AVC based AVB Device

Ashley Butterworth
Apple Inc.
AVC Devices

- Lots of AVC devices on the market
- Blurry line between pro / consumer
AV/C Devices

- Pioneer
AV/C Devices

- Pioneer TV’s

PDP-4340HD 43-inch Plasma TV
PDP-4350HD 43-inch Plasma HDTV
PDP-4360HD 43-inch Plasma HDTV
PDP-5040HD 50-inch Plasma TV
PDP-5050HD 50-inch Purevision Plasma HDTV
PDP-5060HD 50-inch Flat Panel Plasma HDTV
PRO-1120HD 50-inch Elite PureVision Plasma TV
PRO-1130HD 50-inch Elite Flat Panel Plasma TV
PRO-810HD 43-inch Elite Purevision Plasma Monitor
PRO-910HD 43-inch PureVision Plasma TV
PRO-920HD 43-inch Elite Plasma DTV Monitor
AV/C Devices

- Denon
AV/C Devices

- Denon
AV/C Devices

- Sony
AV/C Devices

- Yamaha
AV/C Devices

- Marantz
AV/C Devices

- TVs all the rest

**Samsung (www.samsung.com)**
- HL-R4667W 46-inch Widescreen HDTV
- HL-R5067W 50-inch Widescreen HDTV
- HL-R5078W 50 in. HDTV Television
- HL-R5667W 56-inch Widescreen HDTV
- HL-R5678W 56 in. HDTV Television
- HL-R6178W 61 in. HDTV Television
- HL-R6768W 67-inch 1080p HDTV
- HL-R7178W 71 in. HDTV Television
- HL-S5688W 56-inch Widescreen DLP® HDTV
- HL-S6188W 61-inch Widescreen DLP® HDTV
- HL-S7178W 71 in. HDTV Television
- LN-S4095D 40 in. HDTV LCD Television
- LN-S4096D 40 in. HDTV-Ready LCD Television
- LN-S4696D 46 in. HDTV LCD Television

**Toshiba (www.toshiba.com)**
- 42HP95 42-inch TheaterWide® HD Plasma TV
- 42HPX95 42-inch Cinema Series HD Plasma TV
- 46HM95 46 in. HDTV Television
- 50HP95 50-inch TheaterWide® HD Plasma TV
- 51H94 51-inch TheaterWide® Integrated HD Projection TV
- 51HX94 51-inch Cinema Series Integrated HDTV Projection TV
- 52HM94 52-inch Theater-Wide Integrated HDTV DLP Projection TV
- 52HM95 52-inch Theater-Wide Integrated HDTV DLP Projection TV
- 52HMX94 52-inch Cinema Series Integrated HDTV DLP Projection TV
- 56HM195 56-inch Rear-Projection DLP HDTV
- 56MX195 56-inch Cinema Series Integrated HD DLP TV
- 57H94 57-inch Theater-Wide Integrated HDTV Projection TV
- 57HX94 57-inch Cinema Series Integrated HDTV Projection TV
- 62HM195 62 in. HDTV Television
- 62HM94 62-inch Theater-Wide Integrated HDTV DLP Projection TV
- 62HM95 62-Inch Widescreen Integrated HD DLP Projection TV
- 62HMX94 62-inch Cinema Series Integrated HDTV DLP Projection TV
- 72HM195 72-Inch Rear-Projection DLP HDTV
- 72MX195 72-Inch Rear-Projection DLP HDTV

**Pioneer (www.pioneerelectronics.com)**
- PDP-4340HD 43-inch Plasma TV
- PDP-4350HD 43-inch Plasma HDTV
- PDP-4360HD 43-inch Plasma HDTV
- PDP-5040HD 50-inch Plasma TV
- PDP-5040HD 50-inch Plasma TV
- PDP-5050HD 50-inch Purevision Plasma HDTV
- PDP-5060HD 50-inch Flat Panel Plasma HDTV
- PRO-1120HD 50-inch Elite PureVision Plasma TV
- PRO-1130HD 50-inch Elite Flat Panel Plasma TV
- PRO-810HD 43-inch Elite Purevision Plasma TV
- PRO-910HD 43-inch PureVision Plasma TV
- PRO-920HD 43-inch Elite Plasma DTV Monitor

**Sharp (www.sharpusa.com)**
- LC-26GD4U 26-inch AQUOS G Series Widescreen LCD
- LC-26GD6U 26-inch AQUOS G Series Widescreen LCD
- LC-32D50U 32 in. HDTV LCD Television
- LC-32GD6U 32-inch AQUOS G Series Widescreen LCD
- LC-45GD4U 45-inch AQUOS G Series Widescreen LCD
- LC-45GD5U 45-inch Liquid Crystal Widescreen TV
- LC-45GD6U 45-inch AQUOS G Series Widescreen LCD
- LC-45GX6U 45-inch AQUOS G Series Widescreen LCD
- LC-57D90U 57 in. HDTV LCD Television
- LC-65D90U 65-inch Liquid Crystal Widescreen TV

**Mitsubishi (www.mitsubishitv.com)**
- LT37131 37 in. HDTV LCD Television
- WD-52525 52 in. HDTV Television
- WD-52527 52 in. HDTV Television
- WD-52627 52 in. HDTV
- WD-52631 52 in. HDTV Television
- WD-52825 52 in. HDTV Television
- WD-57731 57 in. HDTV Television
- WD-57833 57 in. HDTV Television
- WD-62525 62 in. HDTV Television
- WD-62527 Projection Televisions
- WD-62528 62 in. HDTV Television
- WD-62529 62 in. HDTV Television
- WD-62927 62 in. HDTV Television
- WD-65731 65 in. HDTV Television
- WD-65831 65 in. HDTV Television
- WD-65833 65 in. HDTV Television
- WD-73833 73 in. HDTV Television
- WD-73927 73-inch DLP HDTV
- WD-Y57 57 in. HDTV Television
- WD-Y65 65 in. HDTV Television
- WD-52012 52-inch Integrated HDTV

**LG (http://us.lge.com/index.do)**
- 32LX1D 32-inch LCD Integrated HDTV
- 37LP1D 37-inch LCD Integrated HDTV
- 42LP1D 42-inch LCD HDTV
- 42PX4D 42-inch Plasma HDTV
- 42PX5D 42-inch Plasma HDTV
- 50PX4DR-H 50-inch Plasma with Built in DVR (160MB)
- 50PX5D 50-inch Plasma HDTV
- 50PY2DR 50-inch Plasma HDTV with Built in DVR
- 60PY2DR 60-inch Plasma HDTV with Built in DVR

Thursday, December 10, 2009
AV/C Devices

### Camcorders

**JVC** ([www.jvc.com](http://www.jvc.com))
- GR-D200 MiniDV Camcorder
- GR-D230US Ultra-Compact Series MiniDV Camcorder
- GR-D72US Compact Series MiniDV Camcorder
- GR-D93US Compact Series Mini DV Camcorder
- GR-DV200U Camcorder
- GR-DV500US Mini DV Camcorder
- GR-DVL120U Camcorder
- GR-DVL320U Camcorder
- GR-DVL520U Camcorder
- GR-DVL720U Camcorder
- GR-DVL820U Camcorder
- GR-DVL920U Camcorder
- GR-DVM76U Camcorder
- GR-DVM80U Camcorder
- GR-DVM96U Camcorder
- GR-DVP3U Camcorder
- GR-DX300US Mini DV Camcorder
- GR-DX307U Celebrity Series Mini DV Camcorder
- GR-DX75US Mini DV Cybercam
- GR-DX77US Celebrity Series Mini DV Cybercam
- GR-DX95US Mini DV Cybercam
- GR-HD1 High Definition Camcorder
- GR-X5US High-Band 3-CCD Digital Video Camera
- GY-HM700 HD Camcorder (09/09)
- GZ-HD10 HD Video Camera (06/08)
- GZ-HD30 HD Video Camera (06/08)
- GZ-HD40 HD Video Camera (06/08)

**Sony** ([www.sonystyle.com](http://www.sonystyle.com))
- DCR-DVD101 DVD Handycam
- DCR-HC1000 Handycam
- DCR-PC11000 Widescreen MiniDV Camcorder
- HDR-FX1 HDV Handycam Camcorder
- HDR-HC1
- HDR-HC3 HDV 1080i Handycam Camcorder

**Canon** ([www.canondv.com](http://www.canondv.com))
- Elura 100
- GL2
- Optura 50
- Optura Xi (03/09)
- Vixia HV20 (06/08) User Forum: [HV20/30 Forum](http://www.canondv.com/HV20Forum)
- Vixia HV30 (06/08) User Forum: [HV20/30 Forum](http://www.canondv.com/HV30Forum)
- XL2 (03/09)
- XL-H1S (03/09) (6-pin)
- XL-H1A (03/09) (6-pin)
- XL-H1 (03/09) (4-pin)
- XH A1S (03/09) (6-pin)
- XH G1S (03/09) (6-pin)
- XH G1 (03/09)
- XH A1 (03/09)
- ZR500 Camcorder (03/09)
- ZR600 Camcorder (03/09)
- ZR700 Camcorder (03/09)

**Panasonic** ([www.panasonic.com](http://www.panasonic.com))
- AG-DVC7 Mini DV Digital Camcorder
- AG-DVC80 Mini DV Digital Camcorder
- AG-DVX100B Mini DV Palmcorder MultiCam User Forum: [dvx user](http://www.pandv.com)
- AG-HVX200
- AJ-HDX900 DVCPro HD Camcorder
- AJ-HPG2000 P2 Camcorder
- AJ-SPP700 DVCPro P2 Camcorder (FireWire Optional)
- AJ-SPX800 P2 Camcorder
- PV-DV102 Compact Camcorder
- PV-DV103 Mini DV Compact Camcorder
- PV-DV401 Compact Camcorder
- PV-DV701 Compact Camcorder
- PV-DV702 Compact Camcorder
- PV-DV73 Mini DV Compact Camcorder
- PV-DV851 Compact Camcorder
- PV-DV901 Compact Camcorder
- PV-GS12 Digital Compact Camcorder
- PV-GS120 3CCD Compact Digital Palmcorder
- PV-GS15 Digital Palmcorder
- PV-GS300 3CCD Compact Digital Palmcorder
- PV-GS50S Mini DV Palmcorder
- PV-GS55 Ultra Compact Digital Palmcorder
- PV-GS59 Digital Palmcorder MultiCam
- PV-VM202 Palmcorder MultiCam

**Sharp** ([www.sharpelectronics.com](http://www.sharpelectronics.com))
- VL-Z1U Viewcam
- VL-Z3U Viewcam
- VL-Z5U Viewcam
- VL-Z7U Viewcam

**Samsung** ([www.samsungusa.com](http://www.samsungusa.com))
- SC-D354 Digital-Cam Mini DV Camcorder
- SC-D963 Mini DV Compact Camcorder
- SC-D965 Mini DV Compact Camcorder
AV/C Devices

- **AVR’s**

  **Denon** ([www.denon.com](http://www.denon.com))
  AVR-4806 7.1 THX® Ultra2 7.1 CH Reference A/V Surround Receiver
  AVR-4806CI Advanced THX® Ultra2 7.1 CH Reference A/V Surround Receiver
  AVR-5805 THX® Ultra2 Multi-Channel/Zone A/V Surround Receiver
  AVR-5805MK2 Advanced THX® Ultra2 Multi-Channel/Zone A/V Surround Receiver

  **Integra** ([www.integrahometheater.com](http://www.integrahometheater.com))
  DTR-10.5 THX Ultra2 Home Theater Receiver

  **Integra Research** ([www.integraresearch.com](http://www.integraresearch.com))
  RDC-7.1 Card-Based Modular A/V Controller

  **Marantz** ([www.marantz.com](http://www.marantz.com))
  SR9600 TX Ultra2 Digital Surround Sound Receiver
  SR9600XM TX Ultra2 Digital Surround Sound Receiver

  **Onkyo** ([www.onkyo.com](http://www.onkyo.com))
  TX-NR1000 THX Ultra2 Network A/V Receiver

  **Pioneer** ([www.pioneerelectronics.com](http://www.pioneerelectronics.com))
  VSX-49TXi THX Ultra 2 A/V Receiver with i-Link
  VSX-55TXi Elite
  VSX-56TXi THX Select A/V Receiver with i-LINK Advanced Digital Audio Interface
  VSX-74TXVi THX Select 2 7.1 Channel A/V Receiver with i.Link

  **Yamaha** ([www.yamaha.com](http://www.yamaha.com))
  RX-V4600 7.1 Channel Digital Home Theater Receiver
  RX-Z9 9-Channel Digital Home Theater Receiver
AV/C Devices

- Apogee
AV/C Devices

- Apogee Plug in card
AV/C Devices

- Mackie ONYX 1200F
AV/C Devices

- Mackie Plug in card
AV/C Devices

- Presonus
AV/C Devices

- Tascam
AV/C Devices

- Echo Audio
AV/C Like Devices

- Yamaha mLAN
AV/C Like Devices

- Yamaha mLAN
mLAN Software

![mLAN Graphic Patchbay](image)
AV/C Based AVB Device

- XMOS XDK
AVC Audio Device

- Based on Music subunit v2.0

- Music subunit encapsulates codec converting transport stream to/from audio samples

- Music subunit v2.0 provides function blocks and controls for manipulating audio
  - Volume, muxing, DSP, etc.

- Legacy 1394 devices use Audio and Music subunits
Device Structure Discovery

- mDNS discovers device
Device Structure Discovery

- Read number of unit plugs (isoch/stream and external)
Device Structure Discovery

- Read device Unit Info Descriptor

Includes plug's format, type, direction and name
Device Structure Discovery

- Read number of subunits from device
Device Structure Discovery

- Read music subunit status and subunit identifier descriptors

![Diagram of device structure]

- [Image of device structure diagram]
Device Structure Discovery

- Read routing information
Device Structure Discovery

- Discover controls
Example AVB AVC Device Setup

- Device startup
  - load code, start up, get network setup
- DHCP/AutoIP address
- Register device A record with mDNS
- Register AVC/FCPDU service with mDNS
- Start responding to AVC commands
Current Stream Connection

- Controller discovers both devices and stream formats
  - at this stage only connects identical stream formats
- Controller sends command to talker device output plug
  - sends destination MAC
  - receives Stream ID (and reference for later disconnection)
Current Stream Connection

- Controller sends command to listener device input plug
  - sends destination MAC, Stream ID
  - receives reference for later disconnection
Current Stream Connection

- Stream connection requires controller to always be present to reestablish connections on device connection/removal

- Controller does not have to be a Mac/PC could be any device capable of discovering devices and sending AVC commands
  - AVR, mixing board, dedicated network configuration device, etc.
Alternate Stream Connection

- Allow devices to automatically reconfigure after restart
- Every device has to run a long lived query lookup for devices
  - requires lots of extra resources, particularly in a large network
Alternate Stream Connection

- Controller discovers both devices and stream formats
- Controller sends command to listener device input plug
  - sends destination MAC, talker GUID, talker output plug number
Alternate Stream Connection

- Listener device then sends command to talker device output plug
  - sends destination MAC
  - receives Stream ID, destination MAC (if already streaming to another MAC it may be different)

- Listener device stores GUID, output plug number and destination MAC in nonvolatile memory
Alternate Stream Connection

- Listener can not assume that Stream ID will be the same for every connection
  - a 1394 to AVB bridge will have one source MAC address and would dynamically assign stream indexes as connections are made.

- Listener device would needs to be able to map GUID to IP address and UDP port
Apple XMOS Demo

- XMOS XDK running AVB demo code with AVC/IP stack
  - UDP/IP stack
  - FCPDU/AVC stack
  - AVC descriptors