Vol. 51 No. 7

July 18, 2005

SOUND & COMMUNICATIONS

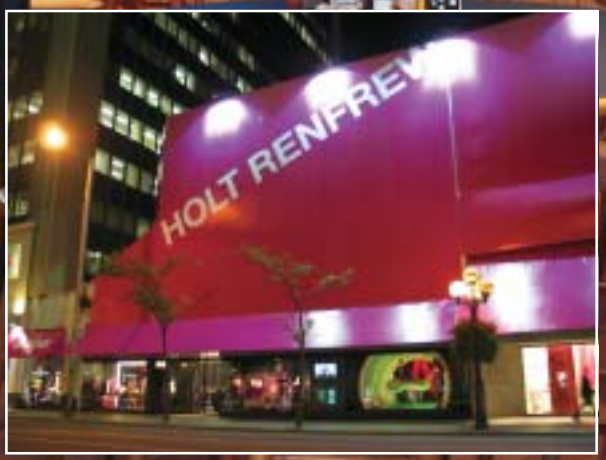
AV FOR SYSTEMS INTEGRATORS, CONTRACTORS AND CONSULTANTS

SPREADING THEIR WINGS

BUFFALO WILD WINGS AV IS A CUSTOMER PLEASER.

ENLIGHTEN RETAIL

LIGHTING IS VITAL IN THE MARKETING ENVIRONMENT.



POWER OF MUSIC

CANADA'S HOLT RENFREW UPGRADES ITS AUDIO.

CONVERGENCE, CONVERGENCE, CONVERGENCE!

Connectors and cabling play a key role.

BY BRET EMERSON, RCDD/NTS

Everyone is aware of the mantra in the real-estate industry: Location, Location, Location. The last few years have brought a similar refrain to the audio/video and information technology industries: Convergence, Convergence, Convergence!

Almost every article you read has some reference to how one system or another was "converged" with another system to provide the customer an advantage in cost or ease of installation and management. The convergence that we read about usually deals with Internet Protocol (IP), which means routing your information via an Ethernet network that may or may not be able to be extended across the internet.

Another distinct aspect of this convergence is more physical in nature. It has to do with the connectors and cabling that are being used in structured cabling systems for new and renovated communications infrastructures. As technology has invaded our educational system, for example, communications engineers and cabling vendors have begun to adapt how they think about cabling and wiring the rooms to meet these new audio and video requirements.

Most K-12 schools that are undergoing a renovation or building a new school have some money earmarked for technology. In the past, this meant Cat5e cabling to the rooms for data and telephones, and maybe a coax cable for a TV mounted in the corner. As the audio and video systems have become more

---

Bret Emerson, RCDD/NTS, president of CommTech Design, a communications engineering firm in Grand Rapids MI, makes presentations and has written numerous articles regarding the need to include communications engineers in the building-design process. Where technology used to be an afterthought, it now should be discussed and designed just as the electrical and mechanical systems are designed.

This full-view of the television, desk and lower converged faceplate shows how the TV could be connected to an alternate audio/video source that might be at a desk or rolled in on a cart.

of an integral part of the learning process, there has been a shift in the infrastructure cabling and connector industry.

More Use of UTP Cabling

More and more of the audio and video signals are utilizing Unshielded Twisted Pair (UTP) cabling, whether it be Cat5e, Cat6 or even the pre-standard Cat6A. This convergence has meant that classrooms require connectors in the rooms that serve data networks, telephone system and audio/video systems. This is of particular consequence when the classroom includes advanced AV such as ceiling-mounted projectors and sound-assist systems.

Almost every school district wants to implement digital video projectors in the classroom. Projectors and PCs have become such a large part of the teachers' lesson plans that there are numerous stories where a teacher will conveniently "forget" to return the projector cart that he had signed out for the day, just to be able to use it for a class the next morning. Alongside the projector, many districts want to install sound-assist systems in the classroom.

Sound-assist systems typically consist of a wireless microphone, a mixer/wireless receiver/amplifier and speakers in the ceiling or on the wall. These are used to enhance the voice of the teacher, with the theory being that students learn better and pay

closer attention when they hear the teacher's voice coming from "everywhere" in the room. Some of the sound-assist systems allow alternate audio inputs to amplify not only the microphone signal but signals from up to three other sources.

This integration of audio and video signals with the IT infrastructure has required that many of the communications engineers who used to deal just with unshielded twisted pair (UTP) cables must now design infrastructures that include the audio and video systems and cables.

In the design of these systems, we must realize that most K-12 classrooms still use a mostly lecture-style teaching arrangement. Integrating projectors and technology means ceiling mounting the projector and ceiling speakers and then routing all the cable to a faceplate at the teacher station or desk. The teacher station at most schools serves as the technology cabinet and usually has a PC, VCR/DVD player, sound-assist amplifier, and maybe a printer and possibly an Ethernet-based control unit.

Any of these Cat6 cables that route back to the panels in the communications room could be used for transmitting video and audio signals between classrooms or back to the video distribution headend equipment.

Integrating the Signals

The physical aspect of this AV/IT convergence is to try to integrate all the input signals and output signals to work as one communications infrastructure. One of the more important things to look at when designing the cabling infrastructure inside a school, as well as inside the classroom, is how to deal with all the telephone and data signals and the new audio/video signals while providing a single faceplate that hopefully has connectors for all these systems. Some manufacturers are farther along in their audio/video product lines than others. It runs the gamut from manufacturers just providing F-connector pass-thrus to manufacturers offering HD-15 VGA connectors with screw connectors on the back.

There are numerous options when integrating audio/video into classrooms, from the simple solution of installing a television in the corner of the room to installing a video/audio switcher in the teacher station and tying that into a control unit and ceiling-mounted video projector. The decision process usually is based on the amount of money available and the complexity of the system the teachers will tolerate and be able to use.

Most of the schools today settle on a system that includes a video projector that acts as the video switcher and a sound-assist system that acts as the mixer for the audio from the PC and

The racks in the main communications room provide a central location for Cat6 cables and fiberoptic cables installed throughout the building.

VCR/DVD player. They also want a control system that allows the teacher to use his PC to turn on the components and switch the projector between the different video inputs. The control system also connects to the IP network to allow a centrally located IT professional to view and remotely control the AV systems in each classroom.

One of the biggest issues teachers have with technology in the classroom is that sometimes it doesn't work and many times they have to wait up to a week for a tech assistant to visit their room to fix the problem. The IP control system allows the IT professional to connect remotely to the classroom control system and diagnose and fix something that may be as simple as changing the video input on the projector.

Pushing for Simple Solutions

As these systems invade the classroom, cable and connector manufacturers are being pushed to provide simple solutions that integrate all the connectors into one faceplate. Some of these manufacturers have taken the next convergence step and are providing audio and video modular connectors that fit into their standard faceplates and use Cat5e or Cat6 cables for transmission of the AV signals.

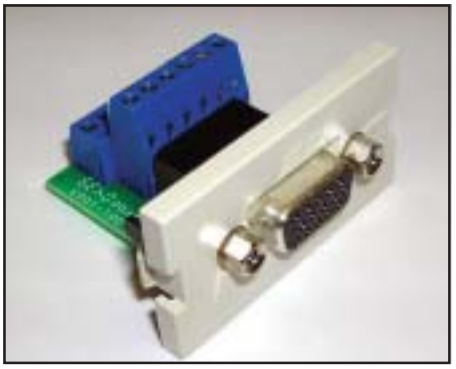
On the wall near the teacher station, the incoming Ethernet and telephone connections are terminated on Cat6, eight-pin modular connectors. The CATV cable is terminated with an F-connector and then attached to an F-connector pass-thru. For years, many of the manufactures have been providing the Cat6 jacks and the F-connector pass-thrus that fit into their faceplates. Beyond these standard connectors, it depends on the manufacturer's dedication to the integration of AV signals with IT infrastructure as to whether it provides a full complement of AV connectors that also fit into its faceplates. Check with your local dealer representative to see if your favorite manufacturer provides a complete line of AV connectors.

Manufacturers that our communications engineers recommend are providing multiple audio and video connectors. The connectors come in many different styles: pass-thrus for pre-terminated cables, solder connectors that attach directly to the connecting cable on the back and to the patch cable in the front, screw-type connectors on the back with female or male connectors on the front. And the most IT-integrated connectors have an audio or video connector on the front and a 110-style connector for UTP cables on the back for connecting to a Cat5e or Cat6 cable.

Everyone in the audio/video industry is aware of the different baluns and connectors that allow users to send video and audio signals via Cat5e or Cat6 cable over long distances. High-end designers probably would use custom-designed faceplates and industry-standard connectors and cables for transmitting signals between the sending and receiving units in their audio and video systems. In schools, where the audio and video signals are simply within the room, and at most have to extend 20 feet from faceplate to the projector or speaker, these connectors that fit into the IT faceplate provide a simple interface that allows one faceplate to be used for IT and AV signals.

Biggest Issue

The biggest issue in integrating AV into the IT faceplate has been with the RGB/HV signal and trying to transition from an HD15-VGA connector on the front to a five-strand mini-coax cable on the back. Some vendors make a VGA to BNC transition cable that is as short as six feet long. This still doesn't work because there is no space in even a double-gang box to hold the transition cable as well as the



The snap-in VGA connector provides a standard HD-15 pin connector on the front, while providing an easy-to-terminate screw-down connector on the back for connection to a five-strand mini coax cable.

This view of a double-gang, converged faceplate details the connectors on the front that the user sees, and the actual cable interface on the back. This could be used to connect a teacher station equipped with a PC and VCR/DVD player to a projector and speakers in the ceiling.

Labeling is important for tracking cable routing. Whichever product you choose should allow for labeling of all the connectors in the faceplates.

Converged faceplates and connectors allow owners to use the same faceplate for data and video connections.

other Cat5e and coax cables. This has led to the introduction of an HD15 female to screw-down connector that allows the contractor to use a five-strand mini-coax cable for connection from the faceplate to the projector.

At the faceplate, the HD15 on the front transitions through a circuit board to a screw-down connector that has connection points for each coax and their shields. The coax cable then extends through the ceiling and is terminated with five BNC connectors at the projector. For the short distances that the video signal has to travel, this solution works wonderfully, while allowing space for other cables and connectors to utilize the same faceplate.

This solution takes care of the PC signal, but that still leaves the composite signal from the VCR and the S-video signal from the DVD player, not to mention the speaker connections from the sound-assist amplifier.

Where the S-video and composite video signals used to be connected via pass-thru connectors, one simple solution is to use a connector with the video connector on the front and a two-pair UTP connector on the back. This allows you to use one Cat6 cable to transmit both the S-video and composite video signals. Route the Cat6 cable from the back of the faceplate and up to a faceplate in the ceiling near the projector that has the same connectors; from that point, simply run an S-video patch cable and an RCA-style composite video cable from

the faceplate to the connectors on the projector.

The speaker level signal that comes out of the sound-assist system can be routed through screw-type speaker posts that mount directly into the faceplate. This allows the speaker cables to be terminated on the back of the jack and then use banana-style connectors on the front of the faceplate.

The education market is different from high-end presentation venues, and even university lecture halls. Each school has a fixed amount of money to use when upgrading its communications systems. The job of the communications engineer is to help the school choose the best products that allow its teachers to use technology in the classroom, while working with the architect to integrate the cabling and systems into the look of the building.

Some May Cringe

Some AV designers may cringe at the use of Cat6 cables for video, utilizing screw-down connectors for RGB/HV signals and banana connectors for the speakers, but this trend toward physical integration at the faceplate is only going to expand as the march of IT and AV convergence continues. Cabling manufacturers are going to continue to innovate and provide audio and video connectors in their plates to try to capture some of the AV market that they used to lose to the specialized faceplate and connector manufacturers.

Combining audio/video and data into the same faceplates has applications in residential installations as well as educational buildings.

As communications engineers working in the education market, we strive to balance the requirements of both the owners and the systems themselves: Choosing products that will provide the quality required to successfully transmit the AV and IT signals, while also keeping an eye on the financial costs of the installation and the "look" that the architect and interior designer want to convey. This comes down to a balancing act that is being assisted by manufacturers that see the value in the AV and IT convergence, and are making products to make these installations easy and cost-effective. ■