

### Part 3: HDMI Audio Kext Verification

Even with a successfully configured DSDT, more work is required. Specifically, your system must be enabled for the specific graphics card you have installed. Typically, this means editing particular software components in your system for compatibility with your graphics card. There is a specific method for Nvidia GeForce GT4XX graphics cards and a different method for AMD Radeon HD 5XXX graphics cards

What you will need:

DSDTSE v1.4.3 - <http://www.osx86.es/?p=610>

IORegistryExplorer - Mac OS X Retail Install Disc v10.6 or v10.6.3 - Optional Installs/Xcode

HexEdit v220 - <http://hexedit.sourceforge.net/>

dsdt-hdmi\_audio-v2.dsl -



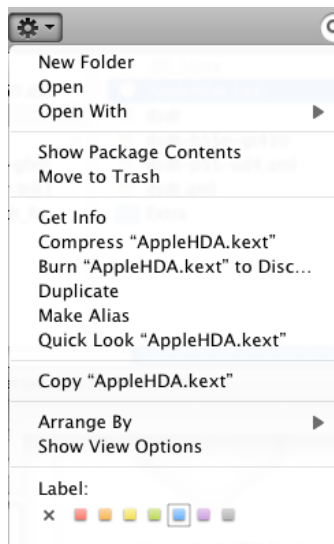
AMD Graphics Cards only

radeon\_bios\_decode - <http://www.insanelymac.com/forum/index.php?showtopic=249642>

vbios - see below

AtiFrambuffer\_v1.6.26 Framebuffer Details/see below/end of this document

### Finder Trick - Pulldown Menu

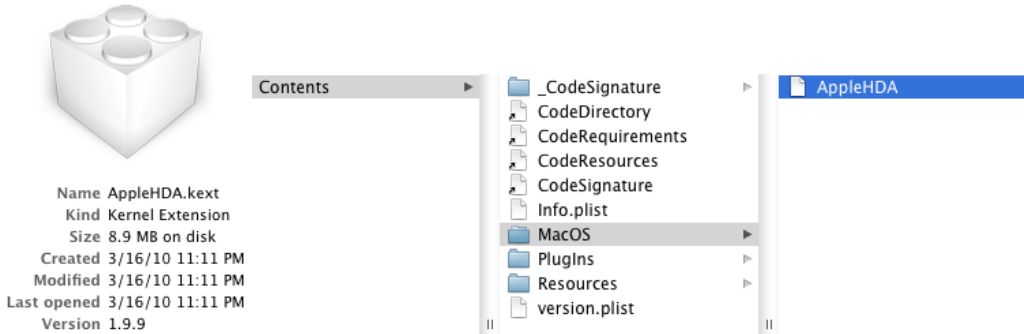


### AppleHDA Configuration

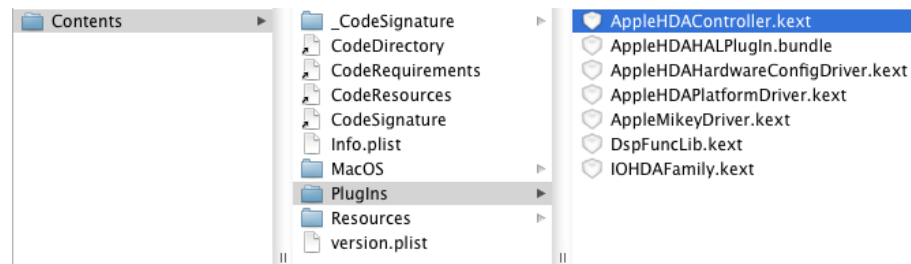
AppleHDA.kext

AppleHDA.kext - Show Package Contents

AppleHDA binary

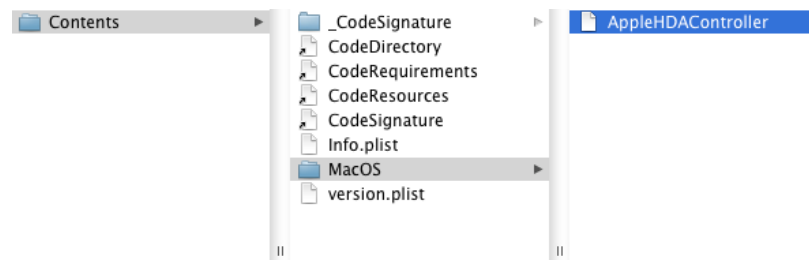


#### AppleHDA\_Plugins



AppleHDA/Plugins/AppleHDAController.kext - Show Package Contents

AppleHDAController binary



## Text Editing

Required:  
HexEdit  
Kext Utility

1. Make a folder on the Desktop with the name of the kext
2. Drag (+ Option key) the kext from (S/L/E or E/E) to the folder from above
3. Run HexEdit
4. Select Open, navigate to the kext folder, select the kext
5. A Contents folder appears
6. Click on the folders until you find the binary file you are looking for
7. Select Open
8. Select Find & Replace
9. Paste the hex string you are looking for in the Find box
10. Press Next.
11. HexEdit will highlight the hex string you requested
12. If it is what you are looking for, paste the edited hex string in the Replace box.
13. Select Replace.
14. Verify change
15. Select Next and repeat as necessary.
16. Select Save As ... and Save to the kext folder on the Desktop
17. In a Finder window, Open the kext folder.
18. Verify the both the kext and the patch binary are there.
19. Select the patched binary, select the gear pull down menu and select a color for the binary
20. Select the kext, select the gear pull down menu and Select Show Package Contents
21. Another Finder window opens with a Contents folder.

22. Open the Contents and navigate to the original binary.
23. Select the gear pull down menu and Select Move to Trash
24. Select the patched (colored) binary from the Kext folder and drag (+ Option key) to the place the original binary was removed.
25. Close each window that opened with a Contents file.
26. Select the kext, select the gear pull down menu and Select Show Package Contents
27. Navigate to the patched binary and verify it is colored.
28. Close each window that opened with a Contents file.
29. Select the patched kext, select the gear pull down menu and select a color for the kext
30. Navigate to the original kext in S/L/E or E/E and select
31. Select the gear pull down menu and Select Move to Trash
32. Enter password
33. Drag (+ Option key) the patched (colored) kext from the kext folder to the S/L/E or E/E
34. Enter password
35. Run Kext Utility to repair permissions
34. If a message "This extension can not be used..." appears, select OK and ignore. There may be many messages, select OK as needed.
36. Reboot

### **vbios**

1. Download from graphic card manufacturer
2. Dump from card with CPU-Z in Windows <http://www.techpowerup.com/gpuz/>
3. Download from techpowerup.com/vbios database <http://www.techpowerup.com/vgabios/>

### **Terminal: How to run radeon\_bios\_decode**

Required:

radeon\_bios\_decode is in Downloads folder

Sapphire.HD5870.1024.100831.bin is in Downloads folder

```
$ cd Downloads
```

```
$ ./radeon_bios_decode < Sapphire.HD5870.1024.100831.bin (note: only two spaces. before and after the less than sign)
```

```
.....output.....
```

```
$ exit
```

Under Terminal/Shell, Export Text As..., save file

Ex: Sapphire.HD5870.1024.100831.bin

Last login: Mon May 9 19:05:52 on console

```
$ cd Downloads
```

```
$ ./radeon_bios_decode < Sapphire.HD5870.1024.100831.bin
```

ATOM BIOS Rom:

SubsystemVendorID: 0x174b SubsystemID: 0xe140

IOBaseAddress: 0x0000

Filename: 140X0300.S5B

BIOS Bootup Message:

CYPRESS XT GDDR5 32Mx32 C00801 BIOS UCODEv:126

PCI ID: 1002:6898

Connector at index 0

Type [@offset 44262]: DisplayPort (10)

Encoder [@offset 44266]: INTERNAL\_UNIPHY2 (0x21)

i2cid [@offset 44390]: 0x90, OSX senseid: 0x1

Connector at index 1

Type [@offset 44272]: HDMI-A (11)

Encoder [@offset 44276]: INTERNAL\_UNIPHY2 (0x21)

i2cid [@offset 44417]: 0x93, OSX senseid: 0x4

Connector at index 2

Type [@offset 44282]: DVI-I (2)

Encoder [@offset 44286]: INTERNAL\_UNIPHY1 (0x20)

i2cid [@offset 44454]: 0x92, OSX senseid: 0x3

Connector at index 3

Type [@offset 44292]: DVI-I (2)

Encoder [@offset 44296]: INTERNAL\_KLDSCP\_DAC2 (0x16)

i2cid [@offset 44454]: 0x92, OSX senseid: 0x3

```

Connector at index 4
  Type [@offset 44302]: DVI-I (2)
  Encoder [@offset 44306]: INTERNAL_UNIPHY (0x1e)
  i2cid [@offset 44491]: 0x94, OSX senseid: 0x5
Connector at index 5
  Type [@offset 44312]: DVI-I (2)
  Encoder [@offset 44316]: INTERNAL_KLDSCP_DAC1 (0x15)
  i2cid [@offset 44491]: 0x94, OSX senseid: 0x5
$ exit

```

**AtiFramebuffer.kext** - Framebuffer Details/end of this document

### Part 3: HDMI Audio Kext Edits

Depending on how your graphics card is enabled, additional edits of your DSDT may be required. The edits are defined as GraphicsEnabler=Yes or Graphics Enabler=No.

There are two components of AppleHDA which are particularly relevant to enabling HDMI audio. They are 1. AppleHDA binary and 2. AppleHDAController binary. For AMD graphics cards, the AtiFramebuffer binary is also important. HexEdit is the tool used to edit each of the binaries.

### Part 3: Kext Edits Table of Contents

#### 1. Nvidia GeForce GT 4XX Graphics Cards (and the GT 240)

- a. Additional DSDT Edits
  - GraphicsEnabler=Yes
  - GraphicsEnabler=No
- b. Kext Edits
  - AppleHDA

#### 2. AMD RADEON HD 5XXX Graphics Cards

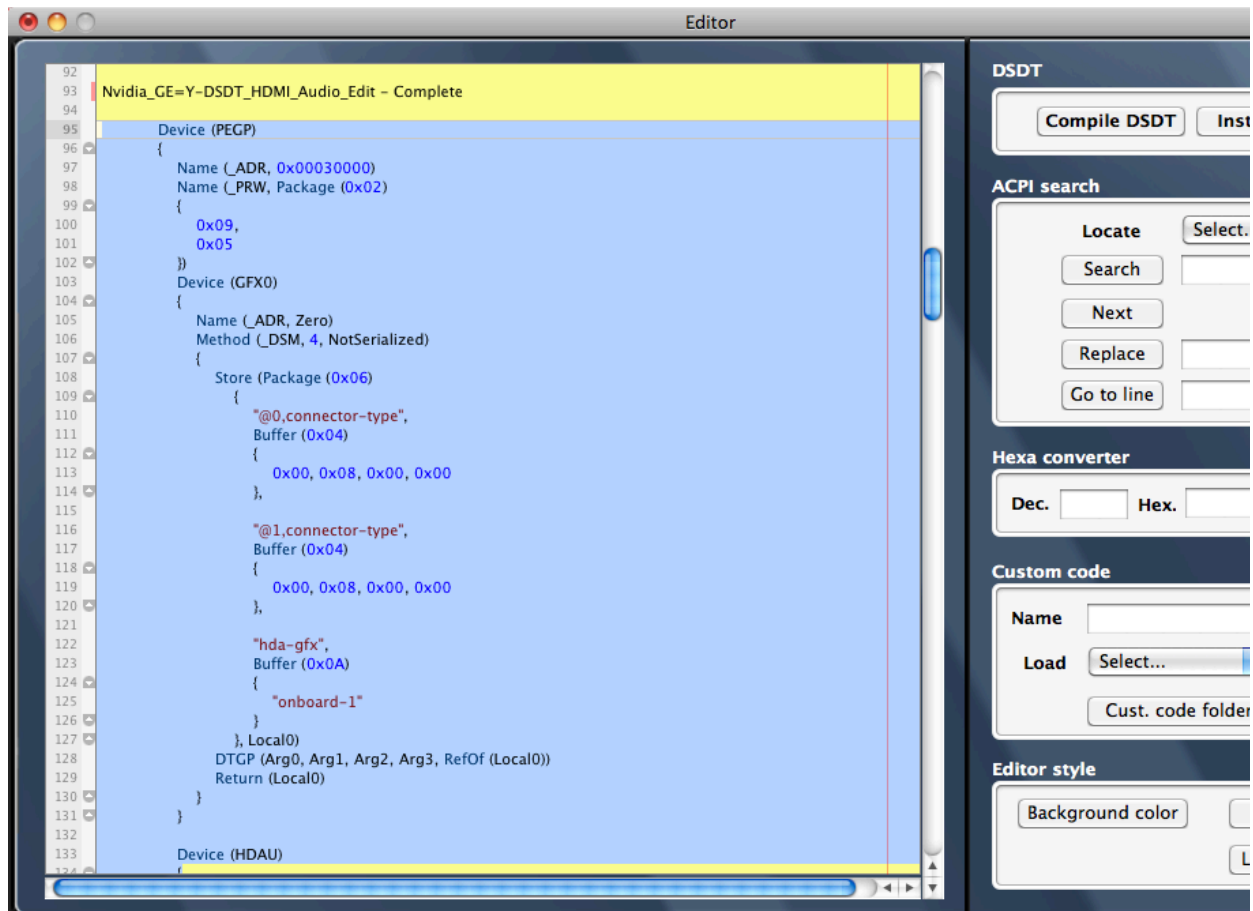
- a. Additional DSDT Edits
  - GraphicsEnabler=Yes
  - GraphicsEnabler=No
- b. Kext Edits
  - AppleHDA
  - AtiFramebuffer

#### 1. Nvidia GeForce GT 4XX Graphics Cards (and the GT 240)

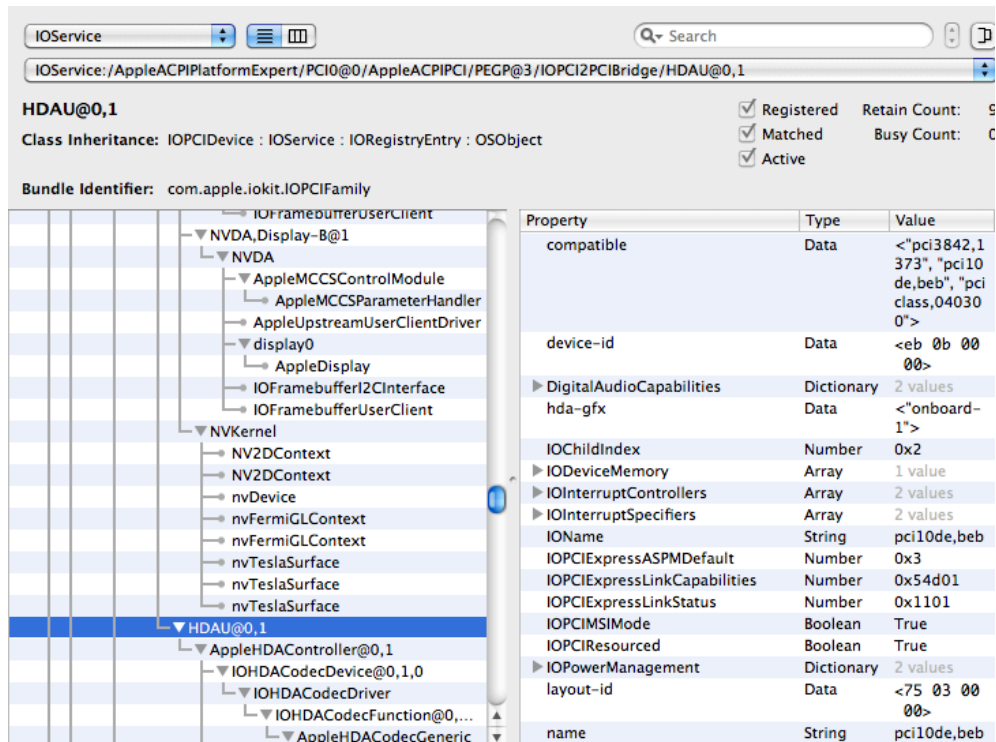
- a. Additional DSDT edits

With **GraphicsEnabler=Yes** in com.apple.Boot.plist, make the following changes to your dsdt.

1. Open your dsdt in DSDTSE. open DSDT-HDMI\_Audio\_Edits\_v2 in DSDTSE
2. Copy the code labeled "Nvidia\_GE=Y-DSDT\_HDMI\_Audio\_Edit - Complete"



3. Paste the copied code over the existing Device (PEGP), Device (GFX0) and Device (HDAU)
4. Compile, install, reboot with HDMI device plugged
5. Run IOReg, Search "HDAU", Note HDMI device-id, Save for later. (i.e., HDMI device\_id is: eb 0b)

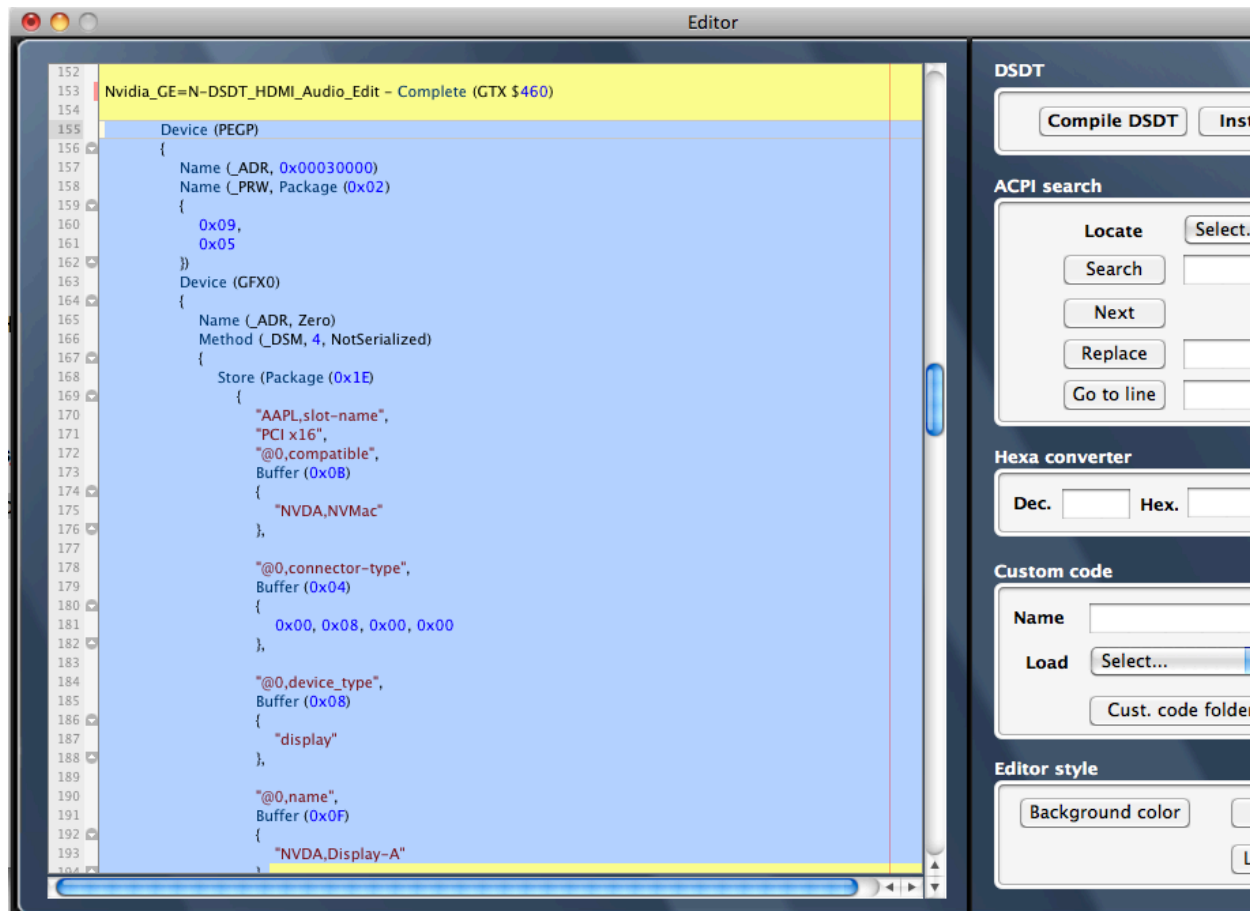


#### 6. Jump to Audio Kext Edits

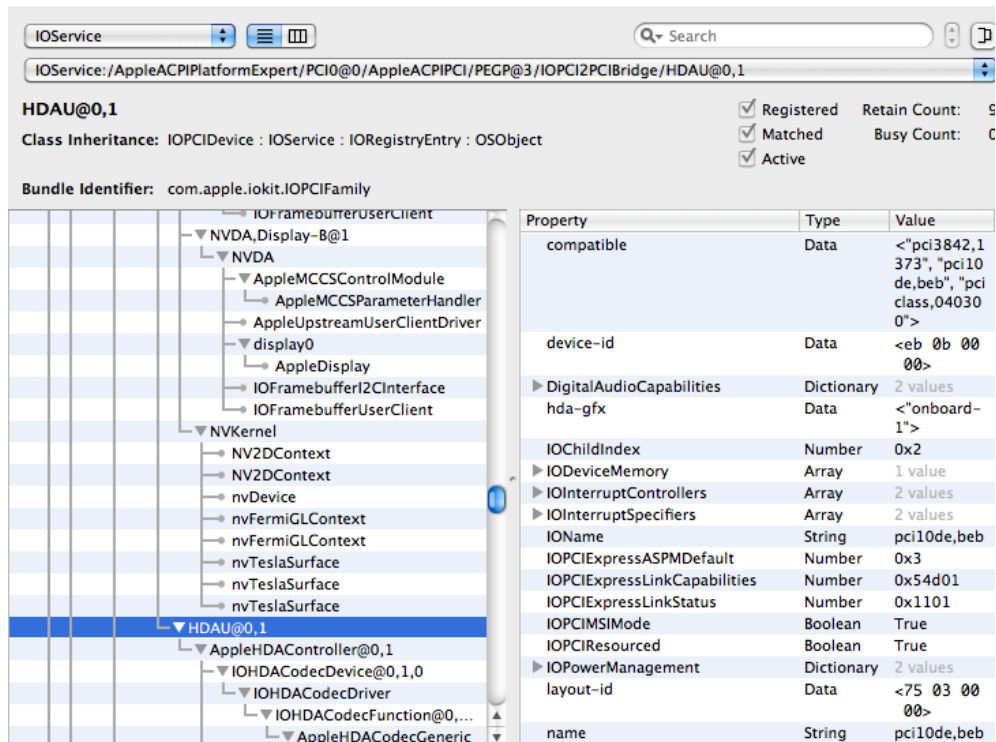
With **GraphicsEnabler=No** in com.apple.Boot.plist, make the following changes to your dsdt.

Add the following code to Device (GFX0) - Modify for your particular Nvidia 4xx graphics card.

1. Open your dsdt in DSDTSE. open DSDT-HDMI\_Audio\_Edits\_v2 in DSDTSE
2. Copy the code labeled "Nvidia\_GE=N-DSDT\_HDMI\_Audio\_Edit - Complete"
3. Paste the copied code over the existing Device (PEGP), Device (GFX0) and Device (HDAU)



4. Compile, install, reboot with HDMI device plugged
5. Run IOReg, Search "HDAU", Note HDMI device-id, Save for later. (i.e., HDMI device\_id is: eb 0b)



#### b. Audio Kext edits

Before we begin, verify AppleHDA v 1.9.9 is installed in S/L/E.

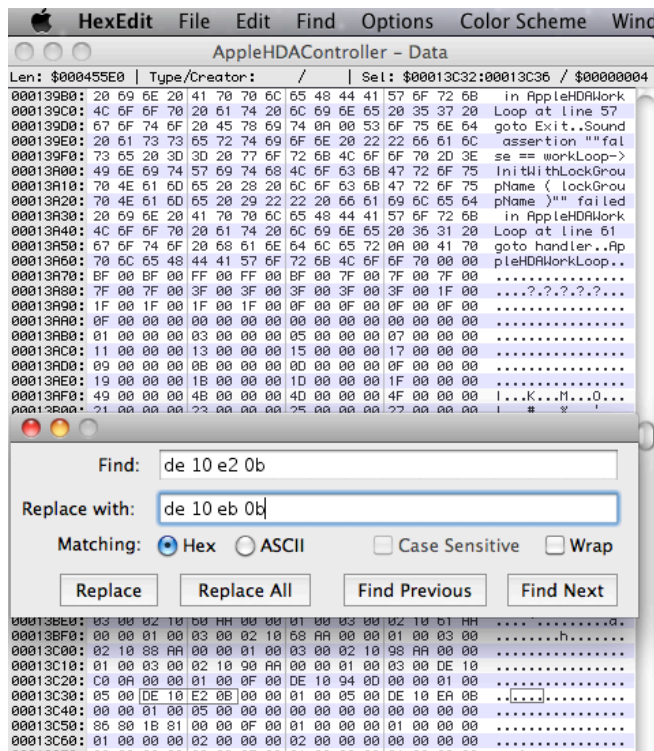
#### AppleHDAController Binary Edit

If your HDMI Device\_id is one the following, an edit is not required (i.e., GT 240).  
de 10 c0 0a, de 10 94 0d, de 10 e2 0b, de 10 e4 0b

Example: HDMI Device\_id: "eb 0b" > Find: de 10 e2 0b Replace: de 10 eb 0b

1. Run IOReg - Skip to Step 3, if you have HDMI Device\_id
2. Search HDAU, Note device-id, this your HDMI Device\_id
3. Edit AppleHDAController Binary: Find: de 10 e2 0b Replace: de 10 ?? ?? 2 Times





4. Install AppleHDAController Binary in AppleHDA.kext
5. Install AppleHDA.kext in S/L/E
6. Run Kext Utility
7. Reboot with HDMI device plugged

#### AppleHDA Binary Edit

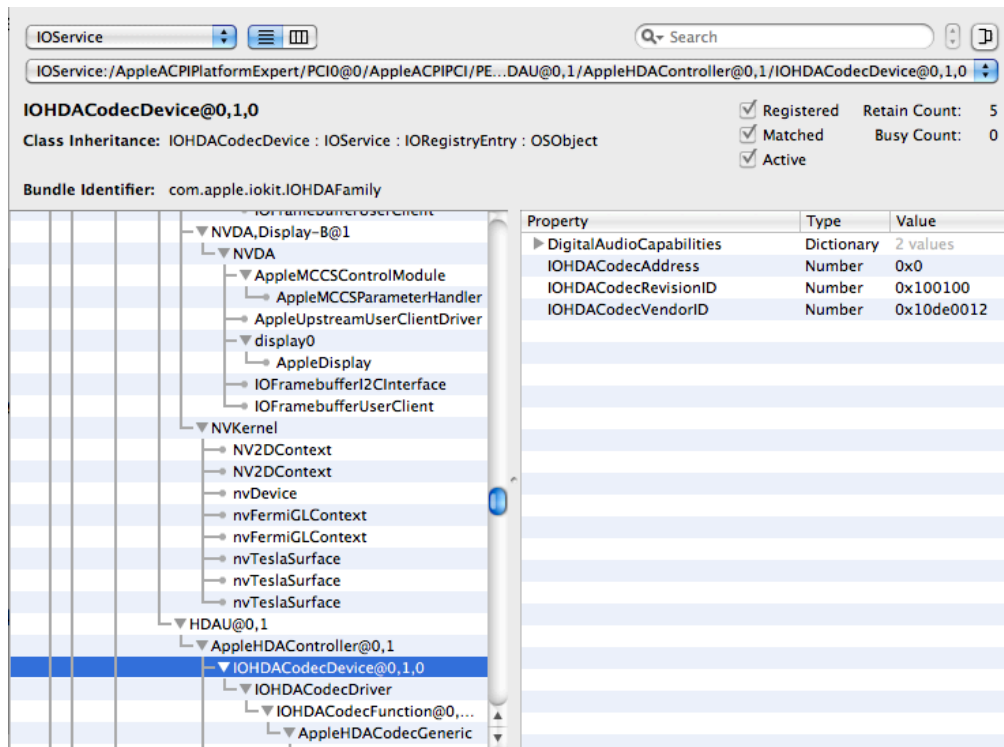
If your HDMI Codec\_id is one the following, an edit is not required.

07 00 de 10, 0c 00 de 10, 0a 00 de 10, 14 00 de 10

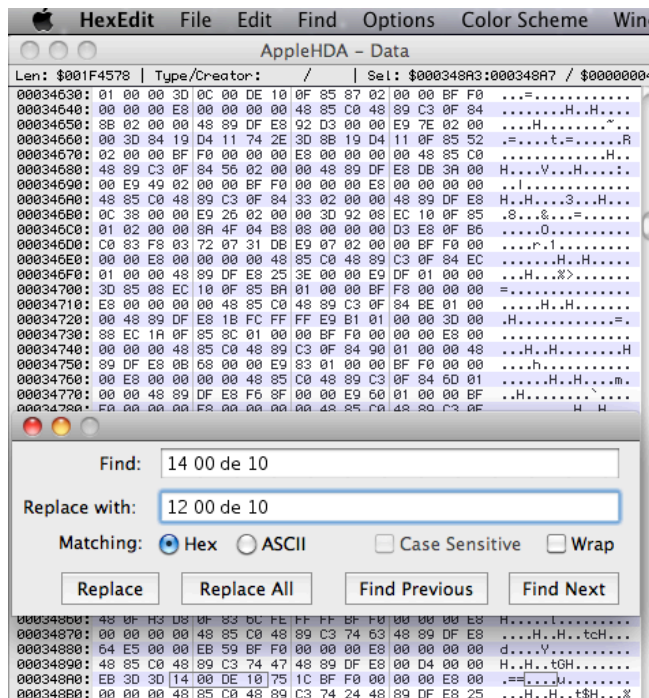
Example: HDMI Codec\_id: "10 de 00 12" Represented in AppleHDA as "12 00 de 10"

Find: 14 00 de 10 Replace 12 00 de 10

1. Run IOReg
2. Search HDAU
3. Clear Search box
4. Scroll down 2 lines and select IOHDACodecDevice
5. Note: IOHDACodecVendorID 10 de ?? ?? Convert to AppleHDA ?? ?? de 10

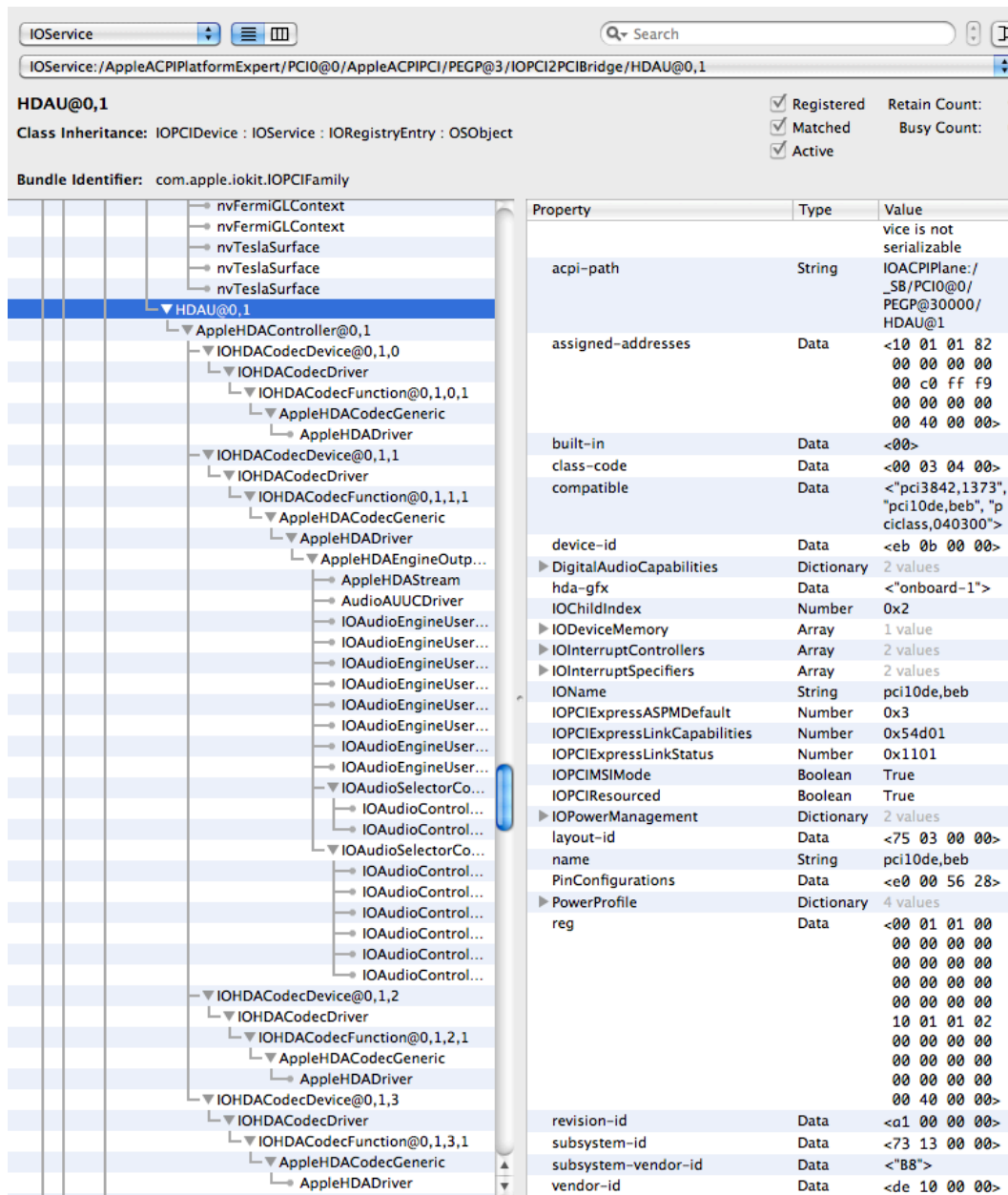


6. Edit AppleHDA Binary: Find: 14 00 de 10 Replace ?? ?? de 10 4 Times



- Install AppleHDA Binary in AppleHDA.kext
- Install AppleHDA.kext in S/L/E
- Run Kext Utility
- Reboot with HDMI device plugged

Mac OS X 10.6.x HDMI Audio  
Nvidia HDMI Audio - Working



## 2. AMD RADEON HD 5XXX Graphics Cards

### a. Additional DSDT edits

With **GraphicsEnabler=Yes** in com.apple.Boot.plist, no changes are required in the DSDT.

1. Jump to b. Audio Kext Editing

With **GraphicsEnabler=No** in com.apple.Boot.plist, make the following changes to your dsdt.

Add the following code to Device (GFX0) - Modify for your particular Radeon HD 5XXX graphics card.

```
Store (Package (0x0C)
{
```

```

"@0,name",
Buffer (0x0D)
{
    "ATY,Uakari"
},

"@1,name",
Buffer (0x0D)
{
    "ATY,Uakari"
},

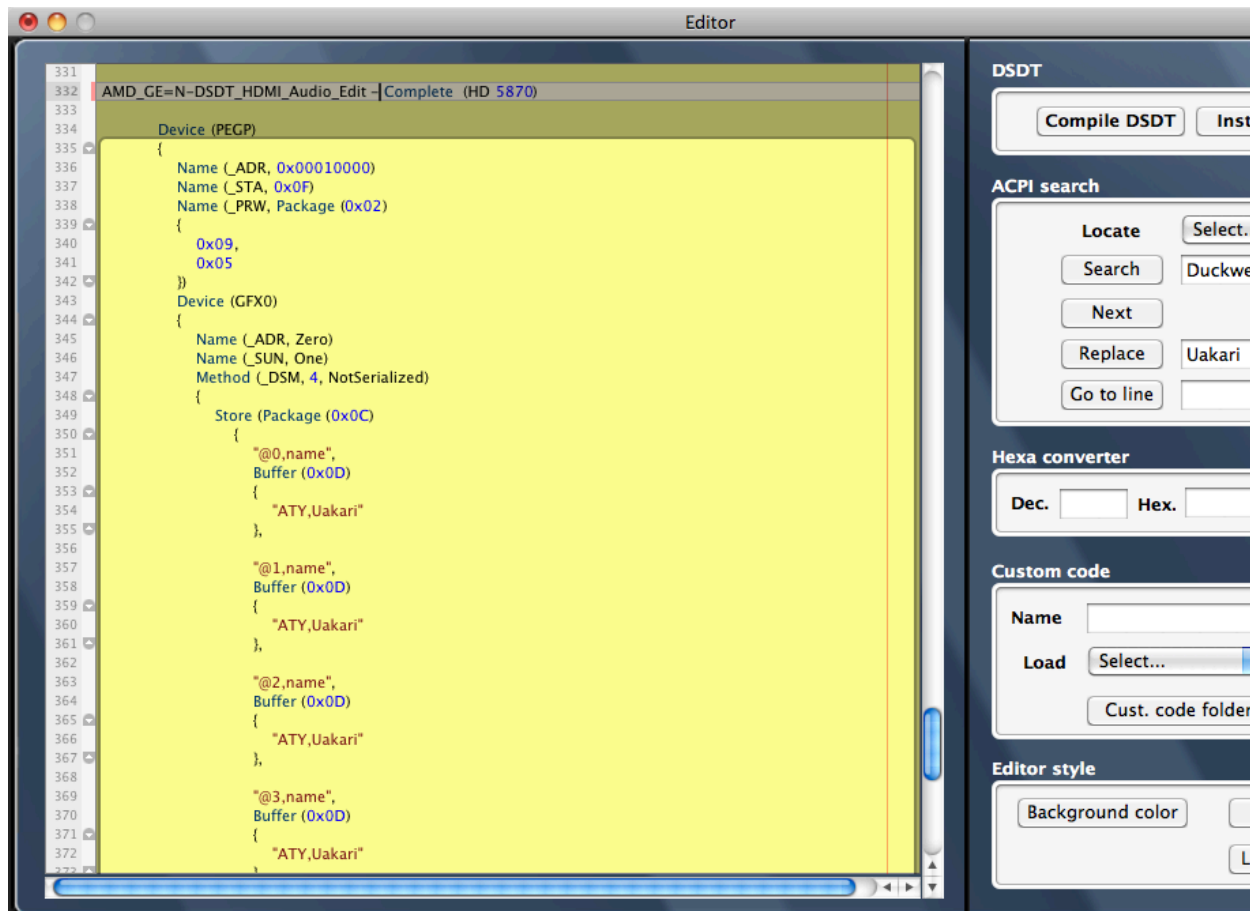
"@2,name",
Buffer (0x0D)
{
    "ATY,Uakari"
},

"@3,name",
Buffer (0x0D)
{
    "ATY,Uakari"
},

"model",
Buffer (0x13)
{
    "AMD Radeon HD 5870"
},

```

1. Open your dsdt in DSDTSE. open DSDT-HDMI\_Audio\_Edits\_v2 in DSDTSE
2. Copy the code labeled "AMD\_GE=N-DSDT\_HDMI\_Audio\_Edit - Complete"



3. Paste the copied code over the existing Device (PEGP), Device (GFX0) and Device (HDAU)
4. Compile, install, reboot with HDMI device plugged
5. Run IOREg, Search "HDAU", Note device-id, this your HDMI Device\_id; save for later. (HDMI Device-id: aa 50)

IOService

IOService: /AppleACPIPlatformExpert/PCI0@0/AppleACPIPCI/PEGP@3/IOPCI2PCIBridge/HDAU@0,1

**HDAU@0,1**

Class Inheritance: IOPCIDevice : IOService : IORegistryEntry : OSObject

Bundle Identifier: com.apple.iokit.IOPCIFamily

Registered Retain Count: 9  
Matched Busy Count: 0  
Active

Property	Type	Value
built-in	Data	<00>
class-code	Data	<00 03 04 00>
compatible	Data	<"pci174b,aa50", "pci1002,aa50", "pci1002,aa50">
device-id	Data	<50 aa 00 00>
DigitalAudioCapabilities	Dictionary	2 values
hda-gfx	Data	<"onboard-1">
IOChildIndex	Number	0x2
IODeviceMemory	Array	1 value
IOInterruptControllers	Array	2 values
IOInterruptSpecifiers	Array	2 values
IOName	String	pci1002,aa50
IOPCIExpressASPMDefault	Number	0x0
IOPCIExpressLinkCapabilities	Number	0xd01
IOPCIExpressLinkStatus	Number	0x1081
IOPCIMSI Mode	Boolean	True
IOPCIResourced	Boolean	True
IOPowerManagement	Dictionary	2 values
layout-id	Data	<7c 03 00 00>
name	String	pci1002,aa50
PinConfigurations	Data	<e0 00 56 28>
PowerProfile	Dictionary	4 values
req	Data	<00 01 01 00>

#### b. Audio Kext Edits

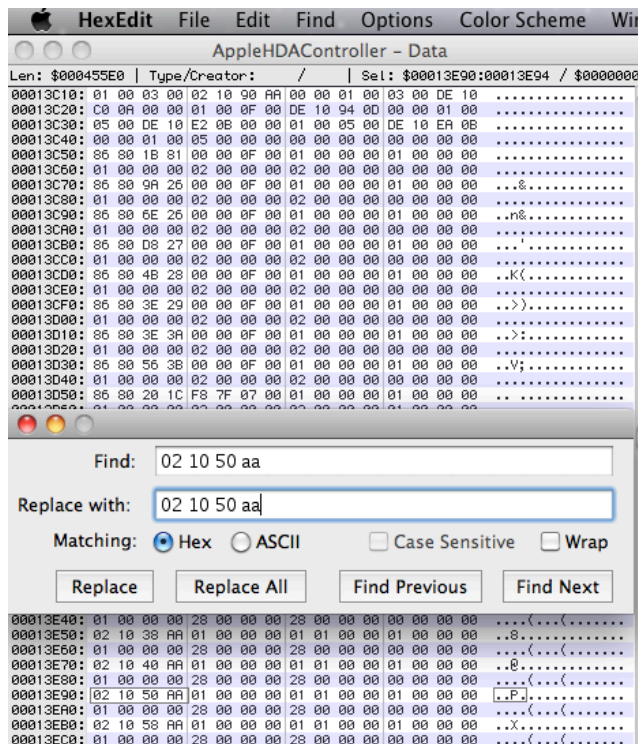
Verify AppleHDA v 1.9.9 is installed in S/L/E.

#### AppleHDAController Binary Edit

If your HDMI Device\_id is one the following, an edit is not required (i.e., HD 5770, 5870).  
50 aa, 58 aa, 60 aa, 61 aa, 68 aa

Example: HDMI Device\_id: "50 aa" > Find: 02 10 50 aa Replace: 02 10 50 aa

1. Run IOReg - Skip to Step 3, if you have HDMI Device\_id
2. Search HDAU, Note device-id, this your HDMI Device\_id
3. Edit AppleHDAController Binary; Find: 02 10 50 aa Replace: de 10 ?? aa 2 Times



4. Install AppleHDAController Binary in AppleHDA.kext
5. Install AppleHDA.kext in S/L/E
6. Run Kext Utility
7. Reboot with HDMI device plugged in

### AppleHDA Binary Edit

The AMD HDMI Codec\_id is always 10 02 aa 01. No edits Of AppleHDA Binary required.

### ATIFramebuffer Binary Edit

Example 1: Sapphire HD 5870, vbios: HDMI sense\_id 0x4, Uakari FrameBuffer: HDMI (00 08) 0x4

Detail:

AMD HD 5870 - Sapphire

```
./radeon_bios_decode < hd5870.bin
```

ATOM BIOS Rom:

SubsystemVendorID: 0x174b SubsystemID: 0xe140

IOBaseAddress: 0x0000

Filename: 140X0300.S5B

BIOS Bootup Message:

CYPRESS XT GDDR5 32Mx32 C00801 BIOS UCODEv:126

PCI ID: 1002:6898

Connector at index 0

Type [@offset 44262]: DisplayPort (10)

Encoder [@offset 44266]: INTERNAL\_UNIPHY2 (0x21)

i2cid [@offset 44390]: 0x90, OSX senseid: 0x1

Connector at index 1

Type [@offset 44272]: HDMI-A (11)

Encoder [@offset 44276]: INTERNAL\_UNIPHY2 (0x21)

i2cid [@offset 44417]: 0x93, OSX senseid: 0x4

Connector at index 2

Type [@offset 44282]: DVI-I (2)

Encoder [@offset 44286]: INTERNAL\_UNIPHY1 (0x20)

i2cid [@offset 44454]: 0x92, OSX senseid: 0x3

Connector at index 3

Type [@offset 44292]: DVI-I (2)

Encoder [@offset 44296]: INTERNAL\_KLDSCP\_DAC2 (0x16)

i2cid [@offset 44454]: 0x92, OSX senseid: 0x3

Connector at index 4

Type [@offset 44302]: DVI-I (2)

```
Encoder [@offset 44306]: INTERNAL_UNIPHY (0x1e)
i2cid [@offset 44491]: 0x94, OSX senseid: 0x5
Connector at index 5
Type [@offset 44312]: DVI-I (2)
Encoder [@offset 44316]: INTERNAL_KLDSCP_DAC1 (0x15)
i2cid [@offset 44491]: 0x94, OSX senseid: 0x5
```

AtiFrambuffer v 1.6.26  
GE=Y > AtiConfig=Uakari

```
Personality: Uakari
ConnectorInfo count in decimal: 4
Effective address for ConnectorInfo table in hex: 111c0 => 226552
dd if=AtiFrambuffer of=/tmp/fb bs=1 skip=226552 count=64
od -Ax -tx1 /tmp/fb
0000000 00 04 00 00 00 04 00 00 00 01 00 00 12 04 04 01
0000010 04 00 00 00 14 00 00 00 00 01 00 00 01 12 01 03
0000020 00 02 00 00 14 00 00 00 00 01 00 00 00 00 06 05
0000030 00 08 00 00 00 02 00 00 00 01 00 00 22 05 05 04
```

Perfect Choice  
AtiConfig=Uakari  
HDMI and DP sense\_ids match Uakari Framebuffer  
No edits required

1. In terminal, run ./radeon\_bios\_decode < HD5XXX.vbios.bin (example: HD5870.bin)
2. Identify HDMI sense\_id (example: 4)
3. Run IOReg
4. Search ATY
5. Identify Frambuffer (i.e., Uakari)
6. Locate HDMI connector (00 08) (example: 4)
7. HDMI sense\_id = HDMI connector\_id
8. No edit necessary

Example 2: Gigabyte HD 5770, vbios: HDMI sense\_id 0x5, Vervet FrameBuffer: HDMI (00 08) 0x1

Detail:

AMD HD 5770 - Gigabyte

./radeon\_bios\_decode < hd5770.bin

```
ATOM BIOS Rom:
SubsystemVendorID: 0x1458 SubsystemID: 0x21d7
IOBaseAddress: 0x0000
Filename: R577UDAD.F60
BIOS Bootup Message:
GV-R577UD-1GD/F60

PCI ID: 1002:68b8
Connector at index 0
Type [@offset 44284]: DisplayPort (10)
Encoder [@offset 44288]: INTERNAL_UNIPHY2 (0x21)
i2cid [@offset 44404]: 0x91, OSX senseid: 0x2
Connector at index 1
Type [@offset 44294]: HDMI-A (11)
Encoder [@offset 44298]: INTERNAL_UNIPHY2 (0x21)
i2cid [@offset 44431]: 0x94, OSX senseid: 0x5
Connector at index 2
Type [@offset 44304]: DVI-I (2)
Encoder [@offset 44308]: INTERNAL_UNIPHY1 (0x20)
i2cid [@offset 44468]: 0x93, OSX senseid: 0x4
Connector at index 3
Type [@offset 44314]: DVI-I (2)
Encoder [@offset 44318]: INTERNAL_KLDSCP_DAC2 (0x16)
i2cid [@offset 44468]: 0x93, OSX senseid: 0x4
Connector at index 4
Type [@offset 44324]: DVI-I (2)
Encoder [@offset 44328]: INTERNAL_UNIPHY (0x1e)
i2cid [@offset 44505]: 0x92, OSX senseid: 0x3
Connector at index 5
Type [@offset 44334]: DVI-I (2)
Encoder [@offset 44338]: INTERNAL_KLDSCP_DAC1 (0x15)
i2cid [@offset 44505]: 0x92, OSX senseid: 0x3
```

AtiFrambuffer v 1.6.26  
GE=Y > AtiConfig=Vervet



```

Personality: Vervet
ConnectorInfo count in decimal: 4
Effective address for ConnectorInfo table in hex: 11200 => 226616
dd if=ATIFramebuffer of=/tmp/fb bs=1 skip=226616 count=64
od -Ax -tx1 /tmp/fb
0000000  00 04 00 00 00 04 00 00 00 01 00 00 12 04 04 02
0000010  04 00 00 00 14 00 00 00 00 01 00 00 01 12 01 04
0000020  00 02 00 00 14 00 00 00 00 01 00 00 00 00 06 03
0000030  00 08 00 00 00 02 00 00 00 01 00 00 22 05 05 01

```

Problem with Vervet -HDMI sense\_id is 5, HDMI port is 1

Framebuffer Edit  
AtiConfig=Vervet

From

```
00 08 00 00 00 02 00 00 00 01 00 00 22 05 05 01
```

To

```
00 08 00 00 00 02 00 00 00 01 00 00 22 05 05 05
```

Final Edit  
AtiConfig=Vervet

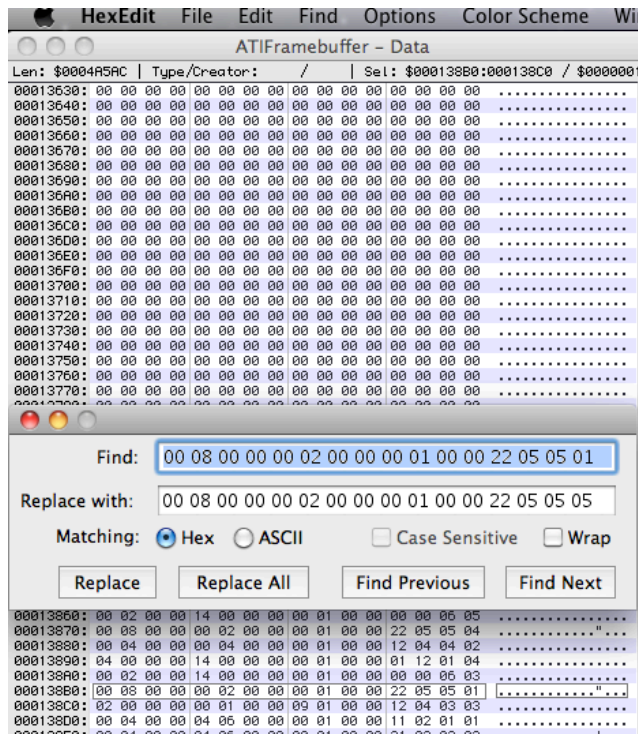
```

Personality: Vervet
ConnectorInfo count in decimal: 4
Effective address for ConnectorInfo table in hex: 11200 => 226616
dd if=ATIFramebuffer of=/tmp/fb bs=1 skip=226616 count=64
od -Ax -tx1 /tmp/fb
0000000  00 04 00 00 00 04 00 00 00 01 00 00 12 04 04 02
0000010  04 00 00 00 14 00 00 00 00 01 00 00 01 12 01 04
0000020  00 02 00 00 14 00 00 00 00 01 00 00 00 00 06 03
0000030  00 08 00 00 00 02 00 00 00 01 00 00 22 05 05 05

```

1. In terminal, run ./radeon\_bios\_decode < HD5XXX.vbios.bin (example: HD5770.bin)
2. Identify HDMI sense\_id (example: 5)
3. Run IOReg
4. Search ATY
5. Identify Frambuffer (i.e., Vervet)
6. Locate HDMI connector (00 08) (example: 1)
7. HDMI sense\_id not HDMI connector\_id
8. Edit AtiFramebuffer Binary; Find: 00 08 00 00 00 02 00 00 00 01 00 00 22 05 05 01

Replace: 00 08 00 00 00 02 00 00 00 01 00 00 22 05 05 05 2 Times



9. Install AtiFramebuffer Binary in AtiFramebuffer.kext
5. Install AtiFramebuffer.kext in S/L/E
6. Run Kext Utility
7. Reboot with HDMI device plugged in

Mac OS X 10.6.x HDMI Audio

Select System Preferences/Sound/Output. Select the HDMI audio device.



```

Personality: Caretta
ConnectorInfo count in decimal: 1
Effective address for ConnectorInfo table in hex: ffb0 => 221928
dd if=ATIFramebuffer of=/tmp/caretta bs=1 skip=221928 count=16
od -Ax -txl /tmp/caretta
0000000  00 02 00 00 14 00 00 00 00 00 00 00 10 01 01 01

Personality: Lamna
ConnectorInfo count in decimal: 2
Effective address for ConnectorInfo table in hex: ffe0 => 221976
dd if=ATIFramebuffer of=/tmp/lamna bs=1 skip=221976 count=32
od -Ax -txl /tmp/lamna
0000000  00 02 00 00 14 00 00 00 80 00 00 00 00 01 01 11
0000010  04 00 00 00 16 00 00 00 80 00 00 00 00 10 02 12

Personality: Triakis
ConnectorInfo count in decimal: 2
Effective address for ConnectorInfo table in hex: 10000 => 222008
dd if=ATIFramebuffer of=/tmp/triakis bs=1 skip=222008 count=32
od -Ax -txl /tmp/triakis
0000000  00 02 00 00 14 00 00 00 00 00 00 00 00 01 01 11
0000010  04 00 00 00 16 00 00 00 00 00 00 00 00 10 02 12

Personality: Iago
ConnectorInfo count in decimal: 2
Effective address for ConnectorInfo table in hex: 10020 => 222040
dd if=ATIFramebuffer of=/tmp/fb bs=1 skip=222040 count=32
od -Ax -txl /tmp/fb
0000000  02 00 00 00 40 00 00 00 09 00 00 00 00 01 01 12
0000010  00 10 00 00 16 00 00 00 c4 00 00 00 10 00 02 11

Personality: Hypoprion
ConnectorInfo count in decimal: 2
Effective address for ConnectorInfo table in hex: 10040 => 222072
dd if=ATIFramebuffer of=/tmp/fb bs=1 skip=222072 count=32
od -Ax -txl /tmp/fb
0000000  02 00 00 00 40 00 00 00 09 00 00 00 00 01 01 12
0000010  00 10 00 00 16 00 00 00 c4 00 00 00 10 00 02 11

Personality: Megalodon
ConnectorInfo count in decimal: 3
Effective address for ConnectorInfo table in hex: 10cc0 => 225272
dd if=ATIFramebuffer of=/tmp/fb bs=1 skip=225272 count=48
od -Ax -txl /tmp/fb
0000000  00 02 00 00 14 00 00 00 00 00 00 00 00 01 01 11
0000010  04 00 00 00 16 00 00 00 00 00 00 00 00 10 02 12
0000020  80 00 00 00 02 00 00 00 04 00 00 00 00 10 00 00

Personality: Flicker
ConnectorInfo count in decimal: 3
Effective address for ConnectorInfo table in hex: 10d00 => 225336
dd if=ATIFramebuffer of=/tmp/fb bs=1 skip=225336 count=48
od -Ax -txl /tmp/fb
0000000  00 04 00 00 00 01 00 00 00 01 00 00 02 01 03 05
0000010  00 04 00 00 00 01 00 00 00 01 00 00 01 00 02 02
0000020  00 02 00 00 14 02 00 00 00 01 00 00 00 10 01 04

Personality: Cardinal
ConnectorInfo count in decimal: 2
Effective address for ConnectorInfo table in hex: 10d40 => 225400

```

```

dd if=ATIFramebuffer of=/tmp/fb bs=1 skip=225400 count=32
od -Ax -tx1 /tmp/fb
0000000  00 02 00 00 14 02 00 00 00 01 00 00 01 01 01 04
0000010  04 00 00 00 14 02 00 00 00 01 00 00 00 10 02 03

Personality: MotMot
ConnectorInfo count in decimal: 2
Effective address for ConnectorInfo table in hex: 10d60 => 225432
dd if=ATIFramebuffer of=/tmp/fb bs=1 skip=225432 count=32
od -Ax -tx1 /tmp/fb
0000000  00 04 00 00 04 01 00 00 00 01 00 00 10 00 02 03
0000010  04 00 00 00 14 02 00 00 00 01 00 00 01 11 01 04

Personality: Quail
ConnectorInfo count in decimal: 3
Effective address for ConnectorInfo table in hex: 10e80 => 225720
dd if=ATIFramebuffer of=/tmp/fb bs=1 skip=225720 count=48
od -Ax -tx1 /tmp/fb
0000000  02 00 00 00 40 00 00 00 09 01 00 00 22 01 00 07
0000010  02 00 00 00 00 01 00 00 09 01 00 00 20 01 03 04
0000020  00 04 00 00 04 03 00 00 00 01 00 00 10 00 02 03

Personality: Kakapo
ConnectorInfo count in decimal: 3
Effective address for ConnectorInfo table in hex: 10ec0 => 225784
dd if=ATIFramebuffer of=/tmp/fb bs=1 skip=225784 count=48
od -Ax -tx1 /tmp/fb
0000000  02 00 00 00 40 00 00 00 09 01 00 00 02 01 00 05
0000010  02 00 00 00 00 01 00 00 09 01 00 00 20 01 02 04
0000020  00 04 00 00 04 03 00 00 00 01 00 00 10 00 01 01

Personality: Raven
ConnectorInfo count in decimal: 3
Effective address for ConnectorInfo table in hex: 10f00 => 225848
dd if=ATIFramebuffer of=/tmp/fb bs=1 skip=225848 count=48
od -Ax -tx1 /tmp/fb
0000000  02 00 00 00 40 00 00 00 09 01 00 00 02 01 00 07
0000010  02 00 00 00 00 01 00 00 09 01 00 00 20 01 02 02
0000020  00 04 00 00 04 03 00 00 00 01 00 00 10 00 01 01

Personality: Peregrine
ConnectorInfo count in decimal: 2
Effective address for ConnectorInfo table in hex: 10f40 => 225912
dd if=ATIFramebuffer of=/tmp/fb bs=1 skip=225912 count=32
od -Ax -tx1 /tmp/fb
0000000  00 02 00 00 04 02 00 00 00 00 00 00 02 01 04 05
0000010  00 04 00 00 00 01 00 00 00 00 00 00 20 00 02 02

Personality: Shrike
ConnectorInfo count in decimal: 3
Effective address for ConnectorInfo table in hex: 10f60 => 225944
dd if=ATIFramebuffer of=/tmp/fb bs=1 skip=225944 count=48
od -Ax -tx1 /tmp/fb
0000000  02 00 00 00 40 00 00 00 09 01 00 00 02 01 00 03
0000010  02 00 00 00 00 01 00 00 09 01 00 00 20 01 02 02
0000020  00 04 00 00 04 03 00 00 00 01 00 00 10 00 01 01

Personality: Uakari
ConnectorInfo count in decimal: 4
Effective address for ConnectorInfo table in hex: 111c0 => 226552
dd if=ATIFramebuffer of=/tmp/fb bs=1 skip=226552 count=64

```

```

od -Ax -tx1 /tmp/fb
0000000 00 04 00 00 00 04 00 00 00 01 00 00 12 04 04 01
0000010 04 00 00 00 14 00 00 00 00 01 00 00 01 12 01 03
0000020 00 02 00 00 14 00 00 00 00 01 00 00 00 00 06 05
0000030 00 08 00 00 00 02 00 00 00 01 00 00 22 05 05 04

```

```

Personality: Vervet
ConnectorInfo count in decimal: 4
Effective address for ConnectorInfo table in hex: 11200 => 226616
dd if=ATIFramebuffer of=/tmp/fb bs=1 skip=226616 count=64
od -Ax -tx1 /tmp/fb

```

```

0000000 00 04 00 00 00 04 00 00 00 01 00 00 12 04 04 02
0000010 04 00 00 00 14 00 00 00 00 01 00 00 01 12 01 04
0000020 00 02 00 00 14 00 00 00 00 01 00 00 00 00 06 03
0000030 00 08 00 00 00 02 00 00 00 01 00 00 22 05 05 01

```

```

Personality: Alouatta
ConnectorInfo count in decimal: 4
Effective address for ConnectorInfo table in hex: 11240 => 226680
dd if=ATIFramebuffer of=/tmp/fb bs=1 skip=226680 count=64
od -Ax -tx1 /tmp/fb

```

```

0000000 02 00 00 00 00 01 00 00 09 01 00 00 12 04 03 03
0000010 00 04 00 00 04 06 00 00 00 01 00 00 11 02 01 01
0000020 00 04 00 00 04 06 00 00 00 01 00 00 21 03 02 02
0000030 00 04 00 00 04 06 00 00 00 01 00 00 22 05 04 04

```

```

Personality: Zonalis
ConnectorInfo count in decimal: 6
Effective address for ConnectorInfo table in hex: 11280 => 226744
dd if=ATIFramebuffer of=/tmp/fb bs=1 skip=226744 count=96
od -Ax -tx1 /tmp/fb

```

```

0000000 00 04 00 00 04 06 00 00 00 01 00 00 20 01 06 06
0000010 00 04 00 00 04 06 00 00 00 01 00 00 10 00 05 05
0000020 00 04 00 00 04 06 00 00 00 01 00 00 21 03 02 04
0000030 00 04 00 00 04 06 00 00 00 01 00 00 11 02 01 03
0000040 00 04 00 00 04 06 00 00 00 01 00 00 22 05 04 02
0000050 00 04 00 00 04 06 00 00 00 01 00 00 12 04 03 01

```

```

Personality: Baboon
ConnectorInfo count in decimal: 3
Effective address for ConnectorInfo table in hex: 112e0 => 226840
dd if=ATIFramebuffer of=/tmp/fb bs=1 skip=226840 count=48
od -Ax -tx1 /tmp/fb

```

```

0000000 04 00 00 00 14 00 00 00 00 01 00 00 01 02 01 03
0000010 00 08 00 00 00 02 00 00 00 01 00 00 22 05 02 01
0000020 10 00 00 00 10 00 00 00 00 01 00 00 00 10 00 02

```

```

Personality: Colobus
ConnectorInfo count in decimal: 2
Effective address for ConnectorInfo table in hex: 11340 => 226936
dd if=ATIFramebuffer of=/tmp/fb bs=1 skip=226936 count=32
od -Ax -tx1 /tmp/fb

```

```

0000000 02 00 00 00 00 01 00 00 09 03 00 00 21 03 02 02
0000010 00 04 00 00 04 06 00 00 00 03 00 00 11 02 01 01

```

```

Personality: Douc
ConnectorInfo count in decimal: 2
Effective address for ConnectorInfo table in hex: 11380 => 227000
dd if=ATIFramebuffer of=/tmp/fb bs=1 skip=227000 count=32
od -Ax -tx1 /tmp/fb

```

```

0000000 02 00 00 00 00 01 00 00 09 03 00 00 21 03 02 02

```

0000010 00 04 00 00 04 06 00 00 00 03 00 00 11 02 01 01

Personality: Galago

ConnectorInfo count in decimal: 2

Effective address for ConnectorInfo table in hex: 113c0 => 227064

dd if=ATIFramebuffer of=/tmp/fb bs=1 skip=227064 count=32

od -Ax -tx1 /tmp/fb

0000000 02 00 00 00 00 01 00 00 09 03 00 00 21 03 02 02

0000010 00 04 00 00 04 06 00 00 00 03 00 00 11 02 01 01

Personality: Eulemur

ConnectorInfo count in decimal: 3

Effective address for ConnectorInfo table in hex: 113e0 => 227096

dd if=ATIFramebuffer of=/tmp/fb bs=1 skip=227096 count=48

od -Ax -tx1 /tmp/fb

0000000 04 00 00 00 14 00 00 00 00 01 00 00 01 02 01 04

0000010 00 08 00 00 00 02 00 00 00 01 00 00 12 04 04 02

0000020 10 00 00 00 10 00 00 00 00 00 00 00 00 10 00 01

Personality: Hoolock

ConnectorInfo count in decimal: 3

Effective address for ConnectorInfo table in hex: 11420 => 227160

dd if=ATIFramebuffer of=/tmp/fb bs=1 skip=227160 count=48

od -Ax -tx1 /tmp/fb

0000000 00 04 00 00 04 06 00 00 00 01 00 00 21 03 05 01

0000010 00 04 00 00 04 06 00 00 00 01 00 00 11 02 04 02

0000020 04 00 00 00 14 02 00 00 00 01 00 00 02 04 01 03

Personality: Langur

ConnectorInfo count in decimal: 3

Effective address for ConnectorInfo table in hex: 11460 => 227224

dd if=ATIFramebuffer of=/tmp/fb bs=1 skip=227224 count=48

od -Ax -tx1 /tmp/fb

0000000 00 04 00 00 04 06 00 00 00 01 00 00 21 03 04 02

0000010 00 04 00 00 04 06 00 00 00 01 00 00 11 02 01 01

0000020 04 00 00 00 14 02 00 00 00 01 00 00 02 04 05 03

Personality: Gliff

ConnectorInfo count in decimal: 3

Effective address for ConnectorInfo table in hex: 11180 => 226488

dd if=ATIFramebuffer of=/tmp/fb bs=1 skip=226488 count=48

od -Ax -tx1 /tmp/fb

0000000 02 00 00 00 40 00 00 00 09 01 00 00 02 01 00 03

0000010 02 00 00 00 00 01 00 00 09 01 00 00 20 01 02 02

0000020 00 04 00 00 04 06 00 00 00 01 00 00 10 00 01 01

Personality: Kipunji

ConnectorInfo count in decimal: 4

Effective address for ConnectorInfo table in hex: 114a0 => 227288

dd if=ATIFramebuffer of=/tmp/fb bs=1 skip=227288 count=64

od -Ax -tx1 /tmp/fb

0000000 02 00 00 00 00 01 00 00 09 00 00 00 12 04 03 03

0000010 00 04 00 00 04 06 00 00 00 00 00 00 11 02 01 01

0000020 00 04 00 00 04 06 00 00 00 00 00 00 21 03 02 02

0000030 00 04 00 00 04 06 00 00 00 00 00 00 22 05 04 04

Personality: Nomascus

ConnectorInfo count in decimal: 5

Effective address for ConnectorInfo table in hex: 11500 => 227384

dd if=ATIFramebuffer of=/tmp/fb bs=1 skip=227384 count=80

od -Ax -tx1 /tmp/fb

0000000 02 00 00 00 40 00 00 00 09 01 00 00 00 00 00 05

```
0000010 00 04 00 00 04 06 00 00 00 03 00 00 11 02 01 01
0000020 00 04 00 00 04 06 00 00 00 03 00 00 21 03 02 02
0000030 00 04 00 00 04 06 00 00 00 03 00 00 12 04 03 03
0000040 00 04 00 00 04 06 00 00 00 03 00 00 22 05 04 04
```

Personality: Orangutan

ConnectorInfo count in decimal: 2

Effective address for ConnectorInfo table in hex: 11580 => 227512

dd if=ATIFramebuffer of=/tmp/fb bs=1 skip=227512 count=32

od -Ax -tx1 /tmp/fb

```
0000000 02 00 00 00 40 00 00 00 09 01 00 00 00 00 00 05
0000010 00 04 00 00 04 06 00 00 00 03 00 00 11 02 01 01
```