# IPTV/VoD & Triple Play – Frequently Asked Questions

By Alexander Cameron, Managing Director, Digital TX Ltd.

**Is triple play really the Holy Grail for telcos and ISPs in the UK?**
No. In the UK, triple play is an established and compelling proposition offered by cable companies, but it is not a panacea. How competitive it will be to offer a bundled service, or differentiate it, when hundred of others are doing the same remains to be seen. The key question is strategic positioning on account the context of the changing role of the ISP in the home – how to manage the inevitable transition from offering wires to added-value QoS-guaranteed multi-play services such as telephony and video, on both a commercial and technical level. It is no longer enough simple to provide the connection – now it is the content provided through it that will determine perceived value. The current thinking markets the ISP as powering the 'digital home network'.

**Do we have to do everything over the broadband connection, or can we integrate with other existing platforms (e.g. Freeview, FreeSat etc)?**
Yes. Using a so-called 'hybrid' approach, as KIT and BT have, is not only regarded as the most effective route to market, but possibly the only one in a television market as crowded as the UK. In such a design, the main bouquet of channels is received by conventional digital broadcast, such as digital terrestrial (DVB-T), handheld devices (DVB-H, DAB) and/or digital satellite (DVB-S), and return channel services are delivered via Ethernet. The biggest challenge to implementing this model is getting the two different types of software needed to work together reliably – there are few, if any, production-ready products that enable this currently in existence.

**What is the minimum bandwidth you need for full screen TV and video?**
Typically video broadcast as MPEG-2 (the current standard for digital television and DVD) takes 4-6Mbit/s, whereas newer, advanced codecs (e.g. MPEG-4 H.264, VP6, VC-1) are designed to consume 1-2.5Mbit/s. Generally, the lower the bandwidth, the lower the video quality. It is possible to deliver video at well below these levels if the environment is optimal – e.g. the picture size is smaller or the content is fairly static.

**Is the market really there for IPTV and video over DSL?**
IPTV is a buzzword that confuses many people. IP stands for 'internet protocol', and IPTV is a way of delivering video using the same mechanism that the internet uses. This is an alternative to legacy systems such MPEG-2 transport over RF. As other interactive

services are based on it as well (e.g. VoIP, internet), it has clear benefits over traditional media which will ensure the technology has rapid and sustained take up, powered through convergence of all the systems.

In the UK it is doubtful that IPTV-only services (such as HomeChoice and KIT) will challenge the largest platforms, although Telewest has committed to using IP over its cable networks and ISPs are looking to build broadband return channels for Freeview, Freesat and Sky Digital. The market for internet video is growing, although is held back b the absence of multicast capability. There is also considerable movement in private networks, such as hospitality systems.

**Do you need multicast capability, and what are the implications for our network?**
Yes. IPTV channels can only be delivered over IP networks as multicast, so if you want to deliver live television, your network (from DSLAM to peering hub access) must be multicast-enabled from end to end. Live TV cannot be delivered by unicast, and multicast also enables the most efficient delivery of video data and the smoothest channel changing speed. For example if you wanted to offer 100 live TV channels in 4Mbit/s MPEG-2, you would need 400Mbit/s backhaul multicast bandwidth. Using dynamic technologies such as PIM can help to reduce network overhead by only relaying the channels that have been specifically requested.

**Will we have to upgrade our existing deployed broadband CPE?**
Yes. Your customers will either need to buy a new router (USB modems will not support triple play) or they will need to manually upgrade the firmware (and/or advanced configuration changes). This is to ensure their incoming connection can support quality of service (QoS) schemes you specify for partitioning multiple-service network architectures such as video, voice and data. You will almost certainly need to decide which manufacturer you will recommend and support, as most subscriber bases will be using a combination of the many major brands.

**What happens if the TV is in a different room to the broadband gateway/router?**
Short answer: use HomePlug. There are three options for solving this problem, as all set-top boxes require a simple Ethernet connection for basic operation. The first is to place your router next to the TV. The second is to provide Ethernet cabling from wherever the router is (usually the hall or study) to the TV. The third, and most elegant solution is to use HomePlug (14-200Mbit/s) broadband over power cabling technology to extend the connectivity to every room in the house. In this scenario, 1 adaptor would be plugged in next to the central router, and the other by the television, invisibly connecting the two.

**Can other people in the same house watch video at the same time as the main user of the connection?**
Yes. Most modern analogue and digital television platforms support some form of 'multi-room' capability as they use the broadcast model of transmitting a whole spectrum of channels at once, instead of one at a time as IP delivery does. It is possible to stream (multicast) the output of a central set-top box across the network to other devices. The ability to receive different channels in separate rooms is dependent on whether the home broadband connection has enough bandwidth to support it. In most cases, ADSL2+ (or 12Mbit/s +) technology is needed for this functionality, along with strict quality of service. For example, three rooms watching three different channels of live TV encoded at 1.5Mbit/s would need 4.5Mbit/s bandwidth, with an additional guarantee of 1Mbit/s to compensate for network overhead and transit problems.

**How can we get the best content, and how will we have to pay for it?**
Whether or not you have compelling content is the deciding factor in whether you succeed or fail – you can have the best technical implementation in the world, but if you have nothing worth watching you will have no subscribers. 'Content' encapsulates live TV channel carriage, movie titles, TV archive footage, computer games, animation and more. Gaining the rights to use these directly from the rightsholder or through an aggregator is fraught with difficulty, extremely expensive and takes a very long time. Most licensing agreements need extensive pre-paid guarantees, minimum subscriber/viewer levels and work on a revenue share basis with at least 60% or more in favour of the rightsholder.

**What can we do to lessen the impact of bandwidth-hungry video on our backhaul infrastructure?**
There are a number of techniques which have had varying success, usually developed for when demand is heaviest (mornings and evenings). They can be separated into 'virtual' (e.g. use of VLANs) and 'geographic' (e.g. cache at exchange level) solutions. The very latest video delivery architectures make use of cutting edge techniques such as parallel transfer, dynamic multicasting, caching, batching, patching, slicing and scheduled/time-shifted download to encourage minimal head-end strain and maximise intelligent service provision.

**Can you really transmit full PAL TV video over a normal UK DSL line reliably?**
Yes, with conditions. Although they need powerful processors for both encoding and decoding, the latest MPEG-4 video compression formats (e.g. H.264 etc) can faithfully reproduce DVD-quality video over a 2Mbit/s connection with plenty of room to spare. On a BT wholesale line (which 98% of ISPs resell and isn't designed to transport video), the network is 'best effort' with no QoS, and is sold as a contended service. Both of these factors can easily make the

picture suffer, and do not reflect the optimum environment in which such services should be deployed. LLU operators are considerably more able to transmit video data reliably and at higher speeds.

**How can VoD be as compelling as renting a DVD?**
The main driving benefits of VoD are sold as convenience and choice. However, with their comprehensive features, DVDs are perceived as much better value than just watching a video stream of the main future. Most streaming platforms are based on the heavily compressed MPEG-4 video format, which does not offer a way to replicate the DVD experience that is offered through MPEG-2 (chapters, subtitles, languages, special features etc). Several companies have developed technologies that use the in-built BIFS/XMT API in MP4 to create commercial applications which can generate titles that are billed as 'network DVD without the disc', and early studies suggest they are received extremely well.

**Can't we just send the video over wireless/wi-fi?**
No. It is now widely accepted that wi-fi is unacceptable for most video applications, although they are fine for simple computer networking. Trying to send MPEG-4 (even simple and advanced profiles such as DivX and xVid) is extremely difficult and unreliable. Newer technologies such as WiMax have yet to prove stable enough in a commercial setting even for PC connectivity.

**Won't the TV picture go wrong if someone steals all the available bandwidth on the connection (e.g. by downloading a large file etc)?**
No. This happens when you try to receive video over an uncontrolled, congested 'best effort' network, such as most DSL networks are based on today. Networks carrying multiple real-time services (e.g. voice, video and data) need strict quality of service (QoS) rules applied to them that effectively 'partition' each service into a separate 'virtual channel' that is separate from the others. These rules need to be enforced by the ISP and mirrored in the home network, usually by the router/broadband gateway. As every network operator's topology is different, a custom mixture of ATM and IP QoS methodologies can be used to label, protect/reserve and prioritise bandwidth for the devices that need it most. Each of these 'virtual channels' has a specified capacity and expand/contract ('burst') allowance that can be dynamically allocated according to an operator's business rules. A typical configuration is guaranteed A1 priority 2.5Mbit VBR (variable bit rate) for video, 256kbit/s CBR (constant bit rate) for voice and the remainder as UBR (unspecified bit rate) data for internet connectivity.

**What about contention?**
DSL products in the UK are sold by BT Wholesale as over-subscribed products where competition for connectivity at the DSLAM is standard practice – this is not the ideal situation for delivering video by any means, but it has served the telecoms world well so far as a business model. What this means in practice is the same congestion at peak

times for critical real-time services as well as internet connectivity (which is less vulnerable and inherently more tolerant to errors). The answer is detailed study of the operator's individual commercial model, and the implications on the business from changing it to accommodate the needs for more flexible bandwidth allowance, enforcing QoS requirements and reducing bottle-necking.

**What about usage and capacity-based charging broadband packages that a lot of ISPs offer?**

Capacity and usage-based broadband charging models are only applicable to on-demand media where the usage can be included as a cost of sale (e.g. BT Wholesale's flexi-bandwidth technology) – multicast services can easily exhaust a subscriber's monthly allowance in an afternoon just by ordinary television viewing behaviour. There is considerable debate about the future of such models, as they don't appear to support and/or empower the commercial roadmaps ISPs in most countries have indicated they are looking to take.

**What parts of the system need security, and how do we provide it?**

Content will need to be protected in every single part of the delivery chain for most rightholders to be happy about licensing their intellectual property. This includes the physical aspects where breaches occur easily through human will, such as keycode mechanisms in secured premises and so forth. In technical practice this means encrypting the electronic video data that is sent across the network with a product offered by one of many approved conditional access (CA) providers from where it is stored/originated (usually head-end equipment) to the very final point of display (PC or set-top box). Access permissions to the content are managed via either a physical card (usually a smartcard or chip) or software programs stored on the set-top box. Specialist analogue copy-protection is also usually mandated to prevent unauthorised reproduction through devices such as VCRs, video cards etc. Although no method is unbreakable or 100%, 20% of the people are generally responsible for 80% of the reported piracy associated with digital distribution.

**How do you bill people and what micro-payment systems could be built in?**

Most video on-demand orders tend to be processed without payment at point of sale (e.g. cash, chip & pin, credit cards etc), and are billed in arrears as itemised transactions on the subscriber's monthly invoice. The environment in 2-way IP systems is different from those of satellite and terrestrial, where premium rate telephony is used as a form of micropayment for services such as games and voting. A typical system uses secure XML-HTTP messaging over SSL to record credited transactions in a database at the operator's head-end. This is cross-referenced with registration and CA information during the billing period to provide the total amount owed by the subscriber at the end of the month.

**Is triple play compatible with newer DSL technologies, such as VDSL2 and ADSL2+?**
Yes. Consumer broadband CPE will certainly need to be upgraded to support either, in the form of a software update or replacement unit. Both work over copper telephone lines and offer massively higher bandwidth (~25Mbit and ~75Mbit respectively) than conventional ADSL technology at the right distance from an exchange. This additional bandwidth can offer the ability to receive multiple signals in different rooms of a house and also high definition (HD) video.

**Could we provide high-definition (HD) video?**
Yes. In normal digital television MPEG-2, HD video requires around 30Mbit/s of bandwidth, but newer compression technologies (such as MPEG-4 H.264) require only 6-9Mbit/s, which is very achievable over existing DSL infrastructure using ADSL2+ and VDSL2. However, it also requires considerable investment in reception equipment to view (TV screen, decoder etc), which makes it currently prohibitive to deploy.

**About Digital TX Limited**
Formed in early 2004, privately owned and based in **London** (UK), Digital TX Limited is a provider of technology and consultancy solutions for interactive digital television and broadband media. Some of the keywords you might associate with us are **IPTV**, **Video On-Demand**, **Triple Play**, **Broadband Entertainment**, **Video Over IP**, **Interactive TV**, **Network Video Gaming** and **Telco TV**.

Our mission is to be the world's leading wholesale provider of broadband entertainment. Our vision is of a world where personalised entertainment is available on-demand 24 hours a day, 365 days a year, at any time, anywhere in the world, on any device. Our technology can power anything your mind can imagine, and beyond.

Digital TX Limited has worked with many leading blue chip communications providers and can help catalyse your route to market for IPTV services by working with you to design your next-generation multimedia network, build your commercial deployment model and broker relationships with vendors, rightsholders, partners and customers. If we can be of any assistance please don't hesitate to contact **Alexander Cameron** on **+44 (0) 7986 373177** or via email on **alex.cameron@digitaltx.tv**.