



CEDIA™

DESIGNING INTEGRATED FUTURE-READY HOMES

A CPD course for specifiers





INTRODUCTION

CEDIA - the Custom Electronic Design and Installation Association is an organisation of experienced companies involved in the design and installation of electronic systems for the home. With over 3,500 members worldwide, and over 650 within EMEA (UK, Europe, Middle East, Russia, Africa and India), CEDIA offers a range of services to specifiers and end-users alike.

The homes you design may come with a 10-year guarantee of some sort, and they'll be used for much longer than that. CEDIA aims to make sure that they are useful throughout that period.

A lot can change in that time - just think back ten years. The past decade has seen the rapid growth of the internet - adopted far faster than any comparable technology, including the wireless and television. In addition, the use of e-mail,

smartphones, computer games and the like have changed the lives of many - not always for the better. High definition flatscreen TV displays and high speed internet connections are available, and people are spending more time at home with their friends and families. Many commuters, frustrated by transport problems, are trying to work from home instead of travelling. Security is increasingly important. As people invest more in the design of their houses and apartments, control over their domestic environment, whether lighting, heating or air conditioning, becomes a challenge.

Perhaps most importantly, we all need to work responsibly to safeguard the world's resources.

COURSE AIMS

CEDIA members work with specifiers to help homeowners get the most from their living environment. As you know, a variety of new regulations and standards, and the range of services required, means that specifying the 'electronic plumbing' in a home has become more difficult. Some years ago, a telephone point in the hall and a TV socket in the living room was about all people expected. Central heating was new to many, and two-way switching for the stair lighting was seen as a nice touch. How times have changed!

You won't learn everything today, but this course will help you understand the basics, so you can talk intelligently with the client and the other members of the design team. It will show you what is possible, describe some alternatives, and explain how to incorporate the various systems without detracting from your design. You'll have a good grasp of modern best-practice for low-voltage systems in the home, and feel more confident specifying these systems. The course will help build your vocabulary and you should discover some simple tips to help you get it right.

Most importantly you'll know who to ask if you need help in a particular area - this guide provides points of contact for detailed support and further assistance.

In many cases your local CEDIA member will be best placed to help, and they will be only too glad to do so.



ALL MIXED UP



Most people have digital TV of some sort and you will already appreciate that your TV-thing is mixed up with your Telephone-thing and your Data-thing. In fact, if you have satellite TV, your set-top box connects to a telephone line and your computer network so that the service provider can interrogate it to discover what you have watched (and ultimately send you a bill!). It also allows you to send e-mail, and watch OTT services such as iPlayer.

Now think of the wiring in a typical home. The telephone cable comes into the hall somewhere, and maybe loops on to a couple of rooms. The TV cable comes into the loft and runs down to the living room, and perhaps on to the kitchen and bedroom. As for data wiring...? Who knows. A typical home might have a loose extension cable run from the telephone socket to a spare bedroom where the computer and modem live. Can you make a phone call and be online at the same time?

MAKE SURE THE CABLING INFRASTRUCTURE IS RIGHT FOR THE HOME.



There are three problems with how a traditional home is wired.

The first is simple -

Quantity : There just aren't enough sockets for how people live today. Think of how the number of power outlets has grown over the years (when electricity was first available, people ran everything from the ceiling lamp fitting - until they were tripping over cables and blowing fuses all the time). More people in a family are doing more things that need a low-voltage connection - throughout the house.

Quality : If cables are 'daisy-chained' - run from one point to another - the signal quality deteriorates down the line. You've heard people say that drinking water in London has passed through 7 people before it gets to the tap - the quality depends on the quality of 'output' from the residents of Slough, Reading, Oxford etc! The same is true for the picture on your TV.

Flexibility : It is difficult to change the use of a socket, or communicate independently between rooms, unless cables run via a hub. The computer network in your office will almost certainly be Ethernet now - a star wired system, and not Token-Ring (an older daisy-chained system) for the same reason.

A star-wired system, with a common hub for all these services, makes a range of things possible. If you only take one thing away from the course, let it be this.



AN INTEGRATED HOME



Your clients have a range of requirements and expectations nowadays, not least to minimise clutter in their homes. It's possible - with good planning and a modest initial expenditure - to get rid of the 'wall-acne' of ugly plastic switchplates, thermostats and other controls and replace them with something more elegant. You can also provide for their changing lifestyle needs by planning the various home services correctly.

Integrating the different subsystems - lighting, HVAC (Heating, Ventilation and Air Conditioning), audio/video, security, telephone & data can make things easier and more useful. Your client could, for example, turn all the lights off automatically when they set the alarm (perhaps having them revert to a security mode that replays their normal usage to deter burglars). An entryphone at the door or gate could be answered from a normal phone, with the guest admitted by pushing a button on the telephone itself. Add a concealed miniature video camera (viewable on any TV) and you have a discreet, effective access-control system.

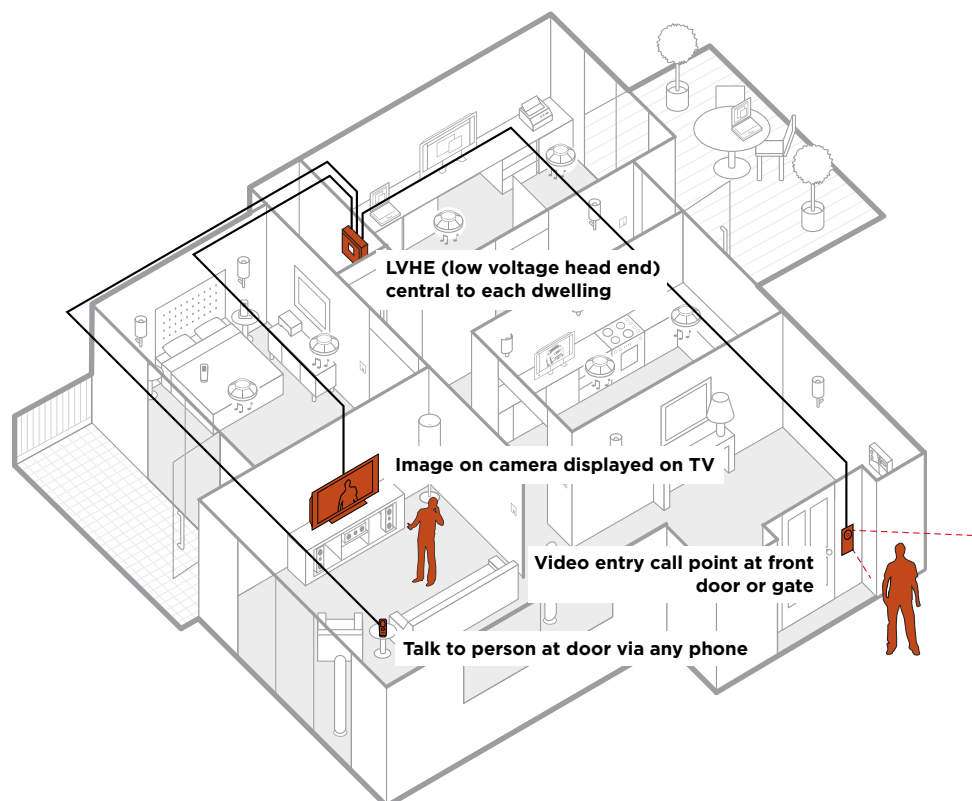


PROVIDE YOUR CLIENTS WITH TOTAL CONTROL OF THEIR HOMES THROUGH ONE EASY TO USE CONTROL SYSTEM.

The design of the lighting, as you know, plays a large part in how the house looks and feels. By adding some simple lighting-control equipment the client can create pathways of light through the house, or control a whole zone from a single location. They might, for example, want to look out at their beautiful garden from the funky new open-plan family kitchen/dining/living area - it's simple then to control the outside lighting from any switch location, or create a mood by pressing a single button as one enters the room. This adds drama, and makes it easier to enjoy the space to the full. The same concepts apply to the environmental controls for heating

and cooling - it's possible to use touchscreens, programmable to user preferences to heat just one area - not the whole house complying with Part L of Building Regulations. With around 50% of CO2 emissions from buildings alone, there are green reasons for planning this intelligently too.

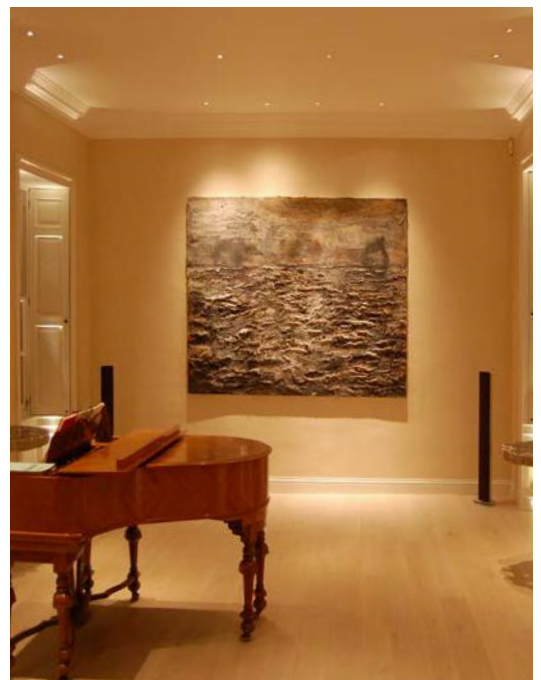
Much of the equipment in our homes can be controlled by Apps enabling simple control of many devices. Most of these devices for the Smart Home are in fact computers in disguise. Adding multiple data / computer connections to the home is key to the success of the new future-ready home.



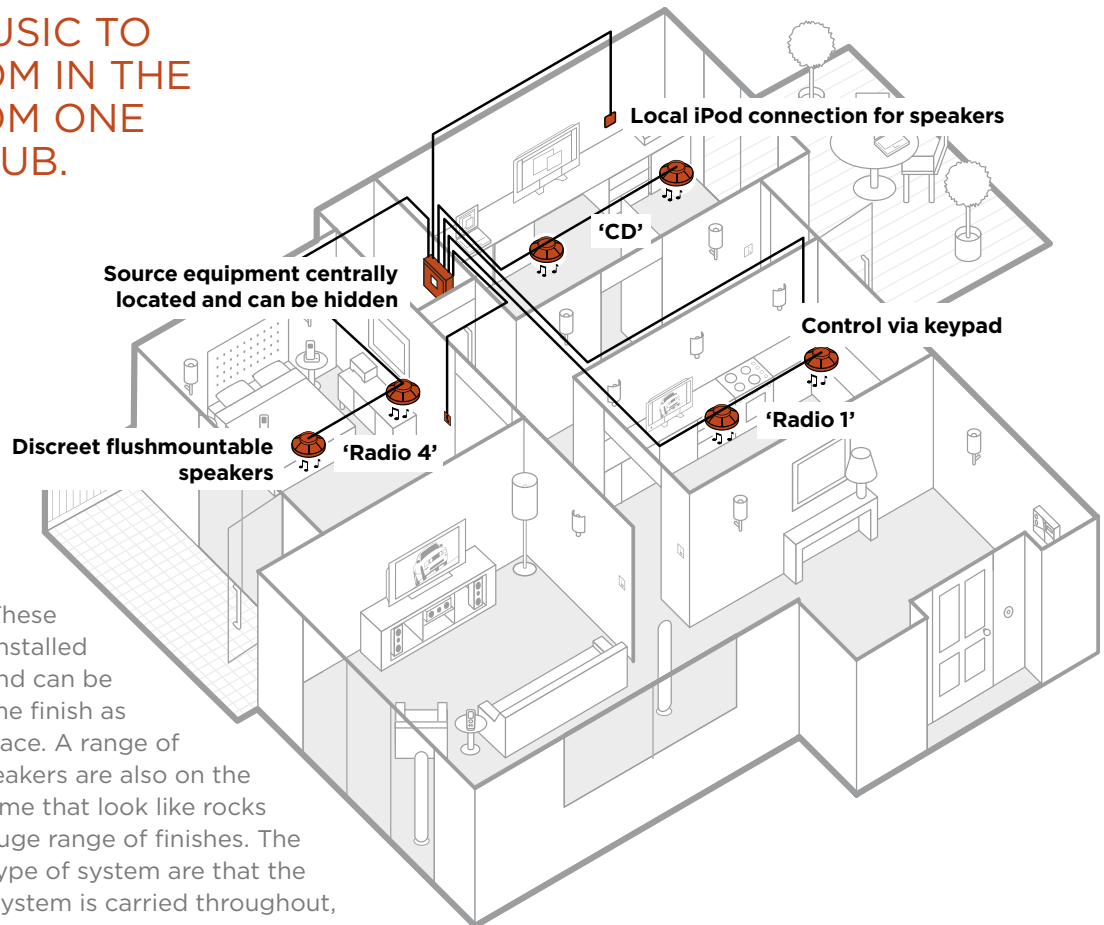
MUSIC



Many systems exist to allow your clients to listen to sound from a central system in more than one room. Most systems today offer the ability to select and control the source equipment from each room, and typically split the home into 'zones' so the user and their family can listen to different music in different rooms. The systems today can either be wired or wireless (wireless systems still require some network structure). The wiring topology of the various systems may differ slightly but most systems require cabling star-wired from a central equipment location - the AVHE or Audio Visual Head End where you will need to provide power outlets and TV/FM sockets, as well as adequate space and ventilation for the equipment itself.



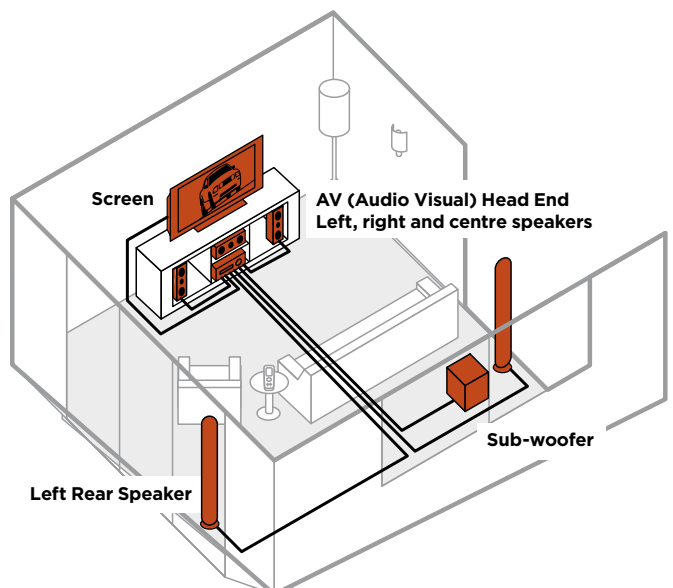
DELIVER MUSIC TO EVERY ROOM IN THE HOUSE FROM ONE CENTRAL HUB.



There are many excellent, discreet flush-mountable speakers available. These are designed to be installed in walls or ceilings and can be painted with the same finish as the surrounding surface. A range of IP-rated external speakers are also on the market, including some that look like rocks and planting - in a huge range of finishes. The advantages of this type of system are that the quality of the main system is carried throughout, and the client's home is free from the clutter of lots of mediocre mini-systems.

A centralised digital music service can be streamed to every wireless enabled device such as tablets or smartphones as well as playing on the main system.

It is generally the case that one room will be chosen as a family TV space or sometimes a dedicated cinema. Various technologies are available for the display side of things, including front and rear projection and various flatscreen plasma, LCD or LED TVs. You should take advice from a CEDIA specialist who will suggest options depending on the lighting, acoustics and other considerations. Surround sound for home cinema will need some dedicated equipment probably including 5, 6, or even 7 full-range loudspeakers and a subwoofer (for the low bass needed to generate some sound effects). Again, provided that the system is planned at an early stage, much of this can be built-in to leave a clean, uncluttered space.



TV

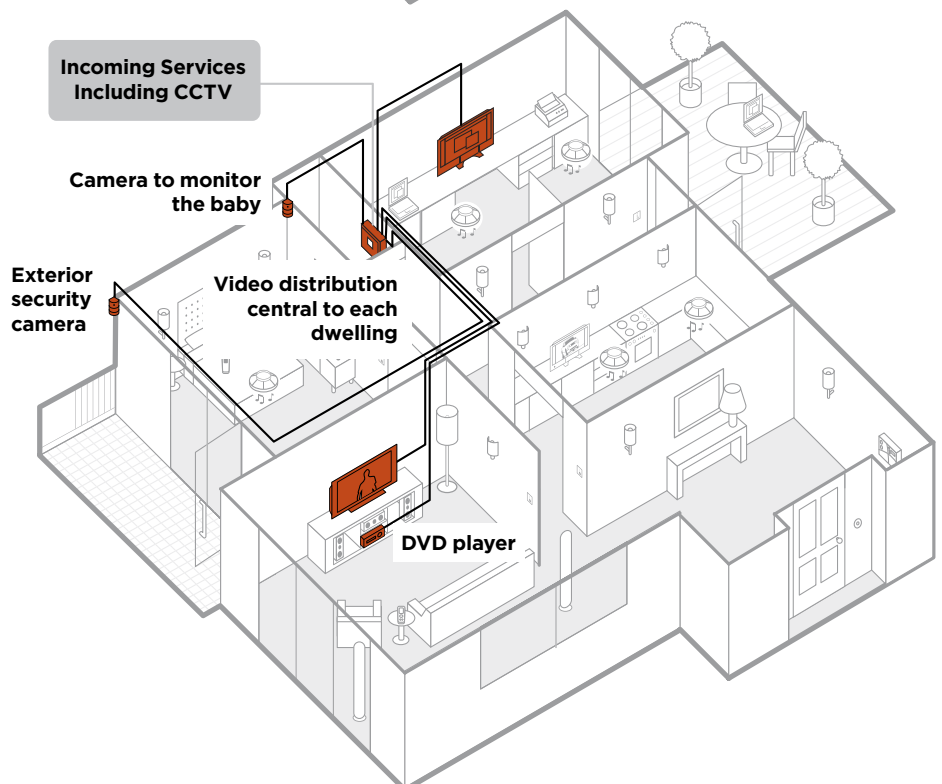
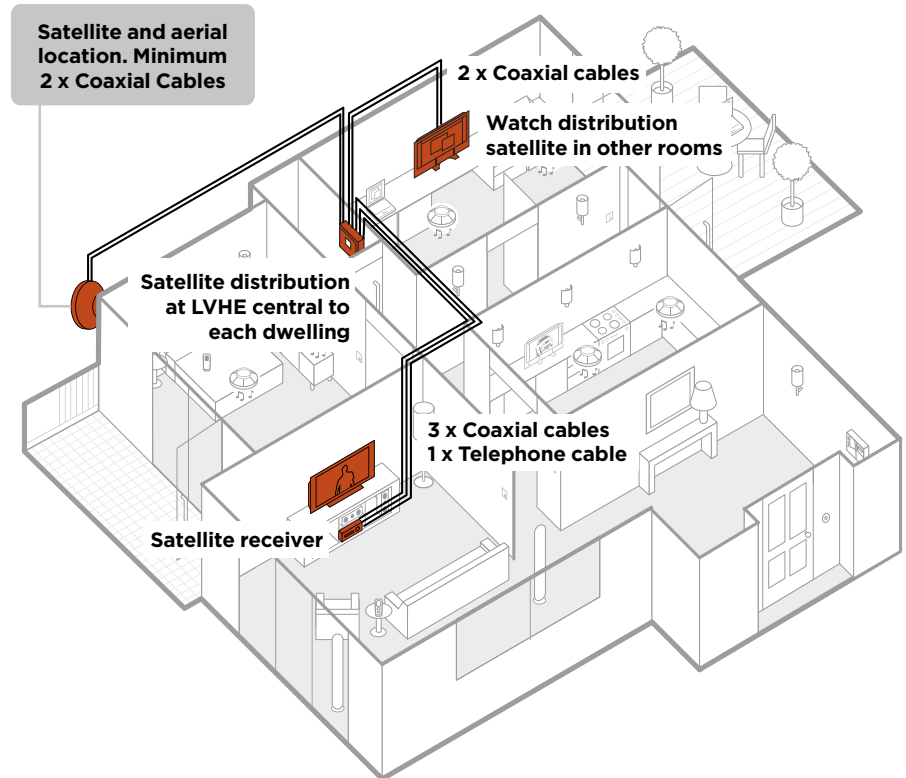
Modern TVs need both a coax cable and a computer cable. Digital Cable TV (CATV) and satellite both require a return path - a route for signals from the home back to the broadcaster. This is a pathway for your interactive use of the system - voting on talent shows, sending e-mail, requesting pay-per-view programming etc. In Cable TV systems this signal can travel back along the same wire that brings the pictures to your receiver or STB (set-top box). With satellite or digital terrestrial TV (DTT) some services are dependent upon a telephone connection to the STB. This can be an existing telephone line, and it allows the STB to connect as needed to pass on information regarding your account or to download content.



ACCESS TV, BLU-RAY, SECURITY CAMERA VIDEO AND MORE ON ANY SCREEN IN YOUR HOUSE.

With properly installed TV systems it is possible to watch something playing in one room (Blu-ray, satellite programme or streamed internet content perhaps) on other TVs in the house. These systems are called playback systems. Many of the multiroom audio/control systems allow control of the central source equipment, and some manufacturers and broadcasters offer infra-red accessories to allow users control of the system from a secondary location.

The TV broadcast world is changing at an amazing pace. As well as interactive, digital TV, we now have interactive teletext, widescreen broadcasts, high-definition broadcasts, video-on-demand systems, and many other innovations. It is difficult to predict exactly what will happen in the next ten years - a lot more content via the Internet is available, for example - but it is certain that all systems will require a well-specified star-wired cabling system, with twisted-pair (CAT5e/6) sockets co-located with coaxial (TV-type) outlets.



A SAFER HOME

There is an increasing need for intruder and fire detection systems - either to meet the requirements of insurance companies or to allow people to feel secure in their homes. As you know, there are building regulation requirements for the installation of basic smoke & heat detection equipment in new-build and refurbishment projects.

The Association of Chief Police Officers (ACPO) have issued a range of guidelines for these systems, and are increasingly concerned about police response to false alarms. Any system monitored via a 'Redcare' telephone connection must be installed and maintained by an approved company. There are two standards bodies - NSI (formerly NACOSS) and SSAIB. Approval is a long and difficult process for installers, and includes inspections of the company and its installations, as well as police vetting of staff and procedure.

Police response is only available to UK homeowners whose systems are designed to Grade 2 and give combined or sequential alarms, when connected to a central station via a Redcare monitored line.

Redcare is a BT service which sends an inaudible tone back and forth over an approved telephone connection to the home. The system still works if the homeowner is making a phone call (this stops a potential burglar tying up the line by calling in) and the monitoring station is immediately aware if the line has been cut as the Redcare equipment detects and flags the absence of the tone.



Integrate the security system with other electronic systems to create a safer, more secure and easier to control home.



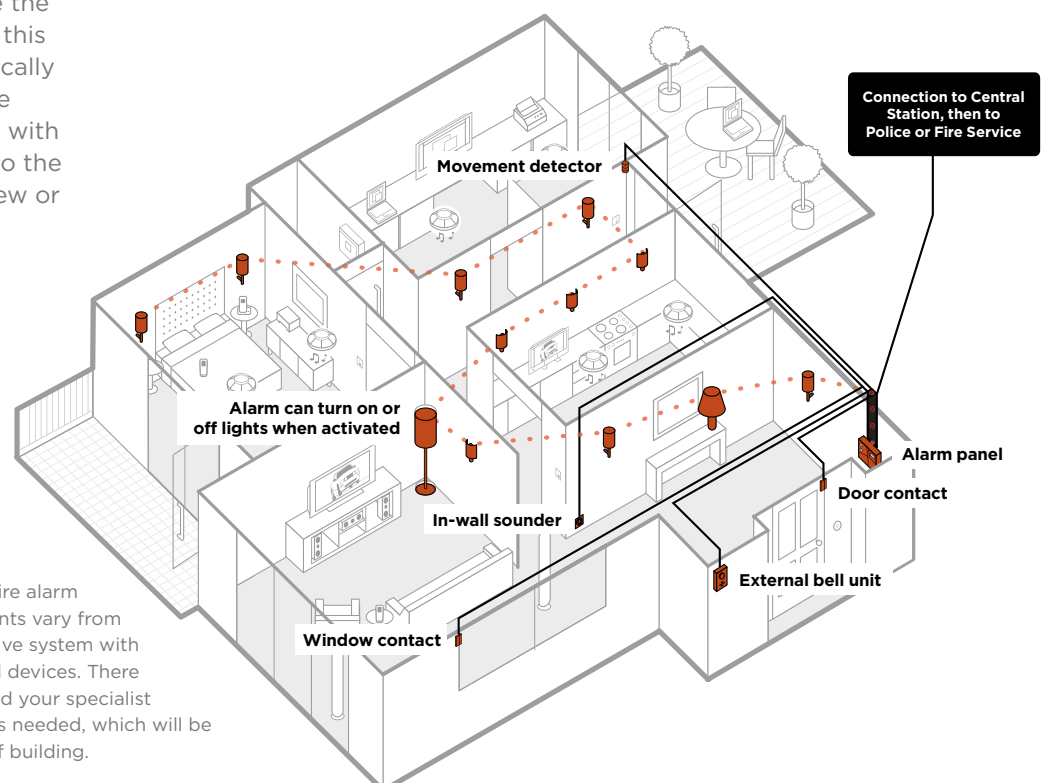
The monitoring station can also receive 'alarm events' via a dedicated dial-up device from some homes (known as a 'digital communicator') - it receives a range of information about the system, and can, for example, tell if the alarm at the property indicates an intruder or fire event, and alert the appropriate service*. The monitoring station will hold details of the homeowner and their keyholders, the installation company and the system itself.

To minimise police time wasted through false alarms, a 'double-knock' is required before an alarm event is passed on for response - this means that unauthorised movement must be detected twice in a specified time window. A door contact might send a signal after forced entry, for example, and a motion detector in the hallway might subsequently pick up activity in that space. The latest guidelines require the monitoring service to verify this by communicating electronically back to the house, and some detectors are even available with cameras and microphones so the monitoring company can view or hear the break in.

A range of reliable wire-free alarms systems are now available, ideal for retrofit installations, however not all of these systems will meet insurance company requirements so it is essential, therefore, that a specialist is consulted early during the design process. They will be able to advise on the suitability of different detectors - door contacts, vibration and motion sensors, break-glass detectors and the like - as well as their location and they will interpret the needs of the residents and their insurers to produce a properly specified and documented system that meets their needs. An incorrectly specified system produces problems and is rarely used - the most common complaint being that clients feel trapped in a part of their home at night, because they will otherwise trigger the motion sensors.

The best quality systems (wired or wireless) include comprehensive perimeter protection, with detectors on windows and doors at lower levels, enabling the system to be set using these devices only so that the residents can move around the building freely.

In many cases basic physical security measures, such as the installation of shutters, gates or grilles are the best value way to solve some problems, and the integration of CCTV equipment, even if it just the use of a video-entry camera, should be considered. Many CCTV systems enable images to be recorded digitally and monitored, controlled and inspected via the internet.

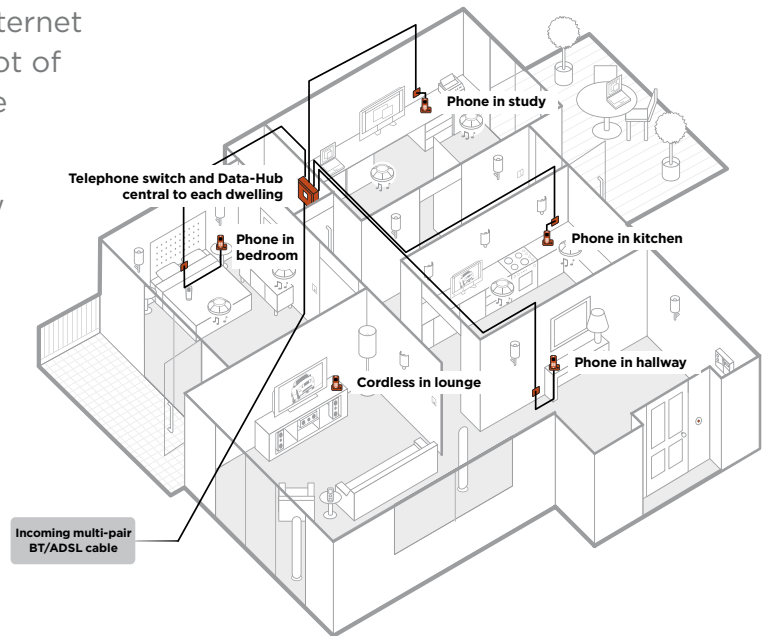


* please note that various levels of fire alarm system are available, and requirements vary from basic smoke detection to a fully active system with call-points and fire-rated cables and devices. There are a range of relevant standards and your specialist consultant will advise you on what is needed, which will be determined by the scale and type of building.

WORK FROM HOME

The wide availability of a Broadband Internet service allows residential customers a lot of flexibility - these days you can be at the office without going to the office.

Modern telephone and IT systems allow one to work from home, at times that best suit one's life, as effectively as actually being in the office. Calls can be forwarded or put through without the caller perceiving where you actually are, and you can use your company network as if you were in the office - receiving e-mail, printing, browsing the server and having access to resources as if you were sitting in the office.



A simple home telephone system can allow the user access to different lines (perhaps for work, home, and teenage kids) independently billed, but accessible from any location. It can link to the entryphone and cordless phones and allow conference calling, paging and voicemail just like a small office system. This all depends on star-wiring of course, and the correct specification and installation.

A number of wireless technologies are now available, and WiFi (or 802.11 - a wireless computer networking standard) is now pervasive. This allows a user to have access to the Internet and all the other network devices in the home without the constraints of being connected with a cable. The 802.11 standard has been written so that it can be enhanced over time, and although current speeds are equivalent to most office networks, it will soon be

available in a sufficiently fast variant which would allow some good quality video streaming as well as data traffic. This has led various manufacturers to produce "home servers" which will send TV, DVD and data signals around the house to next-generation wireless devices.

Don't think you can get away without wires though! You'll still need them in the right places to deal with the incoming services,

printers, fax machines, normal TVs, speakers and almost all security, lighting and fire detection devices. And not all buildings work well for wireless equipment - particularly those with a lot of steel work, or older masonry construction. Issues with interference, security, ease of configuration and ultimate speed all push the case for a properly designed cable infrastructure rather than relying on wireless systems.

ASSISTED LIVING



With an aging population across the world, assisted living is now relevant in helping to keep the elderly in touch with family, friends and modern day living. In 20 years time, one third of Britons will be aged 60 or more, with many other European countries in a similar position.

Assisted living provides flexibility and freedom whilst ensuring the safety network is readily available when required. The communications and data systems enable sensors and alarms to be integrated seamlessly in to the fabric of the building providing discrete monitoring for the elderly.

REMOTE HEALTHCARE

A new generation of technology exists and is supported by the NHS and Government to help improve patient care and efficiency levels. Wearable devices that monitor heart rate, blood pressure and much more and even sleep patterns through mats placed below a mattress are now readily available.



LEARN AT HOME

Some clients spread the guilt of the purchase by thinking that their big-screen entertainment purchase is really for the children to watch Disney movies on, when actually they plan to watch sport and action films. Despite this, a lot of current home technology really is very well suited to use for education. An increasing amount of families are using the Internet for supplementary learning - not just for the younger generation.

Around 15 years ago there were about 30 web sites. These days the Internet is unrecognisable compared to then, with search engines trawling over 30 billion web pages. The Internet is the fastest-adopted technological advance in mankind's history by some margin. In fact, the Internet's ability to connect people from different backgrounds and locations is probably it's greatest strength. Information is available to suit many areas of interest, and Internet shopping and remote healthcare have proved remarkably successful.



Many training companies and universities now use the web for distance and cooperative learning projects, making computer use at home a priority for some clients. With the right cabling you can allow a homeowner the flexibility to turn a spare bedroom into a study or vice-versa. All of this links up with entertainment too - many people are downloading music and games from the internet, with downloaded music sales overtaking CD sales, and they can listen to this throughout the house if the right connections are in place.

So why not use the large flatscreen TV to display computer images? This could be for games or learning. With the correct cabling and a wireless keyboard a PC can be used in a completely new way. A number of Internet filters are available to ensure that children don't come across any unsuitable content, and always-on broadband connections mean that youngsters can quickly discover what they need whilst they're still interested.



A SUSTAINABLE HOME

It has become crucially important that we safeguard the world's resources. New Building Regulations are enforcing energy saving measures, and you'll already be familiar with the growing range of energy efficient light fittings, and steps you can take to improve a building's thermal efficiency.

Whether you want to easily turn all your lights off when you leave; or turn off unused circuits and appliances, CEDIA members can help.

Pilot projects around Europe have shown that, using a combination of low-cost control and monitoring equipment, and intelligent design principles, many savings can be achieved – both in terms of input energy and financially. Savings between 30-50% on heating and hot water and similar reductions in carbon emissions can be achieved in this way, giving a 30% saving on water and gas bills, and around 20% on electricity. This saves a substantial amount over the period of a typical mortgage and will likely wipe out any increases in fuel charges that the providers will levy in the next few years.

Whilst we can seek to increase efficiency, sustain natural resources and generating capacity, and avoid waste and use energy wisely, we need to use innovation to monitor and control demand. We can only do this by changing community and individual behaviour.

Energy suppliers are looking to meter electricity, gas and water more accurately and more frequently and bill on real data, in the hope that they shift peak demand by providing more information to the customer. This will only work if they can connect homes to their central systems. They then have the ability to offer load signature billing, and provide automatic remote control to shed or manage the load. Further more this connection allows for support of micro-generation in the home or community (eg. micro Combined Heat and Power units, which can contribute some electricity back to the grid).



Many savings are available to housebuilders and homeowners and CEDIA members can help you ensure the homes you design are future ready to capitalise on this fact. Many millions of customers worldwide are already on AMR, or Automatic Meter Reading, and the UK Energy Minister recently stated: “more advanced metering is one of the technologies that could help empower consumers to manage their energy use more effectively in an age where energy consumption is growing fast.”

MAINTAINED HOME

In the days of homeowner packs it is important that people can use, describe and maintain the systems they have in their home.

Most CEDIA members offer maintenance contracts, and although most equipment is boringly reliable, many clients appreciate that they can call for assistance, at home, when they need.

All larger installations are provided with comprehensive O&M documentation, which proves especially useful if the property is sold to new owners.

Maintenance response times typically vary from 4-hour 24/7 in-home support for 'Life Critical' systems (such as lighting, security and telephone) to next working day for the entertainment and other systems.

Many companies ensure that their most experienced field engineer is responsible for maintenance work, and the controller will attempt to schedule the client's preferred person to make the visit. Pro-active visits are scheduled to make sure everything is running correctly, and reactive visits if a repair or replacement is needed. Loan equipment can be provided where appropriate.

If a maintenance package is agreed at the time of installation, the maintenance manager can make a site visit to introduce themselves to the client or client representative and respond to specific client expectations regarding all things to do with after care, service and maintenance. Companies build and maintain their knowledge of each individual client and system, so they can offer the most prompt support – in some cases remotely.

It is also possible, as new things become available, to offer customised set-ups and fun add-ons that the family really enjoys – for example, enhancing a home cinema so it works as a gaming room. Members can also create photo slideshows, modify lighting scene settings, set up iTunes, etc.



FURTHER INFORMATION

Technology Acronyms

ADSL

Asynchronous Digital Subscriber Line

Blu-ray

High Definition DVD format

CAT5e & CAT6

are specifications of data cabling, plugs and sockets - for the complete channel including connectors, NOT JUST THE CABLE. They can support data rates up to 10GB/s if installed correctly.

CATV

Community Access TV (Cable TV)

DTV

Digital TV

DTT

Digital Terrestrial Television (or 'Freeview')

Ethernet

Is a family of computer networking technologies for a local area network (LAN).

HD (High Definition)

TV pictures with 720 or 1080 horizontal lines of resolution. (720p, 1080i, 1080p). i stands for interlaced and p stands for progressive - The way the picture is 'drawn' on the screen.

HDCP

High-Bandwidth Digital Content Protection. The technology that stops us recording and sharing copy protected HD content.

VoIP

Voice Over IP. This is a telephone using the Internet connection, rather than the PSTN network.

HDMI

High-Definition Multimedia Interface. A digital video and audio connection typically used between modern HD TVs and DVD players/Satellite receivers.

IRS

Integrated Reception System

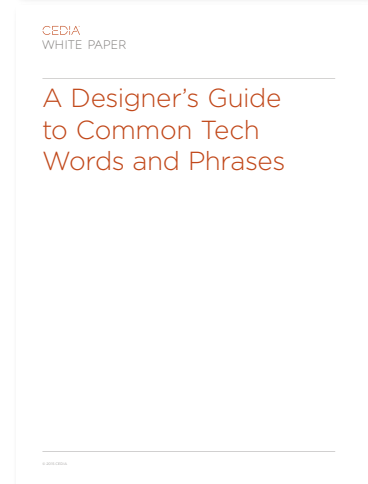
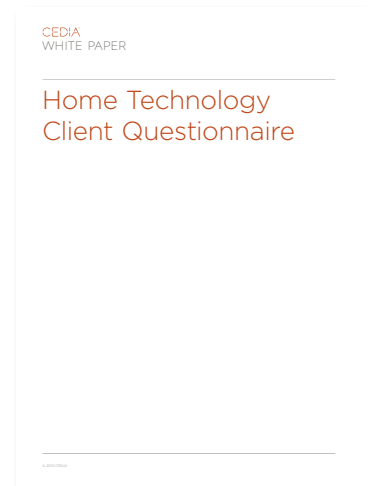
OTT

Over-the-top content - delivery of audio, video, and other media over the Internet without the involvement of a multiple-system operator in the control or distribution of the content.

SMATV

Satellite Master Antenna TV

Additional Resources



www.cedia.co.uk/white-papers



www.cedia.org/recommended-wiring-guidelines

Image use

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