

Cabling Opportunities

Saving money and labor in the S-Video environment

By Jeffrey Herman

One of the largest untapped cabling opportunities for using twisted pair instead of coax can be found in the A/V cabling environment. Traditionally rooted in coax, the A/V industry is beginning to adopt copper twisted pair as a viable transmission medium for a wide range of audio and video formats. This is partly due to recent improvements in twisted pair cable and to the growing range of active and passive media adapters (e.g., baluns) to convert A/V from coaxial cable to unshielded twisted pair (UTP).

WHAT IS S-VIDEO?

S-Video is a video transmission standard that was developed in the 1980s in order to provide superior picture resolution versus ordinary composite video. S-Video is transmitted in two parts: luma (Y) and chroma (C). In contrast, composite video is transmitted as one signal that combines chroma (color) and luma (luminosity). By transmitting chroma and luminosity separately, S-Video achieves a sharper picture versus composite video. S-Video cabling is characterized by a four-pin mini DIN connector that contains two pairs of wires—one pair for Y and another for C.

For example, in the residential market, S-Video has been proven to provide better picture quality than regular composite video for DVD and video gaming applications. S-Video is now a standard option on most consumer A/V and digital electronics devices.

HOW CAN S-VIDEO BE ADAPTED TO UTP?

One way S-Video may be adapted to UTP is by using S-Video baluns. An S-Video balun converts S-Video from coax to two unshielded twisted pairs. Although some loss of signal occurs due to the passive design of the baluns, the picture quality is typically excellent from up to 1,000 feet

via Cat 5 UTP in applications that do not need broadcast quality. By comparison, the typical distance achieved using S-Video cable is 300 feet.

For broadcast-quality applications, there are more expensive S-Video transceivers on the market that will convert S-Video to UTP with no signal loss.

Regardless of what method is used to convert S-Video to UTP, the S-Video signal is now ready for the structured cabling highway. A DVD can be connected to an S-Video monitor using standard Cat 5 cabling techniques such as modular wall outlets, patch panels and cross-connect blocks.

Due to the excellent crosstalk immunity of Cat 5 cable, multiple S-Video signals can coexist under one multi-pair cable. For example, since S-Video requires only two

twisted pairs, two S-Video signals can be supported under one four-pair Cat 5 cable. This provides significant savings in applications where S-Video equipment is clustered in one area such as a classroom or training center.

COST SAVINGS USING CAT 5

One of the main reasons for using twisted pair instead of coax is to save on material cost. The cost savings of connecting S-Video via UTP instead of coax is defined by the length of the cable. The longer the cable, the greater the savings. In new installations, the actual cable cost savings for any given connection can be made by using the following guidelines:

- cost per foot for Cat 5 UTP

Traditional Method	100 ft	200 ft	250 ft	300 ft	400 ft	500 ft	1000 ft
S-Video Cable	\$47.00	\$94.00	\$117.50	\$141.00	\$188.00	\$235.00	\$470.00

Cat 5 & Baluns	100 ft	200 ft	250 ft	300 ft	400 ft	500 ft	1000 ft
Plenum Cat 5	\$19.00	\$38.00	\$47.50	\$57.00	\$76.00	\$95.00	\$190.00
S-Video Baluns (2)	\$70.00	\$70.00	\$70.00	\$70.00	\$70.00	\$70.00	\$70.00
Total Cost	\$89.00	\$108.00	\$117.50	\$127.00	\$146.00	\$165.00	\$260.00

Savings	100 ft	200 ft	250 ft	300 ft	400 ft	500 ft	1000 ft
\$ Savings	-\$42.00	-\$14.00	\$0.00	\$14.00	\$42.00	\$70.00	\$210.00
% Savings	-89%	-15%	0%	10%	22%	30%	45%

TABLE SET 1: Savings — One S-Video signal under one plenum Cat 5 cable

Traditional Method	100 ft	200 ft	250 ft	300 ft	400 ft	500 ft	1000 ft
S-Video Cable	\$47.00	\$94.00	\$117.50	\$141.00	\$188.00	\$235.00	\$470.00

Cat 5 & Baluns	100 ft	200 ft	250 ft	300 ft	400 ft	500 ft	1000 ft
Plenum Cat 5	\$6.50	\$13.00	\$16.25	\$19.50	\$26.00	\$32.50	\$65.00
S-Video Baluns (2)	\$70.00	\$70.00	\$70.00	\$70.00	\$70.00	\$70.00	\$70.00
Total Cost	\$76.50	\$83.00	\$86.25	\$89.50	\$96.00	\$102.50	\$135.00

Savings	100 ft	200 ft	250 ft	300 ft	400 ft	500 ft	1000 ft
\$ Savings	-\$29.50	\$11.00	\$31.25	\$51.50	\$92.00	\$132.50	\$335.00
% Savings	-63%	12%	27%	37%	49%	56%	71%

TABLE SET 2: Savings — One S-Video signal under one PVC Cat 5 cable

- cost per foot for S-Video cable
- cost per S-Video balun (a pair is needed per connection)

Let's take a look at the cost comparisons in a case-by-case manner. For this exercise, the following typical costs will be used:

- S-Video cable: \$0.47 per foot
- Category 5 UTP: \$0.19 per foot (Plenum); \$0.07 per foot (PVC)
- S-Video balun: \$70.00 per pair

Using these average prices, the following four tables illustrate the cost savings for each of the scenarios. In **Table Sets 1 and 2**, cost savings are calculated based on the installation of one Cat 5 cable to support one S-Video signal. **Table Set 1** shows savings if plenum Cat 5 is used, and **Table Set 2** shows savings if PVC Cat 5 is used. Note that savings start to accumulate only when the distance is between 200 to 300 feet or at longer distances. In those cases, the savings are significant.

Since S-Video only uses two twisted pairs, two S-Video signals may be transmitted under one four-pair Cat 5 cable. **Table Sets 3 and 4** illustrate even higher cost savings when one four-pair Cat 5 cable is fully utilized to transmit two S-Video signals.

It is apparent from the above tables that at distances above 250 feet, significant material cost savings can be achieved. At short distances, there must be additional non-tangible or indirect cost savings to entice a switchover to UTP.

INTANGIBLE BENEFITS

There are numerous reasons why the installer would prefer to use UTP versus S-Video cable, even at short distances of under 250 feet:

- UTP is less bulky than S-Video cable and easier to pull through walls and conduits and around corners. It also uses less conduit and duct space than coax, resulting

in lower hardware infrastructure costs.

- UTP also provides ease in moves, additions and changes. Once the cable is installed, making connection changes is easier because a host of cross-connect points already in place. The result is lower post-installation service costs for both the installer and the end user.

- By allowing S-Video and other low-voltage signals to occupy the same Cat 5 cable, the investment in a structured cabling system (SCS) is optimized.

- Modular connectors are easier to crimp than the four-pin mini DIN connectors used for S-Video. Furthermore, in applications where the S-Video equipment must be reconnected frequently, the mini DIN connector is more prone to breakage, so converting to RJ-45 makes the connection more robust.

- Using video balun technology, S-Video can be transmitted further than the typical 300-foot distance limitation using ordinary S-Video cable. Using Cat 5 UTP, distances of 1,000 feet are easily reached for S-Video.

SOLUTIONS

The S-Video format is widely found on consumer and professional A/V equipment. Some of the equipment that supports S-Video includes

- S-Video monitors
- PCs, laptops and notebooks
- LCD projectors
- Plasma screens
- DVDs
- VCRs
- Camcorders
- Satellite receivers
- MPEG players
- Digital video recorders
- Scan converters
- Video scalars
- Matrix switchers

DVD player S-Video connection. In A/V applications, S-Video and stereo audio can share one four-pair Cat 5 cable, thus eliminating the need to install three coaxial cables. For example, if a DVD needs to be connected to an A/V monitor and the building is pre-wired for Cat 5, such a configuration would be applicable.

Connecting an S-Video Source to a Video Scaler. Sometimes an S-Video source (i.e., DVD, VCR) must be connected to VGA display (plasma screen, LCD projector). In this case, a video scaler is needed to provide the conversion from composite or S-Video to VGA format. Cat 5 also can be used in these applications to convert the cable between the DVD and the video scaler to Cat 5.

Connecting a DVR to an S-Video Monitor. In CCTV security applications, digital video recorders (DVR) and CCTV multiplexers are receive multiple CCTV camera signals before displaying them onscreen. The DVR often has an S-Video

output for an external monitor, which produces better picture quality than a single composite video. If the DVR is located far from the S-Video monitor, then Cat 5 twisted pair cable may be more practical and cost-effective to use instead of coaxial cable.

CONCLUSION

New opportunities to streamline cabling via Cat 5 can be found by keeping an eye out for applications where S-Video is being deployed. Material cost savings are achieved when distances exceed 200 feet. There are also several intangible benefits that can be seen for shorter distances.

Jeffrey Herman is a product manager at MuxLab Inc., a designer and manufacturer of connectivity and physical layer switching solutions for the structured cabling and networking industry. Jeffrey may be contacted at j.herman@muxlab.com.

E-SOURCES

S-Video Definition — www.webopedia.com/TERM/S/S_Video.html

S-Video Frequently Asked Questions — www.vidgames.com/ps/hints/svideo.html

S-Video-to-Composite Video — www.hut.fi/Misc/Electronics/circuits/svideo2cvid eo.html

S-Video Versus Composite Video — www.netfact.com/crs/projects/syncomat/svideo/

S-Video Versus Other Video Formats — www.michaeldvd.com.au/Articles/Video Connectors/VideoConnectors.asp

Traditional Method	100 ft	200 ft	250 ft	300 ft	400 ft	500 ft	1000 ft
S-Video Cable (2)	\$94.00	\$188.00	\$235.00	\$282.00	\$376.00	\$470.00	\$940.00

Cat 5 & UTP	100 ft	200 ft	250 ft	300 ft	400 ft	500 ft	1000 ft
Plenum Cat 5	\$19.00	\$38.00	\$47.50	\$57.00	\$76.00	\$95.00	\$190.00
S-Video Baluns (4)	\$140.00	\$140.00	\$140.00	\$140.00	\$140.00	\$140.00	\$140.00
Total Cost	\$159.00	\$178.00	\$187.50	\$197.00	\$216.00	\$235.00	\$330.00

Savings	100 ft	200 ft	250 ft	300 ft	400 ft	500 ft	1000 ft
\$ Savings	-\$65.00	\$10.00	\$47.50	\$85.00	\$160.00	\$235.00	\$610.00
% Savings	-69%	5%	20%	30%	43%	50%	65%

TABLE SET 3: Savings — Two S-Video signals under one PVC Cat 5 cable

Traditional Method	100 ft	200 ft	250 ft	300 ft	400 ft	500 ft	1000 ft
S-Video Cable	\$94.00	\$188.00	\$235.00	\$282.00	\$376.00	\$470.00	\$940.00

Cat 5 & UTP	100 ft	200 ft	250 ft	300 ft	400 ft	500 ft	1000 ft
Plenum Cat 5	\$6.50	\$13.00	\$16.25	\$19.50	\$26.00	\$32.50	\$65.00
S-Video Baluns (2)	\$140.00	\$140.00	\$140.00	\$140.00	\$140.00	\$140.00	\$140.00
Total Cost	\$146.50	\$153.00	\$156.25	\$159.50	\$166.00	\$172.50	\$205.00

Savings	100 ft	200 ft	250 ft	300 ft	400 ft	500 ft	1000 ft
\$ Savings	-\$52.50	\$35.00	\$78.75	\$122.50	\$210.00	\$297.50	\$735.00
% Savings	-56%	19%	34%	43%	56%	63%	78%

TABLE SET 4: Savings — Two S-Video signals under one PVC Cat 5 cable

Glossary

DVR—Digital Video Recorder. Often used in the CCTV security and surveillance environment to process incoming images from multiple CCTV cameras.

Scan converter—Device that converts VGA video signal into composite or S-Video format.

Video scaler—Device that converts a composite or S-Video signal into component VGA format for display on VGA screens.

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