue is related to a problem in the Xen hypervisor's `x2apic` emulation. The incorrect APIC ID is returned.

To work around the issue, add the `nox2apic` parameter to the kernel command line and reboot.

1. In the VM, edit `/etc/default/grub` to add the `nox2apic` parameter to the GRUB_CMDLINE_LINUX entry:

   ```
   GRUB_CMDLINE_LINUX="...... nox2apic"
   ```

2. Regenerate the `/boot/grub2/grub.cfg` file:

   ```
   sudo grub2-mkconfig -o /boot/grub2/grub.cfg --update-bls-cmdline
   ```

3. Reboot the virtual machine

(Bug 38006792)

Upgrading Oracle RDMA Packages on Oracle Linux

You can upgrade the Oracle RDMA packages on Oracle Linux by using the `dnf update` command.

If you're upgrading a system that has the `oracle-rdma-release` or `oracle-rdma-release-guest` package installed, if the package version is lower than version 0.18.1-1 and you intend to upgrade to version 0.18.1-1, or later, you must first manually remove the `rdma-core-devel` package. Remove this package by using the `rpm -e --nodeps` command, which removes the package outside of the standard yum or DNF package manager control and leaves any dependencies intact, for example:

```
sudo /bin/rpm -e --nodeps rdma-core-devel
sudo dnf update
```

If the system you have upgraded has the `oracle-rdma-release` or `oracle-rdma-release-guest` package installed and if the package version is version 0.31.0-1, then you can remove it because that package no longer serves any purpose:

```
sudo dnf remove oracle-rdma-release*
```

4

Installation and Availability

This chapter provides information about the availability of UEK 8U2 on Oracle Linux and includes installation and instructions on upgrading from a previous UEK release to UEK 8U2.

UEK 8U2 is supported on the Intel® 64-bit x86_64, AMD 64-bit x86_64 and 64-bit Arm (aarch64) platforms.

About Upgrading From a Previous Oracle Linux or UEK Release to UEK 8

UEK 8 is the default kernel on Oracle Linux 10.

UEK 8 is made available for installation on Oracle Linux 9, starting with the Oracle Linux 9.5 release, and is the default kernel on Oracle Linux 9.6 and later.

The suggested migration path for upgrading the system from an earlier UEK release to UEK 8 is as follows:

- If you're running an Oracle Linux 8 release you must upgrade to Oracle Linux 9 to install UEK 8. For instructions on upgrading an Oracle Linux 8 system to Oracle Linux 9, see Oracle Linux 9: Upgrading Systems With Leapp.
- If you're running an Oracle Linux 9 release, you must ensure that the system is updated to the latest update level before installing UEK 8.

Obtaining Packages for Installation

If you have a subscription to Oracle Unbreakable Linux support, you can obtain the packages for UEK 8 by registering the system with the Unbreakable Linux Network (ULN) and then subscribing it to other channels. See Subscribing to ULN Channels.

If the system isn't registered with ULN, you can obtain most of the required packages from the Oracle Linux yum server. See Enabling Access to Oracle Linux Yum Server Repositories.

When you have subscribed the system to the appropriate ULN channels or to the Oracle Linux yum server, you can proceed to upgrade the system to UEK 8. See Upgrading a System to UEK 8.

Enabling Access to Oracle Linux Yum Server Repositories

Packages for UEK 8 and any associated user space applications are available on the Oracle Linux yum server at https://yum.oracle.com/ in yum repositories that are available for each supported Oracle Linux release.

- Oracle Linux 9: `ol9_UEKR8`
- Oracle Linux 10: `ol10_UEKR8`

Oracle Linux 10

To enable access to the UEK 8 repository on the Oracle Linux yum server, use the `dnf config-manager` command.

> **Note**
>
> 64-bit Arm (aarch64) platforms that have Oracle Linux 10 installed use UEK 8 by default and RHCK isn't available on these platforms, therefore no installation steps are required.

1. Ensure that you have the latest `oraclelinux-release-el10` package installed and updated.

   ```
   sudo dnf install -y oraclelinux-release-el10
   ```

   The package contains the yum repository definition for the `ol10_UEKR8` repository.
2. Enable the `ol10_UEKR8` repository.

   ```
   sudo dnf config-manager --set-enabled ol10_UEKR8
   ```
3. Install the UEK 8 packages, for example:

   ```
   sudo dnf install -y kernel-uek kernel-uek-devel
   ```

   Installing the `kernel-uek-devel` package also installs the `gcc-toolset-14` packages.
4. Verify the UEK 8 kernel packages are installed, for example:

   ```
   dnf list --installed kernel-uek*-6.12.0-*
   ```

Oracle Linux 9

To enable access to the UEK 8 repository on the Oracle Linux yum server, use the `dnf config-manager` command.

1. Ensure that you have the latest `oraclelinux-release-el9` package installed and updated.

   ```
   sudo dnf install -y oraclelinux-release-el9
   ```

   The package contains the yum repository definition for the `ol9_UEKR8` repository.
2. Enable the `ol9_UEKR8` repository.

   ```
   sudo dnf config-manager --set-enabled ol9_UEKR8
   ```
3. Install the UEK 8 packages, for example:

   ```
   sudo dnf install -y kernel-uek kernel-uek-devel
   ```

Installing the `kernel-uek-devel` package also installs the `gcc-toolset-14` packages.

4. Verify the UEK 8 kernel packages are installed, for example:

```
dnf list --installed kernel-uek*-6.12.0-*
```

Subscribing to ULN Channels

UEK 8 kernel image and user space packages are made available for the each supported Oracle Linux release and platform architecture in the following ULN channels:

- Oracle Linux 10 (x86_64): `ol10_x86_64_UEKR8`
- Oracle Linux 10 (aarch64): `ol10_aarch64_UEKR8`
- Oracle Linux 9 (x86_64): `ol9_x86_64_UEKR8`
- Oracle Linux 9 (aarch64): `ol9_aarch64_UEKR8`

The following instructions assume that you have already registered the system with ULN.

To subscribe a system to a ULN channel:

1. Sign in to https://linux.oracle.com with a ULN username and password.
2. On the Systems tab, in the list of registered machines, select the link that corresponds to the name of the system.
3. On the System Details page, select **Manage Subscriptions**.
4. On the System Summary page, from the list of available channels, select each of the required channels, then select the right arrow to move the selected channel to the list of subscribed channels.
5. Select **Save Subscriptions**.

For more information about using ULN, see Oracle Linux: Managing Software on Oracle Linux.

Upgrading a System to UEK 8

The following instructions describe how to upgrade a system to UEK 8. For more details about the suggested migration paths for upgrading to UEK 8, see About Upgrading From a Previous Oracle Linux or UEK Release to UEK 8.

1. Enable access to the appropriate ULN channels or yum repositories, as described in Subscribing to ULN Channels and Enabling Access to Oracle Linux Yum Server Repositories.

> **Tip**
>
> Disable any other UEK channels or repositories that you might have previously configured as good practice.

2. After enabling access to the appropriate channels or repositories, upgrade the system to UEK 8 by running the following commands:

```
sudo dnf install -y kernel-uek
sudo dnf update -y
```

3. After the upgrade has completed, reboot the system.

   Ensure to select the UEK 8 kernel (version 6.12.0) if it's not the default boot kernel. For more information about setting the default boot kernel, see Oracle Linux 9: Managing Kernels and System Boot or Oracle Linux 10: Managing Kernels and System Boot.

For questions regarding installing software or updating a system, see Oracle Linux: Managing Software on Oracle Linux.

A
Module Deprecations (x86_64)

The following modules are deprecated in this release of UEK 8U2. While these modules are available and operative in this release, they are planned for removal and support isn't guaranteed in future UEK releases. Thus, these modules should not be used in new UEK 8U2 deployments to avoid problems upgrading in the future.

Table A-1 Module Deprecations (x86_64)

Module Name	Description
a8293	Allegro A8293
adm8211	ADMtek ADM8211 support
af9013	Afatech AF9013 demodulator
af9033	Afatech AF9033 DVB-T demodulator
atbm8830	AltoBeam ATBM8830/8831 DMB-TH demodulator
atmtcp	ATM over TCP
au8522_common	
au8522_decoder	Auvitek AU8522 based ATV demod
au8522_dig	Auvitek AU8522 based DTV demod
b2c2-flexcop	
b2c2-flexcop-pci	Technisat/B2C2 Air/Sky/Cable2PC PCI
b2c2-flexcop-usb	Technisat/B2C2 Air/Sky/Cable2PC USB
b43legacy	Broadcom 43xx-legacy wireless support (mac80211 stack)
bcm3510	Broadcom BCM3510
cpu5wdt	SMA CPU5 Watchdog
cx22700	Conexant CX22700 based
cx22702	Conexant cx22702 demodulator (OFDM)
cx23885	Conexant cx23885 (2388x successor) support
cx24110	Conexant CX24110 based
cx24113	Conexant CX24113/CX24128 tuner for DVB-S/DSS
cx24116	Conexant CX24116 based
cx24117	Conexant CX24117 based
cx24120	Conexant CX24120 based
cx24123	Conexant CX24123 based
cxd2099	Sony CXD2099AR Common Interface driver

Table A-1 (Cont.) Module Deprecations (x86_64)

Module Name	Description
cxd2820r	Sony CXD2820R
cxd2841er	Sony CXD2841ER
dib0070	DiBcom DiB0070 silicon base-band tuner
dib0090	DiBcom DiB0090 silicon base-band tuner
dib3000mb	DiBcom 3000M-B
dib3000mc	DiBcom 3000P/M-C
dib7000m	DiBcom 7000MA/MB/PA/PB/MC
dib7000p	DiBcom 7000PC
dib8000	DiBcom 8000MB/MC
dibx000_common	DiBcom 9000
drx39xyj	Micronas DRX-J demodulator
drxd	Micronas DRXD driver
drxk	Micronas DRXK based
ds3000	Montage Tehnology DS3000 based
dvb-pll	Generic I2C PLL based tuners
dvb-usb	Support for various USB DVB devices
dvb-usb-a800	AVerMedia AverTV DVB-T USB 2.0 (A800)
dvb-usb-af9005	Afatech AF9005 DVB-T USB1.1 support
dvb-usb-af9005-remote	Afatech AF9005 default remote control support
dvb-usb-af9015	Afatech AF9015 DVB-T USB2.0 support
dvb-usb-af9035	Afatech AF9035 DVB-T USB2.0 support
dvb-usb-anysee	Anysee DVB-T/C USB2.0 support
dvb-usb-au6610	Alcor Micro AU6610 USB2.0 support
dvb-usb-az6007	AzureWave 6007 and clones DVB-T/C USB2.0 support
dvb-usb-az6027	Azurewave DVB-S/S2 USB2.0 AZ6027 support
dvb-usb-ce6230	Intel CE6230 DVB-T USB2.0 support
dvb-usb-cinergyT2	Terratec CinergyT2/qanu USB 2.0 DVB-T receiver
dvb-usb-cxusb	Conexant USB2.0 hybrid reference design support
dvb-usb-dib0700	DiBcom DiB0700 USB DVB devices (see help for supported devices)
dvb-usb-dibusb-common	DiBcom USB DVB-T devices (based on the DiB3000M-B) (see help for device list)
dvb-usb-dibusb-mb	DiBcom USB DVB-T devices (based on the DiB3000M-B) (see help for device list)

Table A-1 (Cont.) Module Deprecations (x86_64)

Module Name	Description
dvb-usb-dibusb-mc	DiBcom USB DVB-T devices (based on the DiB3000M-C/P) (see help for device list)
dvb-usb-dibusb-mc-common	
dvb-usb-digitv	Nebula Electronics uDigiTV DVB-T USB2.0 support
dvb-usb-dtt200u	WideView WT-200U and WT-220U (pen) DVB-T USB2.0 support (Yakumo/Hama/Typhoon/Yuan)
dvb-usb-dtv5100	AME DTV-5100 USB2.0 DVB-T support
dvb-usb-dvbsky	DVBSky USB support
dvb-usb-dw2102	DvbWorld & TeVii DVB-S/S2 USB2.0 support
dvb-usb-ec168	E3C EC168 DVB-T USB2.0 support
dvb-usb-gl861	Genesys Logic GL861 USB2.0 support
dvb-usb-gp8psk	GENPIX 8PSK->USB module support
dvb-usb-lmedm04	LME DM04/QQBOX DVB-S USB2.0 support
dvb-usb-m920x	Uli m920x DVB-T USB2.0 support
dvb-usb-mxl111sf	
dvb-usb-nova-t-usb2	Hauppauge WinTV-NOVA-T usb2 DVB-T USB2.0 support
dvb-usb-opera	Opera1 DVB-S USB2.0 receiver
dvb-usb-pctv452e	Pinnacle PCTV HDTV Pro USB device/TT Connect S2-3600
dvb-usb-rtl28xxu	Realtek RTL28xxU DVB USB support
dvb-usb-technisat-usb2	Technisat DVB-S/S2 USB2.0 support
dvb-usb-ttusb2	Pinnacle 400e DVB-S USB2.0 support
dvb-usb-umt-010	HanfTek UMT-010 DVB-T USB2.0 support
dvb-usb-vp702x	TwinhanDTV StarBox and clones DVB-S USB2.0 support
dvb-usb-vp7045	TwinhanDTV Alpha/MagicBoxII, DNTV tinyUSB2, Beetle USB2.0 support
dvb_dummy_fe	Dummy frontend driver
dvb_usb_v2	Support for various USB DVB devices v2
e4000	Elonics E4000 silicon tuner
ec100	E3C EC100
fc0011	Fitipower FC0011 silicon tuner
fc0012	Fitipower FC0012 silicon tuner
fc0013	Fitipower FC0013 silicon tuner
fc2580	FCI FC2580 silicon tuner
gp8psk-fe	

Table A-1 (Cont.) Module Deprecations (x86_64)

Module Name	Description
isl6405	ISL6405 SEC controller
isl6421	ISL6421 SEC controller
isl6423	ISL6423 SEC controller
it913x	ITE Tech IT913x silicon tuner
itd1000	Integrant ITD1000 Zero IF tuner for DVB-S/DSS
ix2505v	Sharp IX2505V silicon tuner
l64781	LSI L64781
lg2160	LG Electronics LG216x based
lgdt3305	LG Electronics LGDT3304 and LGDT3305 based
lgdt3306a	LG Electronics LGDT3306A based
lgdt330x	LG Electronics LGDT3302/LGDT3303 based
lgs8gxx	Legend Silicon LGS8913/LGS8GL5/LGS8GXX DMB-TH demodulator
libertas_sdio	Marvell Libertas 8385/8686/8688 SDIO 802.11b/g cards
lnbh25	LNBH25 SEC controller
lnbp21	LNBP21/LNBH24 SEC controllers
lnbp22	LNBP22 SEC controllers
m88ds3103	Montage Technology M88DS3103
m88rs2000	M88RS2000 DVB-S demodulator and tuner
m88rs6000t	Montage M88RS6000 internal tuner
max2165	Maxim MAX2165 silicon tuner
mb86a16	Fujitsu MB86A16 based
mb86a20s	Fujitsu mb86a20s
mc44s803	Freescale MC44S803 Low Power CMOS Broadband tuners
mn88472	Panasonic MN88472
mn88473	Panasonic MN88473
mt2060	Microtune MT2060 silicon IF tuner
mt2063	Microtune MT2063 silicon IF tuner
mt20xx	Microtune 2032 / 2050 tuners
mt2131	Microtune MT2131 silicon tuner
mt2266	Microtune MT2266 silicon tuner
mt312	Zarlink VP310/MT312/ZL10313 based
mt352	Zarlink MT352 based
mxl111sf-tuner	MxL111SF DTV USB2.0 support

Table A-1 (Cont.) Module Deprecations (x86_64)

Module Name	Description
mxl5005s	MaxLinear MSL5005S silicon tuner
mxl5007t	MaxLinear MxL5007T silicon tuner
mxl5xx	MaxLinear MxL5xx based tuner-demodulators
mxl692	MaxLinear MXL692 based
nxt200x	NxtWave Communications NXT2002/NXT2004 based
nxt6000	NxtWave Communications NXT6000 based
or51132	Oren OR51132 based
or51211	Oren OR51211 based
parport_pc	PC-style hardware
parport_serial	Multi-IO cards (parallel and serial)
pluto2	Pluto2 cards
qm1d1b0004	Sharp QM1D1B0004 tuner
qm1d1c0042	Sharp QM1D1C0042 tuner
qt1010	Quantek QT1010 silicon tuner
r820t	Rafael Micro R820T silicon tuner
rt2400pci	Ralink rt2400 (PCI/PCMCIA) support
rt2500pci	Ralink rt2500 (PCI/PCMCIA) support
rt61pci	Ralink rt2501/rt61 (PCI/PCMCIA) support
rtl2830	Realtek RTL2830 DVB-T
rtl2832	Realtek RTL2832 DVB-T
rtl2832_sdr	Realtek RTL2832 SDR
rtl818x_pci	Realtek 8180/8185/8187SE PCI support
s5h1409	Samsung S5H1409 based
s5h1411	Samsung S5H1411 based
s5h1420	Samsung S5H1420 based
s921	Sharp S921 frontend
si2157	Silicon Labs Si2157 silicon tuner
si2165	Silicon Labs si2165 based
si2168	Silicon Labs Si2168
si21xx	Silicon Labs SI21XX based
sp2	CIMaX SP2
sp887x	Spase sp887x based
stb0899	STB0899 based
stb6000	ST STB6000 silicon tuner

Table A-1 (Cont.) Module Deprecations (x86_64)

Module Name	Description
stb6100	STB6100 based tuners
stv0288	ST STV0288 based
stv0297	ST STV0297 based
stv0299	ST STV0299 based
stv0367	ST STV0367 based
stv0900	ST STV0900 based
stv090x	STV0900/STV0903(A/B) based
stv0910	STV0910 based
stv6110	ST STV6110 silicon tuner
stv6110x	STV6110/(A) based tuners
stv6111	STV6111 based tuners
sundance	Sundance Alta support
tc90522	Toshiba TC90522
tda10021	Philips TDA10021 based
tda10023	Philips TDA10023 based
tda10048	Philips TDA10048HN based
tda1004x	Philips TDA10045H/TDA10046H based
tda10071	NXP TDA10071
tda10086	Philips TDA10086 based
tda18212	NXP TDA18212 silicon tuner
tda18218	NXP TDA18218 silicon tuner
tda18250	NXP TDA18250 silicon tuner
tda18271	NXP TDA18271 silicon tuner
tda18271c2dd	NXP TDA18271C2 silicon tuner
tda665x	TDA665x tuner
tda8083	Philips TDA8083 based
tda8261	Philips TDA8261 based
tda826x	Philips TDA826X silicon tuner
tda827x	Philips TDA827X silicon tuner
tda8290	TDA 8290/8295 + 8275(a)/18271 tuner combo
tda9887	TDA 9885/6/7 analog IF demodulator
tea5761	TEA 5761 radio tuner
tea5767	TEA 5767 radio tuner
ts2020	Montage Tehnology TS2020 based tuners

Table A-1 (Cont.) Module Deprecations (x86_64)

Module Name	Description
tua6100	Infineon TUA6100 PLL
tua9001	Infineon TUA9001 silicon tuner
tuner-simple	
tuner-types	Simple tuner support
ves1820	VLSI VES1820 based
ves1x93	VLSI VES1893 or VES1993 based
wl1251	TI wl1251 driver support
wl1251_sdio	TI wl1251 SDIO support
xc4000	Xceive XC4000 silicon tuner
xc5000	Xceive XC5000 silicon tuner
zl10036	Zarlink ZL10036 silicon tuner
zl10039	Zarlink ZL10039 silicon tuner
zl10353	Zarlink ZL10353 based

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Module Deprecations (aarch64)

The following modules are deprecated in this release of UEK 8U2. While these modules are available and operative in this release, they are planned for removal and support isn't guaranteed in future UEK releases. Thus, these modules should not be used in new UEK 8U2 deployments to avoid problems upgrading in the future.

Table B-1 Module Deprecations (aarch64)

Module Name	Description
a8293	Allegro A8293
af9013	Afatech AF9013 demodulator
af9033	Afatech AF9033 DVB-T demodulator
as102_fe	
ascot2e	Sony Ascot2E tuner
atbm8830	AltoBeam ATBM8830/8831 DMB-TH demodulator
ath10k_sdio	Atheros ath10k SDIO support
ath6kl_sdio	Atheros ath6kl SDIO support
au8522_common	
au8522_decoder	Auvitek AU8522 based ATV demod
au8522_dig	Auvitek AU8522 based DTV demod
b2c2-flexcop	
b2c2-flexcop-pci	Technisat/B2C2 Air/Sky/Cable2PC PCI
b43legacy	Broadcom 43xx-legacy wireless support (mac80211 stack)
bcm3510	Broadcom BCM3510
cw1200_wlan_sdio	Support SDIO platforms
cw1200_wlan_spi	Support SPI platforms
cx22700	Conexant CX22700 based
cx22702	Conexant cx22702 demodulator (OFDM)
cx23885	Conexant cx23885 (2388x successor) support
cx24110	Conexant CX24110 based
cx24113	Conexant CX24113/CX24128 tuner for DVB-S/DSS
cx24116	Conexant CX24116 based
cx24117	Conexant CX24117 based
cx24120	Conexant CX24120 based

Table B-1 (Cont.) Module Deprecations (aarch64)

Module Name	Description
cx24123	Conexant CX24123 based
cxd2099	Sony CXD2099AR Common Interface driver
cxd2820r	Sony CXD2820R
cxd2841er	Sony CXD2841ER
dib0070	DiBcom DiB0070 silicon base-band tuner
dib0090	DiBcom DiB0090 silicon base-band tuner
dib3000mb	DiBcom 3000M-B
dib3000mc	DiBcom 3000P/M-C
dib7000m	DiBcom 7000MA/MB/PA/PB/MC
dib7000p	DiBcom 7000PC
dib8000	DiBcom 8000MB/MC
dibx000_common	DiBcom 9000
drx39xyj	Micronas DRX-J demodulator
drxd	Micronas DRXD driver
drxk	Micronas DRXK based
ds3000	Montage Tehnology DS3000 based
dvb-pll	Generic I2C PLL based tuners
dvb-usb	Support for various USB DVB devices
dvb-usb-a800	AVerMedia AverTV DVB-T USB 2.0 (A800)
dvb-usb-af9005	Afatech AF9005 DVB-T USB1.1 support
dvb-usb-af9005-remote	Afatech AF9005 default remote control support
dvb-usb-af9015	Afatech AF9015 DVB-T USB2.0 support
dvb-usb-af9035	Afatech AF9035 DVB-T USB2.0 support
dvb-usb-anysee	Anysee DVB-T/C USB2.0 support
dvb-usb-au6610	Alcor Micro AU6610 USB2.0 support
dvb-usb-az6007	AzureWave 6007 and clones DVB-T/C USB2.0 support
dvb-usb-az6027	Azurewave DVB-S/S2 USB2.0 AZ6027 support
dvb-usb-ce6230	Intel CE6230 DVB-T USB2.0 support
dvb-usb-cinergyT2	Terratec CinergyT2/qanu USB 2.0 DVB-T receiver
dvb-usb-cxusb	Conexant USB2.0 hybrid reference design support
dvb-usb-dib0700	DiBcom DiB0700 USB DVB devices (see help for supported devices)
dvb-usb-dibusb-common	DiBcom USB DVB-T devices (based on the DiB3000M-B) (see help for device list)

Table B-1 (Cont.) Module Deprecations (aarch64)

Module Name	Description
dvb-usb-dibusb-mb	DiBcom USB DVB-T devices (based on the DiB3000M-B) (see help for device list)
dvb-usb-dibusb-mc	DiBcom USB DVB-T devices (based on the DiB3000M-C/P) (see help for device list)
dvb-usb-dibusb-mc-common	
dvb-usb-digitv	Nebula Electronics uDigiTV DVB-T USB2.0 support
dvb-usb-dtt200u	WideView WT-200U and WT-220U (pen) DVB-T USB2.0 support (Yakumo/Hama/Typhoon/Yuan)
dvb-usb-dtv5100	AME DTV-5100 USB2.0 DVB-T support
dvb-usb-dvbsky	DVBSky USB support
dvb-usb-dw2102	DvbWorld & TeVii DVB-S/S2 USB2.0 support
dvb-usb-ec168	E3C EC168 DVB-T USB2.0 support
dvb-usb-gl861	Genesys Logic GL861 USB2.0 support
dvb-usb-gp8psk	GENPIX 8PSK->USB module support
dvb-usb-lmedm04	LME DM04/QQBOX DVB-S USB2.0 support
dvb-usb-m920x	Uli m920x DVB-T USB2.0 support
dvb-usb-mxl111sf	
dvb-usb-nova-t-usb2	Hauppauge WinTV-NOVA-T usb2 DVB-T USB2.0 support
dvb-usb-opera	Opera1 DVB-S USB2.0 receiver
dvb-usb-pctv452e	Pinnacle PCTV HDTV Pro USB device/TT Connect S2-3600
dvb-usb-rtl28xxu	Realtek RTL28xxU DVB USB support
dvb-usb-technisat-usb2	Technisat DVB-S/S2 USB2.0 support
dvb-usb-ttusb2	Pinnacle 400e DVB-S USB2.0 support
dvb-usb-umt-010	HanfTek UMT-010 DVB-T USB2.0 support
dvb-usb-vp702x	TwinhanDTV StarBox and clones DVB-S USB2.0 support
dvb-usb-vp7045	TwinhanDTV Alpha/MagicBoxII, DNTV tinyUSB2, Beetle USB2.0 support
dvb_dummy_fe	Dummy frontend driver
dvb_usb_v2	Support for various USB DVB devices v2
e4000	Elonics E4000 silicon tuner
ec100	E3C EC100
fc0011	Fitipower FC0011 silicon tuner
fc0012	Fitipower FC0012 silicon tuner
fc0013	Fitipower FC0013 silicon tuner

Table B-1 (Cont.) Module Deprecations (aarch64)

Module Name	Description
fc2580	FCI FC2580 silicon tuner
gp8psk-fe	
helene	Sony HELENE Sat/Ter tuner (CXD2858ER)
horus3a	Sony Horus3A tuner
isl6405	ISL6405 SEC controller
isl6421	ISL6421 SEC controller
isl6423	ISL6423 SEC controller
it913x	ITE Tech IT913x silicon tuner
itd1000	Integrant ITD1000 Zero IF tuner for DVB-S/DSS
ix2505v	Sharp IX2505V silicon tuner
l64781	LSI L64781
lg2160	LG Electronics LG216x based
lgdt3305	LG Electronics LGDT3304 and LGDT3305 based
lgdt3306a	LG Electronics LGDT3306A based
lgdt330x	LG Electronics LGDT3302/LGDT3303 based
lgs8gxx	Legend Silicon LGS8913/LGS8GL5/LGS8GXX DMB-TH demodulator
libertas_sdio	Marvell Libertas 8385/8686/8688 SDIO 802.11b/g cards
lnbh25	LNBH25 SEC controller
lnbp21	LNBP21/LNBH24 SEC controllers
lnbp22	LNBP22 SEC controllers
m88ds3103	Montage Technology M88DS3103
m88rs2000	M88RS2000 DVB-S demodulator and tuner
m88rs6000t	Montage M88RS6000 internal tuner
max2165	Maxim MAX2165 silicon tuner
mb86a16	Fujitsu MB86A16 based
mb86a20s	Fujitsu mb86a20s
mc44s803	Freescale MC44S803 Low Power CMOS Broadband tuners
mn88472	Panasonic MN88472
mn88473	Panasonic MN88473
mt2060	Microtune MT2060 silicon IF tuner
mt2063	Microtune MT2063 silicon IF tuner
mt20xx	Microtune 2032 / 2050 tuners
mt2131	Microtune MT2131 silicon tuner

Table B-1 (Cont.) Module Deprecations (aarch64)

Module Name	Description
mt2266	Microtune MT2266 silicon tuner
mt312	Zarlink VP310/MT312/ZL10313 based
mt352	Zarlink MT352 based
mxl111sf-tuner	MxL111SF DTV USB2.0 support
mxl5005s	MaxLinear MSL5005S silicon tuner
mxl5007t	MaxLinear MxL5007T silicon tuner
mxl5xx	MaxLinear MxL5xx based tuner-demodulators
mxl692	MaxLinear MXL692 based
nxt200x	NxtWave Communications NXT2002/NXT2004 based
nxt6000	NxtWave Communications NXT6000 based
or51132	Oren OR51132 based
or51211	Oren OR51211 based
pluto2	Pluto2 cards
qm1d1b0004	Sharp QM1D1B0004 tuner
qm1d1c0042	Sharp QM1D1C0042 tuner
qt1010	Quantek QT1010 silicon tuner
r820t	Rafael Micro R820T silicon tuner
rsi_sdio	Redpine Signals SDIO bus support
rt2400pci	Ralink rt2400 (PCI/PCMCIA) support
rt2500pci	Ralink rt2500 (PCI/PCMCIA) support
rt61pci	Ralink rt2501/rt61 (PCI/PCMCIA) support
rtl2830	Realtek RTL2830 DVB-T
rtl2832	Realtek RTL2832 DVB-T
rtl2832_sdr	Realtek RTL2832 SDR
rtl818x_pci	Realtek 8180/8185/8187SE PCI support
s5h1409	Samsung S5H1409 based
s5h1411	Samsung S5H1411 based
s5h1420	Samsung S5H1420 based
s921	Sharp S921 frontend
si2157	Silicon Labs Si2157 silicon tuner
si2165	Silicon Labs si2165 based
si2168	Silicon Labs Si2168
si21xx	Silicon Labs SI21XX based
sp2	CIMaX SP2

Table B-1 (Cont.) Module Deprecations (aarch64)

Module Name	Description
sp887x	Spase sp887x based
stb0899	STB0899 based
stb6000	ST STB6000 silicon tuner
stb6100	STB6100 based tuners
stv0288	ST STV0288 based
stv0297	ST STV0297 based
stv0299	ST STV0299 based
stv0367	ST STV0367 based
stv0900	ST STV0900 based
stv090x	STV0900/STV0903(A/B) based
stv0910	STV0910 based
stv6110	ST STV6110 silicon tuner
stv6110x	STV6110/(A) based tuners
stv6111	STV6111 based tuners
sundance	Sundance Alta support
tc90522	Toshiba TC90522
tda10021	Philips TDA10021 based
tda10023	Philips TDA10023 based
tda10048	Philips TDA10048HN based
tda1004x	Philips TDA10045H/TDA10046H based
tda10071	NXP TDA10071
tda10086	Philips TDA10086 based
tda18212	NXP TDA18212 silicon tuner
tda18218	NXP TDA18218 silicon tuner
tda18250	NXP TDA18250 silicon tuner
tda18271	NXP TDA18271 silicon tuner
tda18271c2dd	NXP TDA18271C2 silicon tuner
tda665x	TDA665x tuner
tda8083	Philips TDA8083 based
tda8261	Philips TDA8261 based
tda826x	Philips TDA826X silicon tuner
tda827x	Philips TDA827X silicon tuner
tda8290	TDA 8290/8295 + 8275(a)/18271 tuner combo
tda9887	TDA 9885/6/7 analog IF demodulator

Table B-1 (Cont.) Module Deprecations (aarch64)

Module Name	Description
tea5761	TEA 5761 radio tuner
tea5767	TEA 5767 radio tuner
ts2020	Montage Tehnology TS2020 based tuners
tua6100	Infineon TUA6100 PLL
tua9001	Infineon TUA9001 silicon tuner
tuner-simple	
tuner-types	Simple tuner support
ves1820	VLSI VES1820 based
ves1x93	VLSI VES1893 or VES1993 based
wl1251	TI wl1251 driver support
wl1251_sdio	TI wl1251 SDIO support
wl1251_spi	TI wl1251 SPI support
wl12xx	TI wl12xx support
wl18xx	TI wl18xx support
wlcore	TI wlcore support
wlcore_sdio	TI wlcore SDIO support
wlcore_spi	TI wlcore SPI support
xc4000	Xceive XC4000 silicon tuner
xc5000	Xceive XC5000 silicon tuner
zd1301	ZyDAS ZD1301
zd1301_demod	ZyDAS ZD1301
zl10036	Zarlink ZL10036 silicon tuner
zl10039	Zarlink ZL10039 silicon tuner
zl10353	Zarlink ZL10353 based