OpenCore

Reference Manual (1.0.5.6)

[2025.08.02]

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.

- `--use-conn-none` - Boolean flag, enabled if present.

  On some sound cards enabling this option will enable additional usable audio channels (e.g. the bass or treble speaker of a pair, where only one is found without it).

  Note: Enabling this option may increase the available channels, in which case any custom setting of `AudioOutMask` may need to be changed to match the new channel list.

11.11 OpenVariableRuntimeDxe

Provides in-memory emulated NVRAM implementation. This can be useful on systems with fragile (e.g. MacPro5,1, see discussion linked from this forum post) or incompatible NVRAM implementations. This driver is included by default in OpenDuet.

In addition to installing emulated NVRAM, this driver additionally installs an OpenCore compatible protocol enabling the following:

- NVRAM values are loaded from `NVRAM/nvram.plist` (or from `NVRAM/nvram.fallback` if it is present and `NVRAM/nvram.plist` is missing) on boot
- The Reset NVRAM option installed by the `ResetNvramEntry` driver removes the above files instead of affecting underlying NVRAM
- `CTRL+Enter` in the OpenCore bootpicker updates or creates `NVRAM/nvram.plist`

Recommended configuration settings for this driver:

- `OpenVariableRuntimeDxe.efi` loaded using `LoadEarly=true`. OpenDuet users should not load this driver, as ~~it~~ a firmware driver serving the same purpose is included in OpenDuet.
- `OpenRuntime.efi` specified after `OpenVariableRuntimeDxe.efi` (when applicable), also loaded using `LoadEarly=true` for correct operation of `RequestBootVarRouting`.
  - `RequestBootVarRouting` is never strictly needed while using emulated NVRAM, but it can be convenient to leave it set on a system which needs to switch between real and emulated NVRAM.
  - `RequestBootVarRouting` is never required on an OpenDuet system, since there are no BIOS-managed boot entries to protect, therefore on OpenDuet recommended settings are `LoadEarly=false` for `OpenRuntime.efi` and `RequestBootVarRouting=false`.
- `LegacySchema` populated.
  - For simpler testing (allows arbitrary test variables), and future-proofing against changes in the variables required by macOS updates, use `<string>*</string>` settings, as described in notes below.
  - For increased security, populate sections with known required keys only, as shown in OpenCore's sample `.plist` files.
- `ExposeSensitiveData` with at least bit `0x1` set to make `boot-path` variable containing the OpenCore EFI partition UUID available to the `Launchd.command` script.

Variable loading happens prior to the NVRAM `Delete` (and `Add`) phases. Unless `LegacyOverwrite` is enabled, it will not overwrite any existing variable. Variables allowed for loading and for saving with `CTRL+Enter` must be specified in `LegacySchema`.