

# Whole house audio/video signal distribution and control over structured wiring

## ***Abstract***

This article describes a novel approach to whole house audio/video signal distribution and control over structured wiring. A brief review of the traditional approach is presented and its problems and limitations are identified. A novel approach that provides higher performance and greater flexibility is described in detail. The benefits and advantages of this novel approach are also explained.

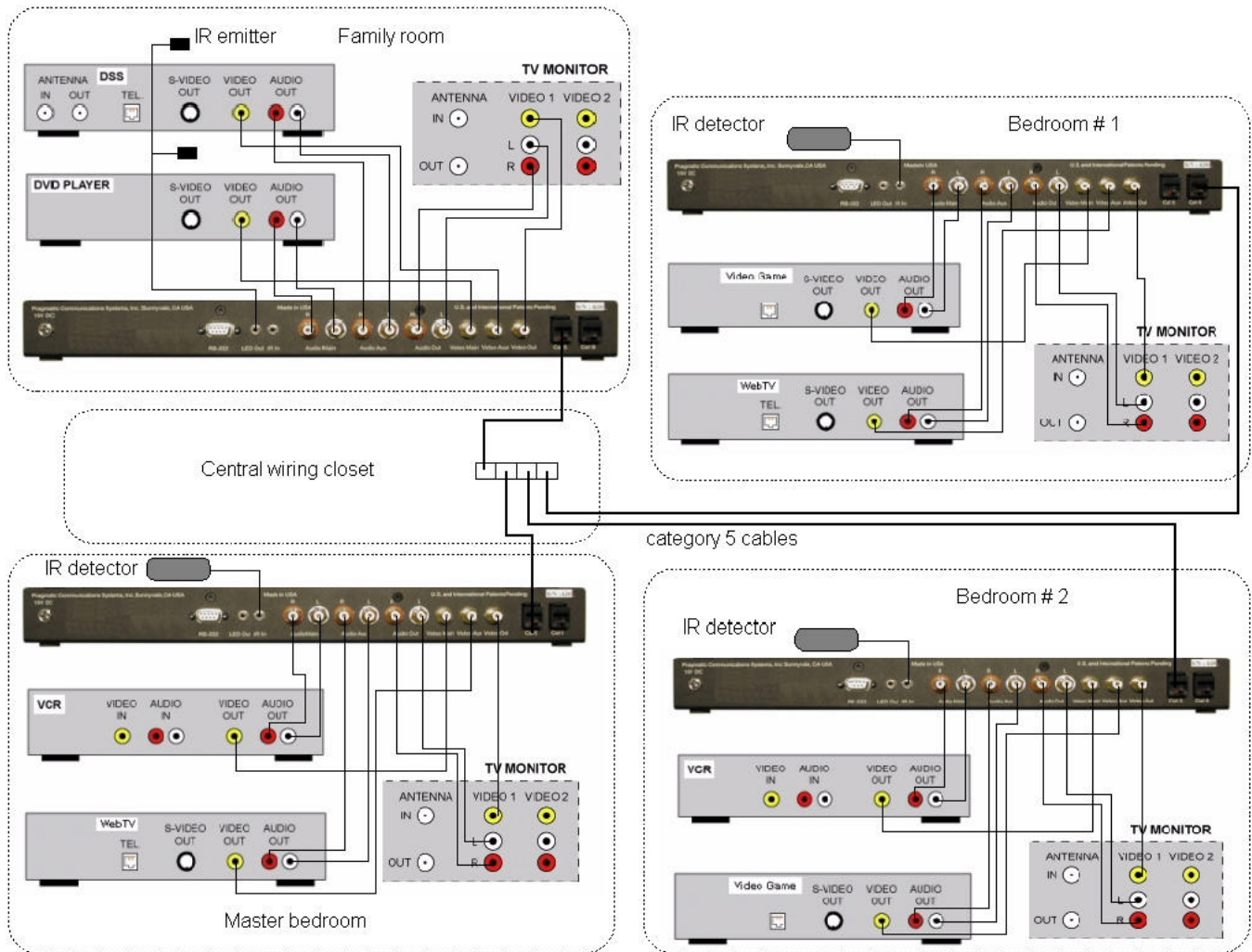
## ***Introduction***

In recent years, the impetus to future-proof homes has motivated the building industry to add structured wiring to new homes all across the country. Typically these new structured wired homes have at least two category 5 (cat5) cables and two RG6 coaxial cables run from various rooms in the house to a central location. In most cases these wires are unused except for the RG6 that distributes the cable or antenna TV signals to various rooms from a central location and usually the cat5 cable is used to distribute telephone signals to various rooms. Audio-visual entertainment has become an integral part of life and living, especially since the advent of DSS or other satellite video systems and DVD players or DVD ROM in personal computers. One way to bring the entertainment to every room in the home is to have a satellite receiver or a DVD player in every room. This is not a very practical solution since from one satellite antenna typically only two receivers can be connected. More antennas, more receivers and more monthly subscription for the same service would be required to have DSS receivers in every room. In reality only one or two channels may be displayed in the house at any given time. A similar situation arises with having a DVD player in every room, but chasing the DVD disc around the house can be a nightmare. Keeping the remote control from getting lost is also a real challenge in most households.

In the old days, when VCRs were the only source of audio-visual entertainment, it was easy to take the video and audio signals from the VCR, modulate them on an unused UHF TV or cable channel and send them to all the rooms in the house. This yielded an average broadcast TV quality signal to all the rooms. Channel modulating the video and audio signals from a DVD or DSS destroys the resolution and fidelity of the signals. It reduces the quality of these high performance and high resolution signals to that of television signals in early 1960s. Also, remote control becomes a problem because IR signals do not travel through walls in the home. For decades, installers have used injectors, combiners, filters, modulators, attenuators, amplifiers, splitters, isolators, hum eliminators, etc. to distribute modulated video signals and remote control around the home on RG6 cables! Despite all the efforts by the experts, the signal quality is diminished. A novel approach that eliminates the need for channel modulators and other archaic paraphernalia yet maintains the same high signal quality to all the rooms from a DVD or DSS is described in the following section. Other benefits of this technical advancement include easy IR remote signal distribution and integration with local sources such as VCR, video games and WebTV appliances.

## Design overview

The rapid growth in data communications and networking industry over the last two decades has led to the availability of very high performance and inexpensive category 5 twisted pair cables. The phenomenal growth and development in the semiconductors and integrated circuit technology has yielded very powerful audio and video signal processing circuits. These advances in technologies have culminated in the design of CATS™ (Complete Audio/Video Transmission System) based on a proprietary and patent pending BDSP™ technology for distribution of high quality audio/video signals over category 5 unshielded twisted pair cables.



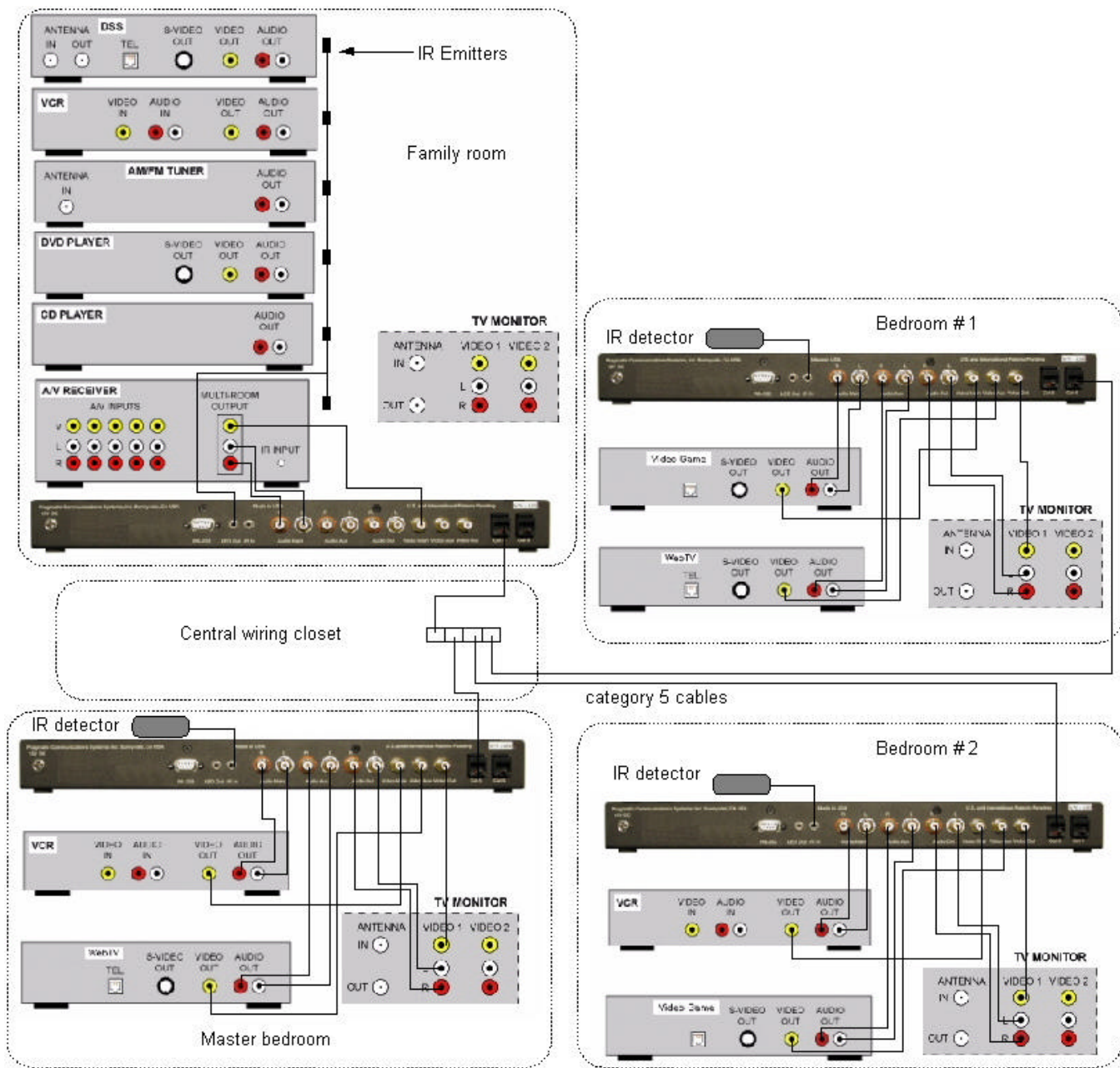
**Figure 1**

A basic application to distribute audio and video signals from DSS and DVD player in the family room to multiple rooms in the house on structured wiring is shown in Figure 1. In this example, the audio and video signals from DVD player and DSS receiver are connected to the CATS™ encoder/transmitter and put on the category 5 cables. The local output of the CATS™ unit is connected to the TV monitor in the family room. The family room is able to select either one of the two inputs for local viewing. The category

5 cable from the transmitter is connected to a distribution panel in the central wiring location. From the central location, all the rooms get a category 5 cable to the CATS™ decoder/receiver unit that is connected to the local monitor. In the remote rooms, the user has a choice to view and control the DSS or DVD player in the family room or switch to the local A/V inputs such as the VCR, WebTV or video game player. When the IR remote control is pressed in the remote room, the signal travels back on the same category 5 cable to the family room CATS™ unit. An IR flasher connected to the CATS™ transmitter/encoder unit will repeat the commands to the DSS or DVD player. This setup creates a simple two-zone system where the first zone is the family room and the second zone is the rest of the house. The family room could be viewing the DSS while the rest of the house is viewing the DVD player. Since there is a pre-amplifier built into the receiving CATS™ units, each room has the ability to set independent audio level. The audio and video quality of the signal in each room is exactly the same as the family room without any degradation. It is as if the DVD or DSS was directly connected in each room.

A more elaborate set-up is shown in Figure 2. Here all the sources such as a DVD, VCR, DSS, AM/FM Tuner, CD player, etc. are connected to an integrated A/V receiver. Most high-end A/V receivers have a multi-source or multi-room output, which is independent of the main A/V outputs. When the multi-room output of the receiver is connected to the CATS™ transmitter input, any room in the house is able to access and control the sources connected to the A/V receiver. Here again it is a two-zone system where the main zone is the family room and it can access any source component connected to the integrated A/V receiver. The second zone is all the other rooms in the house which can see the same source as the family room or a different source from the multi-room output of the A/V receiver.

A true high-performance multi-source, multi-zone set up can also be created using individual CATS™ transmitters for each source and replacing the distribution panel in the central wiring closet with a CATS™ matrix router. A complete 8 sources, 8 zones system can be achieved on structured wiring with only the category 5 cables!



**Figure 2**

**Conclusion**

CATS™ represents a major breakthrough in high quality audio/video signal distribution and control on category 5 cables. It solves problems that have plagued traditional methods for over four decades. The superior signal quality level, the versatility of the system, and the complete avoidance of problems which plague traditional method, make CATS™ the best overall approach to whole house audio/video signal distribution.

CATS™ has been successfully installed in a variety of commercial applications including enhanced video conferencing setups in corporate buildings, media retrieval systems in schools and numerous residential systems for multi-source multi-zone systems.

### ***About the Company***

Pragmatic Communications Systems, Inc., is a Silicon valley company established in 1994 to design, develop, and produce a variety of innovative products for wireless audio, video, and data communications. The majority of company's products until 1997 were primarily designed for industrial and commercial applications. The success of these products has led to a strong and dynamic technology base, which has been applied to new generation of products such as CATS™ and others like the DMS™, TrueMusic™ wireless hi-fi system and TrueView™ wireless video system. The company's philosophy is to use its technologies to solve problems that have gone unresolved for decades.

### ***For more information:***

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### ***Author's biography***

Prasanna M. Shah is the Chief Pragmatist and Thinker at Pragmatic Communications Systems, Inc. He earned his M.S. degree in Electrical Engineering from Stanford University and B.S. degree in Electrical Engineering from Santa Clara University, Santa Clara, CA. He has more than two decades of experience working on semiconductors for analog and digital audio, video, cellular telephones, wireless communications, fiber optic communications, data communications, data acquisition and industrial controls in the Silicon Valley. He holds one patent on power line communications and several patents pending on audio, video and wireless multimedia systems. An avid audiophile and music lover, in his free time, he likes to apply his pragmatic thinking to solve complex problems.

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