Innovative Advantage, Inc.

AVDS Configuration Document

Document Information

Summary: Defines the parameters and tags used in the AVDS configuration file.

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Revision: C

Revision History

REV	Date	Initials	Description
A	9/16/2010	RLD	ECO-00169 Initial Release.
B	3/18/2011	RLD	ECO-00214 Updated with configuration for the channel tracker card.
C	11/21/2011	RLD	ECO-00241 Updated with new graphical configuration tool info and added Alto Amplifier block parameters.

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1 Introduction

The AVDS (Audio Video Distribution System) is a highly configurable system capable of distributing high definition video and audio.

Figure 1 below depicts a way in which the system can be broken up into logical channels. Configuring an AVDS system involves defining the specific inputs that define each input channel in the system and the specific outputs that define each output channel in the system. Configuring the system is the task of the System Designer.

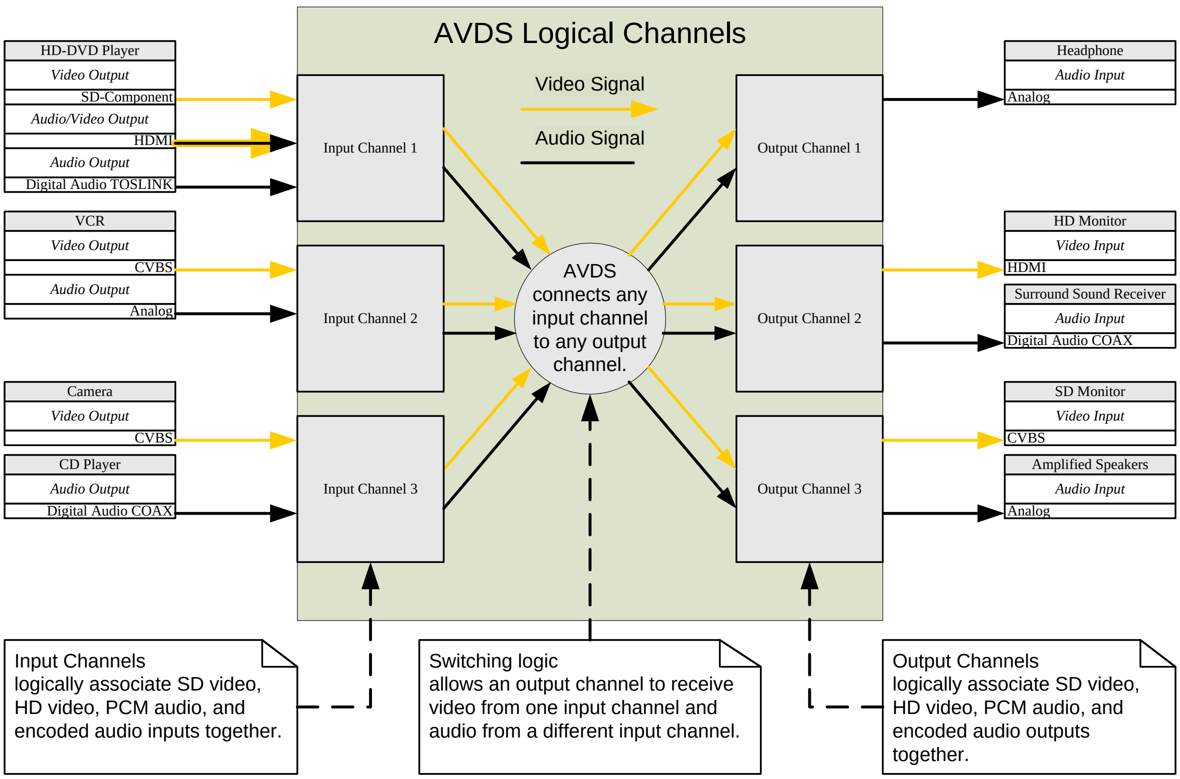


Figure 1 AVDS Logical Channels

Controlling an AVDS system involves requesting the system to route a given input channel to a given output channel and is the task of the CMS controls provider.

A key design feature of the AVDS is the straight forward manner that HD video, SD video, encoded audio, and analog audio signals can all be input from the same source. Hence, the system is able to provide the best match of available input signals to the capabilities of the rendering device. For example, one HD monitor can be displaying the HD video signal from a BluRay DVD player, while an SD monitor is displaying the SD video signal from the same player. A surround sound receiver can process the player’s encoded audio while the same player’s down-mixed analog audio can be routed to a stereo-only device like headphones. The control system only needs to set the output channel to an input channel, AVDS will match the optimal input to the output.

To simplify organization of the various input and output signals and make them easy to manage by the external control system, related signals are combined into logical channels. Selecting an input channel to be directed to an output channel is the fundamental task of the CMS controller.

The logical channels make it possible to associate the video signal from one source with the audio signal from another source as is the case of Input Channel 3. However, if one didn't want them to be grouped together, another input channel could be defined just for the CD player.

Note that although audio and video signals are combined logically within a given input channel, the system affords the flexibility of routing the audio from one input channel and video from another input channel to the same output channel. This allows the user to watch the video from one channel while listening to the audio from another channel.

1.1 Channels

Each channel has a channel number (1 and above).

Input channels are typically assigned to a particular *source*, e.g. a BluRay, CD Player, VCR, Camera, etc.

Output channels are typically assigned to a particular *seat location,* e.g. a personal monitor and a pair of headphones might be assigned to RHS-1.

A CMS supplier that is responsible for controlling the AVDS must be given a map by the System Designer to associate equipment with logical channels. Using the simple example from Figure 1 above, the map would look as follows:

Input Channels	
Channel	**Description**
1	HD-DVD
2	VCR
3	Camera/CD Player
Output Channels	
1	RHS-1 Headphones
2	FWD Area Monitor/Surround Speakers
3	AFT Area Monitor/Speakers

Table 1 Example System Mapping

1.2 Blocks

Blocks represent a single uniquely routable audio or video signal and are combined to create channels. For example, a high definition video block can be combined with a standard definition video block and a stereo audio block to create an input channel. All channels are composed of one or more blocks.

1.3 Zones

A zone is a group of output channels. These are used for control of an area, and are most often used for page/brief or video announcement overrides. Zones can also be used to set all output channels in an area of the aircraft to a channel using a single command. Output channels are not required to be placed in a zone, zones are only provided to simplify the control system interface.

2 Configuration

The AVDS configuration file assigns blocks to channels, sets default values, assigns zones, and initializes third party device interfaces. This single file is distributed to all AVDS node boxes in the system. It is an *.xml file with AVDS as the primary tag as shown in Figure 2 below.

```
<AVDS>
      ....
</AVDS>
```

Figure 2 AVDS Tag Example

It should be noted that no tags or parameters in the configuration are case sensitive, so “Avds” is the same as “avds” or “AVDS”.

2.1 Revision

The configuration file can optionally be given a revision number. The revision field expects a file name, Major, Minor and Revision values to be entered and can be read back by the control system to verify that the correct configuration file is being used. An example of a configured Revision property is shown in Figure 3.

```
<AVDS>
    <Version File="AVDS Config" Major="1" Minor="4" Revision="1"/>
</AVDS>
```

Figure 3 Configuration Revision Example

2.1.1 Revision History

Revision History is an optional group contained within the Version tag. It is a location for keeping revision history information. This is not used by the AVDS at runtime, but is used by the AVDS Client Configuration Editor to display revision history.

```
<AVDS>
    <Version File="AVDS Config" Major="1" Minor="4" Revision="1">
        <RevisionHistory>
            <RevEntry Name=”J. Doe” Date=”1/1/2011” Major=”1” Minor=”0” Revision=”1” Note=”Initial Release”/>
            <RevEntry Name=”J. Doe” Date=”10/9/2011” Major=”1” Minor=”0” Revision=”2” Note=”Update”/>
        </RevisionHistory>
    </Version>
</AVDS>
```

Figure 4 Revision History Example

Each entry should be contained by the RevEntry field, as shown in Figure 4.

2.2 Debug

The debug tag contains special parameters used for system testing and can contain hardware information about the system.

2.2.1 Nodes

This section maintains a list of AVDS nodes in the system. This information is not used by the AVDS at runtime, rather it is used by the AVDS Client Configuration Editor when creating or editing the configuration.

2.2.1.1 Node

Each node is listed with its address, part number, and description as shown in Figure 5. The available cards can be determined by the node part number.

```
<AVDS>
    <Debug>
        <Nodes>
            <Node Addr="1" PartNumber="100-0012-xx" Description="Fwd LH Node"/>
            <Node Addr="2" PartNumber="100-0013-xx" Description="Fwd RH Node"/>
        </Nodes>
    </Debug>
</AVDS>
```

Figure 5 Node Example

2.2.1.1.1 Card

If the node does not contain a pre-defined mix of cards each card must be individually defined. In this case the node part number is said to be “Undefined”, and the node part number field is left blank.

```
<AVDS>
    <Debug>
        <Nodes>
            <Node Addr="1" PartNumber="" Description="Fwd LH Node">
                <Card CardNumber="1" PartNumber="110-0012-xx"/>
                <Card CardNumber="2" PartNumber="110-0019-xx"/>
                <Card CardNumber="5" PartNumber="110-0020-xx"/>
                <Card CardNumber="8" PartNumber="110-0036-xx"/>
            </Node>
        </Nodes>
    </Debug>
</AVDS>
```

Figure 6 Card Example

The CardNumber field is the slot number where the card is located (1-8) and the PartNumber field is the part number of the card.

2.3 Channel Configuration

The channel configuration is divided among input and output channels. Once defined in the configuration file, they can be connected at run time by the control system. Channels are defined using the <Channel></Channel> tags. The direction (input or output) of the channel is determined by its parent tag.

2.3.1 Input Channels

Input Channels are defined by placing channels inside the <InputChannels></InputChannels> tags. As an example, the input channel tag in Figure 7 contains a single input channel routed from a BluRay player.

```
<AVDS>
    <Version File="AVDS Config" Major="1" Minor="4" Revision="1"/>
    <InputChannels>
        <Channel Cn="1" Id="BluRay">
            …
        </Channel>
    </InputChannels>
</AVDS>
```

Figure 7 Input Channel Configuration

2.3.2 Output Channels

Output channels are defined by placing channels within the <OutputChannels></OutputChannels> tags. The output channel tag in Figure 8 contains a single output channel assigned to the forward area monitor.

```
<AVDS>
    <Version File="AVDS Config" Major="1" Minor="4" Revision="1"/>
    <InputChannels>
        <Channel Cn="1" Id="BluRay">
            …
        </Channel>
    </InputChannels>
    <OutputChannels>
        <Channel Cn="1" Id="Fwd Area Monitor">
            …
        </Channel>
    </OutputChannels>
</AVDS>
```

Figure 8 Output Channel Configuration

2.3.3 Channel Properties

Each input and output channel in the configuration contains one or more property values that describe that channel. Examples of this can be seen in the sample configuration in Figure 8. The channel number (Cn=”1”) and the channel ID (Id=”Fwd Area Monitor”) are channel properties.

2.3.3.1 Common Channel Properties

The common channel properties are used to describe both input and output channels. The following properties are valid for both input and output channels:

Tag	Value Range	Default Value	Required	Description
Cn	1-32767	N/A	Yes	Logical channel number
Id	text	N/A	No	Channel label
Priority	Low, Normal, High, Highest	Normal	No	Route priority

Table 2 Common Channel Properties

2.3.3.1.1 Channel Property: Cn

This property defines the channel number. This number is used both internally by the AVDS and by a connected CMS to reference the channel, so it is a required parameter. The channel number must be unique among other channels of its type. In other words, you can have an output channel 1 and an input channel 1, but you don't want two input channel 1s. The channel numbers must range between 1 and 32767. There is no requirement that the channel numbers start at 1 or that they are contiguous, but it is considered good practice.

2.3.3.1.2 Channel Property: Id

The ID is an optional parameter that will assign a name to the channel. This can be helpful when using diagnostic tools to look at the system and makes the configuration more readable, but it is not required.

2.3.3.1.3 Channel Property: Priority

Under normal circumstances all input channels will be available at any time, but if a failure occurs the system may need to run in a prioritized mode. In this mode, the channels with the highest priority are distributed first. This allows the critical input channels (e.g. page/brief) and output channels (e.g. VIP) to continue operating without interruption. Each channel priority can be independently set.

In most system designs, the VIP seat location output channel and the Page/Brief input channel should be set to a priority of Highest or High. This parameter is optional, and all channels will default to a value of "Normal".

2.3.3.2 Input Channel Properties

There are currently no channel properties that apply only to input channels.

2.3.3.3 Output Channel Properties

The following table lists all properties that are only valid for output channels:

Tag	Value Range	Default Value	Required	Description
DefVideoInputCn	0-32767	0	No	Default video input channel (0 = Off)
DefAudioInputCn	0-32767	0	No	Default audio input channel (0 = Off)
DefVolume	-80.0 to +20.0	-10.0	No	Default Volume
DefMute	0,1,false,true	0	No	Default Mute
DefTreble	-12.0 to +12.0	0	No	Default Treble
DefBass	-12.0 to +12.0	0	No	Default Bass
DefAudioCompression	0,1,false,true	0	No	Default Audio Compression
Override	Allow, Ignore, ChannelOff	Allow	No	Action during override

Table 3 Output Channel Properties

2.3.3.3.1 Output Channel Property: DefVideoInputCn

This is the default video input channel for the output channel. This value can be set to any valid input channel number, but should be left out of the configuration or set to 0 (Off) when the system is connected to a CMS. This allows the CMS to control the default channel.

2.3.3.3.2 Output Channel Property: DefAudioInputCn

This is the default audio input channel for the output channel. This value can be set to any valid input channel number, but should be left out of the configuration or set to 0 (Off) when the system is connected to a CMS. This allows the CMS to control the default channel.

2.3.3.3.3 Output Channel Property: DefVolume

This sets the default volume level for the output channel. The valid range is -80.0 to +20.0.

2.3.3.3.4 Output Channel Property: DefMute

This sets the default mute state of the output channel. 0 or false = Not Muted, 1 or true = Muted.

2.3.3.3.5 Output Channel Property: DefTreble

This is the default treble level for the output channel. The valid ranges are -20.0 to +20.0.

2.3.3.3.6 Output Channel Property: DefBass

This is the default bass level for the output channel. The valid ranges are -20.0 to +20.0.

2.3.3.3.7 Output Channel Property: DefAudioCompression

This sets the default audio compression state for the output channel. 0 or false = No Compression, 1 or true = Compression.

2.3.3.3.8 Output Channel Property: Override

The AVDS supports an override control that allows a temporary channel to be set, then the previous channel is restored when the override is closed. Override control for audio channel, video channel, and volume are provided. When an override is set, a new override will overwrite the previous. When the override is released, the channel will revert to the original value. The AVDS system allows normal channel changes to occur during an active override, but these changes are not seen until the override is released. It is the responsibility of the control system to prevent channel changes during an active override if desired.

This parameter sets the action the channel should take when an override is activated. The valid values are:

- Allow (default): This means that the channel will change to the override channel when directed.
- Ignore: This means that the channel will ignore all override commands.
- ChannelOff: This means that the output channel should turn off when an override is active.

2.3.3.4 Default Channel Properties

To simplify configuration, properties can be set for all input or output channels. For example, a default volume can be set for all output channels. This volume level will be used by all output channels, but will be overridden by a local default definition.

The example in Figure 9 shows the default volume of all output channels is set to -30, but channel 2 has its own default volume of -15. The local default will take priority, so channel 1 defaults with a volume of -30 and channel 2 defaults with a volume of -15.

```
<AVDS>
    <Version File="AVDS Config" Major="1" Minor="4" Revision="1"/>
    <InputChannels>
        <Defaults>
            <Channel Priority="Normal"/>
        </Defaults>
        <Channel Cn="1" Id="BluRay">
            …
        </Channel>
    </InputChannels>
    <OutputChannels>
        <Defaults>
            <Channel Priority="Normal" DefVolume="-30.0"/>
        </Defaults>
        <Channel Cn="1" Id="Fwd Area Monitor">
            …
        </Channel>
        <Channel Cn="2" Id="Aft Area Monitor" DefVolume="-15.0">
            …
        </Channel>
    </OutputChannels>
</AVDS>
```

Figure 9 Default Properties

2.4 Zones

As mentioned in section 1.3, output channels can be grouped into zones. Zones can be used by the CMS to control multiple output channels in an area with a single command. To add an output channel to a zone, simply define it within the zone tag as shown below:

```
<AVDS>
    <Version File="AVDS Config" Major="1" Minor="4" Revision="1"/>
    <InputChannels>
        <Defaults>
            <Channel Priority="Normal"/>
        </Defaults>
        <Channel Cn="1" Id="BluRay">
            …
        </Channel>
    </InputChannels>
    <OutputChannels>
        <Defaults>
            <Channel Priority="Normal" DefVolume="-30.0"/>
        </Defaults>
        <Zone Zn=“1“ Id=“Fwd Zone“>
            <Channel Cn="1" Id="Fwd Area Monitor">
                …
            </Channel>
        </Zone>
        <Zone Zn=”2” Id=”Aft Zone”>
            <Channel Cn="2" Id="Aft Area Monitor" DefVolume="-15.0">
                …
            </Channel>
        </Zone>
    </OutputChannels>
</AVDS>
```

Figure 10 Zone Configuration

The example in Figure 10 defines two zones, “Fwd Zone” and “Aft Zone”. All output channels within the <Zone> and </Zone> tags become members of that zone.

2.4.1 Zone Properties

Zones have properties that are very similar to channels. The following properties are valid for zones:

Tag	Value Range	Default Value	Required	Description
Zn	1-65534	N/A	Yes	Logical zone number
Id	text	N/A	No	Zone label

Table 4 Zone Properties

2.4.1.1 Zone Property: Zn

This property defines the zone number. This number is used both internally and by a connected CMS to reference the zone, so it is a required parameter. Each zone must have a unique zone number ranging between 1 and 65534. Like channel numbers, there is no requirement that the zone numbers start at 1 or that they be contiguous but it is considered good practice.

2.4.1.2 Zone Property: Id

The Id property is a text label for the zone. It is not required but can simplify the use of diagnostic tools and makes the configuration file easier to understand.

2.5 Blocks

A block represents a single audio or video port (either input or output). Input blocks are combined to define input channels and output blocks are combined to create output channels. They are responsible for mapping the logical channel to a physical AVDS node and card. In Figure 11 below there are two blocks defined in input channel 1:

```
<AVDS>
    <Version File="AVDS Config" Major="1" Minor="4" Revision="1"/>
    <InputChannels>
        <Defaults>
            <Channel Priority="Normal"/>
        </Defaults>
        <Channel Cn="1" Id="BluRay">
            <HD     Addr="5.1" Port="HDMI-1"/>
            <Stereo Addr="5.1" Port="HDMI-1"/>
        </Channel>
    </InputChannels>
    <OutputChannels>
        <Defaults>
            <Channel Priority="Normal" DefVolume="-30.0"/>
        </Defaults>
        <Zone Zn="1" Id="Fwd Zone">
            <Channel Cn="1" Id="Fwd Area Monitor">
                …
            </Channel>
        </Zone>
        <Zone Zn="2" Id="Aft Zone">
            <Channel Cn="2" Id="Aft Area Monitor" DefVolume="-15.0">
                …
            </Channel>
        </Zone>
    </OutputChannels>
</AVDS>
```

Figure 11 Block Configuration

These blocks define the type of signal expected on the port and the physical location of the port.

2.5.1 Use

The “Use” is the label of the block and defines the type of audio or video signal that the block handles. The list of possible uses is shown in Table 5.

Use	Description
HD	High Definition Video
SD	Standard Definition Video
Encoded	Encoded, or bitstream audio
MultiCh	Multi-Channel Audio
Stereo	Stereo Audio
DnMix	Down Mix Audio

Table 5 Valid Uses

The use assigned to the block will determine how it is routed. For instance, when an output channel with an HD block is set to an input channel, the AVDS will look at the available blocks supplied by the input channel and find the best match. If the input channel has an HD block it will be selected, if it doesn't it will look for an SD block. An SD output block can only connect to an SD input block, so if it were routed to a channel with only an HD block, the routing would fail.

2.5.2 Block Properties

Each block contains properties that define the location of the block. Other properties are sometimes used for special block types.

2.5.2.1 Common Block Properties

The following properties are valid for all blocks:

Tag	Value Range	Default Value	Required	Description
Addr	1-9999**.**1-25	N/A	Yes	Node address of the AVDS port location, dot and card number of AVDS port location
Port	See Port Definition	N/A	Yes	The port type, a dash, and the port number

2.5.2.1.1 Common Block Properties: Addr

The addr property represents the AVDS node address and card number of the block. Valid ranges for the address are 1-9999 and valid ranges for the card number are 1-25. These values are mapped to the physical location of the card. In the example shown in Figure 11 the addr value is listed as 5.1, so the input port is located on node address 5, card 1.

2.5.2.1.2 Common Block Properties: Port

The port defines which physical port on the card that is assigned to the block. Most cards have multiple ports, and each can be assigned to a different channel. Most ports can only be defined once in the configuration. Table 6 shows all AVDS cards and the ports for each.

Card Number	Card Description	Port Name	Valid Port Numbers	Valid Uses	Input/Output
110-0003-xx	CVBS Input Card	CVBS	1-4	SD	Input

Card Number	Card Description	Port Name	Valid Port Numbers	Valid Uses	Input/Output
110-0004-xx	CVBS Output Card	CVBS	1-4	SD	Output
110-0005-xx	Analog Audio Input Card	Analog	1-4	Stereo, MultiCh, DnMix	Input
110-0006-xx	Analog Audio Output Card	Analog	1-4	Stereo, MultiCh	Output
110-0007-xx	Digital Audio Input Card	Coax	1-4	Stereo, MultiCh, Encoded, DnMix	Input
110-0008-xx	SDI Input Card	SDI	1-4	SD, HD	Input
110-0010-xx	YPrPb and Analog Audio Input, SDI output	CVBS, YC or YPrPb	1	SD only for CVBS and YC, SD or HD for YPrPb	Input
		Analog	1	Stereo	Input
		SDI	1	SD, HD	Output
110-0012-xx	HDMI and Digital Audio Input Card	HDMI	1	HD, Encoded, MultiCh, Stereo, DnMix	Input
		Coax	1	Stereo, Encoded	Input
110-0014-xx	SDI Output Card	SDI	1-4	SD, HD	Output
110-0015-xx	PC and Video Input Card	CVBS, YC, YPrPb, VGA	1	SD for CVBS and YC, SD or HD for and VGA	Input
110-0019-xx*	Video Converter Card	ConverterIn	1	SD, HD	Output
		ConverterOut	1	SD, HD	Input
110-0020-xx	CVBSx3 and SDI Output	CVBS	1-3	SD	Output
		SDI	1	SD, HD	Output
110-0036-xx**	3G-SDI Input x 4	SDI	1-4	SD,HD,Stereo, DnMix, MultiCh	Input

Table 6 Port Assignment by Card

***Refer to section 0 for special instructions on configuring video converter cards.**

**** Refer to section 2.7 for special instructions on configuring the 110-0036-xx 3G SDI Input cards.**

As the table above shows, there are a few physical ports can be defined in multiple ways. For instance, the 110-0010-xx YPrPb input card has a video port that can be configured for CVBS, YC, or YPrPb. Since that card is capable of receiving several video formats, the port is used to tell the card which signal to expect.

The 110-0012-xx HDMI input card is a little different; this is one port that will often be defined multiple times because the link carries both audio and video. In this case it is the use that defines what part of the signal belongs to the block.

It should also be noted that the DnMix use is special in that it can be assigned to any port assigned as MultiCh. It will down mix the multi channel audio to stereo.

Figure 12 shows a typical HDMI input configuration with all three input blocks assigned to the same HDMI input port. The HD video and MultiCh audio blocks come directly from the HDMI, the DnMix block is created from the MultiCh block.

```
<AVDS>
    <Version File="AVDS Config" Major="1" Minor="4" Revision="1"/>
    <InputChannels>
        <Defaults>
            <Channel Priority="Normal"/>
        </Defaults>
        <Channel Cn="1" Id="BluRay">
            <HD      Addr="5.1" Port="HDMI-1"/>
            <MultiCh Addr="5.1" Port="HDMI-1"/>
            <DnMix   Addr="5.1" Port="HDMI-1"/>
        </Channel>
    </InputChannels>
    <OutputChannels>
        <Defaults>
            <Channel Priority="Normal" DefVolume="-30.0"/>
        </Defaults>
        <Zone Zn="1" Id="Fwd Zone">
            <Channel Cn="1" Id="Fwd Area Monitor">
                …
            </Channel>
        </Zone>
        <Zone Zn="2" Id="Aft Zone">
            <Channel Cn="2" Id="Aft Area Monitor" DefVolume="-15.0">
                …
            </Channel>
        </Zone>
    </OutputChannels>
</AVDS>
```

Figure 12 Typical HDMI Configuration

2.5.2.2 Specialized Block Properties

There are some special block properties that apply only to certain cards or ports. They are show in Table 7.

Property	Value Range	Default	Card - Port
FormatOut	480i_60, 525i_50, 720p_60, 720p_50, 1080i_60, 1080i_50	480i_60 if SD, 1080i_60 if HD	Video Converter – ConverterOut port
			PC Graphics Card – CVBS, YC, YPrPb, or VGA ports
AspectRatio	FullScreen, Panoramic, LetterBox, Extract, Through	If input is HD and output is SD: Extract. Otherwise LetterBox.	Video Converter – ConverterOut port
		LetterBox	PC Graphics Card – CVBS, YC, YPrPb, or VGA ports
SDOverscan	0-25	1	Video Converter – ConverterOut port
			PC Graphics Card – CVBS, YC, YPrPb, or VGA ports
GraphicsUnderscan	0-25	0	PC Graphics Card – CVBS, YC, YPrPb, or VGA ports
SDIParameters, StandardSDIParameters	N/A	N/A	SDI Input and SDI Output Cards - SDI
LoudnessEnabled	0,1	0	Alto Amplifier Output Block - Group
BassBoost	0-3	0	Alto Amplifier Output Block - Group
TrebleBoost	0-3	0	Alto Amplifier Output Block - Group
SpatialEnabled	0,1	0	Alto Amplifier Output Block - Group
SpatialIntensity	0-3	0	Alto Amplifier Output Block - Group

Table 7 Specialized Block Properties

2.5.2.2.1 Specialized Block Properties: FormatOut

The FormatOut property is used by the PC Graphics card and the Video Converter card. These cards have the ability to convert the received video format to another format. This property tells the card what video format should be output from the card.

For more information on video formats, see section 4.
The possible values are:

Configured Value	Resulting Format
480i_60	480i 60Hz
525i_50	525i 50Hz
720p_60	720p 60Hz
720p_50	720p 50Hz
1080i_60	1080i 60Hz
1080i_50	1080i 50Hz

Table 8 Format Property Values

```
<AVDS>
    <Version File="AVDS Config" Major="1" Minor="4" Revision="1"/>
    <InputChannels>
        <Channel Cn="1" Id="PC">
           <HD Addr=”1.1” Port=”VGA-1” FormatOut=”1080i_60”/>
        </Channel>
    </InputChannels>
</AVDS>
```

Figure 13 Example of FormatOut Property

2.5.2.2.2 Specialized Block Properties: AspectRatio

The AVDS Video Converter and PC Graphics Cards contain a video processor that accepts an “AspectRatio” parameter. This can be used to stretch the source video to fill the display or to prevent this stretching and preserve the original aspect. This property tells the card what video format should be output from the card.
For more information on aspect ratio, see section 7.
The possible values are:

- FullScreen
- Panoramic
- Letterbox
- Extract
- Through

```
<AVDS>
    <Version File="AVDS Config" Major="1" Minor="4" Revision="1"/>
    <InputChannels>
        <Channel Cn="1" Id="PC">
             <HD Addr=”1.1” Port=”VGA-1” FormatOut=”1080i_60” AspectRatio=”Letterbox”/>
        </Channel>
    </InputChannels>
</AVDS>
```

Figure 14 Example of AspectRatio Property

2.5.2.2.2.1 Aspect Ratio: FullScreen

The FullScreen setting refers to anamorphic fullscreen. In this mode, the input video frame is stretched to fit the output format. For more information on Anamorphic Fullscreen, see section 7.5.

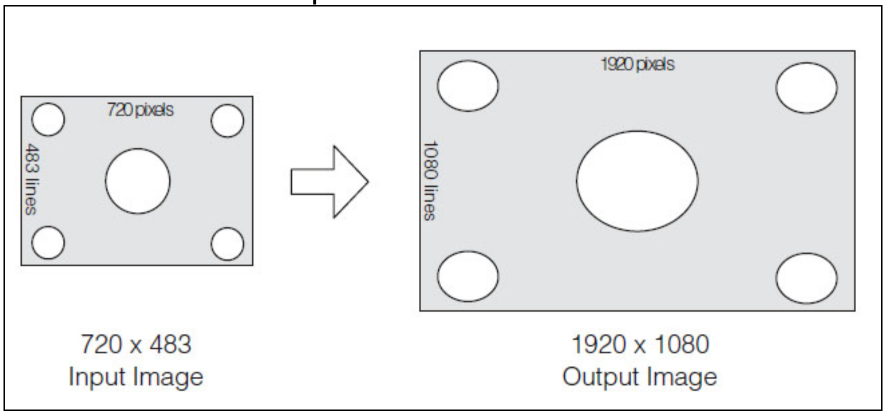


Figure 15 Example of Anamorphic Fullscreen

2.5.2.2.2.2 Aspect Ratio: Panoramic

In Panoramic mode, the input video is stretched in a non-linear fashion so that the frame distortion is confined to the edges of the screen. For more information on Panoramic Fullscreen, see section 7.6.

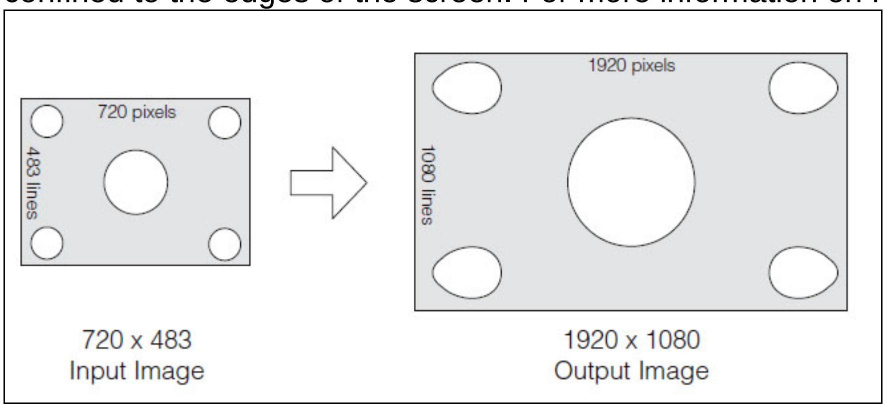


Figure 16 Panoramic Fullscreen Example

2.5.2.2.2.3 Aspect Ratio: Letterbox

This setting will use Letterbox or Pillarbox to maintain the original aspect ratio of the video. For more information on Letterbox and Pillarbox, see section 7.3.

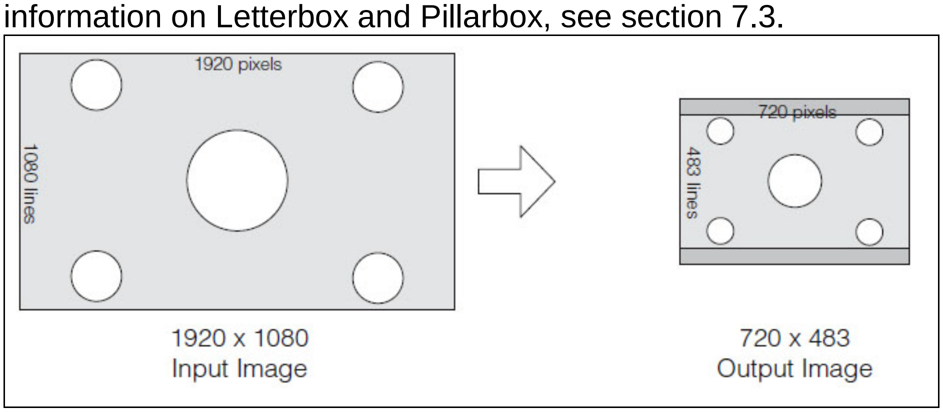


Figure 17 Letterbox Example

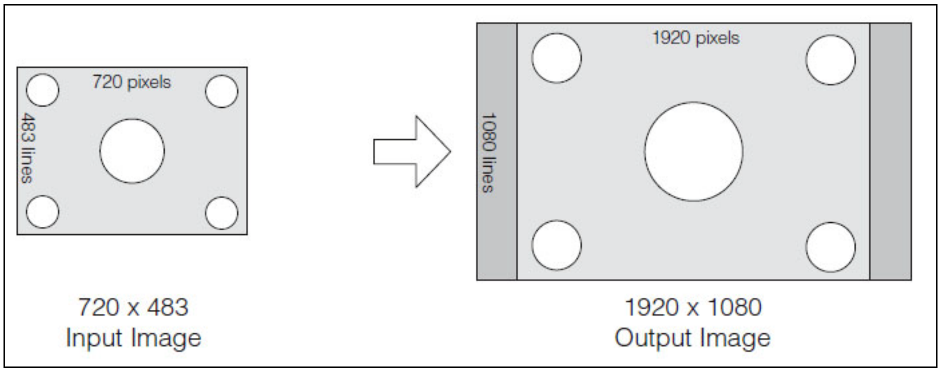


Figure 18 Pillarbox Example

2.5.2.2.2.4 Aspect Ratio: Extract

Extract mode will pull a section of the received video out and scale it up. This is especially useful when the source is outputting letterbox and you want it removed.

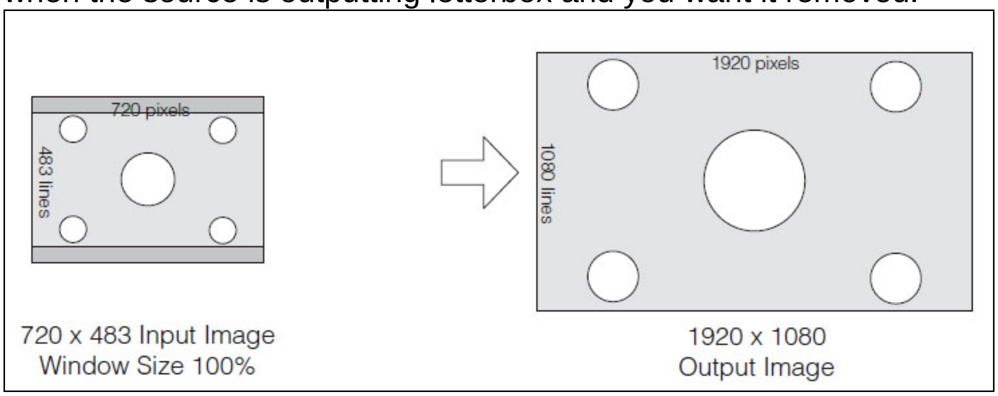


Figure 19 Extract Example

2.5.2.2.2.1 Aspect Ratio: Through

Through mode simply passes the video without any change. This mode can be useful if you wish to view the video with no aspect ratio changes applied. It is mostly useful for testing.

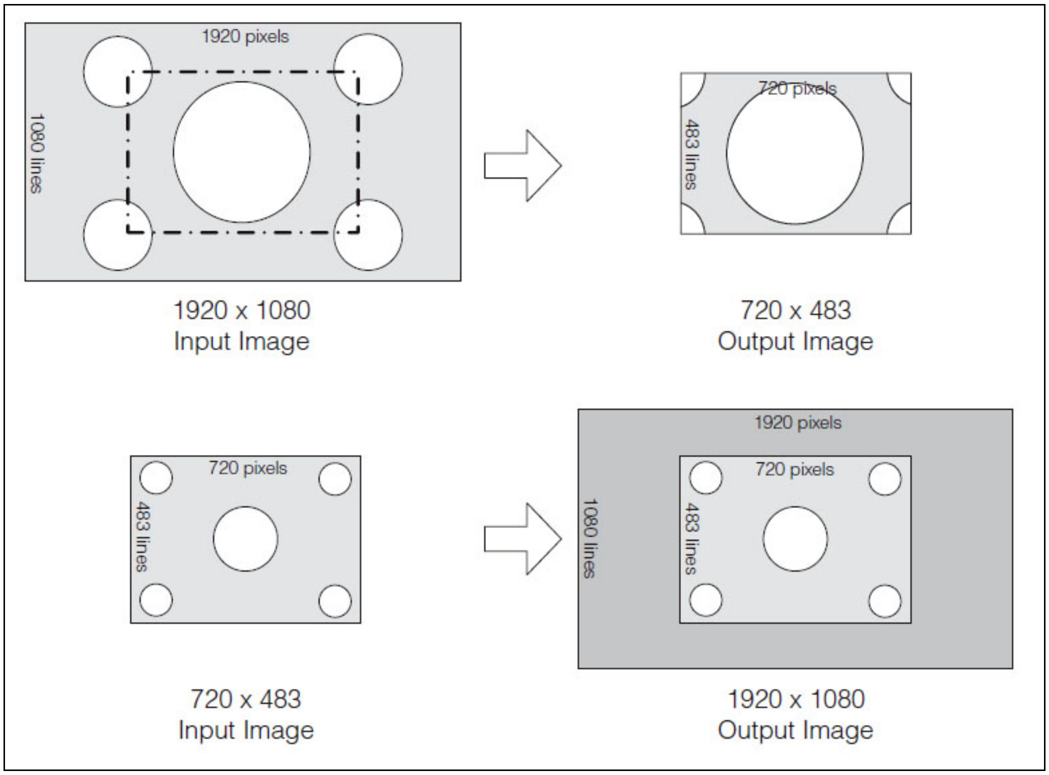


Figure 20 Through Mode Examples

2.5.2.2.3 Specialized Block Properties: SDOverscan

The SDOverscan parameter is only valid on blocks created using the Video Converter or PC Graphics Cards and takes a numeric value from 0-25 (which refers to the percent of overscan). This parameter is only applied when the card receives a standard definition video signal, high definition signals are not overscanned.

For more information see Appendix 5: Overscan.

```
<AVDS>
    <Version File="AVDS Config" Major="1" Minor="4" Revision="1"/>
    <InputChannels>
        <Channel Cn="1" Id="BluRay">
             <HD Addr=”1.1” Port=”YPrPb-1” FormatOut=”1080i_60” SDOverscan=”2”/>
        </Channel>
    </InputChannels>
</AVDS>
```

Figure 21 Example of the SDOverscan Property

2.5.2.2.4 Specialized Block Properties: GraphicsUnderscan

The GraphicsUnderscan parameter is valid on input blocks created with a PC Graphics Card and accepts a numeric value from 0-25 (which refers to the percent of overscan compensation). This value is only applied when the card receives a VGA signal.

For more information see Appendix 6: Overscan Compensation.

```
<AVDS>
    <Version File="AVDS Config" Major="1" Minor="4" Revision="1"/>
    <InputChannels>
        <Channel Cn="1" Id="PC">
             <HD Addr="1.1" Port="VGA-1" FormatOut="1080i_60" GraphicsUnderscan="2"/>
        </Channel>
    </InputChannels>
</AVDS>
```

Figure 22 Example of the GraphicsUnderscan Property

2.5.2.2.5 Specialized Block Properties: SDIParameters and StandardSDIParameters

The SDIParameters property is used to pass some configuration parameters needed to support various source and display devices. Since these devices can have slightly different SDI implementations, the parameters are placed in the configuration file. If new parameters are required they will be provided by Innovative Advantage.

```
<AVDS>
    <Version File="AVDS Config" Major="1" Minor="4" Revision="1"/>
    <InputChannels>
        <Channel Cn="1" Id="PC">
             <HD Addr="1.1" Port="SDI-1" SDIParameters="1,2,3,4,5,6,0,0,1"/>
        </Channel>
    </InputChannels>
</AVDS>
```

Figure 23 SDIParameters Example

The "SDIStandardParameters" field maps common parameter lists for the SDI and can be referenced from the blocks. In the example below, channel 1 references "MySourceParameters". There is also a "default" set of parameters that applies to all SDI blocks that do not explicitly define another set of parameters. Channel 2 will receive this set of parameters. These parameters apply to both audio and video blocks created for an SDI input card, so the SDI parameters tag should be present on both if you are not using the defaults.

```
<AVDS>
    <Version File="AVDS Config" Major="1" Minor="4" Revision="1"/>
    <StandardSDIParameters>
        <SDIParameters Id="default" SDIParameters="1,2,4,3,5,6,0,0,0"/>
        <SDIParameters Id="MySourceParameters" SDIParameters="1,2,3,4,5,6,0,0,1"/>
    </StandardSDIParameters>
    <InputChannels>
        <Channel Cn="1" Id="HD Video 1">
             <HD Addr="1.1" Port="SDI-1" SDIParameters="MySourceParameters"/>
        </Channel>
        <Channel Cn="2" Id="HD Video 2">
             <HD Addr="1.1" Port="SDI-2"/>
        </Channel>
    </InputChannels>
</AVDS>
```

Figure 24 StandardSDIParameters Example

2.5.2.2.6 Specialized Block Properties: LoudnessEnabled

LoudnessEnabled must be set for the BassBoost and TrebleBoost values to be activated. A value of 1 enables the loudness controls, 0 disables it. The default is 0.

```
<AVDS>
    <Version File="AVDS Config" Major="1" Minor="4" Revision="1"/>
    <Driver Id="Alto Amp" Addr="1.17" Port="Eth-2" PAZone="0xFFFF" PAVolume="-15"
             AMP_Main_Record="SampleMainRecord.atdb" AMP_PA_Record="SamplePARecord.atdb"/>

    <InputChannels>
        <Channel Cn="10" Id="PA">
             <Stereo Addr="1.17" Port="Group-1" LoudnessEnabled="1" BassBoost="1"/>
        </Channel>
    </InputChannels>
</AVDS>
```

Figure 25 LoudnessEnabled Example

2.5.2.2.7 Specialized Block Properties: BassBoost

The BassBoost parameter adjusts the max amount of bass boost at low volume.

Value	Boost Value
0	None
1	6 dB
2	9 dB
3	12 dB

Table 9 Bass Boost Values

2.5.2.2.8 Specialized Block Properties: TrebleBoost

The TrebleBoost parameter adjusts the max amount of treble boost at low volume.

Value	Boost Value
0	None
1	4 dB
2	6 dB
3	8 dB

Table 10 Treble Boost Values

2.5.2.2.9 Specialized Block Properties: SpatialEnabled

The SpatialEnabled flag enables the spatial enhancement algorithm to improve the soundstage. A value of 1 enables spatial processing, 0 disables it. The default is 0.

```
<AVDS>
    <Version File="AVDS Config" Major="1" Minor="4" Revision="1"/>
    <Driver Id="Alto Amp" Addr="1.17" Port="Eth-2" PAZone="0xFFFF" PAVolume="-15"
             AMP_Main_Record="SampleMainRecord.atdb" AMP_PA_Record="SamplePARecord.atdb"/>

    <InputChannels>
        <Channel Cn="10" Id="PA">
             <Stereo Addr="1.17" Port="Group-1" SpatialEnabled="1" SpatialIntensity="2"/>
        </Channel>
    </InputChannels>
</AVDS>
```

Figure 26 SpatialEnabled Example

2.5.2.2.10 Specialized Block Properties: SpatialIntensity

The SpatialIntensity parameter controls the intensity of the spatial enhancement.

Value	Spatial Intensity
0	Disabled
1	Intensity Min
2	Intensity Med
3	Intensity Max

Table 11 Spatial Intensity Values

2.6 Video Converter Cards

Video converter cards have the ability to convert received video format to another format. They can be configured as a video source (part of an input channel) or as a video sink (part of an output channel). When configured as an input channel they are typically used for PAL to NTSC conversion or High Definition to Standard Definition conversion. When tied to an output channel they can insure that the display sees a steady video format regardless of what input channel is connected, which results in faster channel switching.

A typical video path without a video converter card consists of a source feeding into an input block. The video is then routed to an output block where it is sent to the display as shown in Figure 27.

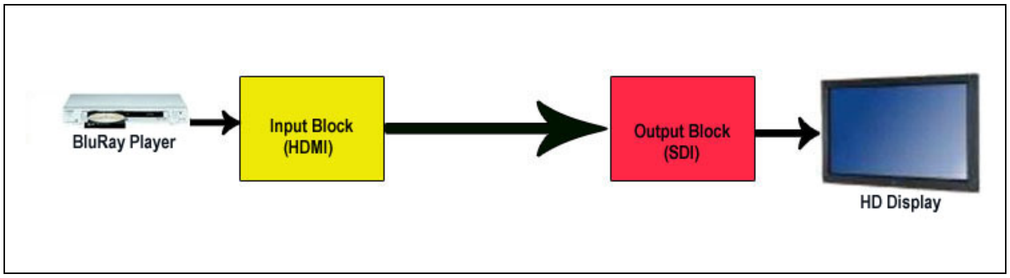


Figure 27 A Typical Video Path

When a video converter card is added, the path becomes a bit more complex. In the example shown in Figure 28 the video is still received from the HDMI input, and the SDI output is still sent to the display, but there is an additional output block and input block that is associated with the converter card.

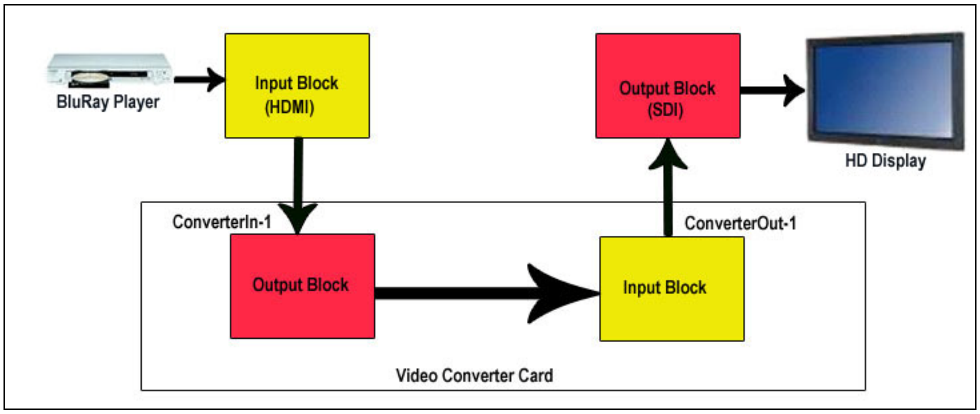


Figure 28 A Video Path Containing a Video Converter Card

You may notice that the **INPUT** of the video converter card is actually an **OUTPUT** block. On the other side, the **OUTPUT** of the video converter card is actually an **INPUT** block. This can be somewhat counter-intuitive, but it is important to remember that output blocks always connect to input blocks. The video converter card shown in the example can be associated with the output channel or the input channel depending on the functionality required.

It is sometimes helpful to think of the video converter card as a card with an output and an input that feeds video to some external video processor. The AVDS video output block sends the video to the video processor, then the modified video signal is passed back into AVDS via an input block.

Section 2.6.1 shows an example of a video converter card that is part of the input block.
Section 2.6.2 shows an example of a video converter card that is part of the output block.

2.6.1 Creating Standard Definition Video from High Definition Input

The example shown in Figure 29 demonstrates a video converter card configured to create an SD video signal from a received HD signal.

```
<AVDS>
    <Version File="AVDS Config" Major="1" Minor="4" Revision="1"/>
    <InputChannels>
        <Channel Cn="1" Id="BluRay">
             <HD Addr=”1.1” Port=”HDMI-1”/>
             <SD Addr=”1.2” Port=”ConverterOut-1” FormatOut=”480i_60”>
                <Source Use=”HD” Addr=”1.1” Port=”HDMI-1”/>
                <Sink Use=”HD” Addr=”1.6” Port=”ConverterIn-1”/>
             </SD>
             <MultiCh Addr=”1.1” Port=”HDMI-1”/>
             <DnMix Addr=”1.1” Port=”HDMI-1”/>
        </Channel>
    </InputChannels>
</AVDS>
```

Figure 29   Video Converter Card Example of HD to SD Conversion

The first line assigns the ConverterOut block. This is the block that is visible to all output blocks, so it is set to output 480i video and is configured as an SD block.
The second line defines the source of the video. In this case the source of the video is the HDMI input on card 1.1.
The third line defines the ConverterIn block as the sink. This block must have a compatible Use with the source block. When this is loaded into the AVDS, a persistent route will be created between the source and sink blocks. The ConverterOut block will receive video from the ConverterIn block and will change the format to 480i.

2.6.2 Connecting to a Monitor to Speed Channel Switching

Some displays have difficulty when locking on to a new video format, which can manifest as a slow channel switch when the format changes. When a video converter card is connected to a display it can decrease switching time by providing a constant video format to the display. The example in Figure 30 shows how this is configured.

```
<AVDS>
    <OutputChannels>
        <Channel Cn="1" Id="Fwd Monitor">
             <HD Addr="1.7" Port="ConverterIn-1">
                <Source Use="HD" Addr="1.7" Port="ConverterOut-1" FormatOut="1080i_60"/>
                <Sink Use="HD" Addr="1.8" Port="SDI-1"/>
             </HD>
             <Stereo Addr="1.5" Port="Analog-1"/>
        </Channel>
    </OutputChannels>
</AVDS>
```

Figure 30 Video Converter Card Example Connected to Display

The first line is the definition of the ConverterIn block. Remember that this block is actually an output block, so any input block that is switched in will connect to this.
The second line is the source of the video output, which is the output of the converter card. This ConverterOut block is also responsible for the video format conversion, so the desired output format is defined here.
The third line is the physical output block, in this case an SDI output. A connection will always exist between the Source and Sink blocks, so even if the output channel is turned off, the SDI output will continue to output video supplied from the converter card (a black empty frame).

2.7 Configuring the 3G SDI Input Card (110-0036-xx)

The 110-0036-xx 3G SDI input card contains 4 input ports capable of supporting HD video and audio, but there are some limitations to the mix of audio blocks that can be assigned to the card. All 4 video ports can be used simultaneously; the maximum number of supported audio block is shown in the table below.

	Stereo	MultiChannel + Downmix
Configuration 1		2
Configuration 2	2	1
Configuration 3	4	

Figure 31 Maximum Supported Audio Configurations for 110-0036-xx

It is also important that the SDIParameters supplied by Innovative Advantage are added to the configuration (See section 2.5.2.2.5). These parameters will vary based on the source equipment and will rarely change, but they must be copied into the configuration to insure proper operation of the SDI Input Card.

2.8 Configuring Interfaces to Third Party Devices

There are various third party interfaces supported by AVDS. These are defined under the Driver tag of the configuration file. Each driver will have various parameters specific to the interface, but an example of the Driver tag is shown in Figure 32.

```
<AVDS>
    <Version File="AVDS Config" Major="1" Minor="4" Revision="1"/>
    <Driver Id="" Addr="" Port="" …/>
        …
</AVDS>
```

Figure 32 Example Driver Configuration

Each driver entry has the following parameters as a minimum.

Parameter	Description
Id	The ID string that identifies the driver.
Addr	The node address and card.
Port	Port information (usually identifies the serial or Ethernet port)

Table 12 Common Driver Parameters

2.8.1 Virtual Cards

The address value of drivers is the same as what is used in input and output blocks; a *node.card* arrangement. The card value can mean different things depending on the driver. For some drivers the card is not used, so it can be set to 0.

On other drivers, the AVDS actually exchanges audio and video with the external device. In this case the driver is treated as a virtual card. An example is the Alto Aviation Amplifier. Since this device supplies an audio input into the AVDS and receives two audio outputs from AVDS it is treated as a virtual card so that input and output blocks can be created. For example, an address of “2.17” means that the physical connection to the device is on node address 2 and that the virtual card number assigned to the amplifier is 17. Virtual card numbers can be numbered from 17 to 25.

2.8.2 Rockwell Collins CMS

The Rockwell Collins driver is a serial interface that receives set channel, set volume, and other commands from the Rockwell Collins CMS.

```
<AVDS>
    <Version File="AVDS Config" Major="1" Minor="4" Revision="1"/>
    <Driver Id="RCSerialInterface" Addr="2.0" Port="Ser-1"/>
        …
</AVDS>
```

Figure 33 Example Rockwell Collins CMS Driver Configuration

Parameter	Description
Id	Always set to “RCSerialInterface”
Addr	Set to the node address that is connected to the CMS, Card is 0.
Port	Describes the serial port (currently always “Ser-1”).
MaxVolume0dB	An optional parameter that makes the AVDS driver compatible with older CMS configurations. The default value is “false”, and the parameter can normally be left out.

Table 13 Rockwell Collins CMS Driver Parameters

2.8.3 Alto Aviation Amplifier

The Alto Aviation Amplifier can connect to an external Ethernet port of an AVDS node. It receives data from the system over this Ethernet connection. The amplifier supports two output “groups” and can supply chime functionality to the AVDS.

2.8.3.1 Hard PA

The Alto Aviation Amplifier supports PA and ordinance keylines. When these are activated, it notifies the AVDS so that the audio can be played over the other audio channels. The AVDS treats this event as a zone PA, meaning that all channels in the configured zone are affected. The zone selection and the PA volume over the AVDS channels must be configured with the driver. This event is referred to as “Hard PA”.

When the AVDS is notified of a hard PA, it looks at the “PAZone” and “PAVolume” values that are configured for that amplifier. It will then switch all output channels in the configured zone and set the volume of those channels appropriately.

2.8.3.2 Soft PA

A zone PA can also be initiated by a command sent by the CMS. This is known as a “Soft PA”. When a soft PA is initiated the AVDS looks at the command from the CMS to determine if a chime is requested. If not, the output channels in the assigned zone are switched and the volume set as requested. If a chime is requested it will find an amplifier in the same zone to generate the chime. It will then switch all output channels in the assigned zone to the amplifiers PA input channel, set their volumes, and command the amplifier to play the chime. Once the chime is complete the output channels in the requested zone are switched to the commanded input channel.

2.8.3.3 Configuration Record Download

The Alto Amplifier uses a “Tuning Database” to fine tune the amplifier based on aircraft layout, configuration, and other factors. There are two of these files, one for the amp main board and one for the amp PA board, that need to be downloaded to the amplifier to achieve correct operation. The AVDS supports downloading of these files, but they must first be converted to a single vectored file and added to the software package.

To load the tuning databases into the AVDS:

1. Create a new folder, and copy all tuning database files for the aircraft into this folder. All of the tuning database files should be at the top level of the folder.
2. Open the AVDS Client (there is no need to connect at this time).
3. Select Configuration->Vectored File Merge from the AVDS Client menu as shown in Figure 34.
4. The Vectored File Merge Dialog will open. In this dialog, select File->Add Root Directory.
5. Select the folder that contains the files and click “OK”.
6. All files and folders will be displayed in treeview form in the dialog window. Any file or folder that is checked will be included in the final vectored file. Subfolders may be used if it simplifies the file management.
7. In the dialog menu, select File->Save Merged File. Select the path and desired file name and click “OK”.

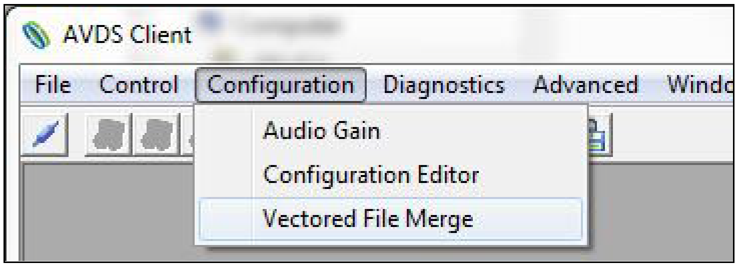


Figure 34 Opening the Vectored File Merge Dialog

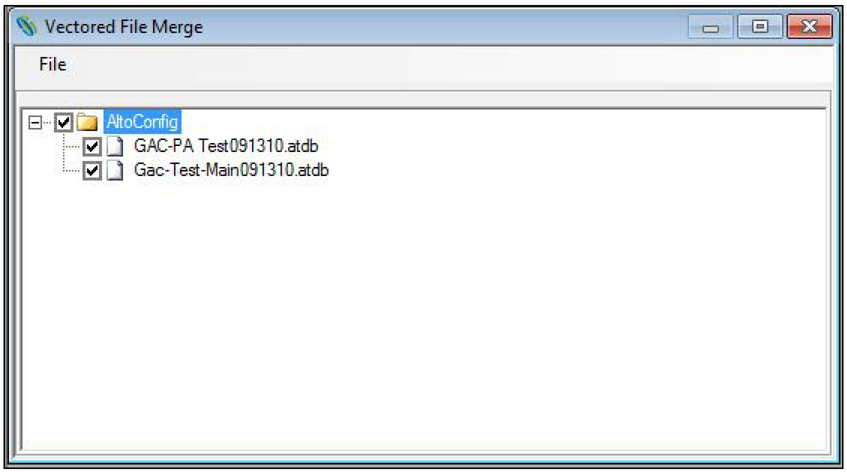


Figure 35 The Vectored File Merge Dialog

All of the tuning databases needed for the system are now contained in a single file. The Vectored File Merge tool also has the ability to extract these files, so it is possible to use only the vectored file for configuration control if desired.

This file must now be added to the AVDS software download package.

1. In the software package folder provided by Innovative Advantage, find the file with the ".dnld" extension.
2. Open this file with your favorite text editor and add the line shown in Figure 36, replacing the file name with the name you chose for your vectored file.
3. Copy your vectored file into the download package folder.
4. Download this package to the AVDS using the AVDS Client.

```
<AVDS>
    <Version File="880-0001-03 Rev F" Major="1" Minor="0" Revision="0"/>
    <Node Address="Default">
        <Application File="800-0001-01 Rev K.sim"/>
        <Cobranet_8x8_01 File="820-0003-01 Rev B.ccn"/>
        <Cobranet_8x8_DSP_01 File="820-0003-02 Rev A.ccn"/>
        <VXP_GF9351_FLASH_DRIVER File="820-0006-01 Rev A.bin"/>
        <VXP_APP_DEVICE_5 File="820-0005-01 Rev C.bin"/>
        <ENET_SW_APP File="820-0002-01 Rev F.bin"/>
        <ALTO_CONFIGURATION File="AltoConfigTest.vec"/>
    </Node>
</AVDS>
```

Figure 36 Download Configuration Containing Alto Amplifier Database

2.8.3.4 Driver Configuration

The Driver tag contains all of the parameters needed to initialize the Alto Amplifier Driver and handle basic PA events.

```
<AVDS>
    <Version File="AVDS Config" Major="1" Minor="4" Revision="1"/>
    <Driver Id="Alto Amp" Addr="1.17" Port="Eth-2" PAZone="0xFFFF" PAVolume="-15"
            AMP_Main_Record="SampleMainRecord.atdb" AMP_PA_Record="SamplePARecord.atdb"/>
        …
```

Figure 37   Example Alto Amplifier Configuration

Parameter	Description
Id	Always set to “Alto Amp”
Addr	The Node Address and virtual card number assigned to the amplifier.
Port	The Ethernet port that connects to the amplifier (“eth-1” or “eth-2”).
PAZone	The zone number assigned to this Alto Amplifier. This is the zone controlled by hardware PA’s and the zone to which this amplifier will provide chime. A value of “0” means all channels that are not assigned to a zone. A value of ”0xFFFF” means all channels.
PAVolume	This is the volume that the AVDS will set all output channels in the zone to when a hardware PA is activated.
AMP_Main_Record	The filename of the main amplifier configuration record. This is NOT referring to the vectored file, but the file WITHIN the vectored file that must be downloaded.
AMP_PA_Record	The filename of the PA amplifier configuration record. This is NOT referring to the vectored file, but the file WITHIN the vectored file that must be downloaded.

Table 14 Alto Amplifier Configuration Parameters

2.8.3.5 Creating Channels Using the Alto Amplifier

To create channels using the Alto Amplifier, simply use the assigned address. In the example shown in Figure 37, the address is set to “1.17”. All that is required to tie an input or output block to the amplifier is to use this address.

2.8.3.5.1 Input Channels

If the amplifier is going to provide chime to the AVDS or of the AVDS is to route hardware PA audio to its audio outputs, a PA input channel is needed. This is configured as shown in Figure 38. The amplifier only supports one stereo input block.

```
<AVDS>
    <Version File="AVDS Config" Major="1" Minor="4" Revision="1"/>
    <Driver Id="Alto Amp" Addr="1.17" Port="Eth-2" PAZone="0xFFFF" PAVolume="-15"
             AMP_Main_Record="SampleMainRecord.atdb" AMP_PA_Record="SamplePARecord.atdb"/>

    <InputChannels>
        <Channel Cn="10" Id="PA">
             <Stereo Addr="1.17" Port="Group-1"/>
        </Channel>
    </InputChannels>
</AVDS>
```

Figure 38   Example Alto Amplifier PA Input Configuration

2.8.3.5.2 Output Channels

If the amplifier is going to play entertainment audio or handle soft PA's, it must be included in one or more output channels. The Alto Amplifier supports two output "Groups". The actual speaker allocation can vary (and is included in the tuning database), but for the AVDS they both look like MultiCh outputs as shown in Figure 39.

```
<AVDS>
    <Version File="AVDS Config" Major="1" Minor="4" Revision="1"/>
    <Driver Id="Alto Amp" Addr="1.17" Port="Eth-2" PAZone="0xFFFF" PAVolume="-15"
             AMP_Main_Record="SampleMainRecord.atdb" AMP_PA_Record="SamplePARecord.atdb"/>

    <OutputChannels>
        <Channel Cn="1" Id="Fwd Bulkhead Monitor">
             <HD Addr="1.8" Port="SDI-1"/>
             <MultiCh Addr="1.17" Port="Group-1"/>
        </Channel>
        <Channel Cn="1" Id="Aft Bulkhead Monitor">
             <HD Addr="7.8" Port="SDI-1"/>
             <MultiCh Addr="1.17" Port="Group-2"/>
        </Channel>
    </InputChannels>
</AVDS>
```

Figure 39   Example Alto Amplifier Output Channel Configuration

2.8.4 Channel Tracker Driver

The Channel Tracker is a special I/O card that allows the AVDS to be inserted into an older analog CMS system and eavesdrop on the channel changes. The channel tracker card connects to the inputs and outputs of the legacy systems A/V switcher. A series of signals are sent into the A/V switcher inputs and the output signals are read to determine the current channel state. The AVDS can then switch the channel to follow the CMS channel changes without requiring the CMS to implement a special interface or change its software in any way.

The channel tracker card also has general purpose inputs and general purpose outputs. These can also be used to control the system. The AVDS configuration can define "functions" to be performed when the value of the inputs enter a certain state. Since it is expected that the GPIO control will often be used with the channel tracker control, the GPIO takes precedence over the channel tracker. For example, if the channel tracker sets a channel then the GPIO sets a channel, the channel would stay on the GPIO channel value until it is released. This is meant to satisfy systems that used a "direct to monitor" type of installation (typically for VGA inputs).

Up to three channel tracker cards can be used to perform channel tracking, each with 12 channel I/O and 4 general purpose I/O. This allows a maximum of 36 tracked channels. Other channel tracker cards can be added to the system if additional GPIO is needed.

2.8.4.1 Basic Channel Tracker Configuration

For configuration purposes, the channel tracker is treated as an interface to a third party device. It is identified in the Driver tag with an ID, but then a series of cards are called out.

```
<AVDS>
    <Version File="AVDS Config" Major="1" Minor="4" Revision="1"/>
    <Driver Id="Channel Tracker">
        <Card Addr="2.4" BaseChannel="1" BaseGPIO="1" GPIOActiveStates="1,1,1,1"/>
        <Card Addr="3.6" BaseChannel="13" BaseGPIO="5" GPIOActiveStates="1,1,1,1"/>
        <Card Addr="4.6" BaseChannel="25" BaseGPIO="0"/>
        <Card Addr="6.5" BaseChannel="0" BaseGPIO="9" GPIOActiveStates="1,0,0,1"/>
    </Driver>
</AVDS>
```

Figure 40   Basic Channel Tracker Configuration

The sample in Figure 40 shows a sample configuration of four channel tracker cards. Each card is called out along with the configuration parameters specific to that card.

2.8.4.1.1 Channel Tracker Card Parameters

2.8.4.1.1.1 Addr

This is the node address followed by the card number.

2.8.4.1.1.2 BaseChannel

This defines the first output channel number. Each card has 12 output channels. The base number defines the value of the first channel and all other channels follow. So setting the base channel to 1 will set output channels 1-12 on that card. The inputs also follow this base channel, so input 1 detecting signal 12 will cause the AVDS output channel 1 to set to channel 12. If the BaseChannel parameter is set to 0 the channel mapping will be disabled for that card.

2.8.4.1.1.3 BaseGPIO

This defines the first GPIO number for the card. Each card has 4 GPIO. The base number defines the value of the first I/O and all others follow. So setting the base GPIO to 1 will set the GPIO numbers to 1-4 on that card. These values can be used to control the system using functions.

2.8.4.1.1.4 GPIOActiveStates

These are the active states of the 4 GPIO. A 1 is used to indicate active high, and 0 indicates active low. The values used for functions are always the logical values.

2.8.4.1.2 GPFunctions

GP Functions are functions that are triggered by general purpose input bit or patterns. An example is shown in Figure 41.

```
<AVDS>
    <Version File="AVDS Config" Major="1" Minor="4" Revision="1"/>
    <Driver Id="Channel Tracker">
        <Card Addr="2.4" BaseChannel="1" BaseGPIO="1" GPIOActiveStates="1,1,1,1"/>
        <Card Addr="3.6" BaseChannel="13" BaseGPIO="5" GPIOActiveStates="1,1,1,1"/>
        <Card Addr="4.6" BaseChannel="25" BaseGPIO="0"/>
        <Card Addr="6.5" BaseChannel="0" BaseGPIO="9" GPIOActiveStates="1,0,0,1"/>
        <GPIFunctions>
            <GPIGroup BitMap="1:3">
                <Function GroupValue="0" Id="SetChannel" params="1, 0xffff, 0xffff"/>
                <Function GroupValue="1" Id="SetChannel" params="1, 1, 1"/>
                <Function GroupValue="2" Id="SetChannel" params="1, 2, 2"/>
                <Function GroupValue="3" Id="SetChannel" params="1, 3, 3"/>
                <Function GroupValue="4" Id="SetChannel" params="1, 4, 4"/>
            </GPIGroup>
            <GPIGroup BitMap="6">
                <Function Id="SetChannel" params="1, 0xffff, #value"/>
                <Function GroupValue="0" Id="RestoreChannelOverride" params="3"/>
                <Function GroupValue="1" Id="SetChannelOverride" params="3, 2, 2, -20.5"/>
            </GPIGroup>
        </GPIFunctions>
    </Driver>
</AVDS>
```

Figure 41 Sample Channel Tracker Configuration with Functions

The outer tag of GPIFunctions contains all of the defined functions. The GPIGroup creates a group of input bits that are used together to trigger the defined functions. This may be a single bit (defined just with the bit number) or a group of bits (defined as first bit, followed by a colon, followed by the last bit).

In the example in Figure 41, bits 1 to 3 are grouped together to control the functions within. When the value of those bits is set to the assigned group value of the function, the function will be performed. So, if bit 1 is logic 0, bit 2 is logic 1 and bit 3 is logic 0 this will be interpreted as a group value of 2 causing the SetChannel command to run with the parameters listed in the second function.

It is also possible to use the value of the group as a parameter. In the example, the second group defines a single bit that triggers three functions. The first function (SetChannel) uses the value of the group to set the channel. It does this by placing “#value” in the parameter list. The AVDS will interpret this as an instruction to use the value of the bits in the group.

2.8.4.1.2.1 Functions

A list of possible functions is listed in Table 15.

The input channel parameters have two special values; 0 represents “off” and 0xFFFF represents “no change”. This is standard among all AVDS functions that use input channels as parameters.

The zone parameters have two special values; 0 represents all output channels that are not assigned to a zone and 0xFFFF represents all output channels regardless of zone.

Function Name	Parameter 1	Parameter 2	Parameter 3	Parameter 4
SetChannel	Output Ch	Audio Input Ch	Video Input Ch	
SetChannelOverride	Output Ch	Audio Input Ch	Video Input Ch	Volume
RestoreChannelOverride	Output Ch			
SetZone	Zone	Audio Input Ch	Video Input Ch	
SetZoneOverride	Zone	Audio Input Ch	Video Input Ch	Volume
RestoreZoneOverride	Zone			

Table 15 GP Input Functions

2.8.4.1.2.1.1 SetChannel Function

This will cause a channel to be set within the AVDS. The parameters are output channel, audio input channel and video input channel.
Once this channel is set it will override any channel tracker changes until the function is called with a value of 0xFFFF for both the audio input channel and video input channel parameters, signifying an inactive state.

2.8.4.1.2.1.2 SetChannelOverride Function

This will cause an override channel to be set. The parameters are the output channel, audio input channel, video input channel and volume. The AVDS is designed to allow channel changes during an active override, but the changes will not be heard until the override is released. A new override will replace a current one, and a single restore will bring the channels back to their normal state.

2.8.4.1.2.1.3 RestoreChannelOverride Function

This causes the override channel to clear and the output channel to return to its previous input. The only parameter for this function is the output channel.

2.8.4.1.2.1.4 SetZone Function

This function sets all channels in the zone. The parameters are the zone, audio input channel and video input channel.

This will prevent changes from the channel tracker from taking effect until it is called again with 0xFFFF for both the audio and video input channels, signifying an inactive state.

2.8.4.1.2.1.5 SetZoneOverride Function

This sets an override to all output channels in the zone. The parameters are the zone, audio input channel, video input channel and volume.

2.8.4.1.2.1.6 RestoreZoneOverride Function

This restores all channels in the given zone to their previous input channel. The only parameter is the zone.

3 Using the AVDS Client Configuration Editor

The AVDS Client contains a configuration editor that allows direct editing of the configuration XML or for configuration using a graphical user interface. It can also upload, download, save and verify configuration files.

3.1 Configuration Tool Views

The Configuration Editor has two views that can be selected using the tab control at the top of the window, Design View and XML View. These are simply two ways of editing the same configuration, so changes to one view will be automatically reflected in the other when the view is changed.

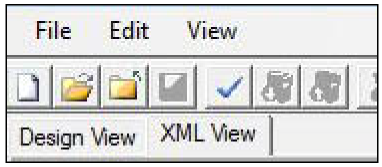


Figure 42 Config Tool View Tab

3.1.1 XML View

XML View allows direct editing of the XML configuration file. The file can be directly edited using the tags and parameters outlined in this document.

3.1.1.1 XML View Toolbar Options

The toolbar options for XML View are shown in Figure 43.

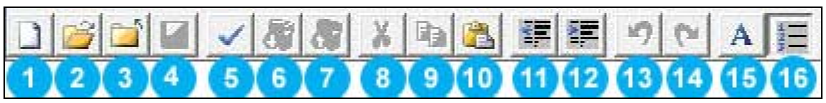


Figure 43 XML View Toolbar Options

1. New File – Opens a new configuration.
2. Open File – Opens a configuration from a file.
3. Close Configuration – Closes the current configuration file.
4. Save Configuration – Saves the current configuration file.
5. Verify – Verifies the configuration file. The results are displayed in the Output Window.
6. Send Configuration to System – Verifies and sends the configuration to the system (client must be connected).
7. Retrieve Configuration from System – Retrieves the configuration file from the system (client must be connected).
8. Cut – Removes the selected text and adds it to the system clipboard.
9. Copy – Copies the selected text to the system clipboard.
10. Paste – Pastes data from the system clipboard to the document.
11. Find Previous – Finds the previous instance of the selected text.
12. Find Next – Finds the next instance of the selected text.
13. Undo – Reverts the last action.
14. Redo – Restores the last reverted action.
15. Font – Allows the font to be changed.
16. Show Line Numbers – Toggles the display of line numbers on the left side of the edit window.

3.1.2 Design View

The Design View is the graphical user interface to the configuration file. The generated file is still the same XML format, it is simply auto-generated to match the selections made.

3.1.2.1 Design View Toolbar Options

The toolbar options for Design View are shown in Figure 44.

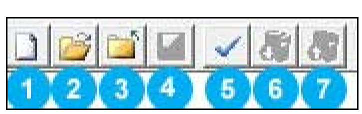


Figure 44 Design View Toolbar Options

1. New File – Opens a new configuration.
2. Open File – Opens a configuration from a file.
3. Close Configuration – Closes the current configuration file.
4. Save Configuration – Saves the current configuration file.
5. Verify – Verifies the configuration file. The results are displayed in the Output Window.
6. Send Configuration to System – Verifies and sends the configuration to the system (client must be connected).
7. Retrieve Configuration from System – Retrieves the configuration file from the system (client must be connected).

3.1.2.2 Design View Windows

The Design View consists of two primary windows; the navigation window and the property page window.

3.1.2.3 Design View Navigation

The various nodes, channels blocks and drivers are navigated in the navigation window. This window contains a treeview, and when an entry is selected the property page will change to reflect the selected item (See Figure 45). Each item is outlined in section 3.1.2.4.1.

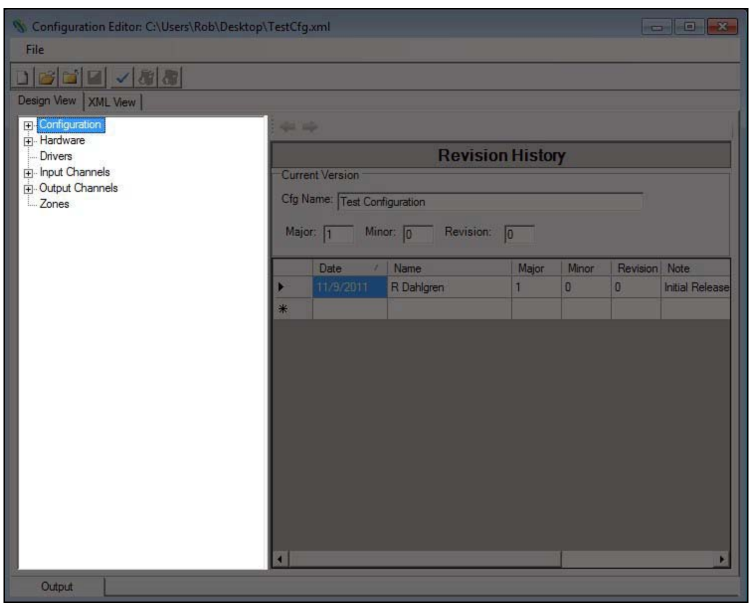


Figure 45 Design View Navigation Window

Navigation can also be performed using the navigation bar (See Figure 46). This is similar to a navigation bar in a web browser, with back, forward, and up buttons being displayed. Hovering the mouse pointer over the button will give an indication where the button leads.

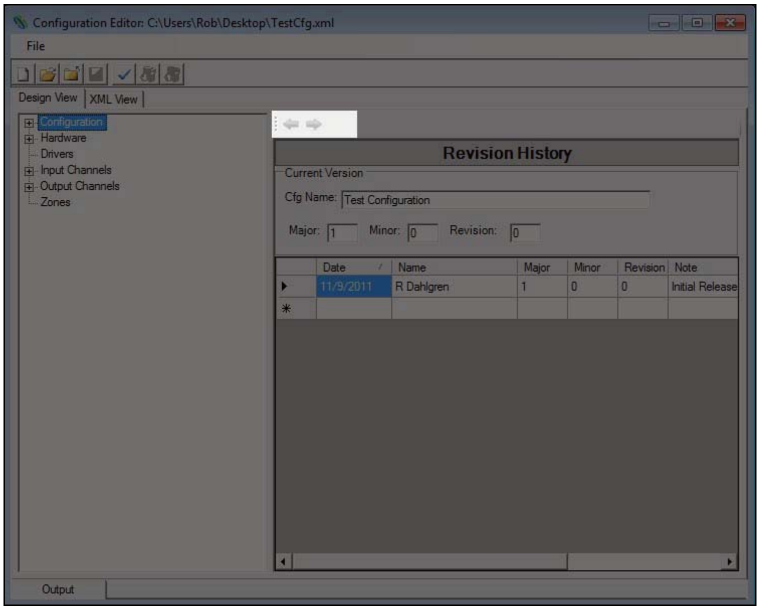


Figure 46 Navigation Bar

3.1.2.4 Design View Property Page Window

The property page window displays the parameters and information related to the item selected in the navigation window. This is where nodes are added to the system, channels are defined, and configuration options are added.

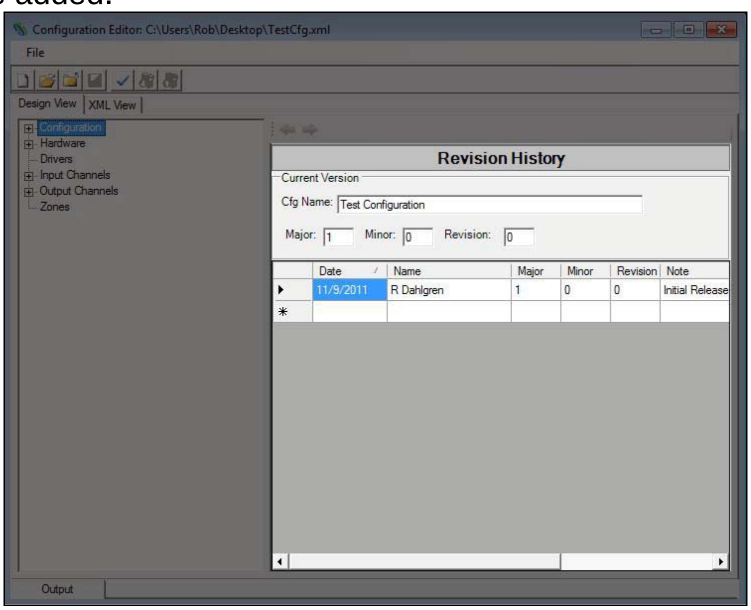


Figure 47 Design View Property Page Window

3.1.2.4.1 Design View Property Pages

The visible property page changes based on the selected item in the navigation window and the data in the configuration.

3.1.2.4.1.1 Configuration

The Configuration section contains the revision information for the configuration file and a child window containing debug parameters.

3.1.2.4.1.1.1 Revision History Panel

This panel allows the configuration name, revision number, and revision history to be added. All of these parameters are optional and are simply provided as a way to easily track configuration versions. For more information on the Revision History field, see section 2.1.1.

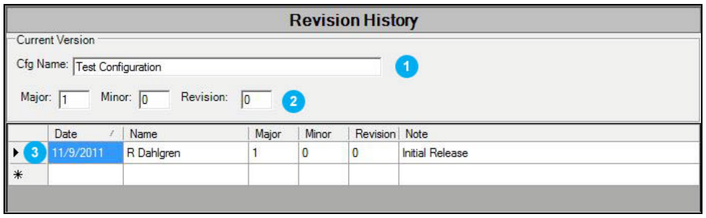


Figure 48 Revision History Panel

1. Cfg Name – This is the name of the configuration.
2. Major, Minor, Revision – Three numeric values that can be used for revision tracking.
3. Revision History – This is a table containing the revision history information.

3.1.2.4.1.1.2 Debug Panel

The Debug panel contains advanced options that can be set when performing certain diagnostic activities. Generally, these should be left at their default state unless directed by IA personnel to change them. The default state is both checkboxes cleared and Baseboard Reclocker State set to “Auto”.

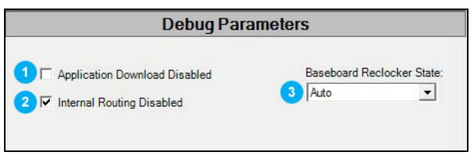


Figure 49 Debug Panel

1. Application Download Disabled – Prevents automatic download of software (software download can still be pushed by the AVDS Client).
2. Internal Routing Disabled – Forces all encoded audio and video routes onto the fibers even if the input and output card are in the same unit.
3. Baseboard Reclocker State – Allows the baseboard reclockers to be explicitly controlled.

3.1.2.4.1.2 Hardware

The Hardware section contains all hardware in the system as well as controls to edit, delete or add new hardware. For information on how the hardware information is stored in the configuration file, see section 2.2.

3.1.2.4.1.2.1 Nodes Panel

The nodes panel lists all nodes in the system. It can be reached by selecting the Hardware link in the navigation panel. An example of the nodes panel is shown in Figure 50.

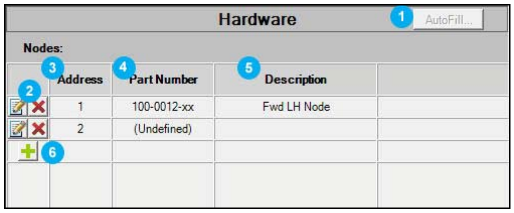


Figure 50 Nodes Panel

1. Autofill Button – This button can be used to automatically populate the hardware information. (The AVDS Client must be connected to the system and online).
2. Edit and Delete Buttons – These buttons edit/delete the node in their row. The edit button opens the node panel of the appropriate node, see section 3.1.2.4.1.2.1.2.
3. Address – The node address of each unit.
4. Part Number – The part number of each unit (or "(Undefined)" if it is an unknown card mix).
5. Description – An optional field that describes the node or its location.
6. New Node Button – This button allows a new node to be added to the configuration. See Section 3.1.2.4.1.2.1.1.

3.1.2.4.1.2.1.1 New Node Panel

This panel opens when a new node is added to the configuration. It allows the part number of the node to be selected if it contains a predefined mix of cards. If it does not contain a predefined card mix the "(Undefined)" part number can be selected and the cards added separately.

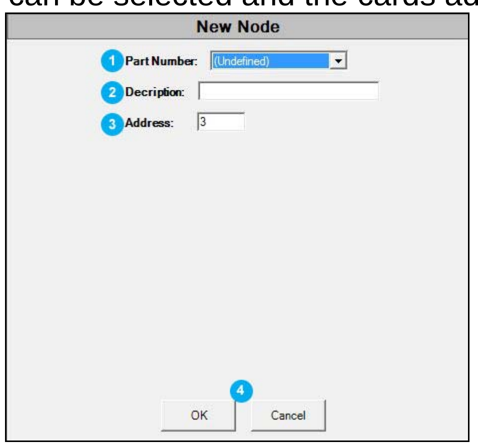


Figure 51 New Node Panel

1. Part Number – The Part Number of the new node. If the part number selected is "(Undefined)", the cards must be added manually.
2. Description – A description of the node, usually physical location within the aircraft, etc.
3. Address – The node address of the new node.
4. OK/Cancel Buttons – Accepts or cancels the new node creation.

3.1.2.4.1.2.1.2 Node Panel

The Node Panel displays the node information and lists all cards it contains.

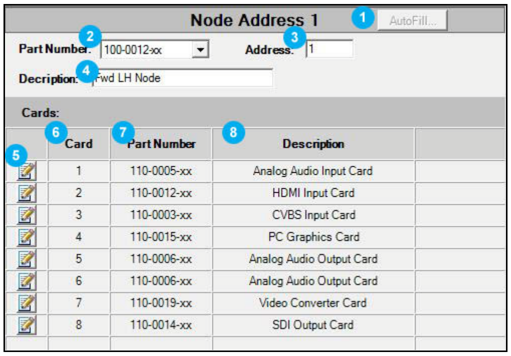


Figure 52 Node Panel

1. AutoFill Button – This button can be pressed to retrieve the card part numbers from the system (for this node only). The AVDS Client must be connected to the system for this to be enabled.
2. Part Number – This contains the part number of the node (or “Undefined” if the mix of cards is unknown).
3. Address – The address of the node.
4. Description – The optional description of the node.
5. Edit/Delete Card Buttons – This allows cards to be edited or deleted. The delete buttons are only available if the selected node part number is “Undefined”. The edit button opens the appropriate card panel, see section 3.1.2.4.1.2.1.2.2.
6. Card – The card number or slot number of the card.
7. Card Part Number – This displays the part number of each individual card.
8. Card Description – A description of the card (based on part number).

If the unit part number is selected as “(Undefined)”, there will also be an “Add Card” button to allow new cards to be added. This is helpful when assembling a unit for testing or when working with a unit that does not have an associated part number. This will open the Add Card Panel, shown in section 3.1.2.4.1.2.1.2.1.

3.1.2.4.1.2.1.2.1 Add Card Panel

This allows the selection of a new card to the appropriate node. This is only available when the node part number is marked as “(Undefined)”. For more information on how the card is defined in the XML file, see section 2.2.1.1.1.

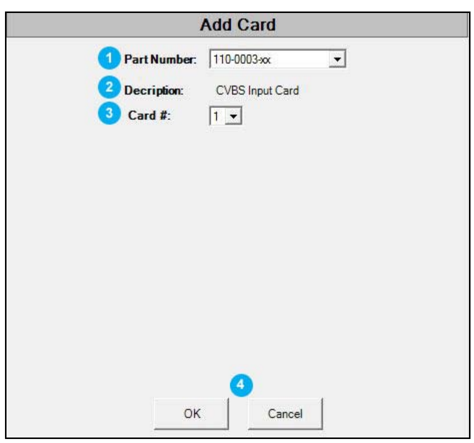


Figure 53 Add Card Panel

1. Part Number – The part number of the card.
2. Description – A description of the current card part number.

3. Card Number – The slot number of the card.
4. OK/Cancel Buttons – Accepts or cancels the new card creation.

3.1.2.4.1.2.1.2.2 Card Panel

The card panel displays the information on the card, including any blocks that have been assigned to it. The actual panel that is displayed varies based on the card type.

The HDMI Input Card Panel is representative of most card panels. An example HDMI Input card is seen in Figure 54.

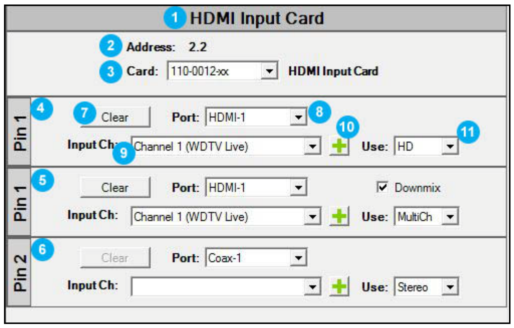


Figure 54 HDMI Input Card Panel

1. Card Description – This describes the card's input or output capabilities.
2. Address – This is the node address and card number.
3. Card Part Number – This displays the part number of the card. If the configuration was loaded without any part numbers the AVDS Client will attempt to determine the correct part number of the card based on the assigned blocks. In some cases there may be several possible cards, so the selection can be changed among those that are possible given the allocated blocks.
4. Block One – This whole row is block one.
5. Block Two – This whole row is block two.
6. Block Three – This whole row is block three.
7. Clear Button – This de-allocates the block.
8. Port – On some cards a single physical input can be represented by multiple ports, and that port selection changes the behavior of the card. For instance, the PC Graphics Card supports the VGA, YPrPb, CVBS, and YC ports. The selection of the port will determine if the card expects VGA, Component, Composite, or S-Video signals. For most ports there is only one valid selection available.
9. Input/Output Channel – This is the channel to which the block is assigned (if any).
10. New Channel Button – If the channel has not yet been created, the new channel button can be selected to create one. This opens the New Input Channel Panel (see section 3.1.2.4.1.4.2) or the New Output Channel Panel (see section 3.1.2.4.1.5.2).
11. Use – The Use of the block.

Video Converter Cards are a bit different, since they work using source and sink block and contain a variety of special parameters. An example Video Converter Card panel is shown in Figure 55 and Figure 56. More information on configuring video converter cards can be found in section 2.6.

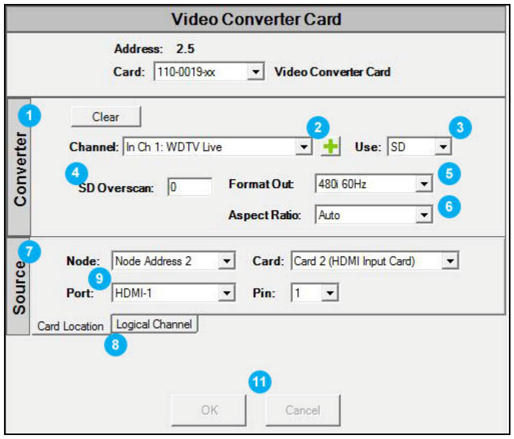


Figure 55 Video Converter Card Panel

Figure 56 Video Converter Card Logical Source

1. Converter – This is the main converter block, the block that is added to the channel.
2. Channel – The channel number is selected just as it is for other cards, but in this case it can select an input or output channel.
3. Use – The Use selection indicates the role this block plays for the assigned channel. So if this is being assigned to an input channel, down-converting an HD input to provide an SD block, this would be set to SD. If it is being assigned to an output channel to allow an SD monitor to display HD video inputs, it would be set to HD. This is the Use that other channels will see during the connection process.
4. SD Overscan – This is the percentage of overscan to be applied when receiving an SD video signal. (See section 2.5.2.2.3)
5. Format Out – This is the output format after conversion. (See section 2.5.2.2.1)
6. Aspect Ratio – This is the aspect ratio of the converted video. (See section 2.5.2.2.2)
7. Source/Sink – This section indicates the source or sink (dependent on if it is assigned to an input or output channel). For a sink, it is always assigned by physical location (Node, Card, Port, and Pin Number). For a source, it can be defined by physical location or by logical channel and Use. (See section 2.6)
8. Card Location/Logical Channel Tab – This selects between the Physical Location and Logical Channel selection for source configuration.
9. Physical Location Controls – These allow the physical location of the source or sink block to be selected.
10. Logical Channel Controls – These allow the source block to be configured using channel and use if the block is defined.
11. OK/Cancel Buttons – This panel is “modal”, meaning once a change has been made you cannot leave the panel until the OK or Cancel button have been pressed. This is necessary on some panels because there are multiple fields that work together and therefore all changes need to be made before the entered data can be verified.

3.1.2.4.1.3 Drivers Panel

The Drivers Panel contains a list of all drivers in the system as well as controls to create, edit and delete drivers.

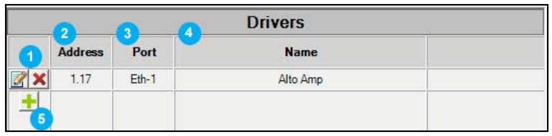


Figure 57 Drivers Panel

1. Edit/Delete Buttons – These are used to edit or delete the driver in that row. If the edit button is selected, it will open the appropriate Driver Panel (see section 3.1.2.4.1.3.2).
2. Address – The node address and card assigned to the driver (the card number will often be virtual).
3. Port – The port assigned to the driver.
4. Name – The driver name.
5. New Driver Button – This opens the New Driver Panel (see section 3.1.2.4.1.3.1).

3.1.2.4.1.3.1 New Driver Panel

The new driver panel allows a new driver to be added to the configuration. The fields that are displayed are dependent on the driver that is selected.

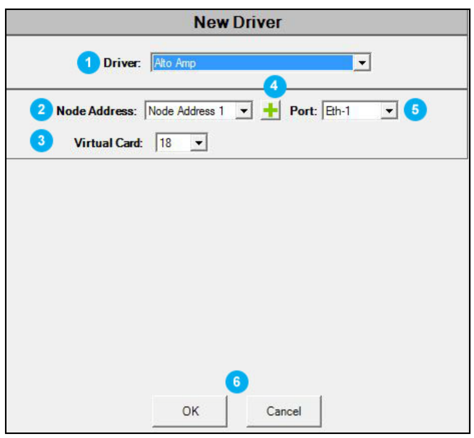


Figure 58 New Driver Panel

1. Driver – This selects which driver to add. The rest of the panel changes based on this selection.
2. Node Address – The address of the node where the driver will run.
3. Virtual Card – The virtual card to be assigned to this driver. More information on virtual cards can be found in section 2.8.1.
4. New Node Button – This allows a new node to be added to the configuration.
5. Port – The communication port for the driver.
6. OK/Cancel Buttons – Accepts or rejects creation of the new driver.

3.1.2.4.1.3.2 Driver Panel

The driver panel will vary based on the type of driver. Some drivers are very simple (i.e. The Rockwell Collins Serial Interface Driver) and some are more like cards (i.e. the Alto Amplifier Driver). An example of the Alto Amplifier Panel is shown in Figure 59.

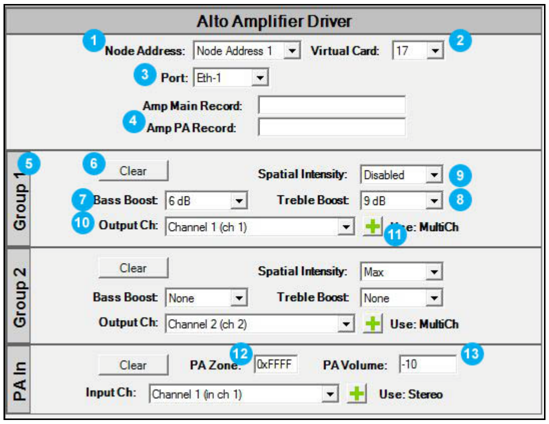


Figure 59 Alto Amplifier Panel

1. Node Address – The node address where the driver will run.
2. Virtual Card – The virtual card number of the driver. More information on virtual cards can be found in section 2.8.1.
3. Port – The Ethernet port connected to the amplifier.
4. Amp Main Record/Amp PA Record – These are the configuration records to be downloaded to the amplifier. See section 2.8.3.3 for more information.
5. Blocks – Each of these rows is an assignable block.
6. Clear Button – This de-allocates the block.
7. Bass Boost – Sets the amplifier bass boost value.
8. Treble Boost – Sets the amplifier treble boost value.
9. Spatial Intensity – Sets the amplifier spatial intensity value.
10. Output Channel – Sets the output channel where the block is assigned.
11. New Channel Button – Allows a new channel to be created.
12. PA Zone – This is the zone that will react to the hardware PA when activated. 0xFFFF is all channels. See section 2.8.3.1 for more information.
13. PA Volume – This is the volume that all channels will be set to during a hardware PA. See section 2.8.3.1 for more information.

3.1.2.4.1.4 Input Channels Panel

The Input Channels Panel lists all input channels in the system and provides a means of editing, deleting and creating input channels. An example Input Channels Panel is shown in Figure 60.

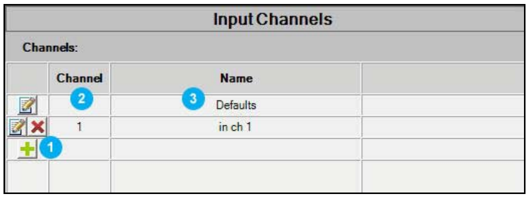


Figure 60 Input Channels Panel

1. Edit/Delete/New Buttons – Allows the channels to edited, deleted or created.
2. Channel Number – The channel number of the channel on that row.
3. Channel Name – The name of the channel on that row.

3.1.2.4.1.4.1 Input Channel Defaults Panel

The parameters on this panel will act as the defaults for all channels. If the same parameter is defined locally on an individual channel it will override this default for that channel only. The Input Channel Defaults Panel is shown in Figure 61.

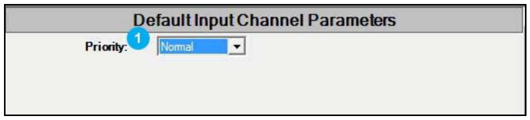


Figure 61 Input Channel Defaults

1. Priority – The default priority level of the input channel.

3.1.2.4.1.4.2 New Input Channel Panel

This panel is used to create a new input channel.

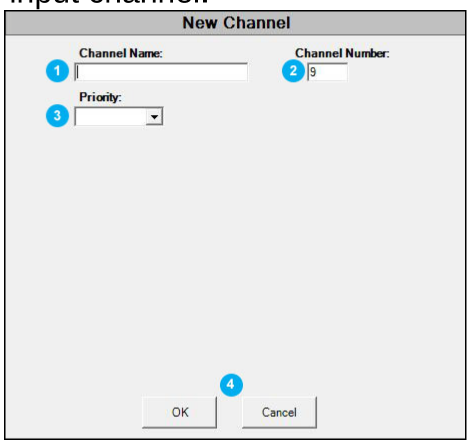


Figure 62 New Input Channel Panel

1. Channel Name – The name of the new input channel.
2. Channel Number – The channel number of the new channel.
3. Priority – The priority of the new channel.
4. OK/Cancel Buttons – Accept or cancels the new channel creation.

3.1.2.4.1.4.3 Input Channel Panel

The Input Channel Panel displays information about the selected input channel and allows the channel name, channel number, priority, and block assignment to be modified. An example of the Input Channel Panel is shown in Figure 63.

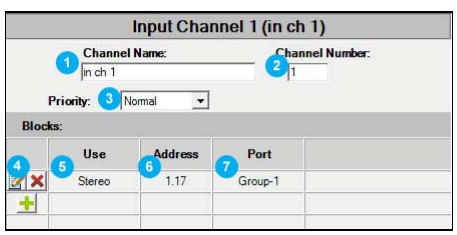


Figure 63 Input Channel Panel

1. Channel Name – Displays the channel name and allows the name to be edited.

2. Channel Number – Displays the channel number and allows the channel number to be edited.
3. Priority – The Priority of the channel. This overrides any channel priority value set in the defaults.
4. Block Edit/Delete/New Buttons – These allow blocks to be edited, deleted, or added to the channel.
5. Block Use – The use of the block on that row.
6. Block Address – The address and card number of the block.
7. Block Port – The port number of the block.

3.1.2.4.1.5 Output Channels Panel

The Output Channels Panel displays all output channels in the system and provides links to edit, delete or add a new output channel. An example of the Output Channels Panel is shown in Figure 64.

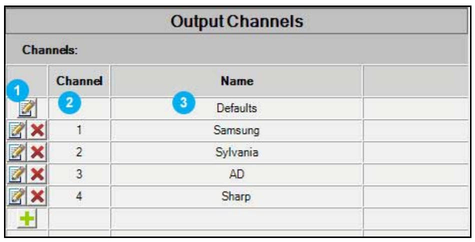


Figure 64 Output Channels Panel

1. Edit/Delete/New Channel Buttons – These buttons are used to edit or delete the associated channel or to create a new output channel.
2. Channel Number – This is the output channel number.
3. Name – The name of the output channel.

3.1.2.4.1.5.1 Output Channel Defaults Panel

This panel contains the default values for all output channels. These default values affect any output channel that does not define the value locally.

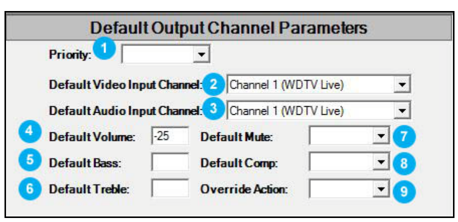


Figure 65 Output Channel Defaults Panel

1. Priority – The priority of the output channel.
2. Default Video Input Channel – The video channel automatically selected after system reset (should be off in most cases).
3. Default Audio Input Channel – The audio channel automatically selected after system reset (should be off in most cases).
4. Default Volume – The volume level selected after system reset.
5. Default Bass – The bass level selected after system reset.
6. Default Treble – The treble level selected after system reset.
7. Default Mute – The mute state selected after system reset.
8. Default Comp – The audio compression state selected after system reset.

9. Override Action – The action that should be taken during an active override. This allows the output channel to be setup to ignore or turn off when an override is active, rather than switching to the override channel. See section 2.3.3.3.8 for more information.

3.1.2.4.1.5.2 New Output Channel Panel

This panel is used to create a new output channel.

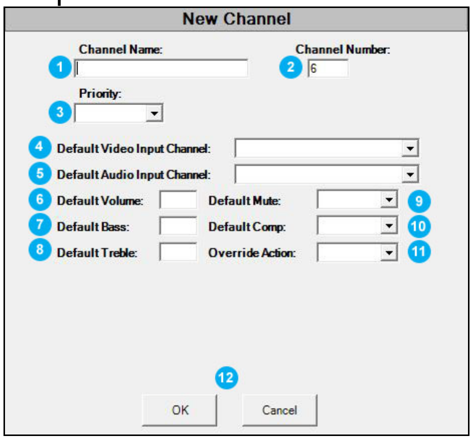


Figure 66 New Output Channel Panel

1. Channel Name – The name of the new output channel.
2. Channel Number – The channel number of the new output channel.
3. Priority – The priority of the new output channel.
4. Default Video Input Channel – The video input channel automatically selected after reset.
5. Default Audio Input Channel – The audio input channel automatically selected after reset.
6. Default Volume – The volume level selected after reset.
7. Default Bass – The bass level selected after reset.
8. Default Treble – The treble level selected after reset.
9. Default Mute – The mute state selected after reset.
10. Default Comp – The audio compression state selected after reset.
11. Override Action – Allows the behavior of this channel during an override to be controlled. The channel can be set to follow the override channel (default), ignore the override or turn off during the override. See section 2.3.3.3.8 for more information.
12. OK/Cancel Buttons – Accepts or cancels the creation of the new output channel.

3.1.2.4.1.5.3 Output Channel Panel

The output channel panel allows the channel parameters to be edited and allows blocks to be edited, added or removed from a channel.

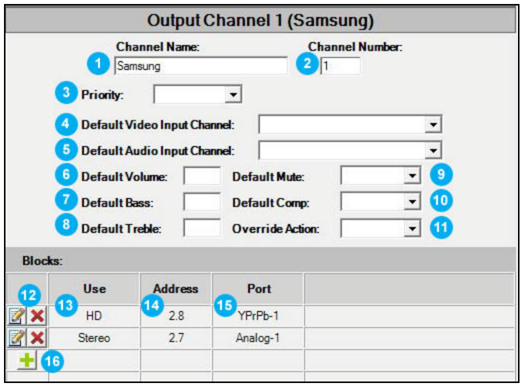


Figure 67 Output Channel Panel

1. Channel Name – The name of the output channel.
2. Channel Number – The number of the output channel.
3. Priority – The priority of this output channel.
4. Default Video Input Channel – The default video channel selected after reset (should be off in most cases).
5. Default Audio Input Channel – The default audio channel selected after reset (should be off in most cases).
6. Default Volume – The volume level selected after reset.
7. Default Bass – The bass level selected after reset.
8. Default Treble – The treble level selected after reset.
9. Default Mute – The mute state selected after reset.
10. Default Comp – The audio compression state selected after reset.
11. Override Action – The action that should be taken during an active override. This allows the output channel to be setup to ignore or turn off when an override is active, rather than switching to the override channel. See section 2.3.3.3.8 for more information.
12. Edit/Delete Block Buttons – Allows the block in the given row to be edited or deleted.
13. Use – The Use of the block in the given row.
14. Address – The node address and card number of the block in the given row.
15. Port – The configured port of the block in the given row.
16. New Block Button – Allows a new block to be added to the output channel.

3.1.2.4.1.6 New Block Panel

The new block panel is used to add a block to a channel. It displays all available blocks and filters them based on the selections in the Use, Port, Node, and Card combo-boxes. These are always filtered by direction, so if this was opened from an input channel only input ports are displayed.

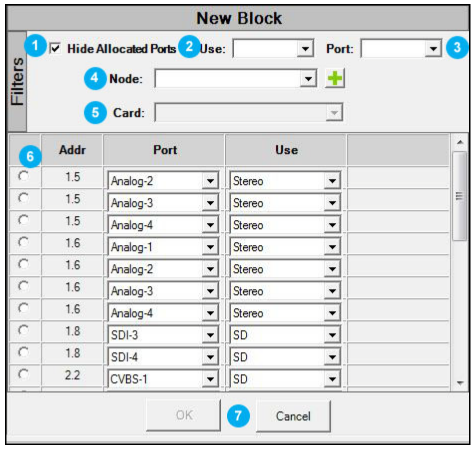


Figure 68   New Block Panel

1. Hide Allocated Ports – If this is checked, only unassigned ports are displayed.
2. Use – Only ports that are capable of providing the selected use are displayed.
3. Port – Only ports that support the selected port name are displayed.
4. Node – Only ports from the selected node address are displayed.
5. Card – Only ports from the selected card number are displayed.
6. Ports – These are the filtered ports. The desired port should be selected by clicking on the radio button in the left column. This will enabled the OK button and allow the block to be added to the channel.
7. OK/Cancel Buttons – These accept or cancel the new block creation.

3.1.2.4.1.7   Zones Panel

The zones panel lists all zones in the configuration and provides links to create, edit, or delete zones.

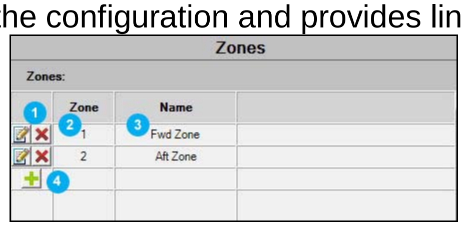


Figure 69   Zones Panel

1. Edit/Delete Zone Buttons – These can be used to edit or delete the zone in the associated row.
2. Zone – The zone number.
3. Name – The name of the zone.
4. New Zone Button – Opens the New Zone Panel (see section 3.1.2.4.1.7.1).

3.1.2.4.1.7.1 New Zone Panel

This panel adds a new zone to the configuration.

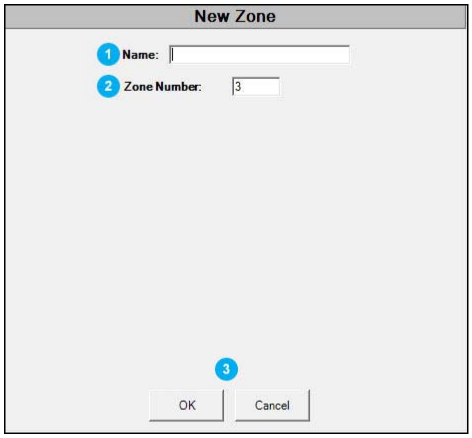


Figure 70 New Zone Panel

1. Name – The name of the new zone.
2. Zone Number – The number of the new zone.
3. OK/Cancel Buttons – Accepts or cancels the new zone creation.

3.1.2.4.1.7.2 Zone Panel

The zone panel lists all channels associated with the zone and allows the zone name and number to be changed.

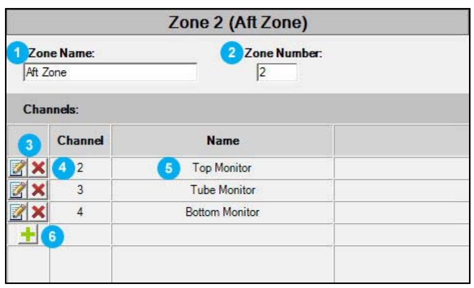


Figure 71 Zone Panel

1. Zone Name – The name of the zone.
2. Zone Number – The number of the zone.
3. Edit/Remove Buttons – Allows the channel in the associated row to be edited or removed from the zone.
4. Channel – The channel number of the associated channel.
5. Name – The name of the associated channel.
6. Add Channel – Opens the “Add Channels to Zone” panel. (see section 3.1.2.4.1.7.2.1)

3.1.2.4.1.7.2.1 Add Channels to Zone Panel

This panel is used to add channels to a zone. If the zone is already a member of another zone it will be removed from that zone and added to the current one.

Multiple zones can be selected by holding the Ctrl key and clicking them individually or a range can be selected by clicking the first channel then holding the shift key and selecting the last.

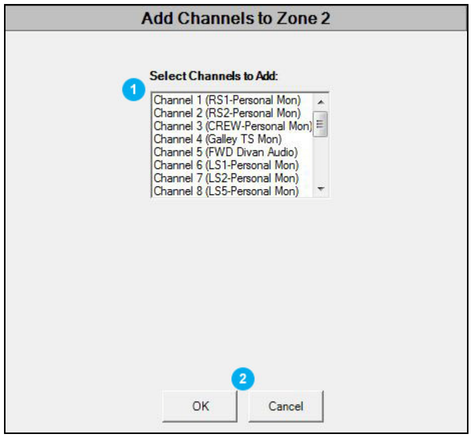


Figure 72 Add Channels to Zone Panel

1. Select Channels to Add – Allows one or more channels to be selected and added to the zone.
2. OK/Cancel Buttons – Accepts or cancels the action.

3.1.2.5 Design View Workflow

There are two primary workflows envisioned for the design view; the hardware workflow and the channel workflow.

3.1.2.5.1 Hardware Workflow

The hardware workflow is the most commonly used. This is for times when the hardware and channels have already been defined and documented (as is the case when creating a configuration for a released aircraft).

1. Configure all hardware in the system by adding the correct nodes.
2. Go to each card and assign its ports to the appropriate input or output channel (creating the channel if it does not exist).
3. Add all drivers and assign any driver blocks to the appropriate channels.
4. Create the zones and add the correct channels to each one.

3.1.2.5.2 Channel Workflow

This workflow is more suited to test configurations. In this case the assignment has not yet been determined, but the hardware is known.

1. Configure all hardware in the system by adding the correct nodes and cards.
2. Create any drivers that are required by the system.
3. Create each input channel and add the necessary blocks.
4. Create each output channel and add the necessary blocks.
5. Create the zones and add the correct channels to each.

3.2 Configuration Templates

Configuration templates are a way of eliminating repetitious work. Many times a particular aircraft model will share the same hardware and many of the same channels. A template is simply a named configuration that can be used as a starting point.

To create a template, create a configuration that contains all of the shared information. Then select File->Save As Template. You will be prompted for a name of the template (or you can select an existing one if you wish to over-write it). Enter the template name and click OK.

Now when you select a new configuration a dialog will open giving you the option of an empty configuration or to use the template. If you select the template, all of the template data is loaded into the configuration automatically.

Templates are saved in the same folder as the AVDS Client and can be removed by deleting their associated files using Windows Explorer.

3.3 Output Window

The output window displays any errors or warnings that were found during validation. The validation is run automatically when switching between views and before download. It can also be triggered manually by selecting File->Verify in the menu.

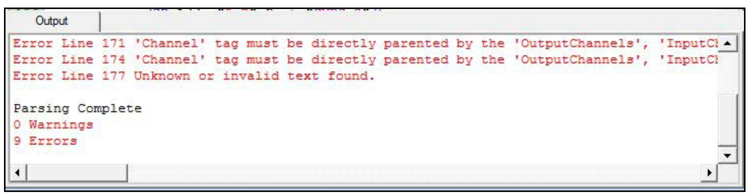


Figure 73 Output Window

If there are any errors or warnings, the location of the error can be quickly found by double-clicking on the error in the output window. This will automatically select the location of the error or warning.

4 Appendix 1: Video Formats

A video signal is created by displaying a series of still pictures in a rapid sequence; each of these still pictures is called a frame. The video format indicates both the resolution of each frame, but also how many frames arrive in one second.

Figure 74 Individual Video Frames

Figure 75 1920x1080 Video Frame

The typical video format values are communicated as follows:
1080i60
1080: The vertical resolution in pixels (as shown in Figure 75).
i: This will be i for interlaced or p for progressive signal.
60: This is vertical refresh rate in fields per second.

The most common video formats are:
576i50, 480i60, 576p50, 480p60, 720p50, 720p60, 1080i50, 1080i60, 1080p50, 1080p60, and 1080p24.

4.1 Fields vs Frames

By convention the vertical refresh rate of the video format is expressed in ***fields*** per second. A frame is a complete picture that is drawn onto the display. With progressive scan images, a field is an entire frame, so the field rate is equal to the frame rate. With interlaced images, a field makes up half a frame, so the full frame rate is half the field rate specified. For example, 1080i60 represents 60 interlaced fields per second which translates to 30 full frames per second. 1080p60 represents 60 progressive fields per second which translates to 60 full frames per second.

4.2 Fields per Second

The refresh rate refers to the number of fields the display will receive in one second. Each field is either one full frame (progressive) or one half frame (interlaced). These values are usually 50 Hz for the European standards or 60 Hz for North America. This happens to coincide with the electrical grid in that particular region. In the early days of television it was necessary to run them at a multiple of the line frequency because of the limitations of vacuum tube electronics.

Other refresh rates are supported for computers and a new television standard, 1080p24 has added another rate to the mix. To learn more about the benefits of 1080p24, see section 4.8.1, Telecine .

Note that you will sometimes see values like 59.94 Hz or 23.976 Hz, just realize that these are treated as 60 Hz and 24 Hz respectively.

4.3 Interlaced Video

Interlaced video is a method of increasing the resolution without requiring higher bandwidth. The picture is sent split in half, with odd lines sent in one frame and the even sent the next. This effectively cuts the frame rate in half. For instance, 480i60 means that the display will receive 60 half frames or 30 full frames per second.

4.4 Progressive Video

Progressive video means that the entire video frame is sent for each field. So, 480p60 means that the display will receive 60 full frames per second.

4.5 Standard Definition Formats

The standard definition formats are 480i60 and 576i50. Since these are both interlaced formats, the display will only receive half of the video frame in each field.

4.6 Enhanced Definition Formats

The enhanced definition formats are 480p60 and 576p50.

4.7 High Definition Formats

The high definition video formats are 720p60, 720p50, 1080i60, 1080i50, 1080p60, 1080p50 and 1080p24.

4.8 Film to Video

Movies makers have set a standard for film recording frame rates, 24 fps. This has been in place since the 1920s. When broadcast stations first started to air these movies, this caused a problem. The television was looking for 60 fps in North America and 50 fps in Europe. How can the 24 fps movie be converted to 60 fields per second or 50 fields per second? The answer was telecine.

4.8.1 Telecine

Telecine is a simple method of generating a 50 or 60 fields per second video from 24 frames per second material by reproducing frames of the original video. The methods used differ based on the desired output field rate. 3:2 pulldown is used to generate 60 Hz video and 2:2 pulldown is used to generate 50 Hz video.

4.8.1.1 3:2 Pulldown

The 3:2 pulldown (also known as 2:3 pulldown) method is slightly different when producing interlaced video than when producing progressive video.

4.8.1.1.1 3:2 Pulldown for Interlaced Video

For interlaced video, the 24 full frames of the original film need to be converted into 30 full frames of video (field rate is 60, and half of the picture is sent in each field). This is achieved by turning four frames of the film material into five frames of video by repeating two of the fields as shown in Table 16.

24 fps Film		A	B	C	D	
30 fps Video	Odd Field	A	B	B	C	D
	Even Field	A	B	C	D	D

Table 16 3:2 Pulldown, 24 fps Film to Interlaced Video

In this way every 4 frames of film produces 5 frames of video: (24/4=6, 6*5=30).
As can be seen in Table 16, the third and fourth frames contain mixed fields. These are referred to as "Dirty Frames". This is generally not noticeable on older tube type displays and newer displays support "inverse telecine" to prevent these dirty frames from being displayed.

4.8.1.1.2 3:2 Pulldown for Progressive Video

All that is required to generate 60 fps progressive video is that the full frames of the film be sent multiple times; the first frame two times, the second frame three times, the third frame two times, etc. Each frame of the film material is sent using this alternating 3:2 pattern as shown in Table 17.

24 fps Film	A		B			C		D		
60 fps Video	A	A	B	B	B	C	C	D	D	D

Table 17 3:2 Pulldown, 24 fps Film to Progressive Video

Using this method, every two frames of film produces five frames of video: (24/2=12, 12x5=60).

4.8.1.1.3 Image Judder

The 3:2 pulldown method used causes a slight temporal distortion due to the alternating 3:2 pattern known as image judder. It's primarily noticed on a slow pan scene where the pan motion appears to jerk slightly. This can be entirely eliminated by monitors that perform inverse telecine and support refresh rates that are even multiples of 24Hz (e.g. 120Hz).

4.8.1.2 2:2 Pulldown

2:2 pulldown is the method used in countries that use the 50 Hz PAL and SECAM standards. This works basically the same for both progressive and interlaced video formats. Each frame of the film is simply sent twice as shown in Table 18.

24 fps Film	A		B		C		D	
50 fps Video	A	A	B	B	C	C	D	D

Table 18 2:2 Pulldown

This causes DVD and broadcast movies played in these countries to run 4% faster. This is generally not noticeable, but the audio pitch is slightly higher.

4.8.2 Inverse Telecine

Displaying interlaced telecined material on a CRT display works fairly well because the display uses interlaced scanning (draws the received picture first to odd lines then even, etc), so the dirty frames are not displayed simultaneously. But all modern flat screen displays are progressive and the appearance of temporally disjointed fields simultaneously is far more noticeable without some kind of preprocessing. Luckily modern displays support Inverse Telecine. Inverse Telecine is the act of restoring the original frame information from the telecined signal.

The process of Inverse Telecine involves identifying and removing repeated fields, and may include deinterlacing. If done properly the resulting frames are identical to the original frames and depending on the capabilities of the monitor can be reproduced with absolutely no spatial or temporal distortion.

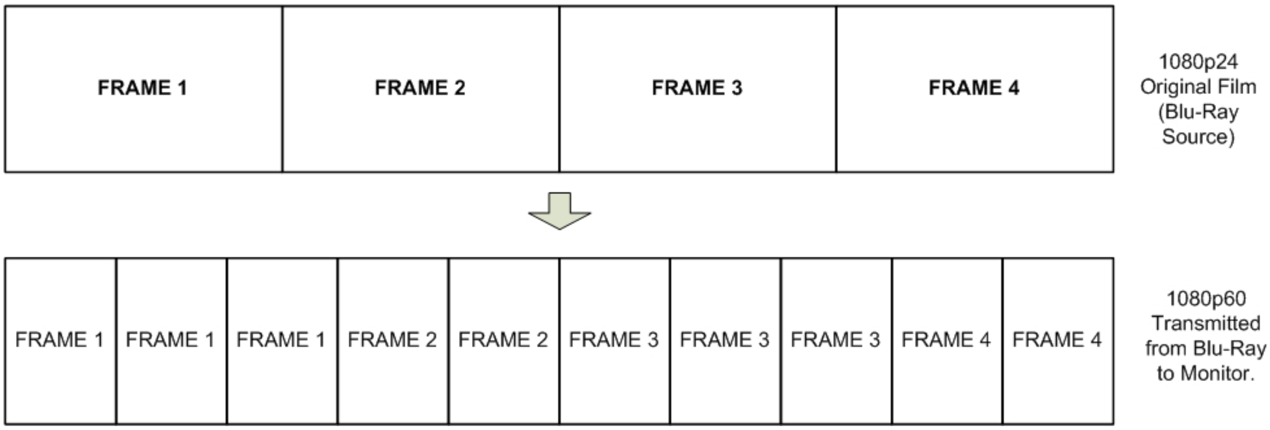
4.8.3 1080i60 vs 1080p60

There is much confusion about “Full HD” 1080p (1080 lines progressive) vs. 1080i (1080 lines interlaced). Progressive means the video frame is presented in order from line 1 to line 1080. Interlaced means the data is presented in two consecutive fields, field 1 containing all odd lines and field 2 containing all even lines.

Full HD is a marketing term applied to monitors or source devices that can display/output 1080p60 as opposed to standard HD (720p60 or 1080i60). When talking about Full HD however, one has to distinguish between ***transmission*** of the image and ***rendering*** of the image and consider the ***frame rate*** of the original source.

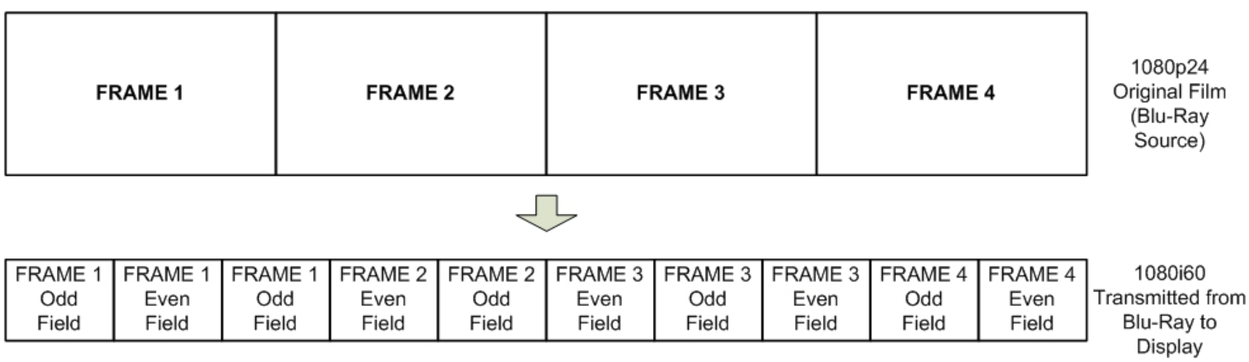
All flat screen monitors are inherently progressive devices and will always ***render*** the image progressively. The flat screen monitor must convert a 1080i signal by a process called de-interlacing to a 1080p signal before display. So why not just go ahead and transmit the data progressively and save the monitor the trouble of de-interlacing? The reason is that 1080i transmissions require only half the bandwidth of 1080p. Since the 1080p can easily be reconstructed at the monitor with no loss of data, it makes no practical sense to transmit at the higher rate. So although AVDS can support transmission of 1080p, it is in fact an imprudent waste of network bandwidth!

To fully understand why, one needs a little background information. All theatrical releases (movies) are shot at 24 frames per second. Because of this, Blu-ray specifies that content shall be encoded at 1080p24. Due to long-standing conventions modern monitors have 60Hz refresh rates so in order to display Blu-ray movie content on the monitor a frame rate conversion from 24Hz to 60Hz must take place. The Blu-ray player can perform this role or the display itself can perform it. A Blu-ray player that can perform this conversion is said to be “Full-HD capable.” The frame rate conversion is accomplished by simply repeating the data from each frame in the following pattern before sending to the display:



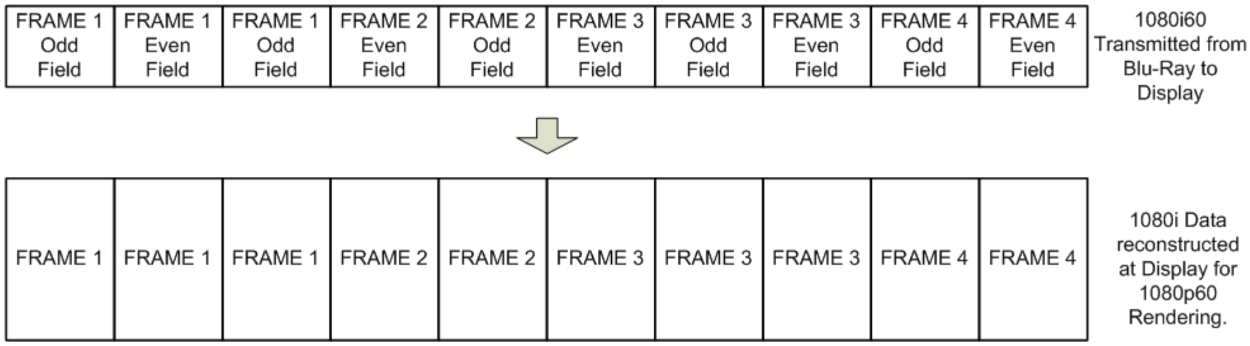
Note all the repeated data in the stream! No new information is presented, just data repeated so that it can be displayed at the monitor's refresh rate. A monitor that can accept this type of data stream is said to be "Full HD capable."

The following diagram shows what happens if the Blu-ray player is set-up to output 1080i60 instead of 1080p:



Notice that all the data from each original frame is still present in the data stream. In fact, there is still some repetition of data, though far less than the 1080p stream. The 1080i stream is exactly one-half the bandwidth of the 1080p stream (1.5Gbps vs. 3Gbps) yet it still transfers all the required data to fully reconstruct the original!

The process of converting 24 frames per second to 60 fields per second per above is a standard practice called "telecine." Most of today's progressive scan monitors are fully capable of reversing this process (inverse telecine) in order to reconstruct the 1080p60 before rendering on its display.



The end-result is the monitor can reconstruct the 1080p60 signal ***exactly*** as the Blu-ray player does when setup to output “Full HD” 1080p! So if you think you are having trouble detecting any difference when you setup your Blu-ray player to output 1080i vs. 1080p, it is not just your imagination… there is no difference! It’s simply a question of which device does the frame rate conversion. Of course, as shown above, if we let the monitor do the work we preserve valuable network bandwidth!

What about broadcast video like TV shows and sporting events? All HD broadcast video content is recorded at standard HD rates (720p60 or 1080i30) so there is no issue there.

What about video games from consoles like Xbox360 or PS3? It is true that Xbox360 and PS3 consoles can be set-up for 1080p on their output, however almost all gaming content is native 720p (mainly because 1080p content takes twice the graphical processing power), so the box itself is up-scaling ***before*** sending to the monitor when in 1080p mode. As explained above, to preserve transmission bandwidth, we always want the up-scaling to happen ***after*** the data is sent to the monitor. So gaming consoles should be set to 720p and let the monitor do the up-scaling.

5 Appendix 2: Video Signals

5.1 Composite (CVBS)

Composite video is an analog signal carried on a single cable (usually with a yellow RCA connector). It is capable of carrying SD signals only. CVBS is the lowest quality video signal because the luma and chroma are placed on the same cable and must be filtered by the receiving end to separate them.

5.2 S-Video

S-Video is an analog signal carried on two cables. It is essentially the same as CVBS except that the chroma and luma are carried on separate cables eliminating the need for color separation and increasing the quality of the picture. The quality is still less than other formats and it can only carry standard definition video formats.

5.3 Component (YPrPb)

Component video is an analog signal carried on three cables (usully with RCA connectors of green, red, and blue). Component video is the highest quality of the analog signals. It can carry standard definition, enhanced definition, and some high definition formats. There is currently no standard for 1080p over component video, but it does handle video up to 1080i.

5.4 HDMI

HDMI is a high quality digital signal that supports standard definition, enhanced definition and high definition formats. It also carries the audio on the same cable. The standard definition formats are usually not implemented, but the standard does support it.

5.5 SDI

SDI is also a high quality digital signal that supports standard definition, enhanced definition, and high definition formats. SDI is also capable of carrying audio on the same cable. For SDI, the enhanced definition formats are sometimes not supported because the specification for handling them came after the standard definition and high definition specifications.

5.6 AVDS Recommendations

Table 19 shows the preferred order for supplying video to the AVDS. Simply find the video format expected on the input and use the highest preference input that is available. This will deliver the highest quality video with the fewest cabling issues.
Innovative Advantage also recommends using a video converter card to convert high definition video to standard definition, rather than using a CVBS or Component input when possible. This can avoid some of the cabling issues associated with the analog inputs.

Preference	Format	Supported Formats
1	SDI	Standard Definition, High Definition
2	HDMI	High Definition
3	Component	Standard Definition, High Definition
4	Composite	Standard Definition

Table 19 AVDS Preferred Video Inputs

6 Appendix 3: Recommended Source Equipment Settings

The settings available will vary based on manufacturer and model, but these are some general source setup guidelines that should apply to most players.

6.1 Blu-ray Player

6.1.1 Recommended Video Settings

- Use SDI or HDMI for High Definition whenever possible.
- Set the high definition video output of the player to 1080i60 (let monitor provide frame rate conversion to 1080p60 to preserve transmission bandwidth).
- If a standard definition signal is required, convert the high definition video using a video converter card whenever possible. If a converter card is not available, use component with a 480i resolution. Use the CVBS output from the player only as a last resort.
- Set the TV Aspect to 16:9.

6.1.2 Recommended Audio Settings

- If using Multi Channel audio, set the player to “Multi Channel” or “PCM” output.
- If using Multi Channel audio and stereo is also required, configure the AVDS to generate the downmixed audio instead of running a stereo coax from the player.

- If there is a “Speaker Select” option in the setup menu, check that it is setup for 5.1 channel audio (the left and right rear surrounds should be disabled).
- For Encoded audio, select the Bitstream audio output. Stereo must then be provided by connecting to the analog stereo output of the player.

6.2 DVD Player

6.2.1 Recommended Video Settings

- Use SDI or HDMI connection and up-convert the video to 1080i whenever possible.
- The best standard definition signal is obtained by allowing the DVD player to output 1080i, then using a video converter card to create the standard definition. If this is not possible or only a standard definition signal is required, component video at 480i is the next best thing.

6.2.2 Recommended Audio Settings

- If using Multi Channel audio, set the player to “Multi Channel” or “PCM” output.
- If using Multi Channel audio and stereo is also required, configure the AVDS to generate the downmixed audio instead of running a stereo coax from the player.
- For Encoded audio, select the Bitstream audio output. Stereo must then be provided by connecting to the analog stereo output of the player.

6.3 Kaleidescape

These recommended settings are based on the M-Class players, so some of the settings may not be available of your player.

6.3.1 Recommended Video Settings

- If supported on the particular model, select “16:9” for the Preferred Movie Format in the System Components tab.
- Use HDMI as the primary video output whenever possible.
- The best method of receiving a standard definition signal is to convert the high definition HDMI signal to standard definition using a video converter card. If this is not possible, use the component output (it should automatically produce an SD signal if HDMI is the primary video output).
- Set the video modes to 1080i60 (1080i50 for PAL) if the system is providing an HD signal, 480i (576i for PAL) if it is to be used as an SD source only.
- Select “Play Without Stretching”.

6.3.2 Recommended Audio Settings

- Select “Player Decode Mode” for the HDMI audio decode
- If there are only headphones and stereo audio outputs in the system, select “Two Channel” as the number of audio channels, otherwise select “Multichannel”.
- If the system supports multichannel audio, let the AVDS create the stereo downmix channel instead of running a stereo coax from the player.
- Avoid the use of encoded audio as this will silent the analog audio outputs of the player so no stereo audio is provided.

6.4 Moving Map

6.4.1 Recommended Video Settings

- Connect the Map to a PC Graphics card whenever possible. This provides some video processing capabilities to the source.
- Using the S-Video should provide a slightly better picture than composite. This requires the use of the PC Graphics card.

6.5 Gaming Console (Xbox360, PS3)

6.5.1 Recommended Video Settings

- Use HDMI connection and set to 720p if possible (this is because most games are 720p natively). To preserve network bandwidth let the monitor do the up-scaling to 1080p.

6.5.2 Recommended Audio Settings

- If using Multi Channel audio, set the player to "Multi Channel" or "PCM" output.
- If using Multi Channel audio and stereo is also required, configure the AVDS to generate the downmixed audio instead of running a stereo coax from the player.

7 Appendix 4: Aspect Ratio

The aspect ratio of video refers to the shape of the video window as a ratio of its width to its height. This value is usually expressed as *x units*:*y units* (i.e. 4:3) or alternatively as *x/y*:1 (i.e. 1.33:1). When a movie is filmed, the director will decide which of the common aspect ratios will be used. Issues of cost, ambience, level of audience immersion and other factors must be considered. Once selected it must be displayed in the theatre using that aspect ratio. Many of these movies are recorded on 35mm film (a 4:3 aspect ratio). An anamorphic lens is used that collects the images at the desired aspect and distorts it to fit squarely on the film. The theatre must then use another anamorphic lens to restore the original aspect ratio so that the audience will see the movie as it was intended.

Figure 76 Example of 1.33:1 Aspect Ratio

Figure 77 Example of 1.78:1 Aspect Ratio

Figure 78 Example of 2.35:1 Aspect Ratio

7.1 Hard Letterbox

When the movie is encoded onto a DVD, it will always be in a 720x480 pixel resolution. This makes a 1.5:1 resolution, which isn't used anywhere. So how is the movie encoded to maintain its aspect ratio? There are two ways this can be done. The first is to encode black bars, also known as letterbox or pillarbox, onto the DVD. This technique is known as "hard letterboxing", and is the method used on older DVDs (those that were marked "full screen" or "widescreen"). The recorded image on the DVD (at 720x480) would look something like what is shown on Figure 79.

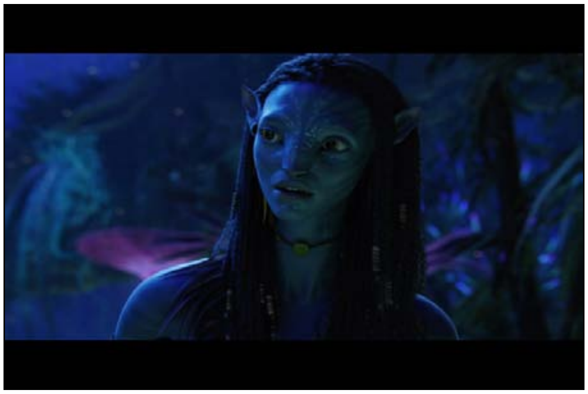


Figure 79   16:9 Movie with Hard Letterboxing as Recorded on DVD

These DVDs were intended for use on 4:3 displays, so the DVD would always report that as the aspect ratio. If they were viewed on a 4:3 display they would look fine, with letterboxing to maintain the desired aspect ratio as expected (see Figure 80).

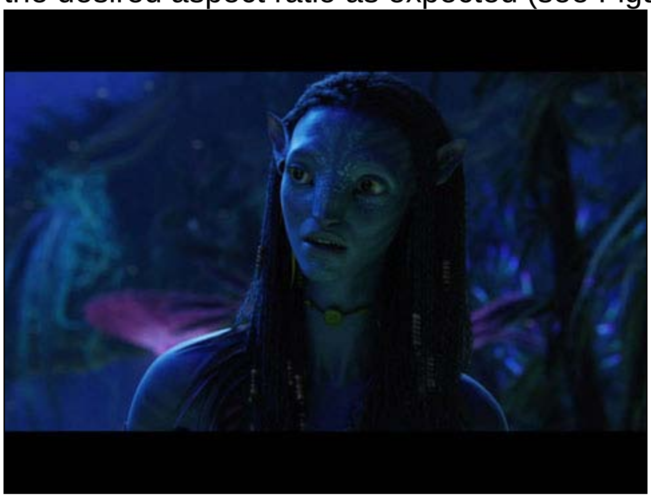


Figure 80   Hard Letterboxed Material Shown on 4:3 Display

Problems arise when this same movie is viewed on a 16:9 display. In the example shown in Figure 81, the display is set up to use letterbox and sees this as a 4:3 movie, so it adds pillar bars to maintain the aspect ratio. The result is that both letter bars and pillar bars are visible at the same time. This is often referred to as “postage stamping”. When the display is set to other size modes it will look different, but it will be inconsistent with other material played in the same mode.

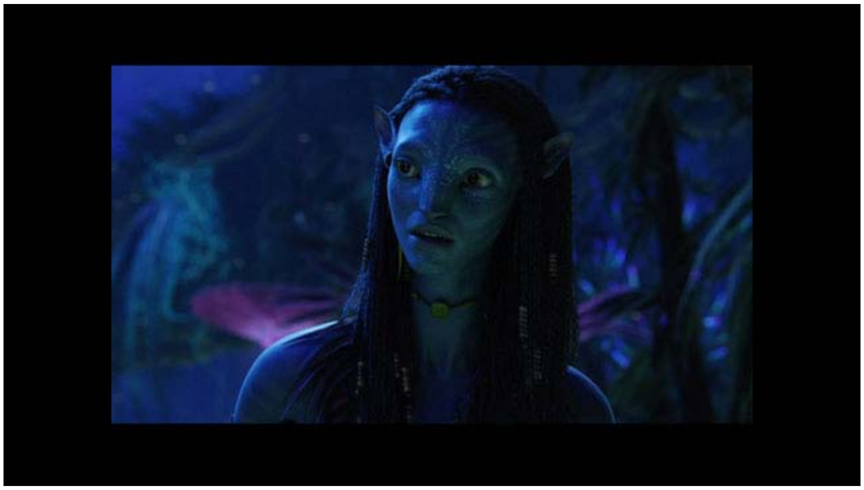


Figure 81 Postage Stamping on 16:9 Display

Another negative to using hard letterboxing is that the resolution of the movie is reduced because of the black bars. Hard letterboxing is rarely seen on DVDs anymore (excluding 2.35:1 films as discussed below), but is still used regularly in broadcast television to provide 16:9 content to standard definition sets or when sending standard definition video up-converted to high definition.

7.2 Anamorphic DVD

Fortunately there is a better way, it is the anamorphic DVD. Anamorphic DVDs don't have a fixed aspect ratio; they are simply recorded to the DVD filling the entire 720x480 frame field. This works much the same way as with film, except the image is distorted digitally instead of using optics. Figure 82 shows how a 16:9 movie is encoded using all of the frame pixels that the DVD allows. Notice how the video is "squeezed" together at the edges, but every pixel is actual video. DVD video has an "aspect ratio flag", also known as "Pixel Aspect Ratio", that tells the DVD player how to distort the picture stored on the DVD to recreate the original film aspect ratio. This flag is either 4:3 or 16:9.

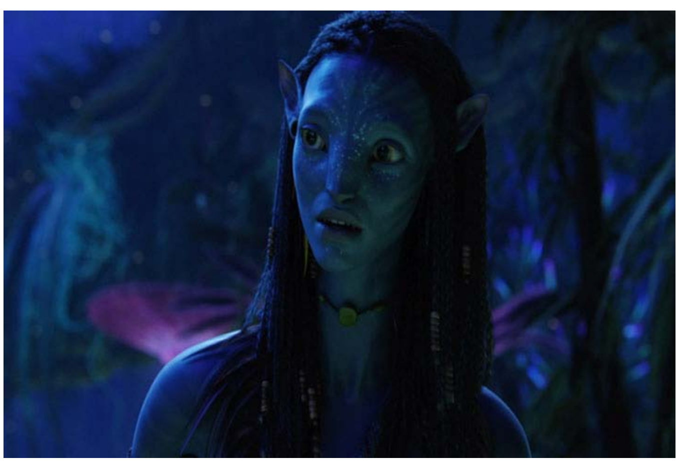


Figure 82 16:9 movie as encoded on a DVD

2.35:1 movies are still given the 16:9 aspect ratio flag. Of course, the content itself is wider. To cope with this, black bars (letterboxing) line the top and bottom of the picture as shown on Figure 83.

Figure 83 2.35:1 Video as Recorded on a DVD

When the movie is played back, the DVD tells the player what the aspect ratio is supposed to be and the video is stretched back out to the desired aspect ratio.

It is then up to the display to render the video in a way that will fit the screen. There are a number of ways this can be accomplished. One we already discussed; letterboxing.

7.3 Letterbox and Pillarbox

As stated previously, letterbox and pillarbox simply makes the video as large as possible then fills the remainder of the screen with black bars. This preserves the aspect ratio of the original film with no video distortion and all of the video is visible on the screen. The negative to this mode is that the screen is effectively smaller as a result of the bars. Nevertheless, this is the mode recommended by Innovative Advantage because it preserves the original content and allows the film to be viewed as it was intended.

Figure 84 16:9 Display Using Letterboxing on 2.35:1 Movie


Figure 85 16:9 Display Using Pillarbox on 4:3 Movie

7.4 Zoom Mode

Another method is to use the "zoom" mode where the image is expanded equally horizontally and vertically until no bars are showing as shown in Figure 86.


Figure 86 2.35:1 Movie Zoomed to Fit a 16:9 Display

The downside to this method is that large areas of the movie are lost as shown in Figure 87.

Figure 87 Picture Loss When 2.35:1 is Zoomed to Fit a 16:9 Display

When this method is used on 4:3 material the top and bottom are cut off as shown in Figure 88.

Figure 88 4:3 Movie Zoomed to Fit a 16:9 Display

7.5 Anamorphic Fullscreen

Another common method is to distort the image using “stretch” or “anamorphic fullscreen” modes. This simply stretches the image until it fits the screen. With this method none of the video is lost, but the entire image can appear distorted. Figure 89 shows this effect, where everything is tall and skinny. Converting a 4:3 to 16:9 using this method causes everything to look short and fat as shown in Figure 90.

Figure 89 2.35:1 Movie Stretched to Fit 16:9 Display

Figure 90 4:3 Movie Stretched to a 16:9 Display

7.6 Panoramic Fullscreen

Methods of non-linear stretching, often called “panoramic fullscreen” or “theaterwide” modes will distort the image on the outside edges and leave the center untouched in an attempt to maintain proper aspect of the item or person in the center of the screen. This mode is a fairly good compromise if fullscreen video is required but it will still have significant distortion on the outer edges of the picture.

Figure 91 2.35:1 Converted to 16:9 Using Panoramic Fullscreen

Figure 92 4:3 Movie Converted to 16:9 Using Panoramic Fullscreen

8 Appendix 5: Overscan

Composite video signals have sections called the “horizontal Blanking Interval” and “Vertical Blanking Interval” that carry data that is not meant to be displayed on screen. If a monitor simply displayed all data received on the CVBS input, you would see lines around the edges (usually on the top, but it can also show on the left or right) as shown in Figure 93. For historical reasons the tolerances tend to be fairly low in the composite video encoders and decoders, so the displays perform an overscan on the image. This simply means that the image is “zoomed in” a few percent until the lines are hidden from view as shown in Figure 94. This is generally something that is only necessary on standard definition signals, high definition video has much tighter tolerances so it is generally best if little or no overscan is performed on it.

Figure 93 SD Video with No Overscan

Figure 94 SD Video with 2 Percent Overscan

Under normal circumstances the display will provide all of the overscan necessary, but there are times when this needs to be controlled within the AVDS. For instance, if a Video Converter Card is connected to a monitor and is upconverting all video to 1080i-60, the monitor may not overscan because it doesn't see the video as a standard definition signal. In this case it is up to the AVDS system to provide the overscan.

9 Appendix 6: Overscan Compensation

VGA outputs from PCs are not meant to have any overscan at all. A display with a VGA input will not apply overscan when VGA is the source, but if the VGA is received by the AVDS then sent to the display over component or SDI it will treat it like any other video signal. This can result in a desktop that is partially scanned off the screen as shown in Figure 95 and Figure 96.

Figure 95 PC Desktop with no Overscan Compensation

Figure 96 Closeup of PC Desktop with no Overscan Compensation

Notice how the taskbar and start button are pushed almost entirely off the screen. The answer to this problem is to use overscan compensation (also known as underscan). What this does is zoom out from the video signal so that when the display applies the overscan the full desktop is visible as shown in Figure 97.

Figure 97 PC Desktop with 2 Percent Overscan Compensation

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