OpenCore

Reference Manual (0.9.2.3)

[2023.05.10]

Note 3: For this patch to be correctly applied, `Override` must be enabled with all keys properly set in `Custom`, under section `Misc->Serial`.

Note 4: This patch is for PMIO support and is therefore not applied if `UseMmio` under section `Misc->Serial->Custom` is false. For MMIO, there are boot arguments `pcie_mmio_uart=ADDRESS` and `mmio_uart=ADDRESS` that allow the kernel to use MMIO for serial port access.

Note 5: The serial baud rate must be correctly set in both `BaudRate` under section `Misc->Serial->Custom` and via `serialbaud=VALUE` boot argument, both of which should match against each other. The default baud rate is `115200`.

6. `CustomSMBIOSGuid`
   Type: `plist boolean`
   Failsafe: `false`
   Requirement: 10.4
   Description: Performs GUID patching for `UpdateSMBIOSMode Custom` mode. Usually relevant for Dell laptops.

7. `DisableIoMapper`
   Type: `plist boolean`
   Failsafe: `false`
   Requirement: 10.8 (not required for older)
   Description: Disables `IOMapper` support in XNU (VT-d), which may conflict with the firmware implementation.

   Note 1: This option is a preferred alternative to deleting `DMAR` ACPI table and disabling VT-d in firmware preferences, which does not obstruct VT-d support in other systems in case they need this.

   Note 2: Misconfigured IOMMU in the firmware may result in broken devices such as ethernet or Wi-Fi adapters. For instance, an ethernet adapter may cycle in link-up link-down state infinitely and a Wi-Fi adapter may fail to discover networks. Gigabyte is one of the most common OEMs with these issues.

8. `DisableIoMapperMapping`
   Type: `plist boolean`
   Failsafe: `false`
   Requirement: 13.3 (not required for older)
   Description: Disables mapping PCI bridge device memory in IOMMU (VT-d).

   ~~*Note 1:* This option resolves compatibility issues with Wi-Fi, Ethernet and Thunderbolt devices when AppleVTD is enabled on systems where the native DMAR table contains one or more Reserved Memory Regions and iGPU is enabled and more than 16 GB memory is installed.~~ On some systems, this quirk is only needed when iGPU is enabled.

   Note 1: This quirk requires a native DMAR table that does not contain Reserved Memory Regions or a substitute SSDT-DMAR.aml in which Reserved Memory Regions have been removed.

   Note 2: This option is not needed on AMD systems.

9. `DisableLinkeditJettison`
   Type: `plist boolean`
   Failsafe: `false`
   Requirement: 11
   Description: Disables `__LINKEDIT` jettison code.

   This option lets `Lilu.kext`, and possibly other kexts, function in macOS Big Sur at their best performance levels without requiring the `keepsyms=1` boot argument.

10. `DisableRtcChecksum`
    Type: `plist boolean`
    Failsafe: `false`
    Requirement: 10.4
    Description: Disables primary checksum (`0x58-0x59`) writing in AppleRTC.

    Note 1: This option will not protect other areas from being overwritten, see RTCMemoryFixup kernel extension if this is desired.

Note 1: Due to using system NVRAM reset, this option is not compatible with the `--preserve-boot` option and will override it, therefore all BIOS boot entries will be removed.

Note 2: Due to using system NVRAM reset, the OpenCore boot option cannot be preserved and OpenCore will have to either be reselected in the native boot picker or re-blessed.

Note 3: On non-Apple hardware, this option will still set this variable but the variable will not be recognised by the firmware and no NVRAM reset will happen.

11.7.2 ToggleSipEntry

Provides a boot entry for enabling and disabling System Integrity Protection (SIP) in OpenCore picker.

While macOS is running, SIP involves multiple configured software protection systems, however all the information about which of these protections to enable is stored in the single Apple NVRAM variable `csr-active-config`. As long as this variable is set before macOS startup, SIP will be fully configured, so setting the variable using this boot option (or in any other way, before macOS starts) has exactly the same end result as configuring SIP using the `csrutil` command in macOS Recovery.

`csr-active-config` will be toggled between `0` for enabled, and a user-specified or default value for disabled.

Options for the driver should be specified as plain text values separated by whitespace in the `Arguments` section of `Driver` entry. Available options are:

- `--show-csr` - Boolean flag, enabled if present.

  If enabled, show the current hexadecimal value of `csr-active-config` in the boot entry name. This option will not work in OpenCanopy when used in combination with `OC_ATTR_USE_GENERIC_LABEL_IMAGE` in `PickerAttributes`.

- Numerical value - Default value `0x27F`.

  Specify the `csr-active-config` value to use to disabled SIP. This can be specified as hexadecimal, beginning with `0x`, or as decimal. For more info see Note 2 below.

Note 1: It is recommended not to run macOS with SIP disabled. Use of this boot option may make it easier to quickly disable SIP protection when genuinely needed - it should be re-enabled again afterwards.

Note 2: The default value for disabling SIP with this boot entry is `0x27F`. For comparison, `csrutil disable` with no other arguments on macOS Big Sur and Monterey sets `0x7F`, and on Catalina it sets `0x77`. The OpenCore default value of `0x27F` is a variant of the Big Sur and Monterey value, chosen as follows:

- `CSR_ALLOW_UNAPPROVED_KEXTS` (`0x200`) is included in the default value, since it is generally useful, in the case where you need to have SIP disabled anyway, to be able to install unsigned kexts without manual approval in System Preferences.
- `CSR_ALLOW_UNAUTHENTICATED_ROOT` (`0x800`) is not included in the default value, as it is very easy when using it to inadvertently break OS seal and prevent incremental OTA updates.
- If unsupported bits from a later OS are specified in `csr-active-config` (e.g. specifying `0x7F` on Catalina) then `csrutil status` will report that SIP has a non-standard value, however protection will be functionally the same.

11.8 AudioDxe

High Definition Audio (HDA) support driver in UEFI firmware for most Intel and some other analog audio controllers.

Note: AudioDxe is a staging driver, refer to acidanthera/bugtracker#740 for known issues.

11.8.1 Configuration

Most UEFI audio configuration is handled via the `UEFI Audio Properties` section, but in addition some of the following configuration options may be required in order to allow AudioDxe to correctly drive certain devices. All options are specified as text strings, separated by space if more than one option is required, in the `Arguments` property for the driver within the `UEFI/Drivers` section:

- `--codec-setup-delay` - Integer value, default `0`.

  Amount of time in milliseconds to wait for all widgets to come fully on, applied per codec during driver connection phase. In most systems this should not be needed and a faster boot will be achieved by using `Audio` section `SetupDelay` if any audio setup delay is required. Where required, values of up to one second may be needed.

- `--force-codec` - Integer value, no default.

  Force use of an audio codec, this value should be equal to `Audio` section `AudioCodec`. Can result in faster boot especially when used in conjuction with `--force-device`.

- `--force-device` - String value, no default.

  When this option is present and has a value (e.g. `--force-device=PciRoot(0x0)/Pci(0x1f,0x3)`), it forces AudioDxe to connect to the specified PCI device, even if the device does not report itself as an HDA audio controller.
  During driver connection, AudioDxe automatically provides audio services on all supported codecs of all available HDA controllers. However, if the relevant controller is misreporting its identity (typically, it will be reporting itself as a legacy audio device instead of an HDA controller) then this argument may be required.
  Applies if the audio device can be made to work in macOS, but shows no sign of being detected by AudioDxe (e.g. when including `DEBUG_INFO` in `DisplayLevel` and using a DEBUG build of AudioDxe, no controller and codec layout information is displayed during the `Connecting drivers...` phase of OpenCore log).

- `--gpio-setup` - Default value is `0` (GPIO setup disabled) if argument is not provided, or `7` (all GPIO setup stages stages enabled) if the argument is provided with no value.

  Available values, which may be combined by adding, are:

  - `0x00000001` (bit `0`) — `GPIO_SETUP_STAGE_DATA`, set GPIO pin data high on specified pins. Required e.g. on `MacBookPro10,2` and `MacPro5,1`.
  - `0x00000002` (bit `1`) — `GPIO_SETUP_STAGE_DIRECTION`, set GPIO data direction to output on specified pins. Required e.g. on `MacPro5,1`.
  - `0x00000004` (bit `2`) — `GPIO_SETUP_STAGE_ENABLE`, enable specified GPIO pins. Required e.g. on `MacPro5,1`.

  If audio appears to be 'playing' on the correct codec, e.g. based on the debug log, but no sound is heard on any channel, it is suggested to use `--gpio-setup` (with no value) in the AudioDxe driver arguments. If specified with no value, all stages will be enabled (equivalent of specifying `7`). If this produces sound, it is then possible to try fewer bits, e.g. `--gpio-setup=1`, `--gpio-setup=3`, to find out which stages are actually required.

  Note: Value `7` (all flags enabled) of this option – as required for the `MacPro5,1` – is compatible with most systems, but is known to cause problems with sound (previous sounds are not allowed to finish before new sounds start) on a small number of other systems, hence this option is not enabled by default.

- `--gpio-pins` - Default: `0`, auto-detect.

  Specifies which GPIO pins should be operated on by `--gpio-setup`. This is a bit mask, with possible values from `0x0` to `0xFF`. The usable maximum depends on the number if available pins on the audio out function group of the codec in use, e.g. it is `0x3` (lowest two bits) if two GPIO pins are present, `0x7` if three pins are present, etc.

  When `--gpio-setup` is enabled (i.e. non-zero), then `0` is a special value for `--gpio-pins`, meaning that the pin mask will be auto-generated based on the reported number of GPIO pins on the specified codec (see `AudioCodec`), e.g. if the codec's audio out function group reports 4 GPIO pins, a mask of `0xF` will be used. The value in use can be seen in the debug log in a line such as:

  ```
  HDA: GPIO setup on pins 0x0F - Success
  ```

  Values for driver parameters can be specified in hexadecimal beginning with `0x` or in decimal, e.g. `--gpio-pins=0x12` or `--gpio-pins=18`.

- `--restore-nosnoop` - Boolean flag, enabled if present.

  AudioDxe clears the Intel HDA No Snoop Enable (NSNPEN) bit. On some systems, this change must be reversed on exit in order to avoid breaking sound in Windows or Linux. If so, this flag should be added to AudioDxe driver arguments. Not enabled by default, since restoring the flag can prevent sound from working in macOS on some other systems.