



# SDI Converter System Examples

## Introduction

*SDI is the digital transport of video signals over point-to-point serial links.*

*SMPTE is the standards body that has developed both the technical requirements and standards.*

Applied Video Imaging’s rugged [video converters](#) allow system designers to create optimal systems with various video input and output standards. Converting to and from various video standards, allows both new and legacy video sensors and sub-systems to be incorporated into platform upgrades. This increases existing sensor life-cycles, improves system performance, lowers life-cycle costs, lowers weight, and improves system performance.

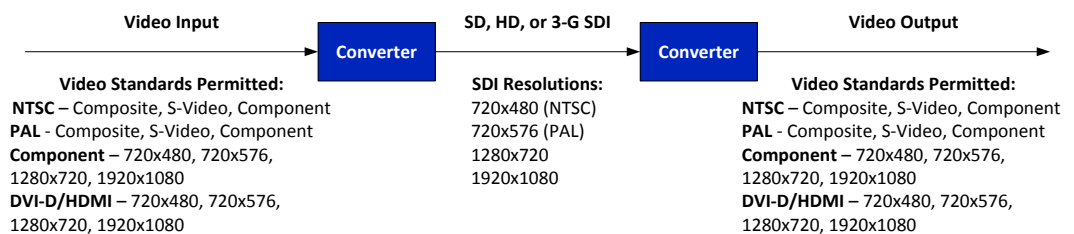
By standardizing the video transport in video mission systems to a [Serial Digital Interface](#) (SDI), heterogeneous system components can be transformed into a homogenous system – a system based on an internationally accepted and supported video display, interface, and transport standards.

This document describes various ways that AVI’s video converters can be used in creating standards based systems.

## Concepts

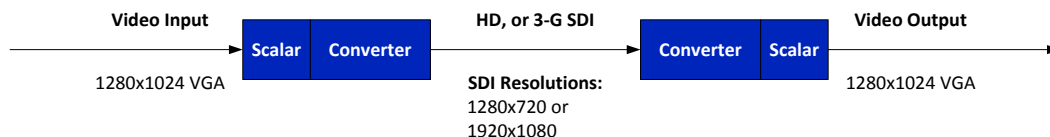
SDI is a one-way transport design – it is point-to-point. For every SDI cable, there must be a transmitter on one end and a receiver on the other end. In Figure 1 below, the transmitter is contained in the converter on the left and the receiver is contained in the converter on the right.

Second, SDI video is standardized to specific video resolutions as listed in between the two converters in Figure1. Therefore, to convert any other video standard to or from SDI, it must adhere to the requisite SDI resolutions.



**Figure 1 - Converter resolution concepts.**

For example, if the input to the converter on the left in Figure 1 is a VGA device normally outputting 1280x1024 resolution video, then either the VGA device will need to be changed to output 1280x720 or 1920x1080 or a video scalar will need to be placed ahead of the converter input. Similarly, if the video output of the converter on the right of Figure 1 goes to a VGA device expecting 1280x1024 resolution video, then either the VGA device will have to be changed to accept 1280x720 or 1920x1080 or a video scalar will need to be placed on the output of the scalar. Figure 2 shows this situation.



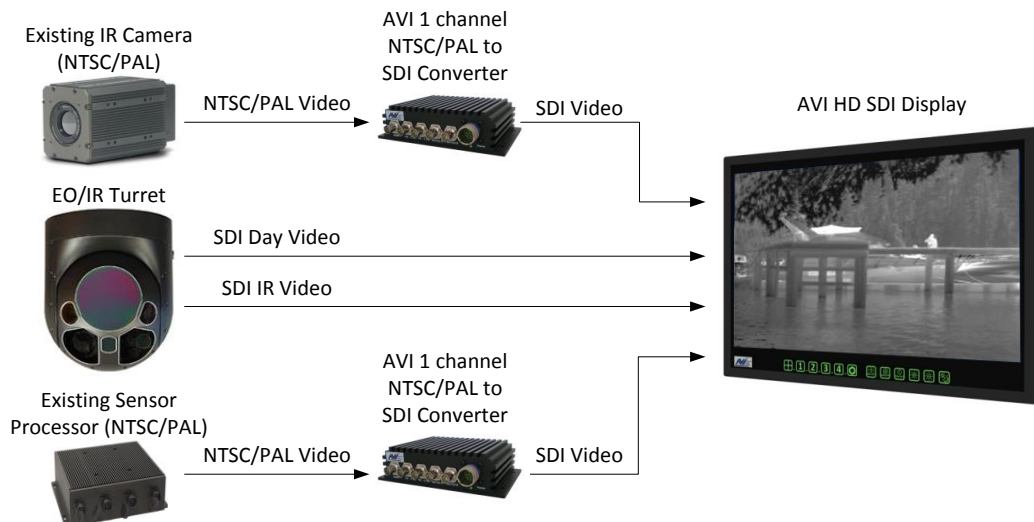
**Figure 2 - Converter input and output of non-standard SDI resolutions.**

*Conversion to SDI allows HD video (1920x1080) to be transported over 190 meters on Belden 1694A coax cable – much farther than DVI or HDMI.*

While not all systems will require both conversion to SDI and conversion from SDI, the concepts are the same. The rest of this document provides Surveillance Mission System examples assuming SDI based standard resolution video and AVI converters.

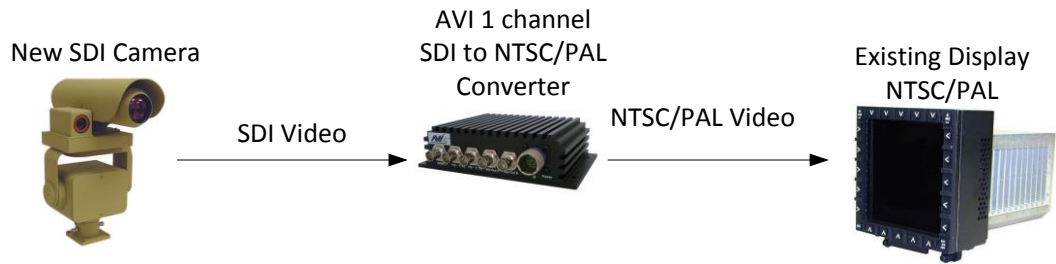
### One and Four Channel NTSC/PAL Converter Examples

Figure 3 below, shows an example of a system with four video inputs to a High Definition (HD) multifunction display. Two of the video devices output NTSC/PAL video, while the other device outputs two SDI videos. Since the two NTSC video devices are not co-located, two AVI single channel NTSC/PAL to SDI converters are used.



**Figure 3 - NTSC/PAL to SDI single channel converter system example.**

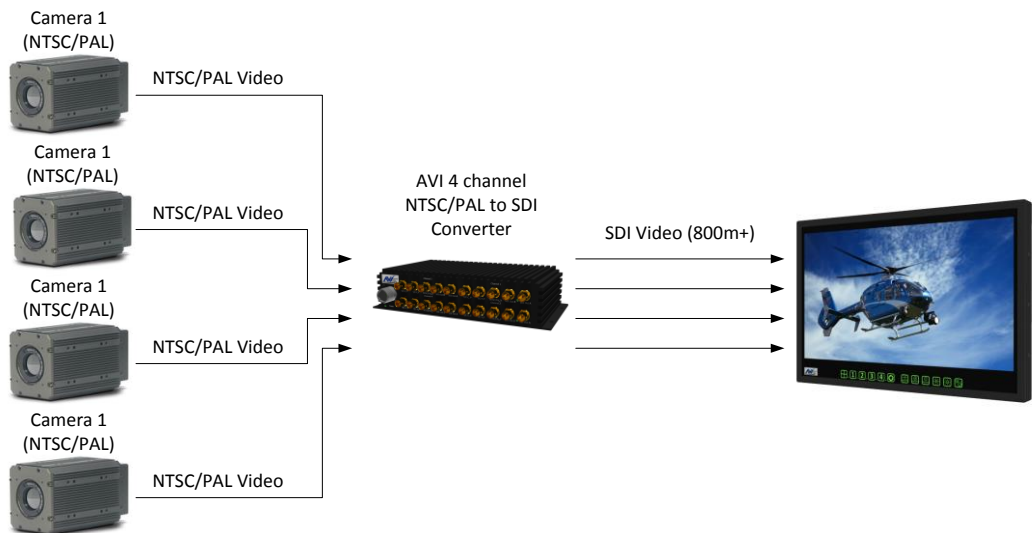
Figure 4 below shows an example of a system upgrade where the camera sensor has been upgraded, but the display system has not due to cost, timing, or funding. In this system the SDI video from the camera is converted by a single channel SDI to NTSC/PAL converter.



**Figure 4 - SDI to NTSC/PAL single channel converter system example.**

*SDI is a much more robust signal for video transport than analog NTSC/PAL or DVI/HDMI. It is highly immune to induced environmental noise.*

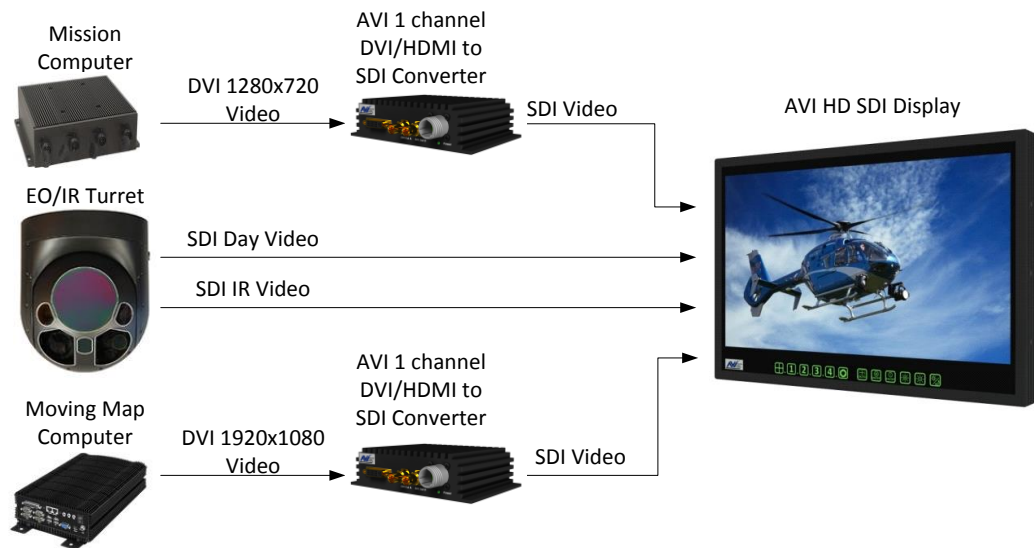
Figure 5 below depicts a system where four NTSC/PAL cameras are co-located. The NTSC/PAL video is converted to SDI then transported more than 800 meters to the multifunction display.



**Figure 5 - NTSC/PAL to SDI four channel converter system example.**

## DVI/HDMI Converter Example

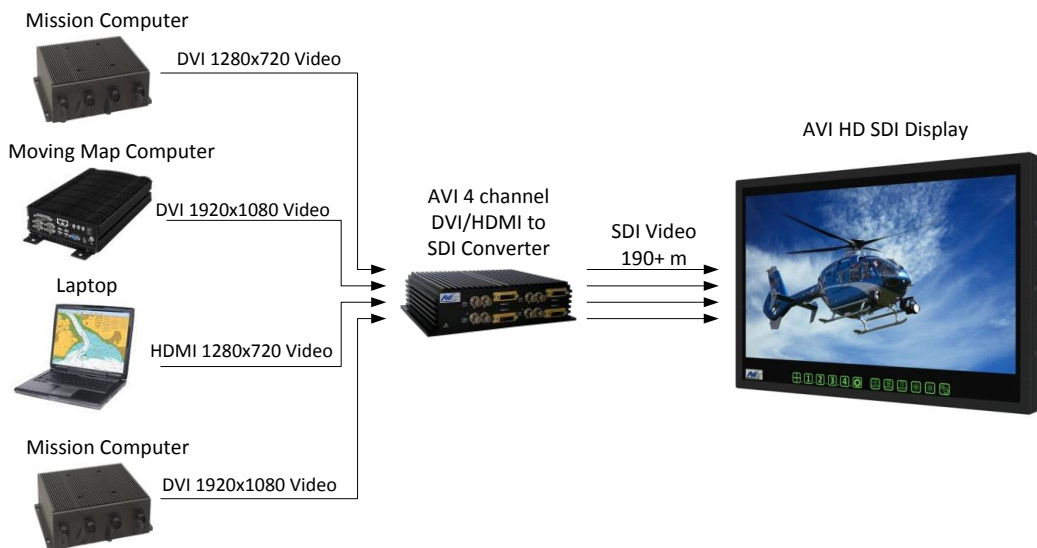
Figure 6 below, is an example of a system where two system components are converted from DVI output to SDI. Both the Moving Map and the Mission Computer are not co-located and can be up to 190 meters from the display.



**Figure 6 - Single channel DVI/HDMI to HD and 3-G SDI system example.**

*SDI converters allow a modular approach to system upgrades. Components or capabilities can be added to a system without replacing the entire video sensor suite.*

The system example in Figure 7 below demonstrates the use of AVI's four channel DVI/HDMI to SDI converter. A combination of both DVI and HDMI inputs are shown. Use of the converter allows carry-on laptops to be instantly connected to the mission system.



**Figure 7 - Four channel DVI/HDMI to HD and 3-G SDI system example.**

## Complex System with converters

The final system example in Figure 8 below shows use of converters for conversion to and from SDI in an SDI based system topology. All video sensor and system inputs are either SDI outputs or are converted to an SDI format prior to input to the rest of the system. This allows the use of a low-cost SDI switch to manage distribution of the appropriate signal to the end user's display. Low cost and lightweight coaxial cable can be used to simplify the system installation.

An SDI based system can save as much as ¾ of the weight in wiring as compared to an RGBHV based installation and over 8 times the transmission distance.

With the use of the switch and SDI, only a single coax cable is required to each display. Also shown is the use of AVI's [3-G SDI Quad Processor](#) for optimal viewing of multiple video inputs. The use of a low bandwidth downlink is also possible by converting SDI input to NTSC/PAL.

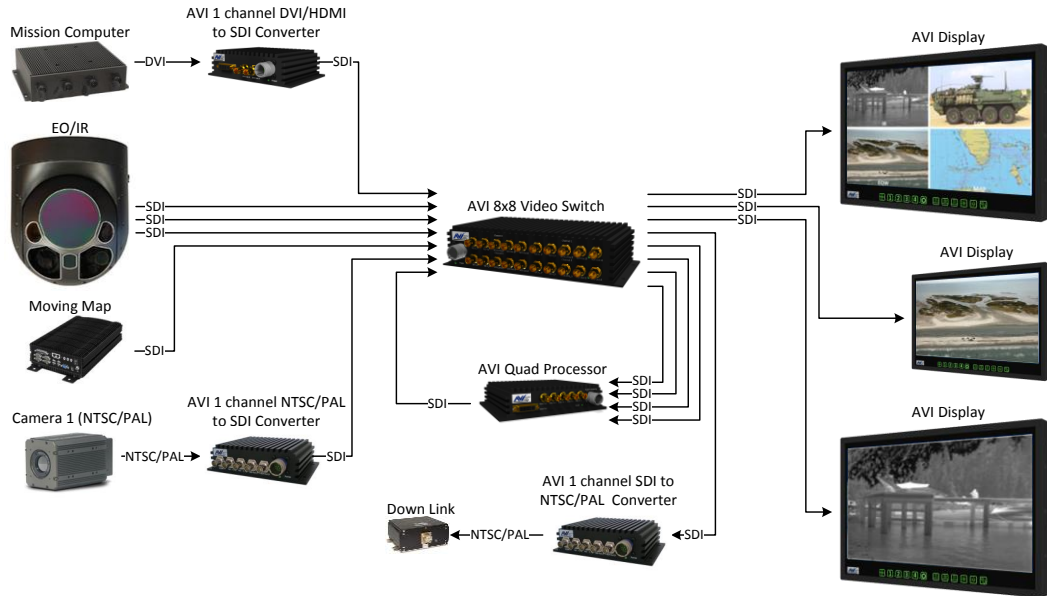


Figure 8 - Complex system example with various converters.

**About Applied Video Imaging, LLC** - Applied Video Imaging designs and manufactures advanced rugged video processing, distribution, recording, and display products for the airborne, ground, and marine surveillance markets. AVI's products, services, and solutions optimize surveillance sensor suites, enhancing the platform and operator's mission effectiveness. For more information, or to discuss your system requirements, visit [www.appliedvi.com](http://www.appliedvi.com) or call 434-974-6310, toll free 855-974-6310.