

# Campus-Wide IP Television and VoIP

Residence Halls get TV and Telephone Makeover Using Ethernet-over-Coax from Coaxsys

By Ted Archer ■ Coaxsys

When Georgia State University students come to campus this fall, they will no longer have cable television or traditional telephones in their bedrooms and living areas. That's because GSU officials have decided to replace their cable with IPTV and their telephone service with Voice over Internet Protocol (VoIP).

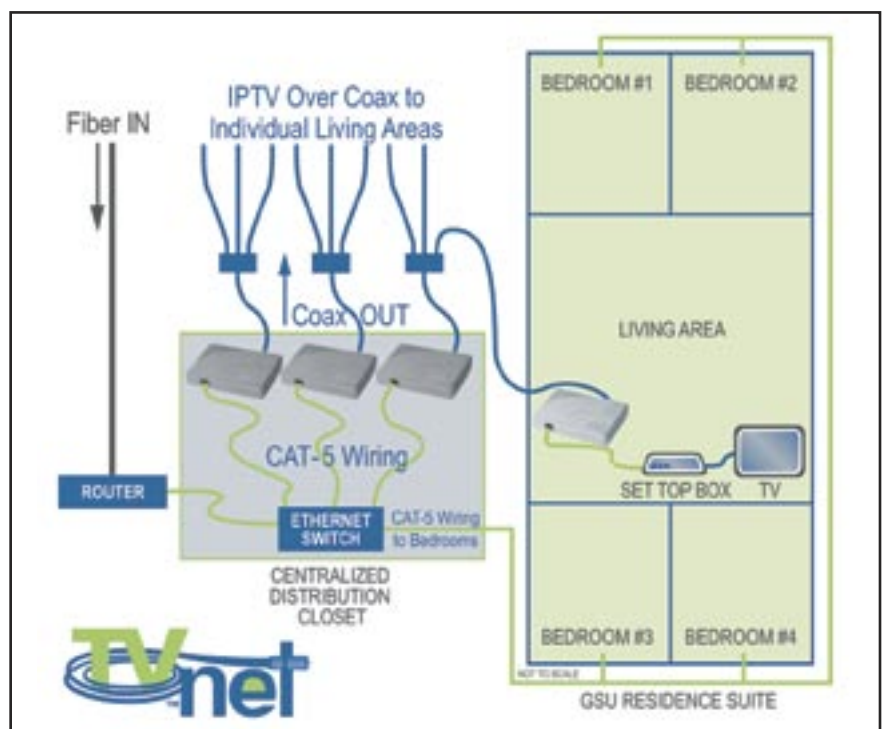
PurDigital Media, Inc. of Atlanta was awarded GSU's campus-wide TV and telephone contract. Starting this fall PurDigital will be making IP video, VoIP, and high-speed data service available to all of its residents. Students will see the same channels and same shows, so many of them won't even be aware their university is on the cutting edge.

PurDigital ran into a problem with the installation, however. IPTV normally requires that subscribers have CAT-5 Ethernet cabling near each TV source. At GSU, all student bedrooms have the necessary wiring. But the living areas have only traditional coaxial cable.

## IPTV Over Coax

PurDigital was faced with a problem: Either find a way to deliver IPTV over the cable company's coax, or rewire hundreds of living areas. PurDigital's CTO Jason Michaud found a cost-effective solution. California-based Coaxsys makes adapters that allow IPTV, high-speed Internet, and VoIP to travel over coax.

"We realized that the GSU living areas presented a bit of a problem for us," said Michaud. "We contemplated using some sort of a balun to transmit the Ethernet signal temporarily, but baluns don't really work reliably in this application. Some of



*PurDigital's GSU IPTV distribution diagram. Fiber comes from the network, CAT-5 plugs into Coaxsys' TVnet adapters, and the IPTV signal travels over coax to various living areas, where a TVnet adapter converts the signal from coax back to CAT-5.*

our crew proposed placing set-top-boxes in centralized closets and transmitting signals to the various common rooms, but that capability is just vaporware at this point, it simply doesn't exist. Coaxsys' TVnet adapters, however, do exist and work incredibly well. In fact, nothing else I've touched actually works over coax."

Armed with a functional technology, Michaud turned to designing an installation solution for the hundreds of Ethernet-over-coax TV deliveries. The task was different than PurDigital's typical instal-

lations and highlights some of the issues that come up in a college environment. Dormitories are not entirely like MDUs.

PurDigital is based in Atlanta and is a wholly owned subsidiary of Biltmore Communications. It services over sixty multiple dwelling units (MDUs), predominantly high-end hotels and apartment complexes in the Southeast. PurDigital was the first digital services provider in the United States to deliver data, video, voice, and public Wi-Fi services through the same fiber infrastructure over a common IP-based platform.

**Each TVnet Master's coaxial output is plugged into an eight-way splitter ...to create multiple connections per network. From there, the IPTV signal travels over the existing coax, where a TVnet adapter ...in each living room converts the signal back to CAT-5 cable.**

#### **It Starts With Fiber**

A traditional PurDigital MDU installation begins with a gigabit fiber Ethernet network. PurDigital captures the TV signal from its self-managed satellite dish and converts the signal for IP transmission over its fiber network. They then place a router in the building and run Ethernet cable to secondary distribution closets on each floor. Each distribution closet is used as a central hub for that



*PurDigital's IPTV distribution closet: Three Coaxsys' TVnet adapters receive the CAT-5 Ethernet feed, and the data is then distributed over coax through the back of the adapters.*

floor's TV service. A gigabit Ethernet switch is placed in the closet, with an Ethernet port reserved for each unit. Then, PurDigital uses existing CAT-5

wiring inside each residence to deliver three to five television drops per unit.

The situation at GSU would be identical were it not for the living areas. For these rooms, Michaud modified traditional MDU installations in order to work over coax.

GSU's apartment-style layout is somewhat different from a traditional college dorm. There is one living room for every four dorm rooms. Michaud took the typical MDU notion of a distribution closet and modified it to incorporate the Coaxsys TVnet adapters in order to run the IPTV signal over coax and into the living areas.

"It's the same logic as a typical MDU situation," Michaud noted. "The TVnet adapters don't have a one-to-one relationship between the master and target adapter. That enables us to have up to eight connections per TVnet network. So, we took the master adapters and placed a few of them in various centralized closets that are capable of servicing dozens of the common areas."

For the modified MDU installation, PurDigital designed spring-loaded shelving that holds three to eight TVnet Mas-

## **Why IPTV? A Georgia State Snapshot**

Georgia State University wanted more than just competitive pricing when it chose to bid its television and telephone contracts. University officials wanted to provide students with enhanced, next-generation services. In short, they wanted the capability of doing more than their traditional cable and telephone service offered.

With the PurDigital solution, students will for the first time have the option to purchase premium services such as HBO and Showtime. Additionally, they will have access to a true video-on-demand (VoD) library with over 500 hours of movies that can be instantly accessed. From a student's perspective, IPTV will mean more options and a more complete entertainment experience.

The benefits to the university, however, are even greater than the extra revenue. GSU will for the first time have the capability to distribute a virtually unlimited amount of GSU-generated content. Because IPTV does not limit the number of channels on which the school can offer its own programming, GSU will be able to offer students as much content as it cares to produce. That means that GSU could offer classes or specialized course-related content either as a supplement to classes or as a replacement for students who are unable to attend a particular class session.

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ter adapters. They then place one of these shelves in a centralized GSU residence hall closet in order to service an average of 25 living rooms. From a standard Ethernet switch, short runs of CAT-5 cable are plugged into one side of each TVnet adapter. Then, the IP signal comes out the other side of the adapter and is ready to travel on coax.

Since PurDigital wanted to use as many connections as possible per Master, each TVnet Master's coaxial output is plugged into an eight-way splitter in order to create multiple connections per network. From there, the IPTV signal travels over the existing coax to each living room, where a second TVnet adapter sits ready to convert the signal back to CAT-5 cable.

### **Splitting The Signal**

Adam Powers, Coaxsys CTO, initially expressed a bit of surprise at the creative solution: "When PurDigital approached us with the idea, we were intrigued but knew it would take some engineering to make it work. We are excited that TVnet has proven to be a valuable and viable installation solution for MDUs."

Traditionally, Coaxsys' TVnet adapters have been deployed in private residences. The company, which makes the most widely deployed IPTV network, has been shipping its products mainly to independent Telcos that want to compete with cable and satellite providers. Not having to rewire homes makes the Telcos'

deployments more cost-effective.

But, the Master-Target adapter model that Coaxsys designed for individual homes has proven a valuable design for MDUs as well. "We originally designed the Master as the decision maker that would sit next to a subscriber's modem and distribute the IPTV, high-speed data, or VoIP over coax throughout a home," said Powers. "But, this same logic works just as well in an MDU environment: PurDigital realized that it can use a Master to service more than one end-user. This should cut their expenses and installation times considerably."

This cost savings is a considerable factor in PurDigital's decision to bid on any MDU contract. PurDigital estimates that companies can spend close to \$1000 for a typical fiber-to-the-home IPTV deployment. At that price, it is nearly impossible to recover the investment within an acceptable time period.

### **Lessons From MDUs**

PurDigital seeks to identify MDU deployments that can be achieved at 10 to 20 percent of the cost of more expensive installations. They avoid costly, higher-end equipment in favor of off-the-shelf equipment that meets performance standards. Michaud admits that they lose some potential business by being selective about the jobs they do, but he notes that the overall cost-benefit to their customers is considerable. In the multimillion dollar GSU deployment, PurDigital's total cost is less than \$400 per unit for both the IPTV and VoIP delivery. This enabled them to submit the winning bid to replace GSU's cable and telephone providers.

## **PurDigital's Off-the-Shelf Equipment for MDU Deployments**

Coaxsys' TVnet: IPTV Networking  
Myrio: Middleware  
i3: Set-top Box  
Transition Networks: Fiber Transceiver

Before deciding to complete the GSU dormitory project with TVnet adapters, the company put Coaxsys' technology to the test. "Coaxsys told us that the adapters could support up to eight TV connections per network and that the signal could travel up to 250 feet from adapter-to-adapter on the coax," said PurDigital's Michaud. "So, we tested by running five IP video feeds through one network with 500 feet of coax between connections. All of the video streams looked great for weeks on end."

### **Long Cable Runs**

When asked about PurDigital's 500-foot distances, Adam Powers chuckled and noted that Coaxsys is very conservative in its product specifications. "We've heard lots of stories about longer distances and more connections, which is great to hear from a marketing perspective," he said. "We don't typically push for installations that exceed these specifications, but the fact that PurDigital has identified an environment in which it works is impressive."

PurDigital has completed some high profile installations at prominent midtown Atlanta locations, including the condominiums Eclipse, Metropolis, and Spire. It has also recently expanded to tackle projects in Nashville, Tampa, and Orlando. And, it will continue to pursue a number of conversion projects for partner Post Properties (NYSE: PPS).

Coaxsys is in the process of licensing its technology to set-top box and semiconductor companies. "In the very near future," said Powers, "companies like PurDigital will have TVnet available to them in other products; the ability to transport Ethernet over coax will be integrated into products that they already use in installations." Coaxsys officials say that the new generation of TVnet products is compatible with cable and satellite television as well, which means that subscribers who wish to maintain their current TV service can use the technology for high-speed in-home data and voice networking. ■

### **About the Author**

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