

# Graphics stack

## Contents

|          |   |          |
|----------|---|----------|
| <b>1</b> | <b>Xorg</b>                                   | <b>2</b> |
| <b>2</b> | <b>Mesa</b>                                   | <b>2</b> |
| <b>3</b> | <b>Fonts</b>                                  | <b>2</b> |
| <b>4</b> | <b>Nvidia</b>                                 | <b>3</b> |
| <b>5</b> | <b>gfx-drm</b>                                | <b>4</b> |
| 5.1      | Intel KMS driver . . . . .                    | 4        |
| 5.1.1    | References . . . . .                          | 5        |
| 5.1.2    | Known Issues . . . . .                        | 5        |
| 5.1.3    | Sandy Bridge GT1 . . . . .                    | 5        |
| 5.1.4    | Gen >= 8 . . . . .                            | 5        |
| 5.2      | Hardware Matrix . . . . .                     | 5        |
| 5.3      | How to checkout Linux drm code only . . . . . | 15       |

Like most UNIX/Linux operating systems, OpenIndiana's GUI environment is based on the X Window System bundled with libraries and applications developed by the [freedesktop.org](https://freedesktop.org) community.

Therefore the Graphic Stack is comprised of: \* the opensource X11 display server Xorg, client libraries and utilities developed by the [X.org Project](https://www.x.org), \* an OpenGL implementation in the form of the opensource [Mesa](https://mesa.sourceforge.io/) library, \* and illumos kernel drivers for different graphics adapters provided by the [gfx-drm](https://dri.freedesktop.org/docs/gfx-drm/) gate, \* together with the [libdrm](https://dri.freedesktop.org/docs/libdrm/) implementing communication between kernel drivers and user-space components through the Direct Rendering Infrastructure (DRI) protocol.

All these components can be installed using the unified build system [oi-userland](https://openIndiana.org/oi-userland/) or simply installed from the package repositories.

Notes concerning different components are provided:

| Component               | Scope  |
|-------------------------|--|
| <a href="#">Xorg</a>    | Building the Xorg display server, protocol headers, client libraries and applications. |
| <a href="#">Mesa</a>    | Building the Mesa library and testing OpenGL capabilities.                             |
| <a href="#">Fonts</a>   | Packaging new fonts for OpenIndiana.   |
| <a href="#">Nvidia</a>  | Installation of Nvidia's proprietary graphics driver for Solaris.                      |
| <a href="#">gfx-drm</a> | Building the illumos KMS drivers and libdrm from the gfx-drm gate.                     |

## 1 Xorg

All the Xorg components are build in oi-userland and located in the x11 directory:

<https://github.com/OpenIndiana/oi-userland/tree/oi/hipster/components/x11>

A bogus component is provided to rebuild the X11 gate: <https://github.com/OpenIndiana/oi-userland/tree/oi/hipster/components/x11/x11-gate>

The upstream Solaris code is located at:

<https://github.com/oracle/solaris-userland/tree/master/components/x11>

## 2 Mesa

To build Mesa use the [x11/mesa](#) component.

## 3 Fonts

Font components in oi-userland are located in the [components/fonts](#) directory.

## 4 Nvidia

Nvidia provides Solaris x86-64/x86 packages of their proprietary driver for different families of graphic adapters.

The Nvidia driver shipped with OpenIndiana is built using `openindiana/nvidia-XXX` e.g. [openindiana/nvidia-470](#) component.

The list of currently supported and legacy drivers is updated on the [Unix Drivers](#) page.

| Series | Label                      | Models  | Notes   |
|--------|----------------------------|---|---|
| 430.xx | Current long lived branch  | Quadro RTX 4000-8000,<br>Quadro, Quadro Blade,<br>Quadro NVS, NVS |   |
| 415.xx | Current short lived branch | Quadro RTX 4000-6000,<br>Quadro, Quadro Blade,<br>Quadro NVS, NVS |   |
| 396.xx | Legacy GPU                 | GeForce 400 to Geforce GTX 10                                     | Driver 396.24   |
| 340.xx | Legacy GPU                 | GeForce 8 to GeForce 700 series                                   | Driver 340.106 ;<br>Delivers libvdpau as part of the package. |
| 304.xx | Legacy GPU                 | GeForce 6 to GeForce 600 series                                   | Driver 304.137  |

The drivers series 340.xx, 390.xx, and 490.xx are currently part of oi-userland, others may be installed manually following Nvidia's instructions.

The 390.xx drivers are current default.

Note on switching driver versions

```
# beadm create nvidia-460
# beadm mount nvidia-460 /tmp/nvidia-460
# pkg -R /tmp/nvidia-460 uninstall xorg-video nvidia nvidia-390
# pkg -R /tmp/nvidia-460 install nvidia-460
# beadm activate nvidia-460
# init 6
```

Note on manual driver installations:

```
# beadm create oi-nvidia
# beadm mount oi-nvidia /mnt
# pkg -R /mnt uninstall x11/server/xorg/driver/xorg-video driver/graphics/nvidia
# /bin/sh NVIDIA-Solaris-x86-390.48.run --extract-only
# cd NVIDIA-Solaris-x86-390.48
# pkgadd -R /mnt -d . NVDAgraphics NVDAgraphicsr
# bootadm update-archive -R /mnt
# beadm unmount -f oi-nvidia
# beadm activate oi-nvidia
# init 6
```

## 5 gfx-drm

The gfx-drm gate consists of different kernel components for support of various graphic adapters in the illumos and the Direct Rendering Infrastructure (DRI) library, libdrm.

| Component  | Description  |
|------------|--|
| libdrm     | The library enables communication between kernel components and user-space libraries through the DRI protocol. |
| agpart     | Kernel driver for the Graphics Address Remapping Table (GART) / Graphics Translation Table (GTT) support.      |
| header-drm | System headers for DRM/KMS kernel drivers and user-space libraries.  |
| i915       | Intel KMS driver for Intel Graphics Media Accelerator (GMA) and Intel HD Graphics adapters.                    |

### 5.1 Intel KMS driver

The xorg-video-intel package is the open-source 2D graphics driver for the X Window System as implemented by X.org. It supports a variety of Intel graphics chipsets including:

- i810/i810e/i810-dc100,i815,
- i830M,845G,852GM,855GM,865G,
- 915G/GM,945G/GM/GME,946GZ
- G/GM/GME/Q965,
- G/Q33,G/Q35,G41,G/Q43,G/GM/Q45
- PineView-M (Atom N400 series)
- PineView-D (Atom D400/D500 series)
- Intel(R) HD Graphics,
- Intel(R) Iris(TM) Graphics,
- Intel(R) Iris(TM) Pro Graphics.

Open source kernel driver(s) by Oracle:

<https://github.com/oracle/solaris-userland/tree/master/components/x11/kernel/sun-src>

The relevant kernel code is located in drm and i915 subfolders.

An illumos port of Oracle code is available here:

<https://github.com/illumos/gfx-drm>

Martin Bochnig, creator of OpenSXCE, initially backported the S12 driver to illumos available in oi-userland until December 20, 2016.

It was then superseded by the new gate providing improvements to the gfx\_private interface and agpgart driver, as well as containing userland libraries used by graphics, like libdrm.

### 5.1.1 References

Alan Coopersmith pointed to the following documents regarding DRI/KMS:

- [http://www.phoronix.com/scan.php?page=news\\_item&px=Solaris-DRM-KMS-2015](http://www.phoronix.com/scan.php?page=news_item&px=Solaris-DRM-KMS-2015)
- [http://www.x.org/wiki/Events/XDC2015/Program/#Fishel\\_status\\_drm\\_i915\\_solaris](http://www.x.org/wiki/Events/XDC2015/Program/#Fishel_status_drm_i915_solaris)
- [https://en.wikipedia.org/wiki/Direct\\_Rendering\\_Manager](https://en.wikipedia.org/wiki/Direct_Rendering_Manager)
- <http://dri.freedesktop.org/wiki/>
- [https://wiki.archlinux.org/index.php/kernel\\_mode\\_setting](https://wiki.archlinux.org/index.php/kernel_mode_setting)
- <https://web.archive.org/web/20170711030533/http://lanyrd.com/topics/x-window-system/>

Additionally, information about driver development:

- <https://01.org/linuxgraphics>
- <http://dri.freedesktop.org/docs/drm/>
- <http://blog.ffwll.ch/2013/01/i915gem-crashcourse-overview.html>
- blog posts from the i915 Linux maintainer <http://blog.ffwll.ch/>

### 5.1.2 Known Issues

**5.1.2.1 SNA** SNA may cause segmentation faults if enabled. If so, just disable SNA and you can copy the attached 20-intel-uxa.conf to /etc/X11/xorg.conf.d/.

For now UXA mode is set by default.

### 5.1.3 Sandy Bridge GT1

A hardware bug required implementing a workaround in the Intel ringbuffer implementation, occasional 1-2 second hangs may occur.

### 5.1.4 Gen >= 8

Generation 8 (and later) devices are not supported at all. They require Intel ringbuffer support, which is not implemented.

## 5.2 Hardware Matrix

Reference:

- [https://github.com/torvalds/linux/blob/master/include/drm/i915\\_pciids.h](https://github.com/torvalds/linux/blob/master/include/drm/i915_pciids.h)
- [https://en.wikipedia.org/wiki/List\\_of\\_Intel\\_graphics\\_processing\\_units](https://en.wikipedia.org/wiki/List_of_Intel_graphics_processing_units)
- [http://src.illumos.org/source/xref/gfx-drm/usr/src/uts/intel/io/i915/i915\\_drv.c#294](http://src.illumos.org/source/xref/gfx-drm/usr/src/uts/intel/io/i915/i915_drv.c#294)

| Generation | Family | Codename  | PCI id | Model                 | i915 support | xf86-video-intel support |
|------------|--------|-----------|--------|-----------------------|--------------|--------------------------|
| 2nd        | I830   | Almador   | 0x3577 | I830M, I830MG         |              |                          |
| 2nd        | I845G  | Brookdale | 0x2562 | I845G, I845GL, I845GV |              |                          |

| Generation | Family       | Codename     | PCI id | Model  | i915 support | xf86-video-intel support |
|------------|--------------|--------------|--------|--------|--------------|--------------------------|
| 2nd        | I85X         | Montara      | 0x3582 | 855GM  |              |                          |
| 2nd        | I85X         | Montara      | 0x358d | 855GM  |              |                          |
| 2nd        | I865G        | Springdale   | 0x2572 | 865G   |              |                          |
| 3rd        | I915G        | Grantsdale   | 0x2582 | 915G   |              |                          |
| 3rd        | I915G        | Grantsdale   | 0x258d | E7221G |              |                          |
| 3rd        | I915GM       | Alviso       | 0x2592 | 915GM  |              |                          |
| 3rd        | I945G        | Lakeport     | 0x2772 | 945G   |              |                          |
| 3rd        | I945GM       | Calistoga    | 0x27a2 | 945GM  |              |                          |
| 3rd        | I945GM       | Calistoga    | 0x27ad | 945GME |              |                          |
| 3rd        | G33          | Bearlake     | 0x29b2 | Q35G   |              |                          |
| 3rd        | G33          | Bearlake     | 0x29c2 | G33G   |              |                          |
| 3rd        | G33          | Bearlake     | 0x29d2 | Q33G   |              |                          |
| 3rd        | PINEVIEW     | Pineview     | 0xa001 |        |              |                          |
| 3rd        | PINEVIEW     | Pineview     | 0xa011 |        |              |                          |
| 4th        | I965G        | Lakeport     | 0x2972 | 946GZ  |              |                          |
| 4th        | I965G        | Bearlake     | 0x2982 | G35G   |              |                          |
| 4th        | I965G        | Broadwater   | 0x2992 | 965Q   |              |                          |
| 4th        | I965G        | Broadwater   | 0x29a2 | 965G   |              |                          |
| 4th        | I965GM       | Crestline    | 0x2a02 | 965GM  |              |                          |
| 4th        | I965GM       | Crestline    | 0x2a12 | 965GME |              |                          |
| 4th        | GM45         | Cantiga      | 0x2a42 | GM45G  |              |                          |
| 4th        | G45          | Eaglelake    | 0x2e02 | GDEG   |              |                          |
| 4th        | G45          | Eaglelake    | 0x2e12 | Q45G   |              |                          |
| 4th        | G45          | Eaglelake    | 0x2e22 | G45G   |              |                          |
| 4th        | G45          | Eaglelake    | 0x2e32 | G41G   |              |                          |
| 4th        | G45          | Eaglelake    | 0x2e42 | B43G   |              |                          |
| 4th        | G45          | Eaglelake    | 0x2e92 | B43G.1 |              |                          |
| 5th        | IRONLAKE     | Ironlake     | 0x0042 |        |              |                          |
|            | D            | (Clarkdale)  |        |        |              |                          |
| 5th        | IRONLAKE     | Ironlake     | 0x0046 |        |              |                          |
|            | M            | (Arrandale)  |        |        |              |                          |
| 6th        | SANDY BRIDGE | Sandy Bridge | 0x0102 |        |              |                          |
|            | D            |              |        |        |              |                          |
| 6th        | SANDY BRIDGE | Sandy Bridge | 0x0112 |        |              |                          |
|            | D            |              |        |        |              |                          |
| 6th        | SANDY BRIDGE | Sandy Bridge | 0x0122 |        |              |                          |
|            | D            |              |        |        |              |                          |
| 6th        | SANDY BRIDGE | Sandy Bridge | 0x010A |        |              |                          |
|            | D            |              |        |        |              |                          |

| Generation | Family         | Codename     | PCI id | Model       | i915 support  | xf86-video-intel support |
|------------|----------------|--------------|--------|-------------|---|--------------------------|
| 6th        | SANDY BRIDGE M | Sandy Bridge | 0x0106 |             | HW bug causes GPU hangs. Work-around in place, but one may see brief render delays. |                          |
| 6th        | SANDY BRIDGE M | Sandy Bridge | 0x0116 |             | HW bug causes GPU hangs. Work-around in place, but one may see brief render delays. |                          |
| 6th        | SANDY BRIDGE M | Sandy Bridge | 0x0126 |             | HW bug causes GPU hangs. Work-around in place, but one may see brief render delays. |                          |
| 7th        | IVY BRIDGE M   | Ivy Bridge   | 0x0156 | GT1 mobile  |   |                          |
| 7th        | IVY BRIDGE M   | Ivy Bridge   | 0x0166 | GT2 mobile  |   |                          |
| 7th        | IVY BRIDGE D   | Ivy Bridge   | 0x0152 | GT1 desktop |   |                          |

| Generation | Family       | Codename   | PCI id | Model            | i915 support | xf86-video-intel support |
|------------|--------------|------------|--------|------------------|--------------|--------------------------|
| 7th        | IVY BRIDGE D | Ivy Bridge | 0x0162 | GT2 desktop      |              |                          |
| 7th        | IVY BRIDGE D | Ivy Bridge | 0x015a | GT1 server       |              |                          |
| 7th        | IVY BRIDGE D | Ivy Bridge | 0x016a | GT2 server       |              |                          |
| 7th        | HASWELL D    | Haswell    | 0x0402 | GT1 desktop      |              |                          |
| 7th        | HASWELL D    | Haswell    | 0x0412 | GT2 desktop      |              |                          |
| 7th        | HASWELL D    | Haswell    | 0x0422 | GT3 desktop      |              |                          |
| 7th        | HASWELL D    | Haswell    | 0x040a | GT1 server       |              |                          |
| 7th        | HASWELL D    | Haswell    | 0x041a | GT2 server       |              |                          |
| 7th        | HASWELL D    | Haswell    | 0x042a | GT3 server       |              |                          |
| 7th        | HASWELL D    | Haswell    | 0x040B | GT1 reserved     |              |                          |
| 7th        | HASWELL D    | Haswell    | 0x041B | GT2 reserved     |              |                          |
| 7th        | HASWELL D    | Haswell    | 0x042B | GT3 reserved     |              |                          |
| 7th        | HASWELL D    | Haswell    | 0x040E | GT1 reserved     |              |                          |
| 7th        | HASWELL D    | Haswell    | 0x041E | GT2 reserved     |              |                          |
| 7th        | HASWELL D    | Haswell    | 0x042E | GT3 reserved     |              |                          |
| 7th        | HASWELL D    | Haswell    | 0x0C02 | SDV GT1 desktop  |              |                          |
| 7th        | HASWELL D    | Haswell    | 0x0C12 | SDV GT2 desktop  |              |                          |
| 7th        | HASWELL D    | Haswell    | 0x0C22 | SDV GT3 desktop  |              |                          |
| 7th        | HASWELL D    | Haswell    | 0x0C0A | SDV GT1 server   |              |                          |
| 7th        | HASWELL D    | Haswell    | 0x0C1A | SDV GT2 server   |              |                          |
| 7th        | HASWELL D    | Haswell    | 0x0C2A | SDV GT3 server   |              |                          |
| 7th        | HASWELL D    | Haswell    | 0x0C0B | SDV GT1 reserved |              |                          |



| Generation | Family    | Codename | PCI id | Model            | i915 support | xf86-video-intel support |
|------------|-----------|----------|--------|------------------|--------------|--------------------------|
| 7th        | HASWELL D | Haswell  | 0x0C15 | SDV GT2 reserved |              |                          |
| 7th        | HASWELL D | Haswell  | 0x0C25 | SDV GT3 reserved |              |                          |
| 7th        | HASWELL D | Haswell  | 0x0C05 | SDV GT1 reserved |              |                          |
| 7th        | HASWELL D | Haswell  | 0x0C15 | SDV GT2 reserved |              |                          |
| 7th        | HASWELL D | Haswell  | 0x0C25 | SDV GT3 reserved |              |                          |
| 7th        | HASWELL D | Haswell  | 0x0A02 | ULT GT1 desktop  |              |                          |
| 7th        | HASWELL D | Haswell  | 0x0A12 | ULT GT2 desktop  |              |                          |
| 7th        | HASWELL D | Haswell  | 0x0A22 | ULT GT3 desktop  |              |                          |
| 7th        | HASWELL D | Haswell  | 0x0A0A | ULT GT1 server   |              |                          |
| 7th        | HASWELL D | Haswell  | 0x0A1A | ULT GT2 server   |              |                          |
| 7th        | HASWELL D | Haswell  | 0x0A2A | ULT GT3 server   |              |                          |
| 7th        | HASWELL D | Haswell  | 0x0A0B | ULT GT1 reserved |              |                          |
| 7th        | HASWELL D | Haswell  | 0x0A1B | ULT GT2 reserved |              |                          |
| 7th        | HASWELL D | Haswell  | 0x0A2B | ULT GT3 reserved |              |                          |
| 7th        | HASWELL D | Haswell  | 0x0D02 | CRW GT1 desktop  |              |                          |
| 7th        | HASWELL D | Haswell  | 0x0D12 | CRW GT2 desktop  |              |                          |
| 7th        | HASWELL D | Haswell  | 0x0D22 | CRW GT3 desktop  |              |                          |
| 7th        | HASWELL D | Haswell  | 0x0D0A | CRW GT1 server   |              |                          |
| 7th        | HASWELL D | Haswell  | 0x0D1A | CRW GT2 server   |              |                          |
| 7th        | HASWELL D | Haswell  | 0x0D2A | CRW GT3 server   |              |                          |
| 7th        | HASWELL D | Haswell  | 0x0D0B | CRW GT1 reserved |              |                          |
| 7th        | HASWELL D | Haswell  | 0x0D1B | CRW GT2 reserved |              |                          |
| 7th        | HASWELL D | Haswell  | 0x0D2B | CRW GT3 reserved |              |                          |

| Generation | Family        | Codename                | PCI id | Model             | i915 support | xf86-video-intel support |
|------------|---------------|-------------------------|--------|-------------------|--------------|--------------------------|
| 7th        | HASWELL D     | Haswell                 | 0x0D00 | CRW GT1 reserved  |              |                          |
| 7th        | HASWELL D     | Haswell                 | 0x0D10 | CRW GT2 reserved  |              |                          |
| 7th        | HASWELL D     | Haswell                 | 0x0D20 | CRW GT3 reserved  |              |                          |
| 7th        | HASWELL M     | Haswell                 | 0x0400 | GT1 mobile        |              |                          |
| 7th        | HASWELL M     | Haswell                 | 0x0410 | GT2 mobile        |              |                          |
| 7th        | HASWELL M     | Haswell                 | 0x0420 | GT2 mobile        |              |                          |
| 7th        | HASWELL M     | Haswell                 | 0x0C00 | SDV GT1 mobile    |              |                          |
| 7th        | HASWELL M     | Haswell                 | 0x0C10 | SDV GT2 mobile    |              |                          |
| 7th        | HASWELL M     | Haswell                 | 0x0C20 | SDV GT3 mobile    |              |                          |
| 7th        | HASWELL M     | Haswell                 | 0x0A00 | BULT GT1 mobile   |              |                          |
| 7th        | HASWELL M     | Haswell                 | 0x0A10 | BULT GT2 mobile   |              |                          |
| 7th        | HASWELL M     | Haswell                 | 0x0A20 | BULT GT3 mobile   |              |                          |
| 7th        | HASWELL M     | Haswell                 | 0x0A00 | EJLX GT1 mobile   |              |                          |
| 7th        | HASWELL M     | Haswell                 | 0x0A10 | EJLX GT2 mobile   |              |                          |
| 7th        | HASWELL M     | Haswell                 | 0x0A20 | EJLT GT3 reserved |              |                          |
| 7th        | HASWELL M     | Haswell                 | 0x0D00 | CRW GT1 mobile    |              |                          |
| 7th        | HASWELL M     | Haswell                 | 0x0D10 | CRW GT2 mobile    |              |                          |
| 7th        | HASWELL M     | Haswell                 | 0x0D20 | CRW GT3 mobile    |              |                          |
| 7th        | VALLEY VIEW M | Valley View (Bay Trail) | 0x0f30 |                   |              |                          |
| 7th        | VALLEY VIEW M | Valley View (Bay Trail) | 0x0f31 |                   |              |                          |
| 7th        | VALLEY VIEW M | Valley View (Bay Trail) | 0x0f32 |                   |              |                          |
| 7th        | VALLEY VIEW M | Valley View (Bay Trail) | 0x0f33 |                   |              |                          |
| 7th        | VALLEY VIEW M | Valley View (Bay Trail) | 0x0157 |                   |              |                          |

| Generation | Family          | Codename                | PCI id | Model           | i915 support  | xf86-video-intel support |
|------------|-----------------|-------------------------|--------|-----------------|---|--------------------------|
| 7th        | VALLEY VIEW D   | Valley View (Bay Trail) | 0x0155 |                 |   |                          |
| 8th        | BROADWELL GT12M | Broadwell               | 0x1602 | GT1 ULT         | Gen<br>>=8<br><b>NOT</b><br>sup-<br>ported<br>at all. |                          |
| 8th        | BROADWELL GT12M | Broadwell               | 0x1606 | GT1 ULT         |   |                          |
| 8th        | BROADWELL GT12M | Broadwell               | 0x160B | GT1 Iris        |   |                          |
| 8th        | BROADWELL GT12M | Broadwell               | 0x160E | GT1 ULX         |   |                          |
| 8th        | BROADWELL GT12M | Broadwell               | 0x1612 | GT2 Halo        |   |                          |
| 8th        | BROADWELL GT12M | Broadwell               | 0x1616 | GT2 ULT         |   |                          |
| 8th        | BROADWELL GT12M | Broadwell               | 0x161B | GT2 ULT         |   |                          |
| 8th        | BROADWELL GT12M | Broadwell               | 0x161E | GT2 ULX         |   |                          |
| 8th        | BROADWELL GT12D | Broadwell               | 0x160A | GT1 Server      |   |                          |
| 8th        | BROADWELL GT12D | Broadwell               | 0x160D | GT1 Workstation |   |                          |
| 8th        | BROADWELL GT12D | Broadwell               | 0x161A | GT2 Server      |   |                          |
| 8th        | BROADWELL GT12D | Broadwell               | 0x161D | GT2 Workstation |   |                          |
| 8th        | BROADWELL GT3M  | Broadwell               | 0x1622 | GT3 ULT         |   |                          |
| 8th        | BROADWELL GT3M  | Broadwell               | 0x1626 | GT3 ULT         |   |                          |
| 8th        | BROADWELL GT3M  | Broadwell               | 0x162B | GT3 Iris        |   |                          |
| 8th        | BROADWELL GT3M  | Broadwell               | 0x162E | GT3 ULX         |   |                          |
| 8th        | BROADWELL GT3D  | Broadwell               | 0x162A | GT3 Server      |   |                          |
| 8th        | BROADWELL GT3D  | Broadwell               | 0x162D | GT3 Workstation |   |                          |
| 8th        | BROADWELL RSVDM | Broadwell               | 0x1632 | ULT             |   |                          |
| 8th        | BROADWELL RSVDM | Broadwell               | 0x1636 | ULT             |   |                          |

| Generation | Family      | Codename                             | PCI id | Model        | i915 support | xf86-video-intel support |
|------------|-------------|--------------------------------------|--------|--------------|--------------|--------------------------|
| 8th        | BROADWELL   | Broadwell                            | 0x163b | Bris         |              |                          |
| 8th        | BROADWELL   | Broadwell                            | 0x163b | EULX         |              |                          |
| 8th        | BROADWELL   | Broadwell                            | 0x163b | AServer      |              |                          |
| 8th        | BROADWELL   | Broadwell                            | 0x163b | DWorkstation |              |                          |
| 8th        | CHERRY VIEW | Cherry View (Braswell, Cherry Trail) | 0x22b0 |              |              |                          |
| 8th        | CHERRY VIEW | Cherry View (Braswell, Cherry Trail) | 0x22b1 |              |              |                          |
| 8th        | CHERRY VIEW | Cherry View (Braswell, Cherry Trail) | 0x22b2 |              |              |                          |
| 8th        | CHERRY VIEW | Cherry View (Braswell, Cherry Trail) | 0x22b3 |              |              |                          |
| 9th        | SKYLAKE GT1 | Skylake                              | 0x1906 | ULT GT1      |              |                          |
| 9th        | SKYLAKE GT1 | Skylake                              | 0x1906 | EULX GT1     |              |                          |
| 9th        | SKYLAKE GT1 | Skylake                              | 0x1906 | DT GT1       |              |                          |
| 9th        | SKYLAKE GT1 | Skylake                              | 0x1906 | BHalo GT1    |              |                          |
| 9th        | SKYLAKE GT1 | Skylake                              | 0x1906 | ASRV GT1     |              |                          |
| 9th        | SKYLAKE GT2 | Skylake                              | 0x1916 | ULT GT2      |              |                          |
| 9th        | SKYLAKE GT2 | Skylake                              | 0x1921 | ULT GT2F     |              |                          |
| 9th        | SKYLAKE GT2 | Skylake                              | 0x1916 | EULX GT2     |              |                          |
| 9th        | SKYLAKE GT2 | Skylake                              | 0x1916 | DT GT2       |              |                          |
| 9th        | SKYLAKE GT2 | Skylake                              | 0x1916 | BHalo GT2    |              |                          |
| 9th        | SKYLAKE GT2 | Skylake                              | 0x1916 | ASRV GT2     |              |                          |
| 9th        | SKYLAKE GT2 | Skylake                              | 0x191d | DWKS GT2     |              |                          |
| 9th        | SKYLAKE GT3 | Skylake                              | 0x1923 | ULT GT3      |              |                          |

| Generation | Family              | Codename                  | PCI id | Model                  | i915 support | xf86-video-intel support |
|------------|---------------------|---------------------------|--------|------------------------|--------------|--------------------------|
| 9th        | SKYLAKE             | Skylake                   | 0x1926 | ULT GT3                |              |                          |
| 9th        | SKYLAKE             | Skylake                   | 0x1927 | ULT GT3                |              |                          |
| 9th        | SKYLAKE             | Skylake                   | 0x192B | Halo GT3               |              |                          |
| 9th        | SKYLAKE             | Skylake                   | 0x192A | SRV GT3                |              |                          |
| 9th        | SKYLAKE             | Skylake                   | 0x1932 | DT GT4                 |              |                          |
| 9th        | SKYLAKE             | Skylake                   | 0x193B | Halo GT4               |              |                          |
| 9th        | SKYLAKE             | Skylake                   | 0x193D | DWKS GT4               |              |                          |
| 9th        | SKYLAKE             | Skylake                   | 0x193A | SRV GT4                |              |                          |
| 9th        | BROXTON             | Goldmont<br>(Apollo Lake) | 0x0A84 |                        |              |                          |
| 9th        | BROXTON             | Goldmont<br>(Apollo Lake) | 0x1A84 |                        |              |                          |
| 9th        | BROXTON             | Goldmont<br>(Apollo Lake) | 0x1A85 |                        |              |                          |
| 9th        | BROXTON             | Goldmont<br>(Apollo Lake) | 0x5A84 | APL HD<br>Graphics 505 |              |                          |
| 9th        | BROXTON             | Goldmont<br>(Apollo Lake) | 0x5A85 | APL HD<br>Graphics 500 |              |                          |
| 9th        | KABY<br>LAKE<br>GT1 | Kaby Lake                 | 0x5913 | ULT GT1.5              |              |                          |
| 9th        | KABY<br>LAKE<br>GT1 | Kaby Lake                 | 0x5915 | JLX GT1.5              |              |                          |
| 9th        | KABY<br>LAKE<br>GT1 | Kaby Lake                 | 0x5917 | DT GT1.5               |              |                          |
| 9th        | KABY<br>LAKE<br>GT1 | Kaby Lake                 | 0x5906 | ULT GT1                |              |                          |
| 9th        | KABY<br>LAKE<br>GT1 | Kaby Lake                 | 0x590E | JLX GT1                |              |                          |
| 9th        | KABY<br>LAKE<br>GT1 | Kaby Lake                 | 0x5902 | DT GT1                 |              |                          |
| 9th        | KABY<br>LAKE<br>GT1 | Kaby Lake                 | 0x5908 | Halo GT1               |              |                          |

| Generation | Family        | Codename    | PCI id | Model    | i915 support | xf86-video-intel support |
|------------|---------------|-------------|--------|----------|--------------|--------------------------|
| 9th        | KABY LAKE GT1 | Kaby Lake   | 0x590B | Halo GT1 |              |                          |
| 9th        | KABY LAKE GT1 | Kaby Lake   | 0x590A | SRV GT1  |              |                          |
| 9th        | KABY LAKE GT2 | Kaby Lake   | 0x5916 | ULT GT2  |              |                          |
| 9th        | KABY LAKE GT2 | Kaby Lake   | 0x5921 | ULT GT2F |              |                          |
| 9th        | KABY LAKE GT2 | Kaby Lake   | 0x591E | EULX GT2 |              |                          |
| 9th        | KABY LAKE GT2 | Kaby Lake   | 0x5912 | DT GT2   |              |                          |
| 9th        | KABY LAKE GT2 | Kaby Lake   | 0x591B | Halo GT2 |              |                          |
| 9th        | KABY LAKE GT2 | Kaby Lake   | 0x591A | SRV GT2  |              |                          |
| 9th        | KABY LAKE GT2 | Kaby Lake   | 0x591D | WKS GT2  |              |                          |
| 9th        | KABY LAKE GT3 | Kaby Lake   | 0x5923 | ULT GT3  |              |                          |
| 9th        | KABY LAKE GT3 | Kaby Lake   | 0x5926 | ULT GT3  |              |                          |
| 9th        | KABY LAKE GT3 | Kaby Lake   | 0x5927 | ULT GT3  |              |                          |
| 9th        | KABY LAKE GT4 | Kaby Lake   | 0x593B | Halo GT4 |              |                          |
| 9th        | COFFEE LAKE   | Coffee Lake | 0x3E90 | GT1      |              |                          |
| 9th        | COFFEE LAKE   | Coffee Lake | 0x3E91 | DT GT2   |              |                          |
| 9th        | COFFEE LAKE   | Coffee Lake | 0x3E92 | DT GT2   |              |                          |
| 9th        | COFFEE LAKE   | Coffee Lake | 0x3E93 | GT1      |              |                          |

| Generation | Family      | Codename    | PCI id | Model | i915 support | xf86-video-intel support |
|------------|-------------|-------------|--------|-------|--------------|--------------------------|
| 9th        | COFFEE LAKE | Coffee Lake | 0x3E94 | GT2   |              |                          |
| 9th        | COFFEE LAKE | Coffee Lake | 0x3E95 | GT3   |              |                          |
| 9th        | COFFEE LAKE | Coffee Lake | 0x3E96 | GT2   |              |                          |
| 9th        | COFFEE LAKE | Coffee Lake | 0x3E9B | GT2   |              |                          |
| 9th        | COFFEE LAKE | Coffee Lake | 0x3EA6 | GT3   |              |                          |
| 9th        | COFFEE LAKE | Coffee Lake | 0x3EA7 | GT3   |              |                          |
| 9th        | COFFEE LAKE | Coffee Lake | 0x3EA8 | GT3   |              |                          |
| 9th        | CANNON LAKE | Cannon Lake | 0x5A52 | GT2   |              |                          |
| 9th        | CANNON LAKE | Cannon Lake | 0x5A5A | GT2   |              |                          |
| 9th        | CANNON LAKE | Cannon Lake | 0x5A42 | GT2   |              |                          |
| 9th        | CANNON LAKE | Cannon Lake | 0x5A4A | GT2   |              |                          |
| 9th        | CANNON LAKE | Cannon Lake | 0x5A51 | GT2   |              |                          |
| 9th        | CANNON LAKE | Cannon Lake | 0x5A59 | GT2   |              |                          |
| 9th        | CANNON LAKE | Cannon Lake | 0x5A41 | GT2   |              |                          |
| 9th        | CANNON LAKE | Cannon Lake | 0x5A49 | GT2   |              |                          |
| 9th        | CANNON LAKE | Cannon Lake | 0x5A71 | GT2   |              |                          |
| 9th        | CANNON LAKE | Cannon Lake | 0x5A79 | GT2   |              |                          |

### 5.3 How to checkout Linux drm code only

```
$ mkdir linux-drm
$ cd linux-drm/
$ git init
$ git remote add origin https://github.com/freedesktop/drm-intel.git
$ git config core.sparsecheckout true
$ echo "drivers/gpu/drm/*" >> .git/info/sparse-checkout
$ echo "include/drm/*" >> .git/info/sparse-checkout
$ git pull --depth=1 origin drm-intel-fixes
```