

WHITE PAPER:

When Worlds Collide

IT and AV Become Partners with Building IPTV

June 2010

Network convergence is helping organisations stretch their infrastructure budgets by enabling IP networks to carry information, such as phone conversations or TV and video channels that formerly required separate infrastructure investments and operational expenses. The impact of this convergence is nowhere greater than among IT and AV professionals, who are dealing with the collision of their worlds in IPTV, which delivers TV and video channels over an IP network. Building IPTV, used for internal communications by organisations, requires close cooperation between IT and AV professionals, systems integrators and the consultants who serve them and product vendors. Properly implemented, Building IPTV offers both IT and AV professionals the opportunity to increase their strategic value to the organisation by concentrating on their core capabilities.

This white paper offers an overview of Building IPTV designed to help IT and AV professionals get the most from Building IPTV. It begins with an overview of network convergence and IPTV, and discusses how Building IPTV differs from consumer-oriented IPTV. After a review of typical Building IPTV applications, how the technology works and its advantages, the white paper concludes with business-focused advice on making Building IPTV work for your organisation.



Contents

Convergence: Doing More With Less 3

Building IPTV = Organisational IPTV 5

Building IPTV Applications 7

How Building IPTV Works 9

The Advantages of Building IPTV 13

Making Building IPTV Work for Your Organisation 16

The Best of Both Worlds 17

About Exterity 17

Convergence: Doing More With Less

In today’s difficult economy, every organisational investment—from office supplies to executive jets— undergoes increased scrutiny. How strategic is it? How much revenue can it drive? Can it be delayed, or is it urgently needed? Can we consolidate? This pressure from the executive team places an imperative demand on managers down the line: do more with less.

Information technology (IT) and audio-visual (AV) professionals are keenly aware of this pressure. Not only must they deal with shrinking budgets and justify their respective disciplines or departments as revenue-drivers rather than cost centres, they must also overcome the confusion engendered by the collision of their two disciplines in Internet Protocol Television (IPTV) and its organisational subset, Building IPTV.

This collision is the result of a phenomenon called “network convergence”, which helps organisations stretch their infrastructure budget further and create new, strategic applications. Network convergence arises from the realisation that a network can transmit any sort of information simply by specifying a standard set of rules, called “protocols” or “standards,” that describe how that information should be generated, propagated, stored, browsed, retrieved and accessed or viewed. Thus, all manner of information, from text messaging to phone conversations to TV channels to books themselves, is now transmitted over IP networks.

The Internet Protocol (IP) is only one of these protocols, but a fundamental one, so the term “IP networking” is often used to refer to the whole constellation of protocols and technologies used in networks of all sizes and types, from the internet down through networks spanning campuses or wide areas to local-area networks (LANs) in buildings.

<i>Purpose</i>	<i>Name</i>
Send and receive email messages	Simple Mail Transport Protocol (SMTP)
Record and distribute TV and video channels	Motion Picture Experts Group (MPEG) standards and protocols, such as: <ul style="list-style-type: none"> • MPEG-4 compression standard, • MPEG-TS (Transport Stream) protocol
Browse the web	Hyper Text Transmission Protocol (HTTP)
Deliver packets from source to destination	Internet Protocol (IP)
Assure proper packet delivery	Transmission Control Protocol (TCP)

Table 1: Typical protocols or standards in IP networking

For instance, convergence is already well-advanced in phone communications. Most phone conversations in the world today are digital along most of their path. Consumer services such as Skype and carrier voice-over-IP (VoIP) services offered by companies such as Virgin and BT testify to the momentum behind convergence.

With IPTV, TV and video communications are not far behind. A good example is videoconferencing, once commonly transmitted over an Integrated Services Digital Network (ISDN) and now almost entirely provided over IP networks instead due to their greater speed and flexibility.

Consolidating multiple storage, transmission, and display systems into a single network makes infrastructure budgets go further, in terms of both capital and operating costs. This leaves more room for strategic investments that can strengthen a company.

IP has technical advantages over traditional analogue methods that also drive convergence.

- Better transmission and storage fidelity. A digital file can be copied exactly—there are no “generations” as there are with analogue systems. Error correction protocols can compensate for information lost during transmission.
- Greater scalability. The Internet connects virtually every network on earth and carries orders of magnitude more information than all analogue systems.
- More flexibility. Much of the power of an IP network is embodied in software, making it easy to extend, change or update systems. Many of the changes required happen automatically, e.g., connecting to a wireless hotspot with a laptop.
- Easy innovation. IP networking is based on vendor-independent standards and protocols that promote both backward compatibility and interoperability. For instance, MPEG-4 is a standard that can be used to transform video (no matter what its analogue format) into a digital stream that can be displayed by virtually any computer. It also supports the earlier MPEG-1 and MPEG-2 standards, so that older videos remain playable.

Building IPTV = Organisational IPTV

IPTV uses many different protocols and technologies to distribute TV and video content over the internet or a LAN. Most people are familiar with some variety of IPTV over the internet, such as YouTube or BBC iPlayer; of the four common types of IPTV, three are internet-based. While useful, these do not answer the needs of organisations that want to distribute TV and video in a building or throughout a campus or metropolitan area. That is the domain of Building IPTV

Internet IPTV is what powers home video sites like YouTube or TV programme distributors like Zattoo. Due to the lack of any guaranteed bandwidth or quality of service (QoS) optimisation required by video over the wide-area networks that comprise the internet, the quality is generally poor: low resolution and jerky motion.

Telco IPTV (e.g., phone/internet/cable) comes from a telecommunications provider such as BT Vision and Tiscali TV in the United Kingdom. These providers implement QoS on the portion of the Internet that is their own network to help ensure reliable delivery of live and on-demand content. Some of the content you see on Freeview or FreeSat was transmitted part of the way to you via Telco IPTV.

Broadcast IPTV used by Television broadcasters to put their programmes, some free and some by subscription, on the internet for public viewing on personal computers. One example of Broadcast IPTV is BBC iPlayer. But broadcasters face the same limitations as Internet IPTV, so quality is subject to Internet conditions.

Building IPTV, also known as Local IPTV, distributes television and video throughout a building or campus over a LAN. QoS is generally not needed to guarantee video quality, as the bandwidth of a LAN is practically limitless compared to an Internet connection. On a properly-designed LAN, the number of channels or users has no effect on picture and sound quality. Furthermore, TV and video channels are injected directly into the building LAN rather than through the organisation's internet gateway.

For organisations, Building IPTV has three fundamental advantages over internet-based forms of IPTV:

- It leverages the comparatively limitless bandwidth of organisational LANs to deliver much higher quality to many more users.
- It allows much more stringent access control—not just by channel, but by business unit, department, group, or even individual user.
- It does not consume any internet bandwidth, which is far more costly than LAN bandwidth.

Building IPTV Applications

Many different kinds of organisations are already realising the benefits of using a building or campus IPTV solution to deliver quality TV, video, and audio content to users and customers. In many cases, they work with their incumbent specialised systems integrators or similar partners to integrate Building IPTV with industry-specific applications, such as hotel property management or healthcare patient information systems.



Broadcast

Replace RF ring main with flexible solution that can span a metropolitan area, build easily-expanded broadcast and post-production facilities, stream breaking news and competitive information to decision-makers.



Construction

Integrate AV and broadcast media into the LAN with Building IPTV. Increase flexibility and scalability for the client while decreasing the cost of the build, minimising client disruption and accelerating project delivery



Corporate

Deliver real-time news to inform decision makers and staff at their desktops, distribute company information in public areas, and make training and sales presentations more effective.



Education

Educational IPTV provides instant classroom access to a virtually unlimited global archive of instructive material in a wide variety of languages. VoD servers mean teachers no longer have to wait for tapes and discs to be returned to resource centres.



Finance

Watch current events that may affect share dealings and financial markets unfold from around the globe; distribute international and country-specific news channels to traders and executives.



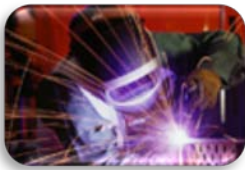
Healthcare

Give patients access to television, radio and video at their bedsides. Provide interactive access to personalised menus and medical information. Display information in reception and waiting areas. Record procedures and operations for training and to protect against litigation.



Hospitality & Leisure

Provide guests with the latest TV, news, music, films and sport from not only the country where the hotel is based, but from a guest's home country. Stream content to conference facilities, hotel bars and restaurants. Provide interactive on-screen "guest book" access to room service, reservations for spa/leisure facilities, restaurants and local attractions to generate additional revenue



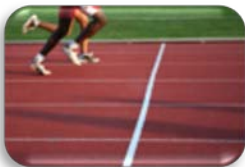
Manufacturing

Use live video feeds from the factory floor for staff security and remote quality control inspection. Monitor live workflow to immediately highlight breakdowns and bottlenecks in the manufacturing process.



Transport

Provide airline, train and bus passengers with departure and arrival times, announcements and information, security procedures, and live news and entertainment throughout the transport facility.



Venues/Stadiums

Stream live coverage directly from the event stage or game pitch to TV screens around the facility so attendees never miss a second of the event. Display third party advertisements, match dates and merchandise information to generate future ticket sales and additional revenue. Provide live TV into hospitality suites.

How Building IPTV Works

IP and AV share a common conceptual framework: source, distribution method and end-points.

A traditional TV distribution system comprises three parts, as illustrated in Figure 1:

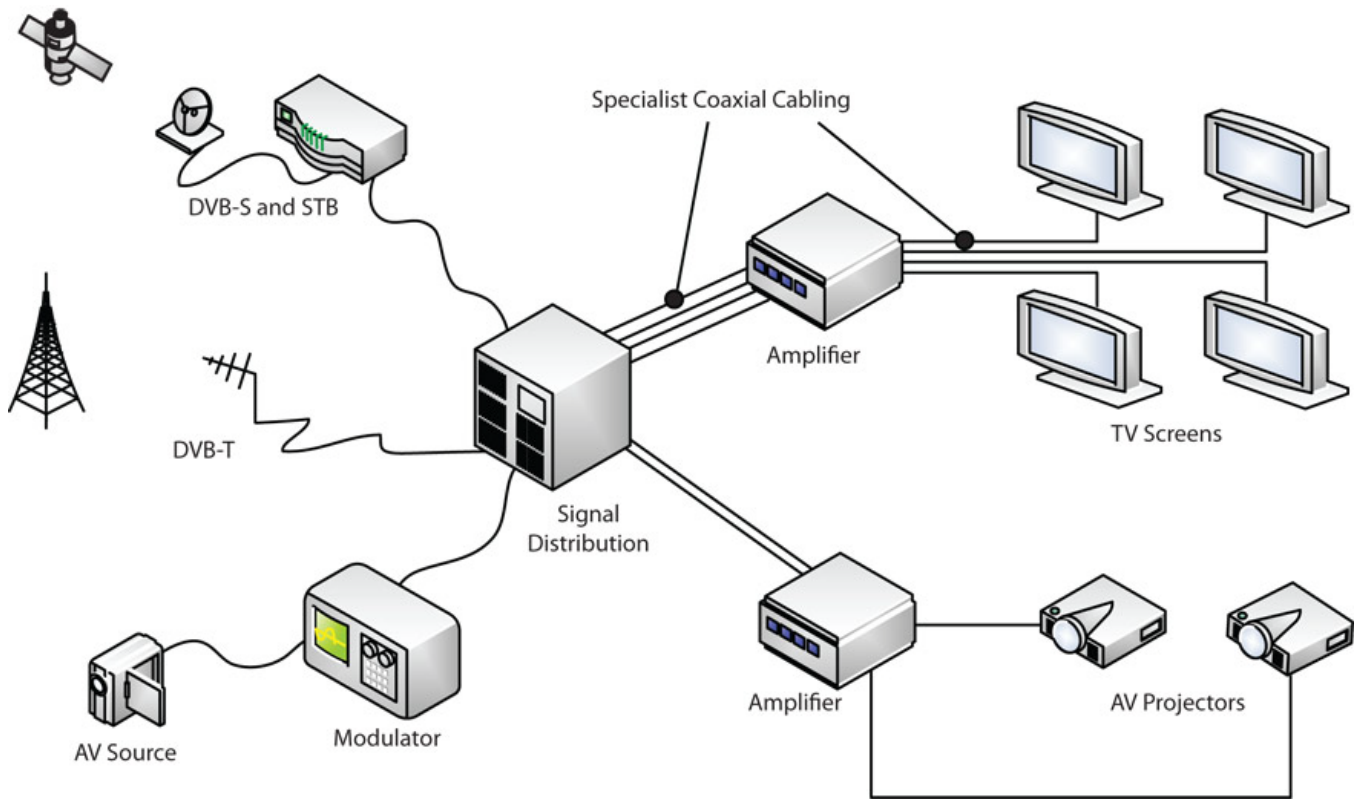


Figure 1: A traditional TV distribution System

- Head-end: the source of content, including devices such as satellite dishes, terrestrial aerials, receivers and videotape machines or DVD players.
- Distribution: analogue cabling, RF modulators, amplifiers, splitters, etc.
- End-points: TVs, AV displays (e.g., projectors)

As illustrated in Figure 2, a converged IP network functions in a similar way:

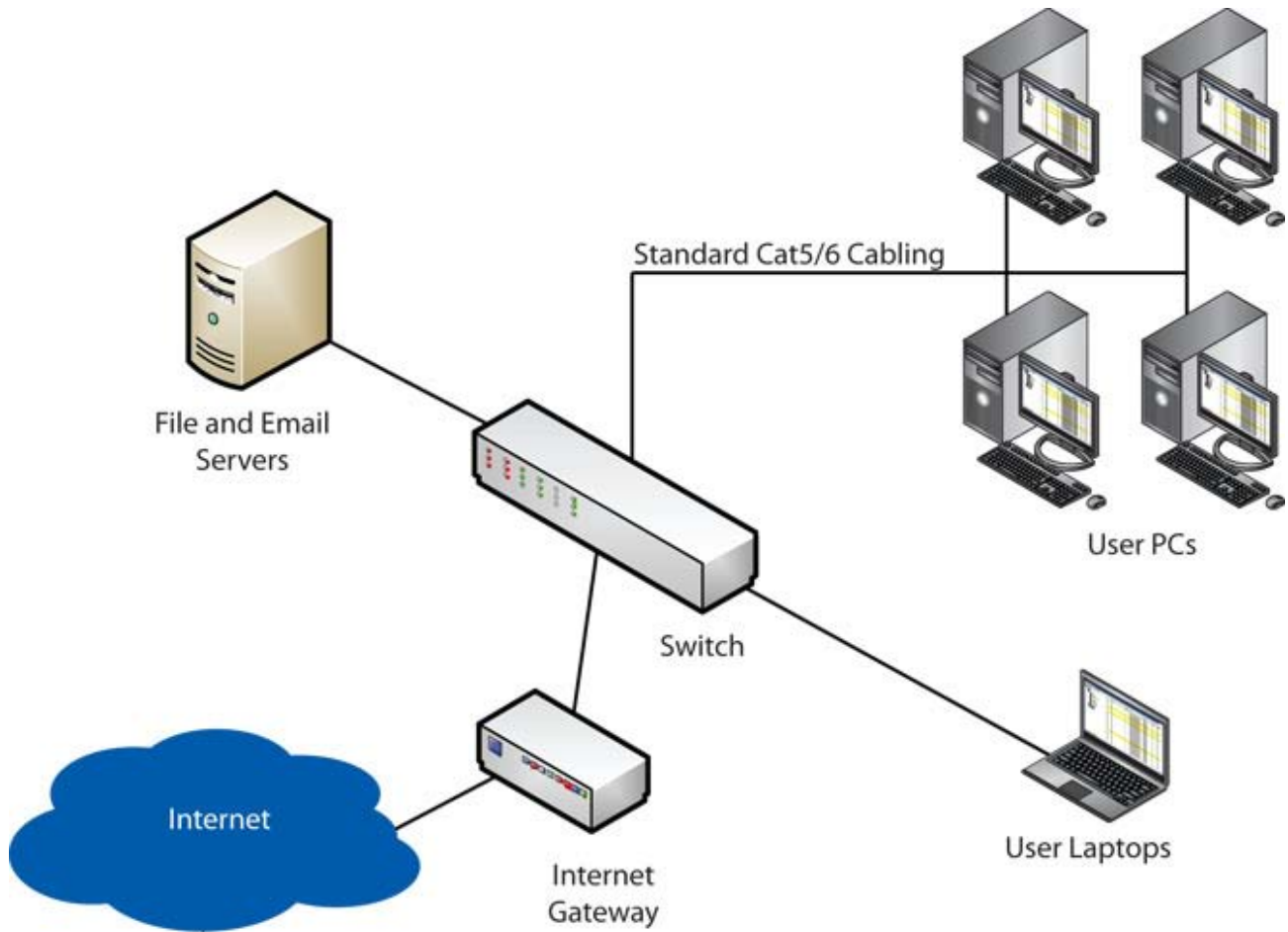


Figure 2: Typical IP network layout

- Server: not only a source of content (data, VoIP, TV channels, and recorded video) but also of applications that manipulate that content:
- Distribution: CAT-5 digital cabling or fibre optics
- End-points: Personal computers, digital AV displays, phones, digital signage

Building IPTV combines the two, comprising the following three parts, as illustrated in Figure 3:

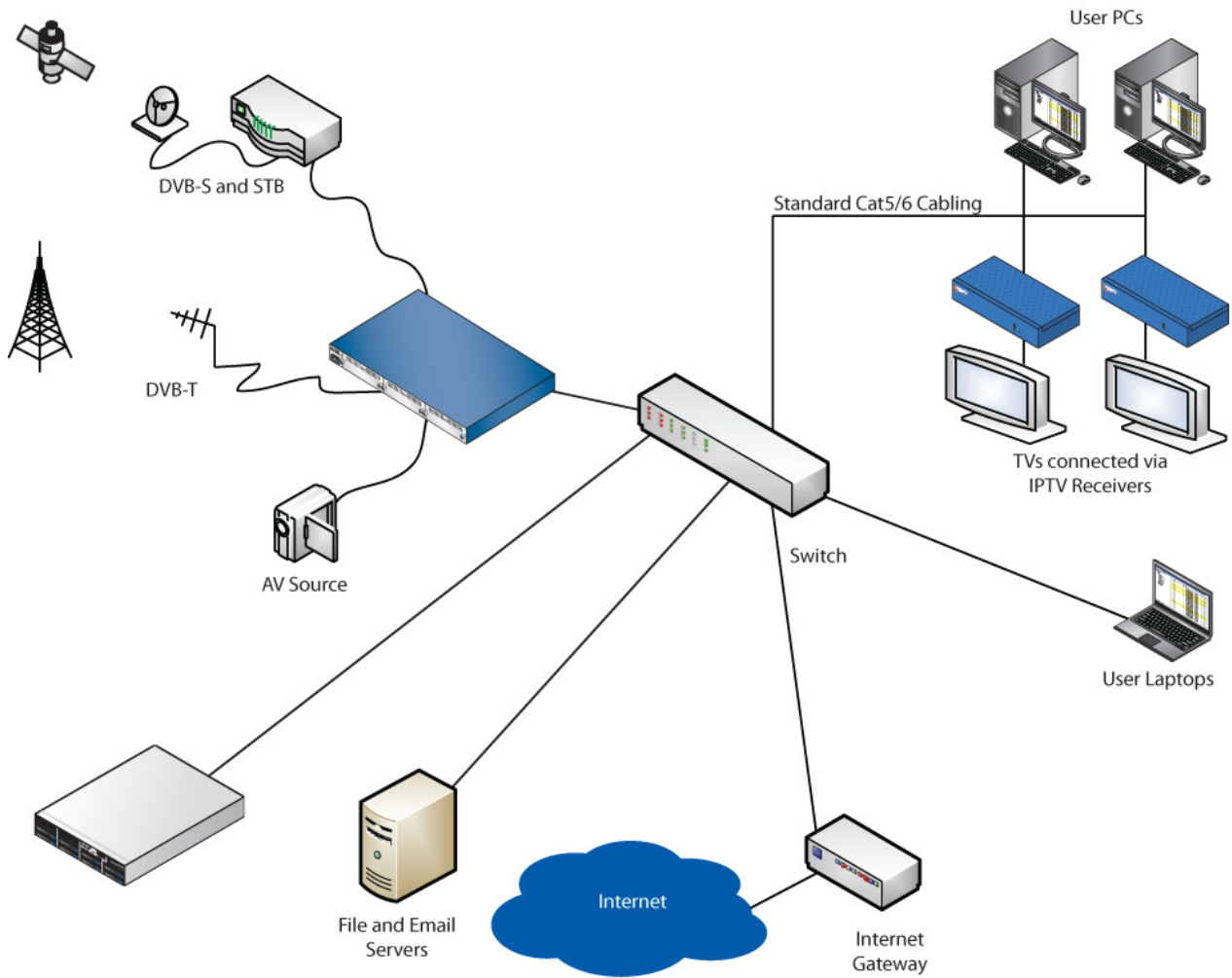


Figure 3: Building IPTV

Head-end: in a building IPTV system, specialised network servers such as TV gateways and encoders provide TV channels or video as MPEG “streams”. Any device compliant with the appropriate MPEG standards can display the channels.

The content sources for these servers include:

- DVB-T(2) streams from terrestrial TV aerials and receivers
- DVB-S(2) streams from satellite TV dishes and receivers (free or encrypted pay services)

- Video playback (DVD or Blu-ray players, or videotape machines for backward compatibility)
- Video-on-demand (VoD) servers that store video content on hard disks, much like home personal video recorders (PVRs) such as Sky Plus
- Video cameras (e.g., for security, safety, or quality control monitoring)
- Digital signage players (e.g. for lobby displays)
- Distribution: the same LAN used for data and possibly phone, over CAT-5 digital cabling or fibre optics, can be used for a building IPTV system. No coaxial network is needed, and you need not sacrifice any of your CAT-5 cabling investments to a separate video distribution system. Existing network management applications can be used to help manage the performance and availability of IPTV traffic.
- End-points: a Building IPTV system can display TV and video using many different devices, including:
 - Personal computers, via a browser or PC client
 - TVs, AV displays and projectors via IPTV receivers, also called IP set-top boxes (STBs). "Triple-play" STBs can support simultaneous use of a personal computer, IP phone, and TV from a single network connection.
 - Interactive whiteboards and other specialised displays

The Advantages of Building IPTV

Building IPTV has numerous advantages over analogue systems, whether they use traditional coax or the newer CAT-5 cabling.

Cost effective.

Because you no longer need an additional network for TV and video, both your long-term capital and operating costs will be lower.

- You avoid the cost of new equipment (offering limited digital compatibility) to extend the service life of analogue systems.
- Building IPTV makes existing equipment ready for the digital switchover, so you can upgrade to full digital as budget or funding permit.
- For builds or refurbishments where a LAN already exists, Building IPTV is an incremental cost with a potentially high return on investment.
- Many of your future LAN infrastructure investments will also enhance your Building IPTV capabilities.
- Many network management systems can monitor streaming performance and video quality.
- Managing a single network reduces the staffing burden.

We will review some of these cost benefits in more detail below.

More impact from higher picture quality

Building IPTV can deliver High-Definition video, such as the output of a set-top box or digital signage player, to users anywhere on the LAN. LANs are not subject to the electrical interference and “ghosting” in analogue systems caused by cable and connection imperfections. It is also more difficult to deliver HD content over analogue cabling.

Easily extended

Extending the system is quicker and less expensive with Building IPTV. In an analogue system, adding channel sources or displays, or extending the reach of cabling (an expensive proposition in an existing facility) requires careful selection and installation of amplifiers and other devices to maintain the signal at an appropriate level. This limits the number of channels an organisation can practically or economically deploy.

LANs use a technology called “multicasting” that enables components such as routers and switches to replicate channel streams, so that such changes are handled automatically. The head-end source doesn’t have to work harder as users are added and less incremental LAN bandwidth is required per channel.¹

¹ The effect of multicasting is to assure that each link in the network carries only one copy of each channel stream, no matter how many users are watching it.

You can plug a display into any point on the LAN and get the same SD or HD picture quality for many more channels. Many buildings are “flood-wired” with LAN cabling, so that no additional cabling is required. With proper network design, you can support a practically unlimited number of channels and users with no degradation of viewer experience.

Flexible

With Building IPTV, you can easily add TV and video sources simply by connecting another head-end device to the network, just like any other kind of network server. Incremental deployment is easy on your budget. For instance, you can start with a small number of free-to air TV channels, and add additional satellite and terrestrial feeds or video-on-demand (VoD) as your schedule and budget dictate. Displays are just as easily added.

Faster response to opportunities

IPTV’s scalability and ease of management promotes the rapid rollout of new TV, video and broadband services across the whole organisation in response to opportunities, competitive challenges and regulatory changes.

Preserves and future-proofs your infrastructure investments

Building IPTV receivers (IP set-top boxes) automatically translate digital content to a format compatible with existing equipment. This eliminates the need for a converter box on each TV or AV display to support the digital switchover. PC clients make the content available to personal computers.

By contrast, analogue systems require new sets with digital video tuners to receive digital content, which require users to manually switch between analogue and digital signals. A PC tuner must be installed in each personal computer to enable content viewing. These systems will fall further and further behind as new, increasingly interactive display technologies become more common, such as networked whiteboards.

Saves costly internet bandwidth

Preserves it for critical business use by multicasting external TV and radio from the head-end rather than as multiple streams through your internet gateway. For instance, consider 100 people on a LAN watching the same programme on their computers using BBC iPlayer. That is 100 individual streams through the internet gateway at 1.5 Mbps (SD) or 3.2 Mbps (HD) each: up to 320 Mbps of content that cannot be cached locally to reduce internet traffic! With Building IPTV, using a TV gateway to provide the programme internally completely eliminates this internet bandwidth usage.

Secure

Since Building IPTV is an internal source, you can block all internet access to streaming content at the firewall for greater security and regulatory compliance. IPTV management software can give you granular control of content access by channel, group or user.

Better return on LAN investments

Building IPTV multicasting technology makes optimal use of LAN bandwidth for a faster ROI on network bandwidth investments. On a LAN, Quality of Service (QoS) management is often not required for the video streams themselves, but may be used to preserve bandwidth for critical applications. For instance, in a hospital setting, simple QoS can set aside bandwidth for the picture archiving and communication system (PACS) that distributes X-rays and other scans.

Expands TV and video to the desktop

IPTV software enables any PC to display multiple TV & video channels on screen with other applications, immediately extending the reach of existing TV and video assets at a very low cost. Many organisations also use this capability to reduce absenteeism during major sporting events by supplying sports coverage at employee desks.

Lower management costs

Building IPTV eliminates the need to manage two networks and makes network planning more efficient. Many network management systems can give a clear picture of how video is using bandwidth, and advanced Building IPTV solutions offer management applications that help quickly resolve channel and display issues. Engineering staff can spot and resolve problems faster, which reduces the load on the help desk.

Making Building IPTV Work for Your Organisation

From the senior management suites, this all looks very good. However, among the IT and AV professionals responsible for implementing and managing Building IPTV, there's some confusion about how best to make all the pieces work together.

Much of this confusion arises because the IT department's remit is steadily expanding to cover previously-separate disciplines, which requires organisational changes. However, successful converged networking—whether VoIP or Building IPTV or any other form—depends on realising that this re-organisation does not change the importance or value-add of the previously separate disciplines and their related expertise. What it does change is the importance of cross-discipline cooperation.

Organisations, the systems integrators and consultants who serve them, and the vendors who supply Building IPTV products must all be able to combine two complex and mature disciplines with very different lineages into a harmonious whole. AV comprises accumulated experience from many other disciplines beyond TV and video: photography, stage lighting, architecture, acoustics and ergonomics among them. IP networking grew out of computer science, designed as a way to link computers together efficiently by automating much of the work involved in distributing information. Both are critical to effective organisational communications using Building IPTV.

Audiovisual professionals help get the most business impact from TV and video by considering it from the perspective of the setting and the user's total experience. Room layout, lighting and acoustics can make or break a boardroom presentation or training session. Well-designed room control systems enable studio-like control of multiple devices, including cameras, microphones, displays, speakers, and lighting. Proper understanding of user work habits or traffic patterns is critical for effective use of large-screen displays and digital signage in public or common areas.

IT professionals help get the most business impact from TV and video by striving to make it available anywhere on the network, anytime it's needed. Because video requires more bandwidth than many other forms of information, expertise in network design using multicasting and other IP technologies such as virtual LANs (VLANs) is critical to Building IPTV success. If these are implemented properly, available bandwidth will generally outpace video traffic demands.

Systems integrators who implement Building IPTV are finding they must offer both kinds of expertise, either by hiring it in, or, as is more common, by partnering with other firms to complement existing capabilities. On top of that, they face the challenge of creating a seamless blend of IP and AV systems: for instance, integrating Building IPTV encoders or VoD servers with the matrix switches at the heart of room control systems.

Finally, both organisations and their systems integrators and consultants must look to vendors that can support them with both kinds of expertise. This is a necessary foundation for what can be complex integration demands, giving integrators and their customers confidence that a project will complete on-time, in-budget, and on target for performance and capabilities. It is also a prerequisite for delivering the most cost-effective blend of features for a given product type (e.g. encoder or IPTV receiver), application or even vertical market (e.g., broadcasting, hospitality, education).

The Best of Both Worlds

With Building IPTV, AV can respond faster than ever before to new opportunities to leverage the power of TV and video, making it even more a strategic asset: a revenue-driver rather than a cost-centre.

Building IPTV helps IT professionals deliver greater value to the organisation. With it, they can cut organisational capital and operating expenses and deliver better content security. Their bandwidth investments deliver more value, and their expertise accelerates AV-oriented projects. Building IPTV thus offers benefits to every level of the organisation, from senior management to end-users, who now have access to an ever-expanding universe of vivid TV and video programming that can help them be more productive and enhance their training. Businesses can leverage Building IPTV to create a closer relationship with visiting customers and create new revenue-generating services. Educational institutions can make course and study material available to students and teachers far more efficiently, and government bodies forge better connections with the public they serve.

Building IPTV helps you get the full benefit from your TV and video assets by combining the strengths of IP and AV to improve employee productivity or student performance. It enhances customer experience and generates new revenue streams.

About Exterity



Exterity Limited was formed in 2001 to create products that deliver broadcast quality digital video over IP networks within buildings. Exterity's products represent a significant advance over the coaxial cable systems in common use today and are viable for deployment in both small and large-scale TV and video distribution systems. Exterity is headquartered just north of Edinburgh, Scotland, UK with additional offices in Reading, England, UK and Dubai, UAE.

Exterity equipment is sold to over 30 different countries and territories, and to date, is installed in over 1,000 different organisations; these range from small schools and boutique hotels to large multinational corporations such as news agency Thomson Reuters HQ in London.

Visit www.exterity.com for more information.