

## JVC

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capability that led them to the JVC/Miranda combination for live shots, Thurber said.

"With this ASI option we have performed live shots where 900 to 1,000 feet of [copper] cable has been used," he said. "This has been particularly helpful in getting signals out of sporting venues."

One early HD live shot WXYZ was able to do with the JVC/Miranda setup was during the 2007 NBA playoffs. They used nearly a thousand feet of standard copper cable to transport the live HD video from the basketball court in Cleveland's Quicken Loans Arena to its satellite truck outside. That ASI feed was plugged directly into the satellite truck's transmitter and sent back to Detroit.

"Using the same ASI technology we have accomplished HD *double hop* live shots," said Thurman. They use a NuComm field microwave to bring the ASI signal from the camera position to the truck.

"We are also very interested in the JVC Libre wireless camera system," he

said, referring to a recently launched microwave system for the ProHD format that JVC developed with Broadcast Microwave Services. "This microwave camera pack also uses the FireWire connection from the JVC 250 camera and transmits HD signals to a diversity receiver. The receiver has an ASI output and again we use a Miranda Dec+ to decode this ASI signal."

## TEAMING WITH TELECAST

Chicago's ABC O&O WLS is also a 720p broadcaster, and has put the JVC 250 cameras to work on high-definition live shots.

To extend its operating range beyond the limits of copper cable, the station has purchased the Telecast Fiber Systems Copper-Head HD/SDI & Analog Fiber Optic Camera Transceiver system to allow it to deploy fiber-optic cable between the camera and the live truck.

"The Telecast CopperHead is the same weight as the copper reel, [and] gives us the ability to do high-def live

shots a thousand feet and more away from the truck," said Craig Strom, WLS assistant director of engineering.

Though CopperHead is designed to work with HD/SDI, JVC's Librach said ASI is "electrically the same as HD/SDI and SDI, so anywhere you have HD/SDI or SDI flowing, you can actually put ASI down the same spigot."

When the ASI stream hits the live shot van, it goes through a Cobalt Digital distribution amplifier, which splits off an ASI signal to feed a 2 GHz,



The Telecast CopperHead transceiver, mated to a JVC camera.

7 GHz and satellite transmitter. Strom said they also run an ASI stream through a Miranda decoder "so the guys in the truck can see and hear what's going on. Otherwise, they have no way of knowing what's being transmitted."

WLS also had success using the JVC/Miranda system to send HD video down an SDI link between the station and Chicago's Board of Election Commissioners, several blocks away.

## ENCODERS AND ARROWS

Strom, like most pioneers, had a few arrows in his back by the time the station got the entire signal path working.

"One of the things we've learned along the way is that ASI is polarity sensitive," he said. "SDI standard-definition serial digital video, and high-def serial digital video were not polarity sensitive."

While the Miranda ASI encoders and decoders had addressed the polarity issue, some other pieces of equipment Strom tried to place between the encoder and decoder did not.

Though not noted in the data sheets, certain ASI outputs on a particular model were inverted, while others were not. In some cases, ASI inversion could change each time the equipment was powered up.

"You have an ASI encoder and decoder, if you pass it through and it doesn't work, it's inverted. If you pass it through and it does work, it's not inverted," he said.

He also found that ASI could be very level sensitive, and while the specification is supposed to be the same for both HD and SD SDI, .8v peak-to-peak, various pieces of equipment he tried had dramatically different levels. "There's not a lot of standardization in this stuff, really," he said.

The ability to move HD video through SD digital microwave gear, the type specified in Sprint Nextel's 2 GHz Relocation program, is likely to spur other camera makers to put HD 1394 outputs on their news camcorders. Look for it at NAB2008. ■

## HD Video Transport: Multiple video and data services over a single Gigabit Ethernet Port



The MD-003 GETR 5-Port Gigabit Ethernet Transceiver combines video and data over 4 GbE copper RJ45 interfaces and one 10/100 RJ45 interface and transports over an SFP optical interface enabling multiple services to be carried on a single router port. VLAN tags enable priority to be set to the video traffic. Data traffic is best effort and can automatically utilize bandwidth that is not occupied with video.

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## ASI: A Robust Way to Move MPEG-2

ASI, asynchronous serial interface, is a standard that has gained popularity for transporting MPEG-2 content because of several advantages it enjoys.

First of all, ASI is very similar in nature to the SDI signal: it employs the same voltages and same amplitude, and can travel across the same infrastructure as SDI and HD/SDI. This means broadcasters wishing to use ASI to transport video don't have to replace or modify their existing SDI and HD/SDI infrastructure, coax, distribution amplifiers and such, in order to do so.

ASI has become a standard way of transferring material between devices made by different equipment manufacturers. The MPEG doesn't need to be decoded and re-encoded as it passes through these devices. Telecommunication companies have long used ASI, as have satellite communication companies. And ENG microwave radio makers have included ASI inputs and outputs on many of their recent equipment introductions.

As the MPEG signal is being converted to ASI ahead of transmission or the ASI converted to HDMI after being received, using devices made by Miranda, DVEO/Computer Modules and K-Tek among others, the delay introduced in either process is imperceptible. And because both audio and video are incorporated into the ASI, both sound and picture retain their sync relative to each other during transport.

Finally, ASI has proven to be a dependable way of moving MPEG material over distances in excess of 900 feet over RG59U coax cable, though some broadcasters with mission-critical applications have chosen to employ a repeater over 500 feet or so to assure a rock-solid signal path.



Miranda's ASI Bridge

Craig Johnston