

Breaking the Broadband Bottleneck with Next-Gen In-Home Structured Cabling

Attention to detail – network layout, labeling and color-coding – vastly improves serviceability and reliability at little extra cost.

By Mark Hawley ■ Telect, Inc.

When Art Silva and his family remodeled their California home, they addressed in-home media distribution and management as well. The problem Silva faced was one to which more and more homeowners can relate.

“Like most people, I had a tangled mess of cables behind our home office desk, a mess that always frustrated me when troubleshooting network problems,” he says. “My cables were all the same color, so I had to resort to tape labels for identification.”

Video distribution presented a similar challenge, Silva says, describing “a ganged set of video splitters sending video cables in every direction.”

After a little research, Silva found the solution he needed: a home structured cabling system. Rather than using miscellaneous products to address individual media distribution challenges, he handled all of the problems with a unified home structured cabling system, following many of the same practices found in larger communications networks, only on a smaller scale.

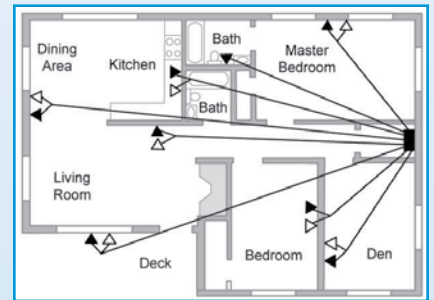
“All that cable clutter I experienced before is neatly managed behind a distribution cabinet,” he says. “And the system’s modular design will allow me to tailor my telephone, video and networking needs to our specific requirements.”

Ultimately, next-generation-style structured cabling systems for the home will become as standard as breaker boxes

for power distribution; today, they’re necessary for new homes and remodels as network topologies evolve, consumer demands increase and more bandwidth continues to be delivered everywhere.

BROADBAND STOPS AT THE HOME

Today’s network architectures are capable of delivering high-bandwidth services to the home. But once the high



Example of a “star” network topology in a residence using “home runs” from the structured cabling panel to each outlet.



Simple features such as color coding of ports help make voice, video and data deployment in a home easier.

data rates get there, can the home handle the traffic? In older homes, old-style telco-based wiring simply isn’t up to the challenge. Basic twisted pair cannot consistently deliver the services end users are coming to expect.

What’s more, the home wiring architecture typically in place isn’t conducive to delivering multiple services to multiple rooms – for example, if the homeowner wants on-demand video and high-speed Internet in more than one room, this usually requires rewiring, unsightly add-ons, or other work-around solutions.

From the perspective of the developer and, ultimately, the service provider, one of the main challenges of home wiring for today’s services is that it is difficult to deploy uniform, repeatable systems. Most available low-voltage wiring solutions involve separate components and



Closeup of the internal connectivity in a structured cabling panel. Color-coded ports and patch cords help to simplify installation and maintenance. Basic cable management ties keep the panel orderly and simple to access.

products from a variety of vendors. The result is a “mix-and-match” deployment that does not easily lend itself to repetition in multiple homes.

The resulting frustrations are obvious. For the homeowner, the options are either lower-quality service or ugly, difficult-to-manage rewiring. For the developer, home builder or system installer, learning a new system with each installation consumes time, effort and, therefore, money. Service providers are faced with troubleshooting multiple

types of systems with no uniformity to streamline their efforts.

Thus, a primary objective should be to establish high-quality, highly repeatable home structured cabling systems and solutions that are also cost-effective. Cost-effectiveness includes everything from capital expenditure to initial installation, service turn-up, and ongoing usage and maintenance.

CAT 5 IN TODAY'S HOMES

As far back as 1997, the FCC recommended Category 5 cabling as the most effective solution for home wiring. Given the continuing growth of online and on-demand services, and the corresponding increase in required bandwidth, the need for Cat 5 in the home is stronger than ever.

Today’s new homes simply need to be Cat 5 wired for triple-play communications, not just to handle high bandwidth, but also because it adds significantly to a home’s marketability.

“We’re not really talking about the ‘home of the future’ anymore,” says Jeremy Gallagher, a systems engineering manager who has dealt with cabling installations from the central office to the home. “The ability to route, deliver and manage high-quality triple-play voice, video and data throughout the home is becoming a given for today’s new builds



A perforated door protects components in the structured cabling panel while also enabling passive cooling.

and, going forward, will be assumed to be a part of homes in future sales.”



A fully installed home structured cabling panel. Note the space in the lower half of the panel for routers and other active equipment.



Module “carriers” inside the structured cabling panel pivot for simple installation and wire connection.



In a well-designed structured cabling panel, ports are easily accessible for additions, changes and maintenance.

The basic architecture for intelligent, well-managed home communications wiring starts with a central distribution point and continues to multifunctional outlets in each room. Each outlet has its own individual “home run” cabling extending back to the central distribution panel.

Inside the central distribution panel, the architecture is simple as well. Service provider demarcation occurs on one side of a configurable connectivity area, which, ideally, is customizable through a modular design. Provider inputs interface with splitters, which then deliver signals to multiple Cat 5e and RF video ports on the front of connectivity modules. The back side of these connectivity modules connect directly (via cable runs) to wall outlets in a “star” network architecture.

This varies significantly from the daisy-chain architectures of old-style low-voltage home wiring. Not only is the wiring platform itself an upgrade, with Cat 5 cabling handling much greater bandwidth compared to old in-home telco wiring, but the home network architecture lends itself to faster and simpler troubleshooting, maintenance and upgrades.

THE SOLUTION: A COMMON, REPEATABLE SYSTEM

The crucial step is to develop a system for approaching homes that can be repeated, is universally applicable and, ultimately, is easy to use.

Many home structured cabling products exist today – individual voice bridges, data components, physical cabling and more are all readily available. Very few of these products, however, are part of a total, unified system. The results are not pretty – patchwork wiring to address upgrades, incompatible components that require work-arounds, insufficient cable management that creates tangled wiring and unsightly masses of cable are just a few of the problems that are prevalent in many homes.

For home builders and installers, this methodology and product set presents several problems. First, on-site staff typically must relearn at least a portion of the installation process with each home. This clearly increases the time required to install a home wiring system, while also creating greater opportunity for mistakes.

In the long run, those mistakes will impact the homeowner’s usage and the service provider will have to fix them, so anything it can do to minimize these situations from the beginning is a significant plus.

Providers are not typically on site during installation, so working with a prespecified total solution that pulls from common parts helps ensure that the end result is indeed what the provider desires. Fewer decisions will be required on site, which not only helps accelerate and simplify the installation, but also helps prevent “surprises” that a service provider might discover in future troubleshooting efforts at the home.

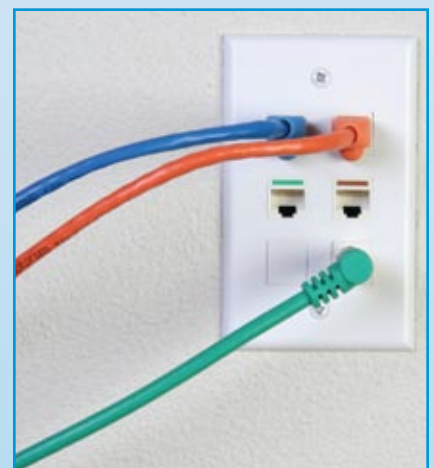
A significant challenge that providers face today is communicating on a regional basis with different installers. A common system, with common parts and common configurations, greatly helps to minimize this challenge. If the home structured cabling solution is truly repeatable and easy to use, ongoing communication and education between provider and installers will be minimal after initial training.

“The practice of uniformity is absolutely critical – and commonplace – in the telecom and enterprise worlds,” says Telect President and CEO Wayne Williams. “Why shouldn’t it be a part of home networks – especially given the emphasis being placed on in-home services with home offices, advanced video and data capabilities and other high-bandwidth applications?”

Uniform labeling should be a requirement. A glance at the circuit breaker boxes in different homes throughout a neighborhood is all it takes to realize that there is a multitude of ways to label power circuits. The same is true for structured cabling. Just as it would be much easier to locate power terminations in homes if all vendors incorporated the same labeling system, it would be easier to locate communications outlets if all structured cabling vendors did the same.

Old platforms used for home structured cabling simply do not have a common labeling system. The results vary based on the individual installer or homeowner, which increases installation time and impedes prompt troubleshooting in the future.

When the structured cabling system incorporates a clear designation and labeling system *integrated* into individual components, all of these issues are alleviated. All it takes is simple color coding (for voice, video or data) and numerical designation (sequencing of individual wall outlets) to create a system that’s



Multifunctional outlets enable the delivery of voice, video and data to a single outlet in a room.



Example of “home run” wiring in the studs of a wall. This approach helps to ensure maximum bandwidth and ongoing reliability.

uniform for installation, troubleshooting and homeowner use.

“If the end user can’t figure it out, it’s a truck roll,” Gallagher says. “Structured cabling doesn’t have to be overly complicated. The homeowner should have at least a reasonable chance of troubleshooting any problems, or making adjustments to distribution of services to locations throughout their home.”

Once a structured cabling system is installed, it’s likely never to be touched by the homeowner. If the system is designed effectively and installed properly, most end users will not need to access the structured cabling panel or change any of the distribution components.

However, if future services, remodeling projects, or changes in rooms necessitate changes to the structured cabling system, these modifications should be as simple to accomplish as possible. For example, if a homeowner needs to reroute data distribution from one room to another, this should be a simple matter of changing patch cord cross-connections within the panel.

The key here is knowing what media are being delivered to what location in the home. For example, if the homeowner currently has Internet service in a child’s bedroom but wants to temporarily stop it, the end user need only find the appropriate port in the panel and

disconnect the patch cord. In the system detailed in photographs here, the number for the wall outlet is on the actual wall outlet, so the homeowner would unplug the Cat 5e patch cord to the appropriate blue-labeled port in the panel. (This example is actually more complicated to explain than to perform.)

Again, the benefits here are broad, particularly for the service provider:

- More troubleshooting can take place remotely if the structured cabling system is uniform across multiple locations – common problems with common answers can be handled without calling in the field technician;
- With a simple, clear labeling system, end users are more likely to understand the distribution of voice, data and video throughout the home, lessening confusion and requiring less interaction with the provider;
- If minor adjustments are required, homeowners have a better chance of accomplishing them by themselves, minimizing the need for provider involvement; and
- A user-friendly system, understandable by the homeowner, will create more perceived value in how the provider is servicing the customer.

As a side note, with a well-designed system, once a cross-connection is made, terminations on the rear of the modules

are still accessible if more significant alterations are required later.

While an intelligently designed structured cabling system will not completely eliminate provider involvement with the end user (nor is that the ultimate goal), the cost of service calls is a legitimate issue faced by service providers today. Any step that addresses this issue in a positive manner must be viewed as desirable.

SIMPLE COMPONENTS, POSITIVE RESULTS

Now that network architectures are pushing broadband closer to the home, it’s a natural progression for the service provider to get involved with the home developer/builder to ensure that systems in place inside the home will support the broadband services that homeowners are bound to request. Fortunately, suppliers from the telecommunications industry are actively entering the home network solutions market, bringing the high-reliability standards that are a given in the telco world to home applications.

Well-designed home structured cabling solutions should manage every type of incoming and outgoing media through a single configurable panel, greatly simplifying installation by the home builder, system management by the provider, and usage by the homeowner. Today, these systems are no longer cost-prohibitive, particularly when the long view is taken. A Cat 5-based structured cabling network is no longer part of the “home of the future;” it’s what’s required today.

Now, Silva’s home is set for high-quality triple-play distribution.

“Using a true structured cabling system makes it easier to be successful with overall installation,” he says. “Simple features like color-coded ports and patch cords will make any troubleshooting or maintenance a lot easier.” **BBP**

About the Author

Mark Hawley, a 25-year veteran of the telecom industry, is Telect’s program manager for broadband solutions. He heads the firm’s outside plant, FTTx and in-home product, system, service and solution development efforts. Telect is a global provider of connectivity, power and equipment housing solutions for communications networks. See www.telect.com.