

Domestic Integrated AV & Data Installation - Wiring Systems

The trend towards integrated control and signal distribution systems in the home is increasing. This leads to much conflicting advice and confusion over the systems approach to be adopted. We attempt here to provide a general overview of the applications you might wish to include in an initial system and those which may be required in the future, accordingly building into your system now an infrastructure which will have a degree of future proofing is considered a sensible and cost effective approach.

Integrated home systems may include all or any of the following:-

- Video sources to various rooms using display equipment from TFT, Plasma, Projection and PC connectivity.
- Audio distribution of CD based music, digital radio, digital TV broadcasts from terrestrial and satellite broadcasters, cable and increasingly over the internet.
- Data connections for the use of home networked computers access to the internet through broadband, ISDN and satellite
- Security control of cameras, recording devices and access control.
- Control of lighting, heating and other domestic services (cookers, washing machines and more)

The central core of any system is not the nature of the equipment used but how that equipment is connected to a central command and control centre. The cabling systems employed will determine whether future advances in technology are going to be available to the house owner without recourse to expensive re-wiring or installation of new control systems.

The first principle is to use a central hub and send a set of cables to each of the destinations - sending to a single destination and then looping or splicing to the next one brings into play a multitude of future problems of connectivity and reliability ; a single fault at any given point will affect everything further down that chain. A central hub ensures there is one point of reference for fault location and that each distribution point is not reliant on another's operation.

Video connectivity at a single point is often via scart, RF, DVI or similar connection. Using a central video source; be this DVD, satellite box or other video player, transmission via any of the above cables causes problems of bulk, cost and loss of signal over a long run. Video connectivity, when distributed throughout a single dwelling, is best served using high quality co-ax cable such as RG59/u runs as a composite signal. For the ultimate video connectivity, signals should be sent component (YUV) but this requires 3 cables to each point of use.

Data transmission for computer connectivity to the internet is best achieved using a Cat5e cable system back to a central router/hub. This enables all computers to share internet access for web, email and outside communications.

Telephone systems should also be connected using another Cat5e cable network which ensures systems are again routed back to a central point and then to the outside world.

Audio distribution from a central CD server to each room using digital cable running line level signals to local amplifier speakers will enable any one of 4 million channels to be selected: classical music for the parents, heavy rock to Kevin the Teenager and Steps to the Little Princess with good old Terry Wogan to the kitchen. Additionally it may be preferable to run the amplification centrally using a zone amplifier: this can then send the audio direct to the speakers at the desired destination

Should you wish to distribute computer video signals this can be done using VGA cable which is bulky and expensive. However, connectivity may be better achieved using a Cat5e network which enables data and audio to be encoded and sent down a much thinner and cheaper cable to each destination point.

Fibre optics may be used but have serious cost implications and physically for multiple channels the cables have minimum bend radii which often are difficult to achieve in a domestic environment. The advantage is that future connectivity is assured, but will require third party trained personnel for set-up and maintenance thus adding to potential costs.

Wireless networks are feasible though despite claims to the contrary are not 100% secure so putting your security system or sensitive computer connection on a wireless connection may provide flexibility but does expose a weak link in the system which the determined could break into.

To provide maximum flexibility it is a good idea to run a cable from the central command point to each room where control is required for each of the following elements:-

- 1 x RG59/u for video - transmit
- 1 x RG59/u or 1 x Cat5e for video receive from security CCTV
- 1 x Cat5e for computer network
- 1 x cat5e for telephone (four lines possible per cable)
- 1 x cat5E as a control wire (increasingly this will become a common control protocol for lighting, heating and new equipment - fridges, cookers, washing machines will doubtless have PC chips within a few years, some already do)
- 1 x Cat5e for future expansion
- All cables to be bunched and sleeved enabling a single pull through at first fix
- Cables terminate in a recessed wall panel with the appropriate cable sockets.
- Cable runs to be pipe encased for future access.
- 1 x fish wire per run - separate to initial first fix bundle (enables future cables to be pulled through)
- In a two storey house cables are best run from ground floor to first floor and run through void between ground and first floor and then run up/ down walls to required points.
- Central command point should be located within the main fabric of the building this can be in a utility room, basement, a garage can be used but security may be an issue.

With this infrastructure in place the system may then be added to and configured without limit to the number or type of devices used, providing the room in question does have a patch panel.