

10 good reasons to test and verify residential VDV installations

Application Note

You may have read the terms “VDV (voice/data/video) Applications” and “Smart Homes,” in the press lately. They refer to the growing convergence of computer and telephony technologies being wired into homes today. Behind the buzzwords lies the potential for

electrical contractors to expand business at a phenomenal rate.

There are any number of good reasons for residential electricians to add structured wiring capabilities to their portfolio. Below is a list of our top ten reasons why you should test and verify residential VDV installations.

1. Make more money.

VDV network systems are a huge innovation in the electrical industry, “the greatest invention since the air conditioner,” reports one trade publication. Home networks are increasingly commonplace and represent a great opportunity for residential cabling installers to provide a valuable service with excellent profit margins.

2. Make more money.

The market for VDV applications or “smart homes” is growing faster than electricians are offering the service. Get into the market early and gain market share.

3. Make more money.

VDV-equipped homes are bigger, higher-end construction projects requiring more overall electrical wiring. The larger and more sophisticated the construction, the more likely the design will incorporate structured cabling.

4. Make more money.

The cost of each structured residential local area network (LAN) wiring system averages about \$2,500. With full integration of the computer network, home automation and home entertainment the price tag can easily reach \$50,000.

5. Make more money.

According to Allied Business Intelligence, a technology research company, total revenue from structured wiring sales is projected to grow from \$70 million in 1998 to more than \$2 billion by 2004. And Parks Associates, a leading research firm, predicts that 40 percent of all new single-family households will include structured wiring by 2004. No doubt



increased by our daily reliance on the Web, the “Internet Generation” is driving – on a double-digit growth track – the emergence of high-speed home wiring to control voice, audio/video, and security applications.

6. Make more money.

The convergence of computers, home theater and other “smart” devices require VDV structured wiring. Construction of homes with these features tends to be much more recession-proof than other segments of the residential market. And there’s a growing market for retrofitting structured wiring into existing homes.

7. Make more money.

Industry analysts project that the number of people with broadband Internet access will skyrocket from 6 million in 2000 to 45 million or more by 2006. Consumers wanting broadband access will demand VDV structured wiring so they can take full advantage of the technology.

8. Make more money.

Conservative estimates are that over 16 million Americans classify themselves as telecommuters. VDV enables them to network their home office systems for greater productivity as well as share devices like printers among their personal and business computers.

9. Make more money.

Fluke Networks’ MicroTools, the perfect solution for testing and verifying VDV structured wiring installations, are less expensive than comparable commercial tools, so you need less investment to enter the market.

10. Did we mention you can make more money?

Fluke Networks’ MicroTools are easy to use, require minimal training and come with the innovative “Business in a Box,” a CD guide to getting started and building a successful VDV business, so you and your crew are up and running quickly – and profitably.

The how of VDV installation

Now that you know why you should add VDV capabilities to your business, you need to know how. Data cabling requires more than the old “install and forget” methodology. Installers and contractors now must be “home networking professionals” who are expected to not only install, but verify and, in some cases, “certify” them as well. Fluke Networks is coming to the aid of electrical contractors and installers with the tools and training needed to support the boom in residential retrofits and new construction.

The unique nature of the home structured wiring market in contrast to the commercial environment is that the applications must be more versatile to encompass a myriad of low-voltage home electronic controls. Whereas commercial cabling is data and voice intensive, residential cabling also encompasses audio and video applications. To sufficiently provide these services a host of different types of cabling are needed. Cable types for residential installations can include Category 3 or 5e UTP for voice and Category 5e UTP for voice and data. Coax is required for home theaters, security cameras, and cable modems.

Data communications

Residential data communications cabling is typically 4-pair 100-ohm twisted pair cabling running from the network interface device (or NID, a wiring distribution panel located near the outside data access connection) to outlets positioned in rooms throughout the home. The homeowner may choose to connect a hub at the NID or simply connect directly to an outside Internet access service, depending upon the desired complexity of the home network.



In the past, home wiring was daisy chained, meaning a cable from a distribution box was pulled from one outlet to the next until the furthest outlet was reached and terminated. However, if one connection fails then all those beyond it fail. This won't cut it anymore with the high-speed data requirements of technology savvy homeowners. Today's preferred layout relies on “home runs,” dedicated cable runs to each outlet so that each functions independently.

When installing residential cabling and attaching data jacks, care must be taken to preserve proper twist ratios in the cable to minimize crosstalk. The cable should not be stretched or pulled around sharp corners, which could lead to signal degradation. When possible, data cabling should be routed away from cables carrying ac power to avoid noise coupling.

Meeting standards

Much work is already being done to standardize requirements for home cabling, often called SOHO (Small Office Home Office) cabling. In late 1999, the TIA/EIA published the TIA/EIA-570-A standard for residential telecommunications cabling, which encompasses products, installation practices and testing. It standardizes the requirements for new construction, additions and remodeled single and multi-tenant residential buildings for telecommunication services, including voice, data, video, multimedia, security, and home automation systems.

The TIA/EIA-570-A standard includes field test requirements for the cable and connecting hardware. Backbone testing includes continuity, shorts, crossed pairs, reversed pairs, split pairs and any other miswiring. The specific tests for the UTP cable and outlets include wire mapping, length, attenuation, and near-end crosstalk. Additional field tests where Category 5e is installed include power sum near-end crosstalk, power sum equal level far-end crosstalk and return loss. Proper testing is required to verify the cables' performance and to ensure that the installation meets evolving standards in this emerging market.

Verification vs. certification

Verification involves testing for functionality. Certification is much more stringent as it involves testing for performance to a pre-defined commercial standard.

"In commercial cabling, standards are solidly in place for the testing and certification of structured cabling systems," states Mark Johnston, copper marketing and standards manager for Fluke Networks. "Business systems are expected to place high demands on installed cabling. Such networks are 'certified' to meet standards, whereas, in contrast, most home cabling systems are verified," he adds.

To certify a Category 5e cable, thousands of measurements are taken and processed in complex formulas to derive a pass/fail result. These measurements test for crosstalk, far end crosstalk, wiremap, length, delay, skew, and return loss. "Verification, on the other hand, does not attempt to measure the information-carrying capacity of the link," explains Johnston.

Fluke Networks' MicroTools

Fluke Networks' MicroTools line is the first cost-effective family of field testers developed specifically for verifying and troubleshooting residential structured cabling. The MicroScanner Pro, a network cable verification tool, measures length, verifies wiremap and tests both coaxial and UTP cabling without having to use external adapters. For troubleshooting, it can identify and locate opens, shorts and crossed split pairs. The MicroScanner Pro's active network identification feature allows the installer to determine if a network tap is operating, and at what speed: 10 Mbps, 100 Mbps or 10/100 Ethernet. It can also identify each room's drop and outlets from the wiring distribution panel.

To address other fundamental diagnostic needs, Fluke Networks offers the MicroProbe™, MicroMapper™ and MicroNetBlink™. The MicroProbe is an inductive probe used for locating cables hidden in floors, ceilings, walls and cable bundles. This is especially useful when rewiring existing homes with newer cables. The MicroMapper is a compact handheld tester that verifies the continuity of a local area network's twisted pair cabling in one easy step. MicroNetBlink identifies network ports and cables by flashing hub and switch port lights for immediate port location in a wiring closet. MicroNetBlink also works as a toner in conjunction with the MicroProbe or any other inductive probe.

Certification tools

Fluke Networks provides a suite of certification tools both for the residential and commercial markets. They include the DSP-4000 Series of digital cable analyzers, which provide fast, accurate testing of high-performance Cat 5e, Cat 6 and fiber optic cabling; the OMNIScanner2®, providing advanced certification for Cat 5/5e/6/7 cabling links to 300 MHz using an extendible digital platform that ensures unprecedented Level III+ accuracy; and CableManager™ Software, the powerful Windows®-based software, that helps organize, edit, print, save or archive job site test results.

Because of the importance of educating electrical contractors on installation and testing procedures, Fluke Networks has introduced "Business in a Box," which includes a MicroScanner Pro and a training package developed specifically to help new installers of residential and light commercial cabling get started. It is available through your local Fluke/Fluke Networks resellers.

Residential VDV networks are increasingly commonplace and represent a great opportunity for residential cabling installers to provide an additional service with excellent profit margins. Basic testing to verify that the residential cabling is installed correctly will ensure customer satisfaction and help grow new business.

Fluke. *Keeping your world up and running.*

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