



iptv/vod:
**the open
4th platform**

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introduction

IPTV/VoD: The Open 4th Platform is an anthology of 20+ articles written between 2005-2008 by one of the media industry's most irreverent and respected leaders, Alexander Cameron. Widely published all over the world and written in his trademarked easily-read cynical style, his insight into the future of television has been cited by hundreds of CEOs and business leaders as a seminal reference for anyone wanting to understand the opportunities and problems of the brave new world.

But more than that, *IPTV/VoD: The Open 4th Platform* is Cameron's unique vision of how the Internet could eventually connect all electronic devices across the globe and be the hyper-intelligent television network of the 21st century, along with his damning critique of how all the industry has only managed to clone cable TV systems so far, despite it being so much more. But it has to retain the characteristics of the Internet to work: open, free, neutral and globally accessible to everyone.

IPTV/VoD: The Open 4th Platform is designed to not only comprehensively answer all of the main questions a newcomer would have about IPTV, but also to lay out a vision for the future that goes against the conventional thinking.

The reader will learn:

- The basics about IPTV and Video On-Demand, and everything someone in the TMT markets needs to know;
- How IPTV has come to be seen as the future and why it is so important;
- What kinds of new applications and services can be created with new IPTV technology;
- How regulation will affect the market and why an interdependent vision for the future is desperately needed;
- How the content industry operates and how its operating, revenue and business models will change;
- The problems, mistakes and pitfalls already encountered in this sector and what others have done to avoid them;
- How pioneer telecoms networks have launched their own TV services and dealt with the problems they have faced;

- How the Internet can deal with the “*net neutrality*” argument and accommodate real broadcast-quality television;

Alexander Cameron is a high profile Future 500 media visionary renowned as the world’s leading expert on IPTV, Video On-Demand and entertainment technology. Cameron is the former Head of Interactive TV at MTV Networks and Cellcast Plc, and has a proven 5-year track record of successfully delivering complex technical systems for international media companies such as the BBC, Channel 4 and CNN.

The content and telecoms markets are focused on delivering proprietary television networks that are exact clones of private cable TV systems. The book comes at the technology from a new and considerably more exciting alternative viewpoint – building a global entertainment system that adopts the philosophies of the Internet as well as its technology. Those principles are openness, freedom, neutrality, accessibility and global availability.

All articles have been published previously on high-profile websites (Slashdot, The Register, NetImperative, Telecoms TV, TVOver.net etc). Their popularity and appeal has already been proved and demonstrated.

There are an estimated 3 billion IPTV-capable devices available in the world today (Jan-2008) that can be served by 500 high-profile content providers and over 150 IPTV networks. IBM estimates the global market for digital content at \$463bn (February 2007). The global content distribution market is worth \$5bn (StatMarket, June 2007) and Screen Digest estimates the UK market alone will be worth £1.2bn by 2011 (Sept 2007).

This book is aimed at the technology, media and telecoms markets (TMT).

- Personnel include executives, senior management and company directors looking for insight, leadership and direction.
- Technical information may also appeal to engineers, IT/technology workers and system developers.

fast-forward to christmas future

It's the Friday before Christmas. The very first thing I hear at 6am is the latest Crazy Frog jingle at full volume that's been remotely programmed into my alarm clock as a hilariously mischievous prank by my girlfriend. I'm tempted to smash the thing, but that would mean buying the 5th one this year. At least it's nice and warm – the heating system receives hourly weather briefings from a central server that help it to regulate the temperature levels in the house. It was cold last night so it went on for 2 hours longer than usual.

Being a not-so-secret nerd, I live in a flat that's IP-based. You can't tell it from the outside because everything is so seamlessly integrated that it looks the same as it would have done years ago. The lifeblood of the network is my electricity cabling, which runs a gigabit Ethernet network into every room. Every device in my home has PLC technology built in microscopically, and gets an automatic IP address when it's plugged into the mains. It forms a home area network that controls everything electrical. The devices speak to each other through common protocols and protected from the outside world by a router/firewall fixed to the wall underneath the stairs.

As I bumble downstairs to get my morning Mochaccino (already boiling as its programmed to talk to the alarm clock), my TV has stopped playing the video version of Crazy Frog and has turned itself on and automatically tuned into Sky News, as that's my first port of call in the morning. Its' important for me to get my daily dose of propaganda before I try and be independently-minded in the day.

Stock market down, politician being economical with the truth, interest rates up, international crisis – same old, same old. To break the monotony I flick over to CBC in Canada to see what's the weather's like over there, as my family will happily be ice-skating away at minus 50 whilst I huddle up in my scarf. I added CBC to my menu a few months ago from the line up of 5000 international TV channels as I can get any that are available in any country. The days of satellite and terrestrial never allowed anyone to do that, but now every channel is streamed over the backbone of the internet, hundreds are springing up every day.

Whilst I'm watching the gorgeous brunette pointing at the map, in the corner of my eye a small mail icon has appeared telling me I have new messages. I'd usually just ignore it, but I've got time, so I decide to check my inbox. 18 video mails, and most of them are spam. The days of written messages about penile enlargement, Viagra, stock market quotes and money-making scams are long gone – now it's the next-generation of video junk. 2 of them are actually useful and from people I know. The first is from my girlfriend, clearly heroically drunk at 2am telling me how much she loves me before doing something unspeakable to the camera.

And of course, my cat has to cause trouble. His bounding round the house and stamping on my laptop keyboard has triggered the motion sensors on my security cameras and sent me the video footage of him peeing up the curtains again. The only other piece of news is from my CFO on his way to work. He's calling to let me know the figures for the day that were collated in the last 24 hours and asking me to pop by his office when I get a chance. I need to brave the cold and go in a little earlier than anticipated.

I'm due to stay in a hotel for a conference later tonight so need to get the directions before I inevitably forget. Using my remote control I surf onto the AA's IPTV portal and text in the postcode of the place I'm going. It generates an on-screen map within seconds and I click the button telling it to email me a JPEG copy to my work email that I can print out later, and feed the details to my car, which has wireless LAN connectivity to the home network. Alongside my map is the option to peak in on the CCTV cameras along the route for real-time traffic news. I choose only the 5 most critical choke-points and it seems ok.

Being that ABC1 early-adopter male, my Aston Martin has all the goodies I need and they are all integrated with one another. My GPS and multimedia deck already know what I need as they are securely logged into my house network via wi-fi. Before I went to bed last night, I queued up 5 new albums of music downloads and set them to transfer onto my hi-fi in the lounge and my car stereo. Luckily it's clever enough to auto-kill any suggestions like X-factor singles, boy bands, emo and record label-manufactured dross before it reaches my sensitive morning ears.

It will auto-sync when I get to the office and when I get home tonight to reflect how often I play certain songs and what kinds of mood playlists

I've put together. Today it's a John Mayer day. Not sure if I can deal with the Manic Street Preachers at 7am. Surviving the obligatory M25 and South Circular traffic jams is a breeze, because I can just watch TV on my mobile or car deck. Last night I got an email on my mobile phone from an industry colleague recommending I subscribe to a new news service for lovers of James Bond.

Whilst I'm walking through the office with my Starbucks Mochaccino I remember that there are 2 TV shows I need to record as I won't be in the house to scream at my voice-activated PVR. On my work PC, I call up the software to instruct my TV to save those shows on-demand on its network PVR storage service as mine is full of West Wing re-runs and A-Team episodes.

The day moves fast as we don't do meetings in my office. We walk and talk, we shout, and we get things done. Staff have Bluetooth headsets connected to a VoIP phone exchange in the office and don't have fixed seating positions. Our office workflow systems are massively advanced compared to the days of Microsoft Office. Our address books are networks, ideas are visualised in 3D, opportunities on the horizon go into IdeaBanks and radar systems to form a collective conscious ecosystem for us all to feed on and from. Work is now about intellectual output as there is no paper and all systems inter-operate. It still needs human judgement, but we've innovated-out bureaucracy.

Thank god for automation, as I'm not a man for paperwork. All my bills, correspondence and accounts are consolidated into a central electronic identity that I can access from anywhere. I can see my bank accounts, tax information, investments, insurance, utility bills, food shopping, medical history, entertainment subscriptions and transaction histories all in the same place from wherever I am, whenever I want. Everything is cross-referenced, statistically analysed and illustrated in real-time. My phone is also de-centralised and international, so rings through wherever I am, regardless of whether I'm on the mobile, at home on the landline or on a PC.

But my electronic world has its downside too. PMT is electronic. My mum can call me whenever I am, even in the most remote of places. If I was prime minister the woman would still be neurotically video mailing me about ridiculous things that don't need to be dealt with for at least

another 5 years. At least now I have the time to enjoy the things that the administration time took away from me before. The world is globalised and everything is local.

But its soon time to go home, and I'm off to my hotel. GPS on my phone helps me locate the place itself, which is only a few tube stops away. My payment and check-in have already been pre-processed and the hotel's systems now I'm on my way and will be arriving in less than half an hour. As soon as I arrive, its time to throw my bags everywhere and settle in. The widescreen HDTV is asking me for my account details, so it can look up my centralised preferences and purchasing history. I text them in with the remote control and in a few seconds, what appears on my TV at home is exactly mirrored in front of me, hundreds of miles away. I've got 15 minutes or so before I have to head out the door, so decide to check what's new. It's found 76 new international TV channels, 400 TV programs I might like (in order of popularity) and a list of suggested system updates (themes, portals and other additions).

Just as I'm about to go out the door the TV screeches out The Cheeky Girls, because my girlfriend is on some resentful campaign of scorn and has reset my message alert at 3am as she's thinks it's very amusing. It's an incoming video call from my sister, who is bouncing around on the screen with my little nephew. They're singing to some dreadful IPTV karaoke service and want me to record it on my network PVR for later. Even the lyrics are playing as a ticker on my screen. It's cute, but I really have to go.

The night is as any industry conference usually is, swinging from tedious to remotely interesting. Any more talk of added-value is going to make me remove some value from someone face's. My tux is creased but I'm unscathed.

But thankfully its back to the hotel earlier than expected, which is good as I'm exhausted as usual. 18 hours into the day and its about time I stick my feet up and wind down but I get any more wound up and do another marathon of sleep deprivation. It may be a sign of genius but it makes you grumpy as hell. As soon as I get through the door, I throw my mobile on the sofa, the TV switches on and I press the button to display my voicemails and text messages because I'm too lazy to look through my phone.

Whilst I've been schmoozing the night away, the TV has been thinking and searching and compiled a nice list of things for me to watch on a lazy Friday night. That's very handy as I really can't be bothered to decide. I flick through TV channels in different countries with the 3D interface, which means I can tuck flying and revolving screens around the box instead of just watching one thing at a time. The programme guide is a slick grey-black as I downloaded a custom theme for it.

Suddenly, shock and horror. One of the channels wasn't Star Trek, but something much worse. I've clearly stumbled on someone's home pay-per-view porn channel. Its two fifty-something old people doing things to each other that should be illegal. Nowadays anyone can have their own TV channel and this hotel obviously has paid a blanket licence to be able to show them all. I hope I'm that flexible when I'm there age, but its time to switch over quite quickly. I've just eaten dinner and that's not really what I want to be looking at.

But it's hilariously funny, so I click the message button on screen and text in a message to one of my less sensitive friends, who I can see in online and has his TV on. It will pop up on his screen as an instant TV message from me telling him to tune to that channel because they are some fascinating home cooking recipes he might want to try out whilst cooking for his wife's parents that night.

After that I just have to settle. I pause all the video on screen and take a snapshot. Five is showing one of those bizarre surgery programs so I bring up their stream to the front of the display to tune in. It's already 20 minutes through so I rewind to the beginning and watch it from there instead. An hour of watching morbidly obese fat people getting liposuction is ideal for me to drift off to.

And before I know it, it's 8am in the morning.

When I get back to the house it's that Saturday before I get to enjoy all the family arguments and Eastenders disasters scheduled in for yuletide. Its DIY day and time to indulge my masculine construction worker urges. My friend Amy wants me to get some culture and get out the 3D Tate gallery exhibition portal which has just sprung up on my IPTV service, but she doesn't have a chance as I need to get out the tools and do damage.

Instead, on the TV is my radio playlist of music videos that cuts in and out with DJs, weather/news announcements and adverts that somehow escaped my advert-avoidance software. The playlist information was on the home stereo and automatically loads up the videos when I put the TV into background mode. It can also lock up in kids-mode in the same way, but I only ever need that when my nephew comes round, and I just download my sister's security settings from her TV.

After mastering panelling first thing (which I thought I'd never see myself doing), I take some pictures on my digital camera and upload them to my TV homepage with a message for all my friends to worship my carpentry skills. I even took some video clips on my phone of me drilling into the wall violently and upload those so they are an eccentric-but amusing looping TV channel. A quick call to my ISP gets me capacity for another TV channel, as they gave it to me free with the package I bought last year but I never used it.

After a little destructive catharsis, I'm in a slightly more relaxed mood so its time for chill out and watch mindless rubbish on the TV. First stop, YouTube. The top 10 movies that morning are filled with home TV channels of weird Oriental types miming along to awful boy band songs and dancing kitten mash-ups. There's only one thing to do, and that's explore. The choice is overwhelming – every piece of content ever created, arranged alphabetically, chronologically, by popularity, by obscurity, category and genre, and even randomly. I could be here for years as the content just keeps piling in and is out of control.

But my relaxation is ended abruptly by best friend letting himself in the house, telling very rude jokes about my mum and calling me awful names. He's decided to come over and pollute my day with a crate of beer and questionable movie clips on his mobile phone because I'm too serious apparently. It's a few hours of video games for us, and thank god the days of consoles are over. He simple calls up the violent shoot 'em up he runs on his Playstation on my TV and we plug in a gamepad each to do battle at the level where we left off a few weeks ago when we were at his girlfriend's place.

Its time for that elusive lazy weekend that is well overdue. Man films that offer no moral or spiritual substance and cruel jokes at the expense of those too weak to fight back. We surf over to his favourite movies and

TV, and pick out the latest violent horror film he's watched and been enthralled by. One lick and the IMDB information is on our TV screen and the trailer is playing to help convince me. As it's on demand we can pause in one room and move into another, which will be very handy when I finish building that bar in the front room that my other half will do anything to sabotage.

The future never looked so fun.

itv is dead, long live iptv

I cut my technical teeth in interactive TV – as a web application developer at the time it had been an interest of mine for years, primarily as the knowledge of how it worked seemed hidden from the developers' view. Once I broke through and started to quench my thirst for information, it wasn't long before the bubble burst and I began to wonder exactly how the technology could sustain itself. The rise of IPTV, to me, has always been inevitable, and those who ignore it do so at their peril. Those that did, have paid a heavy price for not seeing what exactly was in front of them.

At the time I was working for a young London-based iTV start-up, who were building an extremely powerful cross-platform iTV management & publishing tool for broadcasters. Everybody thought that tool was great, but according to anecdotal feedback, nobody knew exactly what it did. The economics of creating and marketing it were just painful, as it was a proprietary system with both existing competitors and a very limited customer base: broadcasters that were large enough to be on more than just the Sky platform. Development resources were heavily limited, timescales verged on the much-feared 'perpetual' track and the pace of middleware technology just kept changing. There is a reason that as technically compelling as they are, fix-all solutions aren't developed – they generate little recurrent revenue in comparison to selling upgrades and multiple single units that service commercial purposes more effectively. The route to the end goal had to be supported with client work that took away more than it gave. Add to that massive undercapitalisation from venture capitalists, and it was no surprise to hear the company went into administration last year.

Interactive TV as a concept and technology has had no easy ride, and for that the industry deserves credit for getting it as far as it has. Barriers to entry are numerous, and returns scarce. Once the initial costs are met (several hundred thousand dollars in most cases), applications need to be topical, exciting and have inbuilt mechanisms for generating the revenue that's needed to justify their existence. In a world so desperately in need of standardisation, the original flexibility of the MPEG-2 specification has produced an absurd spaghetti of proprietary middleware platforms just

don't seem to want to co-exist peacefully alongside each other. The vested interests of those early willing monopolists who had their products pre-installed on set-top box hardware have fatally wounded the community as a whole. If iTV is dying, the industry has no-one to blame but itself.

Despite its stability and its effectiveness at manipulating low-level hardware functionality, OpenTV is a laughable misnomer for a technology that is anything but open. MediaHighway provides virtual machines for languages that hardly anyone has ever heard of (MHEG, Pantalk) and what is left of the most flexible candidate Liberate has now been purchased by SeaChange, The most promising of all, MHP, cannot be discussed without a chorus of scorn for how bloated it is for running on a typical calculator-power set-top box. Developing for the UK's foremost digital TV platform is a laborious process that requires months of C code and subsequent QA/SSSL testing – precisely the opposite of what is needed in a topical, event-driven environment such as TV. WapTV is a genuinely interesting innovation, but the price tag that comes with it certainly isn't anywhere near as attractive. It would be interesting to calculate the total value of the technology developed in-house by agencies just to actually get to market efficiently with their applications. More traumatic will be the realisation that it will soon be utterly worthless.

What I reported to my employer back then is what I stand vindicated of today – it might have taken a while to make the transition to MPEG-4, but it was always going to happen. Even MPEG-7 and MPEG-21 are on the way and have been for some time, and their season is fast approaching. They define the description multimedia content, and a global framework for them to fit into, respectively, which is becoming increasingly important as we move to ubiquity of digitised assets and the need for their management. MPEG-2 couldn't last forever. First we had DivX, then xViD, Windows Media 9, then Apple's AAC format and finally H.264 AVC, MPEG-4 requires less bandwidth, offers far better quality and a considerably more complex model than its predecessor. Its price is processing crunch and a problem of backwards compatibility with legacy hardware. Its no panacea, but it's a leap in the right direction.

The genuine excitement that has fuelled the hype about IPTV is the merging of internet technology with the world of television – the endless possibilities for innovation. When I say “IPTV”, I mean broadcast quality/size video delivered in a controlled way over a private network using internet protocol as the transmission medium, rather than just “internet TV”, or “the internet on your TV” or “TV on your PC”. It’s everything MPEG-2 iTV never was, and never could be. It’s an opening and democratisation of the living room to all comers. The growth of high speed broadband able to support truly reliable broadcast-quality video streams has given us a platform that can enable us to communicate and interact in new ways we can’t even imagine yet. I’m not one to gratuitously proselytise the wonders of a technology for the sheer sake of it, and I don’t necessarily believe the world is going to change overnight – perhaps in the greater context it will be seen a rapid change, but in reality IPTV will see steady gradual take-up in most of the world without fiber running directly into neighbourhoods, beginning with deployments that are hybrid DVB-T/S systems. The infrastructure (and in the UK particularly, the market) is just not there to support it, and the investment won’t be either until it has showed its promise in the baby steps first.

Two things are the lifeblood of IPTV – MPEG-4 as the standard and/or high definition delivery media (whether it is H.264, AAC or WM9), and mark-up language based middleware systems (HTML, XUL, WTVML). Content delivered over broadband is by its very nature a 2-way transaction process, which was what DVB-C was originally designed to be to a certain extent. That process enables us to uniquely identify viewers, and subsequently heavily personalise their services to their tastes and quirks. HTTP, RTP and RTSP are a fundamentally different (albeit not new) paradigm to broadcast transmission, guaranteeing delivery and being intimately involved in the transit process. We have no need for carousels, forward error correction, expensive distribution equipment or mysterious private API documentation. Prepping a channel for multicast playout over IP is a relatively simple matter of descrambling, transcoding and encapsulating the source media in real time.

The 22-part MPEG-4 standard doesn’t explicitly specify a transport system as MPEG-2 does (although it does define a streamable container format into which separate tracks/objects can be muxed, MP4), which is

a deliberate and welcome abstraction. Not only do we have crisper video, we can send it in the way that fits us best (even by wrapping it in MPEG-2 transport and using a carousel if necessary, e.g. for satellite IP networks), and for most that is IP. We can encode it in one of many different profiles, encrypt it, tag objects in it with meta-data and embed interactivity in it that should work for any MPEG-4 capable receiver device (as opposed to needing a specific middleware to demystify the contents of a carousel). Interactivity in MPEG-4 is loosely based on the now defunct VRML language, and can be authored in textual scripts through converting (dynamically if necessary) BT (BIFS Text) or XMT (eXtensible MPEG-4 textual format) scripts into a binary format called BIFS accessible as a 'systems' object.

Another important factor is the evolution of the set-top box that acts as the centrepiece of the IPTV ecosystem. What we are experiencing is not a revolution as such, but what some would call a "phase-shift". Two schools of thought are fighting for primetime: a) IT vendors putting all their resources into Windows Media Center, and b) thin client devices, as has been the *modus operandi* of the past. Whichever you think will succeed is essentially irrelevant, as the point is that the software they run is based on internet technology (typically a browser model, but with TV-specific extensions). What that means is that you build rich TV menus/screens from HTML stored on a web server, just as normal web pages, and can both cross-train developers from anywhere and adapt all the content you already have very quickly indeed. It means XML, WML, Flash/SWF, SOAP, XHTML, CSS, Javascript and any server-side platform or tricks you choose to generate it with. It means an IPTV set-top box will support interaction between any other system that also talks common internet protocols (such as POP3, VoIP/SIP, RTSP, SMS/MMS), but gives a much more effective and specialised video streaming experience. So farewell then, multiple proprietary mess, and hello interoperability.

That standardisation helps us streamline workflow processes like content management – from on-screen graphics titling, web applications, mobile interaction and now, walled garden content for IPTV. We can apply existing and tested disciplines to new technologies, and get them to interact with each other in unprecedented harmony. There is however, a fundamental issue that needs to be addressed by both commercial management and systems administrators, and that is how content

available to set-top box clients is policed. This is more than whether it will be displayed correctly (which needs QA in itself), but more about whether it should be available at all. Central to the success of IPTV is the ability to converge content across multiple devices, and a walled garden alone will not open the platform effectively or allow for the innovation that will drive uptake. The question is how to maintain integrity of security and protection from indecency whilst allowing the masses the freedom to innovate and subsequently grow the service and its community. Access control lists are one answer but are not sufficient – the question is: how do we filter 3rd party and/or user-generated content?

But as we all know, television is now no longer about video alone. The advertising-supported FTA (“free to air”) model that was overtaken by pay-subscription has now been superseded by transaction-driven programming – the focus in multi-channel platforms has come to fall on encouraging viewers to use premium-rate SMS/MMS/IVR, all in the guise of “participation”. Part of the reason BSkyB succeeded (and why cable TV failed) in delivering a viable commercial platform for interactive TV services in the UK was its built-in micropayment system, premium rate telephony. This poses a serious challenge for operators deploying IPTV – billing for pay per-view is generally done by adding individual charges to a subscriber’s bill that is collated at the end of the month, but 3rd parties developing TV programming and interactive applications need a way to generate revenue. And that in itself poses a greater question – how do viewers access interactivity now as intimately mixed with the content as it is, when they previously just used the red button? The answers aren’t clear, but as just as gaming was the most popular iTV application because of the Playstation precedent; it is likely that familiarity will be essential for successfully selling to potential viewers.

Video delivery and distribution also brings its own challenges, mostly relating to scalability and quality of service (QoS). IP networks are a known quantity and highly configurable, but being composed of 2 parts (a control channel, TCP and a delivery channel, UDP), they are not specifically designed to transmit video. RTP and its control layer RTSP were designed to compensate for this (as well as HTTP’s statelessness). TCP is by nature an extremely aggressive protocol that continually probes the bandwidth available in order to fill it completely, causing buffer

issues that can affect playback. What it gives in transmission guarantees, it takes away with the need for greater discretion. Preparing a playout network for IPTV requires a multicast-enabled distribution platform (with the appropriate topology), that segments IP data into 3 separate prioritised VLAN “channels” – voice, video and data. That same architecture coupled with the latest efficiency algorithms can help to optimise ways for providing media on-demand, which suffers from the age-old problem of costs rising proportionally with customer acquisition (even despite traditional VoD economics).

Change isn't always bad, but it is also not always better, as the saying goes. IPTV is the inevitable natural evolution of a technology on which the sun is setting, and despite its capability for disruption, not to be either feared or rubbished. It is the natural fulfilment of a powerful and compelling paradigm that originated with the birth of viewer interaction, and just needs time to breathe and spread its wings. HTTP was a simple concept, but like the building of Rome, it gave us the internet as we know it today.

the emperor's new entertainment

The ghost of the dotcom years continues to haunt the technology world, even though the commercial propositions of a new era of startups in the converged media sector appear considerably more disciplined and grounded in conventional business wisdom than their predecessors. Raising money for a technology business right now isn't easy, especially if you're involved with highly disruptive concepts like IPTV, as I am. I'm not an accountant, corporate guy or investment banker, but I am an entrepreneur who is regarded as authoritative and visionary by his peers. Finance is an alien world to me which has meant a steep learning curve, but it has also allowed me to be able to look in from the outside objectively.

The very first I learnt about people who work in finance is that they are, quite surprisingly, very, very blunt. I had been told to expect modesty, talking in terms of credits and debits and perfectionism. What I found was something else entirely, and it certainly shook me. One of the problems with being someone involved in developing technology products and services is that it's very easy to fall in love with your idea and get caught up in your own hype. Technical types tend to have a unique inability to simplify or explain their ideas in basic terms that laymen can understand. You could call this 'sexing-down' if you like. Converting your wonderful, ground-breaking new venture into numbers on a spreadsheet is a challenging but essential discipline that few in our world ever learn, let alone get right. You will always find resistance when a bubble could potentially be burst.

Savvy readers will already have hype-alarms ringing all over the place at the mention of IPTV, and rightly so. Scepticism over highly-touted terms in a fast-paced sector like telecoms is well deserved, and so very important. Yet there is a curious anomaly which I find more disturbing than fascinating when I read through the industry press – not a day goes by without news of another absurd tech venture that has just gained tens of millions of dollars of venture capital, despite the product being utterly hopeless. I have no idea what some of these investors are having their drinks spiked with, but if I could march a band of angels to the cash machine in the same way that some of these startups seem to be able to

just turn up with a business plan based on hot air and extract money from fools whom are apparently so easily parted from it, I would be a very happy man indeed.

In fact, I would go so far as to say that the vast majority of really great ideas I have learnt about never got the help that they needed, and hence faded away into the general ether. IPTV is a classic example, but also an incredibly inspiring one. We are witnessing something quite rare and rather beautiful – a technology that has caught the imagination of so many people that it is has been strong enough to have enough momentum to swim against the market tide. All the signs point to very stormy waters – Homechoice on sale, KIT closing down, gorillas such as Sky and BT entering the market, but still the wave continues to fight its way through. The fire has been lit and innovation is relentless.

ISPs and telcos in the UK are bleeding from everywhere in 2006. Margins are dropping, supplier pricing is increasing and markets are very near to saturation point. Churn and insolvency levels are high, consumer spending is dropping because of spiralling household debt and competition is so fierce that consolidation has become an accepted part of the industry lifecycle. The idea of 'triple play' service bundling (i.e. broadband, phone and TV) a la cable company-style, has become an attractive option for many, and a panacea for some. Video is a natural progression for those companies already offering both connectivity and telephony over copper lines. It only the underlying economics were as encouraging as the sales potential of the commercial proposition.

Triple play is clearly an exciting idea, and compelling for many consumers. But there will always be another step to climb onto, the next being so-called 'Quad-play' where mobile connectivity is added, and whatever comes after that ad infinitum. The fundamental problem is that the third part of the deal, TV, is radically different from the rest as although the mechanism that drives it uses the same connectivity, its success depends on content. The costs of providing video-centric services are enormous, and the returns are minimal. That usually spells disaster in most financiers' minds, but telecoms companies need to do something to keep their momentum going.

Only the top five ISPs in the UK who can collectively claim over 60% market share of broadband connections in the UK (BT, Wanadoo, Tiscali,

AOL, C&W and now Sky) can truly afford to create and run their TV platform. The other few hundred spend their time squabbling over the crumbs left under the table that didn't make it into the big boys' provisioning systems. DSL in itself is a horrid business to be in, with even some of the biggest players relying on loss-leaders to drive sales and suffering heavy losses. With TV, there is firstly the prohibitive infrastructure cost (anything up to \$2000 per subscriber, not including customer acquisition costs) as video requires bandwidth to be a commodity and the delivery network to be quality-controlled. Anyone who has ever rented a BT Central pipe knows that we're a long way from that. Centralised delivery of content (e.g. video on-demand data centres) also requires considerable capital expenditure on rapidly-depreciated technology.

However, assuming you don't take the relatively easy route of just distributing a Freeview set-top box made in China re-branded with your own ISP logo (and amortising the negligible cost across the lifetime of the customer's account) , you soon get to the nightmare that is content licensing. The simple fact is that content owners know that the only reason customers will choose your platform is if you have the content they want, whether that is the latest movies or the football. As you're already down tens of millions of pounds from your capital expenditure on infrastructure and marketing, the very last thing you want to do is pay large up front payment guarantees to arrogant movie studios who aren't convinced you have a big enough audience for them to do the deal in the first place. Your revenue share deal will almost certainly be heavily in the licensee's favour, leaving you a miniscule margin for when you try to recoup. Designing IPTV and triple play services is beyond the scope of this article, but we will touch on a few crucial points.

Content acquisition is a massive risk, and one that requires economies of scale for the desired reward. Video on-demand and pay-per view do not pay for themselves very well, and only real-world experience can show you why the US cable model of 4-6 movie purchases a month is fundamentally flawed. Exclusivity is rife, as is over-valuation of intellectual property. In the free-to-air UK, video on-demand is equated with payment, competes with both piracy (movies for free) and ordinary TV viewing, and is consequentially not too popular. It's also regarded as having lower value than a DVD service, despite being priced similarly or

considerably higher, as titles don't include features like menus, chapters or directors commentary.

The key question is whether the IPTV platform you offer will be compelling enough to attract enough subscribers to it, to enable the purchases (i.e. ARPU) that will allow you to make back the money you have already spent on both creating and operating the service. Content owners are, in effect, venture capitalists who tend to only like dealing with people that can offer the largest audiences as 80% of the viewing is of the top 20% of their title catalogue. In a normal deal, an operator takes less than 40% of the title's price, which at normal Blockbuster-style rates (£3.75 per rental), is around £1.50. Analysis so far shows that the mean average number of VoD purchases per year (not month) is around six. In year one, you will be lucky to make £9 per customer. Your turnover will be rather impressive, your cash flow very volatile, and your operating profit, negative.

The moral of the story is that video on-demand by itself, or even any other interactive entertainment service for that matter, is not able to sustain a viable IPTV platform. A mass-market service to compete with the likes of Sky requires a fundamental change in approach (complete with a good 'angle' to differentiate itself), backed up with a combination of services – a rounded 'multi-play' scenario if you like. The alternative is to focus on a specific market niche, promoted to social, cultural or demographic groupings, such as Bollywood, adult entertainment or a vertical market such as hospitality. Popular, high-value broadcasters will often charge you to carry their broadcast signal (e.g. MTV), and 3D video game farms require massive space for computing resources. There are more costs to consider than those of video content on-demand, and lots after them as many rightsholders still haven't figured how to make money from their digital archives.

The kickback against content owners we are now seeing in the telecoms world is worrying, but entirely predictable. Broadcasters such as Sky and the BBC are doing all they can to offset video distribution costs for download services by pushing traffic to the edge of the access network with secure peer-to-peer delivery technologies, such as Kontiki. This reduces their own infrastructure costs (but not removes, as a central 'seed' grid is required), but does very little for an ISP. Rightfully, network

operators are ever so slightly fed up with being given such limited flexibility with content rights by the same people using their networks to make money from their customers for free.

There is also a trap in the newly converged telecoms-entertainment industry that finance executives almost always walk into due to their meticulous nature and desire for faultless propositions. That mistake is to write off potentially lucrative opportunities because risk is high, certain factors are unknown and the maths isn't as favourable as they would like. This problem is far more profound in the UK, as opposed to the US where investors are much more aggressive in their outlook and less timid when it comes to taking risks. Analysts almost seem to be looking for a reason to say no. There will always be unknowns, this sector is in the processing of maturing and we really don't know how the market will react until we release a product or service.

This issue is a particularly painful one for entrepreneurs, whether the product or service they are selling needs to be signed off by a CFO or believed in by investors. Ideas and visions are easily blown off track, reshaped, twisted and slowly ground down until they are unrecognisable, by well-meaning management and finance types who don't always fully agree with or understand those promoting them. There will always be those for whom the earth is flat and for whom Sky will reign over the heavens and earth undisturbed for all eternity. Market predictions will always be the best guess, cash requirements will always be woefully inadequate and a whole list of reasons will be available for why something will never sell.

So what is the solution for the house of cards that is video provision? The UK is geographically dense, has the most developed digital TV market in the world, and has a broadband industry that has developed through, and is based almost entirely on, the resale of transit across the incumbent telco's copper network. I believe it to be a wholesale model – one that does for entertainment what BT Wholesale has done for broadband. And it's no throwaway whim or careless comment. I'm betting my company on it. The feedback from ISPs in the field is that they just won't get to market without having access to a 'white label' or wholesale model for both infrastructure and content, and it's easy to see their argument. From an investment perspective, it's an easy business

case with successful precedents, such as Virgin Mobile, Video Island and more.

Wholesaling offers a different dynamic that is not without its very own problems, so we should not be naïve and assume it is perfect. It has been considered before and is being planned by many different parties as we speak, but never implemented successfully due to the massive capital expenditure needed up-front and the difficulties in negotiating re-sale (sub-licensing) rights for premium content. I believe we have solved the problem so we have the underlying magic or 'secret formula' to make it work very effectively. The demand we are seeing from potential ISP customers and content owners is extremely encouraging and offers considerable weight to the case for a new paradigm of service deployment.

Offering a so-called 'white label' IPTV system in a box in recognition of the demand for it unfortunately doesn't do the job that needs to be done though, as greater factors are at work in the IPTV world that need addressing with it. There is a law of thermodynamics that says the part of a system with the most flexibility ends up controlling the system. IPTV as a technology, and as an industry, needs to develop organically into a natural alternative to the three main digital TV platforms, and that will take some time. I don't believe that duplicating cable TV over copper phone lines is the right thing to do, as Video Networks have so painfully discovered in the last few years. My vision is of an aggregated platform whose differentiating characteristic is its openness and its receptiveness to innovation and third party integration. But how well I explain that to the people controlling the money will be admittedly a lot more variable.

cutting off the air supply

The power of television is undeniable. When gorillas were first introduced to Longleat Zoo's Gorilla Island and had to be quarantined and initially segregated from each other, the wardens came up with the rather smart idea of building TVs in their enclosures to keep them occupied. The gorillas loved it so much that when they came to take it away, they protested and sulked so violently that they were forced to put them back in. Now their living quarters come with Sky Digital satellite dishes fixed to the roof. According to the zoo officials, they are particularly fond of Spongebob Squarepants and other children's programs.

What happens in nature is often a fantastic yardstick for our own technological evolution. We are all subject to natural law and develop in the way everything else does, albeit on a slightly more advanced style and pace with all the tools that help us build bigger and better tools. Digital media is an art as much as it is a science, and it subscribes to the same principles that every other business does, especially the traditional precedents it takes it lead from.

A long time ago around 300BC, Aesop, a Greek slave and storyteller, wrote a famous fable entitled "*The Tortoise And The Hare*" that we are all taught in school as an impervious wisdom of the danger of becoming complacent and how slow and steady always wins the race. In the fable, the hare is so convinced he is faster than the tortoise that he rests and falls asleep under a tree. By the time he woke up, the tortoise had already crossed the finishing line by simply plodding along at his own speed. The hare lost the race because of his arrogance and assumptive thinking.

Spend a few days flirting with either the content owning community or technology vendors and one theme strongly shines through – their consistent belief that the market for IPTV and video on-demand is so nascent that it is virtually non-existent. Consumers aren't ready for next-generation entertainment and don't understand it, they say. They are happy with what they have and are overwhelmed with choice, the story goes. These are the same sages who make up the digital distribution

teams in major studios that sell pay-per-view video on-demand but have never had a broadband connection in their home, preferring 56k dial-up.

How very, very wrong they are.

The average consumer is way ahead of any industry professional out there today. They are crying out for content, and the technology that powers it. So much, in fact, that they have already gone ahead and done it themselves without being marketed to. Unfortunately we are all being held up by the weakest link in the chain.

The secret is that the market is there, as is the content and the technology, but the delivery network to get it to them isn't.

The chances are that if you did an anecdotal survey amongst the people you know, its almost certain that they will have build some kind of video on-demand network in their home, however basic. Naturally the percentage will be much higher in the early adopting 24-35 year old male demographic, but it also extends to the middle-aged and older audiences, and across genders. Its very easy to understand why they've gone ahead and moved up a gear from daisy-chaining VHS players to watch digital video content – they are illegally downloading TV and movies over the Internet using programs like BitTorrent and want to watch them on their normal living room TV rather than the computer.

This leap of getting content from the PC to a normal TV is colloquially called the "air gap" in industry vernacular. It's an obvious and predictable transition, but a very hard one to make. The problem is generally with the location of their broadband router, which is typically in the study, hall or in a room that is nowhere near the TV. You can't use Ethernet cabling because it's too messy, you can't use coaxial or copper cabling as drilling holes in walls is too time-consuming, and you can't use wireless as its too unreliable for video.

The answer to home networking for video is powerline communication (PLC) or Ethernet over home electric cabling, which needs no install and can provide up to 200Mbps IP connectivity in any power socket in the home. Companies like Devolo (HomePlug), Corinex (DS2) and Netgem now have their products in high street stores and consumers are slowly realising their usefulness. The way to get your iPod to play on your car stereo when you only have an old cassette player is similar – buy an FM

broadcasting device for the headphone socket and tune into the signal on the car radio.

At where we are now, consumers have a massive collection of electronic hardware doing a million different tasks. They are flooded with gadgetry that fills their shelves and doesn't quite seem to do everything they want. A typically forward-thinking home has an HD-ready plasma/LCD TV, a digital TV set-top box (often with PVR or recording capability, like Sky+ or Freeview Playback), a DVD player and/or recorder, a games console (e.g. Xbox 360), 3-4 PCs and increasingly a network media player such as Apple's iTV or D-Link's streamer ranger. It's getting chaotic. The proliferation of these devices is direct evidence that the electronics industry sees the demand for digital media in the home.

This pile of silver boxes the bane of most girlfriends' or wives' lives, and is leading to a wave of consolidation. If Sky added Ethernet connectivity to their HD set-top boxes that allowed access to digital content over the local home network, that is to say doubled as a network media player, their dominance would be complete. The most frequent question amongst subscribers surveyed is why they can't use the Sky+ box to stream the music, TV and movies they've downloaded onto their PCs from the Internet onto their living room TV. Nobody wants the hassle of ripping DVDs, re-encoding video files or burning their own discs.

Setting up a basic video on-demand network at home isn't easy, and it's not made any easier by the fact that there are very places to go for help, or any companies that provide engineers that will come to your home to do the wiring for you. Ironically these companies don't exist as the perception is that the market is not there to justify their launch. Setting up that network is also very costly. At the least, a pack of PLC adaptors are needed, as is an IP device to show the media on the plasma TV screen (i.e. a set-top box or media player).

The first incarnation of the home video network was arguably the first generation Xbox that could be "mod-chipped" to allow a 3rd party program called the "Xbox Media Center" to run on it instead of the normal Xbox operating systems. Computer nerds immediately realised that it was simply a computer with hard drive embedded into it; hence it could run Linux, read video files from a disc in its DVD drive and stream out TV through its Ethernet connection. Mod your Xbox, add the Media

Center software and the movies you downloaded would play on your normal TV.

The next-generation Xbox 360 took advantage of this and added the capability to behave as a media player and stream files from shared network folders on PCs built-in from the beginning. The catch was that the only material that could be streamed had to be encoded using the Windows Media system. Each proprietary media player product that has been brought out has its own idiosyncrasies that affect its reliability and attractiveness.

Luckily there is an answer to the problem of certain devices not being able to read certain types of files or decode video created in different formats. The open-source media server TVersity is an act of genius. Install TVersity onto your PC, and you can immediately watch all the content on your PC hard drive through a web browser anywhere in the world. Put a media player connected to the TV screen on the network and TVersity connects to it perfectly. But the genius is TVersity's use of the open-source FFMpeg library to transcode any audio or video format on the fly to any other. Your xVid file is converted into Window Media video in real-time for the Xbox to pump out onto the TV. If your D-Link judders and jitters when it tries to play back H.264 content, just use TVersity to transcode it into MPEG-1, which it displays perfectly.

To get a home video network up and running in 20 minutes is easy. Buy an external USB hard drive to put your movies and music on, connect it to a PC in the study, and share it out as a network drive. Buy a PLC starter kit and connect the first electric plug to your home router, and the second into a plug by your TV. Buy a media player of some kind (D-Link, Philips, Netgear, Xbox etc) and connect it to the second PLC plug's Ethernet connection in the lounge. Install TVersity on your media server PC and tweak it to play out the right way for your media player over the power cabling. 19 minutes later, you have a home video on-demand network.

Install one of these, and you'll be amazed at just how excited people are when they see what it can do. It's about as compelling as it gets. The message is simple, yet profound. Your customers are going ahead and doing it anyway, even when there's no content for them to buy.

But that still leaves the massive collection of DVD packaging on the shelf. We all know discs will become irrelevant as times goes on and Bill Gates has predicted. Media will be streamed across the network, not from a physical product. Consumers want to be able to backup their DVD collection onto a hard drive (complete with menus, subtitling, featurettes etc), but crucially, they want to be able to burn it back onto a disc again later if they need to. Research has consistently shown that reproducing the DVD experience over a network increases video on-demand take-up by more than 40%. Network DVD is a familiar “bridge” to video on-demand that makes it easier to adopt and be perceived as great value for money.

Again this touches on another difficult problem, the one of consumers wanting the physical packaging and a sense of ownership of a product. CD artwork is especially pertinent as its part of an artist’s work and it cannot be reproduced easily on a PC. Apple’s CoverFlow application does a good job with its 3D representation of a CD and its artwork, but like books, CDs need to be held in the hand. Many smaller independent labels and artists are supplying the artwork with music downloads so consumers can take the PDF file down to the local printers and ask them to produce a top-quality copy of the physical product on-demand at their own cost.

But all of this is relatively pointless when we consider the whole point is about sending content down a broadband circuit into someone’s home. Professional video on-demand networks do work when the conditions of the network are right, and they work very well indeed. Most services are contended around a 20:1 ratio, and tend to be live in real-time with response times less than 100ms. More advanced video compression may save bandwidth, but it has its price in that the decoding hardware needs a much faster processor to provide a smooth playback experience.

The truth is that in the UK, the copper ATM network just isn’t capable of streaming media properly to a TV screen, unless it’s provided as part of an unbundled telecoms platform. We are massively behind other civilised economies despite having the most advanced TV platforms and audience in the world. So-called “Max” broadband is anything but. We cannot do live, real-time video delivery and won’t be able to for a long time. Even when we can technically-speaking, the economics will still prove too

prohibitive. Usage-based tariffs are totally opposite to what is needed for video. Regional fiber connectivity pricing to exchanges is frankly, absurd.

What we can do though is push video content progressively “over the top” or through a private ISP circuit onto some form of hard disk storage, like a PVR, media player or desktop PC for playback later. The trouble is the vast majority of IPTV set-top box devices out there as we speak have been built for deployment in countries where real-time streaming is possible and already been in effect for years. Offering a TV guide based on XML data and HTML menus is easy with an in-built browser making requests to a web server somewhere. Getting 1GB video files down the line takes a lot more, even when you can cache the most popular material at the BT exchange at the cost of co-location fees.

Until capacity increases and the BT network becomes viable for delivering video, we will have to produce set-top boxes that progressively download DVD-quality media over the Internet that we have to wait for. As most “live” streamed Internet TV now uses Flash Video, set-top box vendors need to integrate the Flash codecs onto silicon to allow us to suck download material from Google Video and YouTube for offline viewing. Centralised playlists built using XML and stored on the Internet to be edited and managed through a web browser are also a compelling feature that again broaches the divide between the PC and the TV.

Naturally downloading video content “over the top” doesn’t solve the issue of ISPs footing the bill for content distribution. Net neutrality may very well just be coming to an end unless content providers contribute to the bandwidth costs their products generate. All we need to know for now is that the audience is there and there is significant demand. We have been too caught up in the guessing game of whether consumers will take what we give them digitally to focus on the true problems, like how on earth we get the material to them without making them want to throw the TV out of the window.

Digital media is all about one thing, and almost only one thing – portability. MP3 files can be transported anywhere, and devices like iPods, Walkman phones and USB thumb drives mean your music can go with you wherever you are. Its now the turn of video, although it has bigger requirements due to its size and complexity. Wherever there is a screen on an IP-connected device, there can be IPTV. DRM in itself is

pointless for lots of reasons but the reason its desperate commercial suicide is that it negates the most powerful selling point of digital material – its portability.

Consumers want to take their media with them wherever they go, and to share the things they have heard and watched that they enjoyed and are passionate about. The world is screaming out for the content industry to provide for it. We need to be able to play our media anywhere, and we're willing to pay for it if we get what we want. And the first law of business is give the customer what they want. Because of that portability, the rights to access the digital content after we've obtained it need to be attached to an individual person, not a territory or some rights window controlled by a big media broadcaster.

P2P has created the market of distribution, whether we like it or not, and whether we choose to acknowledge it or not. The catch is that market is now becoming disintermediated by the stampede of high street customers now wanting to buy directly from content owners instead of their middlemen. It has no distributor or agent with a stranglehold they can wield to monopolise their industry. Naturally there are vested interests from those who are threatened, from the likes of high street retailers and broadcasters who traditionally buy it on our behalf and decide when we can watch it. Niche is the new mainstream when it comes to a globalised audience.

Consumers also desperately want back catalogue "long tail" content, and for simple reasons. They cherish memories, they are curious and the big production names don't necessarily distribute material that appeals to their individual niche tastes. Yes, they want the latest movies, but they are more compelled by the all-you-can-eat buffet of digital archives and enjoy getting lost in them. The trick is how to give them the choice of hundreds of thousands of hours of it so they can find their way easily and not feel totally overwhelmed.

The hare in Aesop's fable is an industry thinking it is way ahead of a tortoise consumer simply because it goes to trade shows and reads market research reports about future technology. Content owners, technology vendors and network owners need to face their fears, their commercial barriers and study the way customers consume. The high street customer isn't dumb, and is already miles ahead. But not because

of technical understanding – because of the need to work out problems in the home that should be simple and common sense. The boat's already left, and hardly anyone who wants to be on it has actually boarded. You either listen to your own customers or they speak to you by voting with their feet.

don't be scared of satellite & cable

Wherever you go and whomever you talk to in any of the media, telecoms and television industries, people are absolutely terrified of Sky. Not just scared, absolutely terrified. Not that they'd ever admit it, of course. The fear of Murdoch extends further than you'd think was possible for an old man, and no company inspires wobbling and trembling in both start-ups, SMEs and venture capitalists alike like Sky does. They are one of the only two companies that the incumbent colossus, BT, fears – the other being Microsoft. Even Bill Gates' merry little band of nerds are hesitant to trifle with Isleworth's finest. The saying goes: *"When you throw stones at Sky, they bomb your village"*. So in the spirit of James Murdoch's recent catchy metaphorical slogan-fest, why throw stones when you can carpet bomb?

No-one can doubt News Corp's power – politicians court the old man's favour as his readership decides who either stays or enters into the corridors of Whitehall. If not the devil incarnate, he's the archetypal power-broker that lives in the secret back room that's always filled with cigar smoke. The \$46bn dollar global empire stretches from Australian newspapers to L.A. movie studios, US television networks, bookstores, Israeli technology and of course, our own beloved print stables. In the UK, News International controls The Sun, The Times, The Sunday Times and the News Of The World.

The bullish culture originally debuted in the 80s through mass sackings and that has come to define many of these companies causes trepidation for those with the thickest of skins. It's rare you will ever find anyone who is enthusiastic about going into a meeting with Sky, nor anyone who had a smile on their face afterwards. These people even bully movie studios, hate the BBC, scorn their own shareholders, refuse to pay tax anywhere they operate and reportedly think very little of even physical violence. You can guarantee that if you decide to compete, or fall out of favour, it will be reflected in the press the next day.

They say that you can't do consumer business in the UK without a brand – the British public is obsessed with them, and they are the de-facto standard if you want credibility or trust for your products and services.

Sky's brand over-shadows almost everyone else you can think of, as it is simply one of the most powerful in this country, if not the world. Nobody gets Sky from Dixons in the High Street for the cool satellite reception equipment – they get it for the football. I've heard Sky called "Chav TV" more times than I care to remember ("*Birds, Beer and Footie*"), and many of those times were just from talking to regulars on the Osterley shuttle.

So if it really is Chav TV, then they've managed to find a lot of chavs, and a lot of rural farming types – just over 8 million at the last count, and if James Murdoch has his way, their army of subscribers will swell by 25% again to top 10 million within a few years. They control almost a third of the UK TV audience. And most people regardless of their knowledge of the TV industry as a whole will be able to tell you how they've done it – by monopolising Premiership football, weaponising their encryption system, cross-promoting in their news media and block-booking pay TV movies.

Sun Tzu argued that that to have victory in a hundred battles, you must know yourself, but also know your enemy. And all this robotic preparation for prostrating in front of the mighty Murdoch altar is making the wolf a lot bigger than he is. If Larry Page and Sergey Brin had decided just to pack it all in because Altavista and Yahoo were just too established in the search market, then we wouldn't have Google today (and they have a market capitalisation more than 10 times that of BSKyB to prove it). Holding Sky up to the absurd level they are at now in the eyes of potential IPTV operators is the equivalent of doing just that. Sky are very good at what they do, but they do not have a divine right to rule the UK television market, nor do they control the greater market forces, as much as they'd like to.

First and foremost, no matter how hard market research companies protest, the UK is a country that is used to getting its TV entirely free (well, at the cost of a licence that applies for any or all platforms) and is very unlikely to ever become a true pay TV market any time soon. Our TV has always been free to receive, free to view and free to interact with. Sky's pay TV model is fundamentally incompatible with British culture, which is why they spend a considerable amount of time trying to erode the case for a licence fee-funded BBC. It also explains the failure of ITV Digital and the success of Freeview – the same people who love pay-as-

you-go see the inherent value of a one-off set-top box purchase. It's the way we've been doing it for years, and it's the way most people are most familiar with. Due to this incontrovertible historical precedent, Sky are always having to swim against the tide – it's very, very difficult to compete with free.

BSkyB as a company is a fat, bloated corporate monster stuffed to the neck with middle management, internal squabbling and mediocre creativity - micromanaged directly by the head honcho. They have shareholders to pacify, and angry vocal ones at that. Smaller companies may not have their size and resources they have, but they do have agility and can focus on niche markets that Sky could never hope to match. The bigger guys can't release anything else than generalised mass-market, nor can they afford to experiment.

The question for Sky shareholders is exactly how many battles the company can fight on how many fronts. No-one's resources are infinite, and history has shown that the jack of all trades eventually collapses when the load becomes too much and the market can't sustain their ambitions. What used to be a fairly simple proposition with some masterstrokes of genius (e.g. giving away satellite dishes) is now a sprawling mass of convoluted services that are competing with stronger adversaries in their respective markets. Sky's arrogance will almost certainly be their undoing. This year will see the advent of high-definition video (HDTV), mobile TV, IPTV, Video On-Demand (VoD), video download services, high-speed broadband many other technologies. Sky has been desperate to fight them all, and time will tell what the damage has been. They are not fighting the old enemy (NTL & Telewest) any more. This isn't a case of releasing a silver bullet like Sky+.

The problem with fighting multiple battles on different fronts is that it can lead to being quartered, in the medieval sense. When you grow or expand, you take a brave step away from your core competencies. You are drawn out into unfamiliar ground where the chance of you making mistakes is very high, and very costly. Your competitors draw you to the battle on their home ground, rather than follow your lead or defend against your innovation. You are vulnerable through the change.

And that vulnerability is beginning to show. Churn (cancellation) levels are higher than ever, and the cynical majority in the industry reportedly

believe the new portfolio of services is a cunning ruse to improve their subscriber statistics as they seem to have reached a difficult commercial plateau in customer acquisition. When you phone them to announce your intention to leave, Sky's desperate customer support staff will do virtually anything to keep you (word to the wise: if you want a few months subscription free, or to bump up your package, call them up and tell them you're getting Freeview or NTL instead). The UK isn't quite the same dynamic as the US, with its hundreds of millions of households. The reason for the slow down are simple – it costs too much, the content is getting worse by the day and you can get better elsewhere.

And for those amongst us who are sceptical of the growing disenchantment with Sky, I give you this. A lot of my friends and colleagues have Sky, and many are unhappy, but that's only my anecdotal evidence. Now i am sure you, my reader, also know several people who are unhappy with Sky, and they in turn will know someone else who is unhappy. So if we all know someone is unhappy with Sky, things are nowhere near as rosy as they would like to make out. That's a hell of a lot of frustrated customers all hungry for something better.

The one credit you can give Sky is that they are keenly aware of their own problems and market challenges, and for a corporate behemoth, have a comparatively fast response to change, which is genuinely rare. They have turned having no return path into an advantage (through premium-rate telephony) and managed to build a formula where they can get a very early payback on their high customer acquisition cost. Recently we have seen "create your own package" on our TV screens and a monstrously large advertising campaign boasting their content credentials. That kind of defensive behaviour is arguably symptomatic of a company on the ropes. The only question now is when the death punch will come. Their executives will tell you that they are taking a breath and lying in wait to strike once the whole herd has gathered in their sights. It's a lovely spin, but that's all it is.

NTL is already looking at buying out Virgin Mobile (the virtual mobile carrier powered by T-Mobile's network) to provide the slightly ridiculously-named 'quadruple play' that is one hallowed step further than the trusted 'triple play' that Sky are trying to fend off by providing themselves. Consolidated cable is a very serious threat to them, as is

competition from the incumbent telco, BT. Sky's strategy of dividing and conquering (investing in Freeview, selling premium channels to their competitors etc) has worked so far, but the renewed vigour of their nearest pay TV rival who can, along with ISPs, exploit their Achilles heel of not being able to provide true video on-demand (general video, not just movies) is a worrying development for them, whether it is conceded publicly or not.

An intentionally secret that is well kept by Sky is their "Freesat" service that has been formally introduced to again drive up subscriber statistics, get viewing cards into homes that could upgrade to premium packages and placate Ofcom. Before the days such a nice brand was developed for it, anyone could purchase a "Solus" viewing card for their own satellite equipment would enable to decrypt public service channels (such as ITV, Channel and Five) broadcast using Videoguard CA scrambling system. Freesat has an ever-growing take-up rate when people realise they can dump the bloated monthly subscription charges to view just the FTA (free to air, or "in the clear") channels that are broadcast over the UK via the Astra and Eutelsat networks. Add a virtual army of telcos and ISPs looking to provide interactive services that are complimentary to existing Free-to-air platforms (Freeview, FreeSat) and the playing field is closing in rapidly. Yes, buying Easynet has given Sky a way of building a hybrid service that uses a broadband back channel, but this again is smoke and mirrors, as will be explained later.

The main alternative for most people is Freeview, unless you happen to live in a cabled area, when of course you would look at NTL or Telewest. In fact, its interesting to look at Sky's penetration rate in those areas, as it gives some gusto to the idea that people's motivation for subscribing to Murdoch's platform is less than brand, and more to do with having no other viable option. And Freeview is a very attractive idea. It has its weaknesses, but it's cheap, broadcasts high-quality programming, and has good availability. What it lacks is a return path, or flexible bandwidth for additional channels and services. But imagine Freeview with a whole thousands and thousands of movies you could watch whenever you wanted. Now that's a killer idea, and a Sky-stopper. Now imagine it with unlimited channels, many years of video content, advanced interactive applications and integrated into your telephone, mobile, PC, games

console and the internet. That's a killer more deadly than News Corp's "poison pill" takeover defences.

Let's not forget that Sky have made some truly disastrous mistakes in the past. When they get it wrong, they really, really get it wrong. Just ask any of the staff who were laid off a few years back after the company's dismal venture into so-called "T-Commerce". It was an abject failure that cost many millions of pounds, and brought home the realisation that people don't even use keyboards to watch TV, let alone buy things on their screen with credit cards like they do over the web. The software on their set-top boxes is made by a Thomson-offshoot called OpenTV, whose ANSI C-based development environment is so tedious that it takes many months to produce any kind of interactive application - which is especially dumb considering TV is a topical medium where content needs to be changed and updated by the second. It was so bad, Sky had to buy a company that made an OpenTV-based WML 'microbrowser' that enabled them to actually get features produced in a realistic time frame. Not that any of those were remotely cost-effective for anyone to get involved in of course.

Their supposed movie download service was due to launch last September, but didn't make it until early this year, and the P2P system being used (made By Kontiki) is a blatant rip-off of the BBC's iMP media player that simply moves traffic to the edge of the internet from the core, rather than allegedly relieving distribution costs. We probably shouldn't start on their marriage to Microsoft or their belief that Windows Media Center will be the next set-top box we all use. The latest whim is their business TV portal, where you can produce your own screens and information or display on Sky-powered televisions everywhere. Quite why you'd be browsing Sky's interactive sections in the office is beyond most of the people I've consulted on it.

But the most wondrously enjoyable fact should encourage ISPs, telcos and interactive service providers to pull out their weaponry and take Sky on, is that despite all the very smart people he employs all over the world, Murdoch just doesn't "get" the internet. In fact, he's so hilariously out of touch and late to market that he may not get a significant foothold without writing cheques that are way above market value. There's nothing quite like the spectacle of someone trying to buy their way into

an industry they fundamentally don't understand. Analysts say he is a cunning, wily old fox that held back from the dot-com boom as he saw the crash coming, and is taking his time to make his moves with the brand new Fox Interactive division. News Corp. recently paid over \$500 million for Intermix, which owns the audience of MySpace, apparently the sixth largest website in the world. Whether that was a lightning bolt of superbly insightful business sense or part of a desperate last minute buying frenzy to keep up with the joneses remains to be seen.

The industry rumours are that Ofcom is going to give Sky a pretty good kicking this year, as its presumably become bored with slapping BT around. Given Murdoch's ability to get politicians to bend over to grab the proverbial shower soap, it will be interesting see just how hard the knuckle-rapping actually is. There are many in TV-land who believe they are long overdue a telling off for their behaviour. Protests aside, BSkyB have an effective monopoly, as there are no other direct satellite TV companies offering an alternative. But that's not the problem – the problem is that they own TV channels as well as the platform. How can you not have a conflict of interest in such circumstances? BT have been split up, deregulated, unbundled and thrown about like a rag doll, and even Microsoft have fallen foul of the European commission. But not Sky.

Sky Bet Vegas was launched just weeks after all competitive channels offering gambling-like services were dubiously ordered to cease and desist transmission on the basis that UK law was ambiguous. There are countless other examples of blatant abuse of position have occurred and nothing has been done – from the subtlest wrongful designation of channel numbers on the EPG to blatant bullying. If you publish channels on a platform you own, your simple daily operational activities will place you in an immediate conflict with your responsibilities as a platform owner. It's no coincidence that the BBC has had to fight tooth and nail to remain in first place on the EPG as the main public service broadcaster. All we can hope is that the forces that control the broadcasting of sports events (Premiership football, golf, cricket) will also act to curb Sky's 13-year dominance of pay-TV sports, as fans are already in open rebellion. Reserving 1 out of 6 packages of broadcasting rights is nowhere near enough and does not provide "choice" or "value" to anyone.

The Sky takeover of Easynet was in itself a very curious purchase. From the outside it seems logical – they have their own nationwide 21CN-style MPLS-based fiber network, considerable existing investment in local-loop unbundling (just fewer than 200 live exchanges), a consumer subsidiary, are respected by the city and have had a close and trusted relationship with Sky in the past. Buying the company immediately gives them an entry point to provide broadband services. But is that really the case? Easynet is also fundamentally a B2B company, supplying just over 20,000 business customers across the country. UK Online were infamously late to market with DSL, have been dogged with provisioning problems and have a very high cash burn rate (e.g. national advertising campaigns etc), all with very few subscribers to show for it in comparison to rivals. Easynet's network as a whole is poorly managed and not ready for video services – in fact, most analysts are deeply sceptical that the money Sky intends to invest in expanding their LLU operations will actually be even remotely enough to get the job done. The figures just don't add up.

One very common misconception about Sky is that they own more of the infrastructure than they do. Ultimately they own the brand, a few channels and the encryption system – not a trivial treasure chest by any stretch of the imagination, but a lot less than most people assume. They don't own the satellites, the uplink kit, the set-top boxes or the other critical parts of the delivery chain. They have created a nice-looking little menu system that is installed on one of any number of set-top boxes that collates all the available TV signals being broadcast (their EPG), and the mechanism to decrypt some of the channels that have agreed to scramble their video output with their conditional access (CA) system.

Starting your own channel on Sky is a fairly straightforward affair if you have £500k or so disposable income a year – after obtaining a broadcasting licence from Ofcom (issued on demand for petty cash), building your studio and playout facilities, arranging an uplink from an earth station and space on a satellite transponder, Sky are obliged to include you on their platform by statute (anyone can pick up and view your broadcast signal anyway). For that, you pay a fee to be included on their menu. That channel number on the EPG costs less if you encrypt your content so only Sky viewers can watch.

The fact that it's so easy to launch a digital channel is slowing poisoning Murdoch's European jewel. Let's face it – Sky is 400 channels of crap and a load of movie repeats. Its a few ripe apples in a barrel of rotten ones. They could save themselves years and years of customer complaint time with one simple addition to the menu – a small option named “*delete this channel*”. A huge list of channels (with 80 more due in 2006 alone) is a crass illusion to breadth and depth of content. Sky is far from it – it's a banger race car park of heavily-repeated, washed-up, poorly-produced trash. Scrolling text messages on screen, dating services, programmes using desktop PCs for on-screen graphics and poor audio don't constitute TV, they are extraneous dross that shouldn't be seen in a control gallery, let alone a national TV network.

The latest news is that the car-crash-in-slow-motion Video Networks are positioning themselves to be bought by Sky for a cool £200 million (comes with free 45% churn rate), to avoid the bankruptcy in the early part of 2006 which seems to be foretold by their accounts. Sky already own around 4% of the company and provide their creatively named “*Sky By Wire*” service direct to HomeChoice subscribers. They were part of a consortium several years ago that offered the then CEO, Simon Hachhauser, just over £1 billion for the company. Presumably the best thing for Sky to do would be to wait until they completely implode and then asset-strip in the most brutal fashion. Buying out Bulldog's subscriber base to combine all 3 ISPs (UK Online, HomeChoice and Bulldog), would then give them close to 150,000 broadband TV subscribers. The blind seem to be becoming quite adept at leading the blind.

Now isn't the time to be scared of Sky, it's the time to attack whilst they are vulnerable. The military say that to have victory you must act in the greatest concentration, and what could be any greater force than an entire industry of telcos and ISPs launching services in Sky's blind spot – the in the very niche areas they are infamously bad at and cannot compete in. We may not have the open markets of Europe or the audience figures of North America, but one company does not have exclusive rule over an entire country's entertainment, especially if they are effectively bludgeoning most of their customers into submission by giving them no alternative. Having bite requires a new model, and imagination – the world is not as Sky defines it, it is what we make it.

What do I want to watch? Probably less than 10% of what their dismal, failing waste of a platform has to offer.

the route to market for uk isps

There are more than 300 ISPs in the UK of varying sizes, from VISP resellers to tier 1 backbone carriers – most resell BT Wholesale’s core DSL product, basing their service costs on the deals they can offer on BT Central backhaul, network bandwidth and external connectivity arrangements. They share a common destiny in that it is not longer acceptable that their networks are ‘best effort’ but they are evolving into QoS-enabled multi-service architectures, incorporating partitioned ‘virtual channels’ of voice, video and data traffic.

Bandwidth is rapidly becoming commoditized with high-speed copper technologies such as ADSL2+ and VDSL catalysing the roll-out of value-added services such as HDTV. The speed of the connection matters less and less as time goes on – what’s becoming more and more important every day is what the connection is used for. The cornerstone of all these services is the broadband connectivity that empowers each one of them.

The crowded television market is also changing at an unprecedented pace thanks to the surge in interest for IP-based delivery. The future of the market is no longer solely the big boy’s domain – the future lies in aggregated niche audiences gathered and owned by ISPs and telcos. Digital distribution is enabling ‘long tail’ economic models that make niche back-catalogue library assets more profitable than premium content. Content owners are slowly getting used to the idea of retiring the idea audience figures in the millions for fractions of highly-targeted demographic groups in the thousands and tens of thousands.

The drive towards ‘telco TV’ has been lead by large US telecoms companies wanting to compete against cable carriers stealing telephony revenues through their ‘triple play’ packages. But this scenario is considerably more relevant in most other parts of the world other than the UK, where the market share of the 4 main platforms (Sky Digital, NTL, Telewest & Freeview) is far more established and the technology more mature. There are precious few opportunities for ISPs to compete and differentiate what they offer as what already exists in a saturated market. Indeed it’s ironic that the vast majority of UK technology

companies trading in the IPTV space have never had their products deployed in their country of operation.

Most companies researching video-centric technology have spent so much time in perpetual loops second-guessing themselves that they have not been able to look past the basic models of deployment to help understand the possibilities the technology empowers. In layman's terms, they're so worried about viability that they haven't used their imagination to think of compelling applications and their constituent parts.

So as the inevitable march towards the triple-play panacea continues unabated, 2 viable routes to market in the British entertainment market have been identified to date – create and monopolise your own IPTV service platform or add value to an existing one. The former is a path that awaits the most fearless (HomeChoice, Bulldog, KIT), whereas the majority seem to be tilting in favour of the latter (BT, Eclipse). In practice, this means adding a powerful interactive back-channel to either Freeview, or its new cousin, FreeSat. What is also an interesting angle is that the 'pass-through' approach for DSL TV used by satellite operators in Europe (e.g. CanalSat and TPS' service with France Telecom – 'MaLigne.TV') does not seem to have the same interest in the UK, despite its apparent effectiveness and natural habitat as a competitive weapon against cable rivals.

Many ISPs are rightly sceptical of IPTV technology, the network's ability to run TV services, and indeed even the business models the existing precedents currently run on. Some simply do not have the resources to countenance even going so far as to provide the simplest of voice services. But in such a fiercely competitive and fast-moving industry, it's important to keep up with the Joneses or you get left behind very quickly, and in telecoms terms that tends to be weeks rather than months or years. Equally important is the need to differentiate products and services from rivals. So our business question is how do we get these companies to market with TV services now and insure them against the need to deploy more advanced services in future?

Operators wanting to build their own platforms are more than capable of finding their own way, but they are a percentage of the top ten UK carriers, predominantly owning their own infrastructure (such as LLU

networks). That leaves the other huge segment of the market – over 90% of the industry that is still researching viability and flirting with the idea of expanding their commercial reach if the necessary resources are conveniently available.

The business that best fits these potential vendors is the add-value platform model – i.e. providing the broadband back-channel as it can be standardised, differentiated and also be marketed in the most flexible way. The two trends that can be immediately exploited are the growth in Free-to-Air (FTA) television (Freeview, FreeSat, or collectively known as ‘Freeband’) and the demand for Sky Plus-like DVR/PVR devices.

This approach can be described as multi-value, as it is built on the premise that a marriage of the technology systems adds value to both individually and the end product collectively. For all their financial and commercial clout, BSkyB can arguably do little to rival the potential of Freeview combined with a DVD/VoD rental partner offering tens of thousands of video titles.

If our objective is to empower ISPs to grab ‘triple play’ market share as their larger rivals also do, their best option is to look at TV in the wider context of the digital home network, or the residential IP ecosystem. In the current conditions, it will be sometime until all services are transitioned onto exclusive IP-based delivery, and until then a hybrid model needs to be used to grow their subscriber base.

In today’s market, the triple-play monthly bundle price ceiling (i.e. the point at which the cost of the service outweighs the value the customer perceives they are getting and becomes a churn incentive) is approximately £45-50. The good news is that it is generally accepted that the demand for value-added broadband services is clearly growing, and the vast majority of customers look to their service providers to act both as a guide, and as the intermediary that can make the technology available to them.

The simplest way for ISPs in the UK to deploy mass market TV services at this moment is to offer a branded Free-to-Air television PVR receiver (based on either Freeview or FreeSat) that has built in Ethernet capability to provide a broadband back-channel return path. Such a device can accomplish exactly what these companies are looking to achieve – so

called brand 'mindshare' and customer retention. Such devices are already plentiful in electronic shops, use the same (ugly) internal software and can be sourced as base components extremely cheaply in Asian markets.

It is increasingly thought that the simplest solution for enabling broadband network connectivity in a set-top box without complex re-wiring is via HomePlug-style technology (broadband over power cabling). The recently ratified HomePlug AV specification guarantees up to 200Mbit/s (twice the speed of traditional LANs) throughput over a house's existing electricity cabling, which is enough for more than 10 high-definition TV channels.

Trials with currently available 'turbo' product versions (85Mbit/s) are encouraging in the face of Wi-Fi's worrying lack of reliability. Only 2 single adaptors are needed to extend the network's reach from the broadband router – one connected next to the home gateway and the other to a plugboard behind the television set (or any other power point in the home for that matter). It is slowly becoming seen as the technology that will enable the industry's goal of the unified broadband networked home.

If and when HomePlug AV functionality is built natively into electronic devices as part of the cabling, it is arguable that we truly will have arrived upon the long-forecasted digital revolution. ISPs need to be working in more detail to shepherd their subscribers into enabling digital home networks by supplying HomePlug technology in tandem with connectivity CPE (routers, USB modems etc).

The commercial mechanism by which hybrid receivers could be offered is established and generally trusted to be sound, having served the market since its humble beginnings over a decade ago. CPE devices, such as routers and USB modems, are offered as loss-leading incentives that drive sign-up and customer acquisition, as well as being a very effective deterrent to churn and hence a reducer of subscription losses. The maximum price point is generally set at around a maximum of £150 (\$300), and is typically amortised against several years' subscription.

A FTA/IP hybrid set-top box (also known as the broadcast TV and broadband video model) provided by an ISP will work, but needs to have

a certain mandatory feature-set to be a compelling consumer proposition against what would normally be found on the high street. Generally speaking, an ISP's customer base is considerably more tech-savvy and more predisposed to adopting technology earlier than the average everyday citizen. They look for maximum value and discriminate ruthlessly, requiring a great amount of commercial design on behalf of the vendor.

The answer to such a demanding audience is to include a mixture of their favourite technology, safe in the knowledge that you will be able to please them for some time to come before the functionality offered is redundant or depreciated. That combination is Free-to-Air broadcast TV (complete with smart-card access if necessary), intelligent PVR functionality, and the software built in to provide advanced interactive services like IPTV, VoD, gaming, network multimedia browsing and more later on. The latter is crucial to insure future-proofing for the challenges to come.

Advantages of taking this more considered value-added approach are that the demand for the hybrid device mass market product is already proven and it allows an operator to 'piggyback' on the platform rather than be forced to adsorb the risks associated with building something from scratch. As most ISPs resell BT Wholesale DSL products, it is also the only way to incorporate live television as the core legacy copper network does not have multicast capability until the 21CN project is concluded. In an ever more crowded marketplace, extending DVB-T reach is the best fit an operator can expect if they do not have the budgets of the top 10 carriers.

There are certain inescapable pre-conditions that need to be addressed in order to meet the expectations of subscribers used to 100% TV reception and/or '5 nines' connection reliability from their ISP. At the top of the list of these issues is Quality of Service (QoS), which as a working system enforces strict rules on the broadband connection supplied by the home and is used to create 'virtual channels' that are respective traffic partitions for voice, video and internet data. QoS is split into two distinct territories – the backhaul network and the home network.

The core BT Wholesale products (DataStream & IPStream), which fall into the former category for most ISPs, are contended mass-market offerings

that deliberately have no QoS built in – vested interests and common wisdom dictate that as soon as BT apply QoS to their network, their considerable core revenues from PSTN traffic will begin to spiral due to competition from VoIP services.

Backhaul QoS is implemented by the ISP operator as a multiplex of 'virtual' traffic channels, typically as a mix of ATM and IP technologies. Despite open industry QoS standards, residential premises are trickier as bandwidth control is not implemented in a formulaic way that it needs to be – there are nearly 10 major providers of connectivity CPE (including Belkin, Netgear, Linksys, DLink, Actiontec etc), and all have different QoS capabilities and implementations. What this means in practice is that each ISP must support a very small range of devices which they have pre or re-configured.

The TV receiver device can incorporate extensive branding and marketing opportunities at many different levels – customisation can be achieved on the physical casing(s), and/or in the software applications that are used to operate it. In day to day terms, this can mean start-up screens, start-up videos, screensavers, EPG 'skins' and the specifying of a portal 'homepage' for interactive services that can be hosted by the ISP.

Rather than individually customising each unit on the production factory floor, it is possible to build an 'activation' mechanism that is executed over the broadband network to download the necessary personalisation features when the box is first used (DHCP supplies several useful parameters too, such as a starting homepage). These basic functions of the device must be left intact and be usable at all times, regardless of whether the ISP that supplied it stays as the owner's preferred provider.

The promises of converged IP services and advanced technologies that the set-top box is capable of delivering do not need to be enabled by default, and in fact, shouldn't be. These features would almost need to be activated at the discretion of the ISP as and when they believe the market is ready for them. The key point is to make them available for use. Adding the capability for new technologies into the set-top box is as simple as a personalised and intelligent software update. Granting access to each per subscriber requires a commercial activation mechanism supplied by the distributor to make them 'live'.

However, there are challenges to this approach. Chief is getting a unit retail price below the symbolic £100 (\$200) mark, including all mark-up given in each point in the chain. Next is the raw horsepower needed to process the both the latest video compression technologies (such as H.264 AVC, WM9, Dirac or VP6) in a 'hot swap' dynamic fashion and general computation requirements of most modern middleware systems.

The choice of architecture is absolutely critical here, with the current wisdom advising the use of a dual-processor solution – twin microprocessors dedicated to video (DSP) and general (GPP) operations respectively. The market leaders in this field are the ARM9 GPP and Texas Instruments DM642, both having had significant success in recent months. The best choice for these next-generation devices is the newly-announced TI 'Da Vinci' platform, which combines the 2 into one powerful chipset.

Surprisingly, despite the demand for hybrid DVB/IP devices, no off-the-shelf software product exists that can be easily integrated into a marketable device. The obvious candidates in the UK market are vendors of MHEG DVB-T interpreters (e.g. Eldon, Ocean Blue, S&T or Cabot) and next-generation IPTV display engines (e.g. Mozilla, Ant, Espial).

The intrinsic barrier to releasing a working hybrid product is getting the two systems to interact transparently, which predicates a need for abstracting the concept of what we know as a 'channel', whether it be a DVB MPEG-2 transport stream, a multicast group, a unicast video on-demand feed or a string of material stored on a hard drive. In development terms, it should not necessary to know the source of the channel once the line-up has been dynamically configured; only that it is available to tune to.

An imperative choice for operators is a middleware display engine based on a user interface mark-up language – this generates all the screens, menus and operational features of the service. The obvious candidate for this scenario is an HTML/Javascript browser (such as Liberate, Mozilla, or Ant Fresco/Galio) as it is a widely known standard with a large pool of expertise available in the market. There are alternatives, such as WTVML as used on the Sky Digital platform, or Espial's Escape browser.

Macromedia also offer version 6 of the Flash player that can enable a certain degree of cross-platform abstraction. At some point in the future, more advanced rendering may be available – languages such as XUL, XAML and Lazlo will be the forerunners that mature on the PC desktop before being ported to the television environment.

What the largest platforms have learnt to their cost is that this particular decision is critical to the effectiveness of interactive applications that run on the set-top box and in most cases, generate revenue that help to recoup the original investment needed for the rollout. Television is a fast-moving medium where reaction to change is a survival factor – it is crucial to get applications to the screen in minutes, especially if they are topical. This cannot be done with cumbersome set-top software such as OpenTV or MHP, even if they do offer low-level access to the device hardware needed for gaming and other advanced functions.

Security can be offered on the set-top box in 3 ways, and is mandated by content rightholders. Identifying individual devices has privacy implications but generally takes the form of using unique serial numbers and hardware (e.g. MAC) addresses. The first is protection against physical theft, or a ‘lockdown’ mechanism, which generally takes the form of blocking the device’s operation should it be used outside the customer’s residence. The latter two are extremely important and interdependent – conditional access (CA – i.e. encryption), and analogue copy protection. Video content must be encrypted from the point of its origin to the point of display, with viewing permissions strictly controlled.

The most resilient and dynamic way to implement security is a more powerful evolution of the ‘smart card’ model – client/server software-only. In this model, security client software replaces a physical card and automatically updates itself at specified intervals (so if a weakness is found, it can be patched almost instantaneously), and can also control the second part of the puzzle – analogue copy protection. Copy protection stops viewers from making recordings and is based on technology that exploits the automatic gain control feature of VCRs by adding pulses to the vertical blanking sync signal. Cheap circuits are widely available that will defeat the protection by removing the pulses.

In conclusion, the UK market may look like a more hostile environment in which to operate, but in reality it simply needs a more adaptive

deployment model than in other countries. Time will move on and stabilise technology, delivery conditions and viewers' tastes will mature, meaning that we must focus on providing the most compelling and rich experience rather than the basic bottom denominator that gets the services to market.

a little rock n' roll

Even 10 seconds of the ridiculously over-valued X-Factor and American Idol make me want to vomit. They are so frighteningly mediocre, vacuous and repetitive that I invariably find myself staring into a worrying abyss of creative bankruptcy that's pumped into millions of people's homes every night through their TV screen. On the side of the road gossip magazines are flourishing, all with the same look, formula and material.

Recently when I was mid-rant, complaining about how Simon Cowell, the man who gave us the TeleTubbies single, was able to accurately judge talent at a karaoke popularity contest on its artistic merit, I screamed out that what I wanted was another Jimi Hendrix. That guy blew everyone away and was a revolution. People's hair stood on end when they saw him play on their black and white TVs. Nobody had seen anything like it, even having seen Elvis. The Sex Pistols followed.

I have a confession to make. BT Vision doesn't excite me. Neither do any of the fancy new IPTV services that are rolling out all over the world. I'm thoroughly underwhelmed, and I'm sure I'm not supposed to be feeling that way, working in the IPTV industry. But honesty is usually more important than diplomacy from an advocate. I hope more than anything that they take off as it will be a springboard to more interesting ideas.

The story is the same with every digital TV service. You get a set-top box, a socket in the wall, some menus and a bunch of TV channels. It costs slightly more every month and there's nothing on, and even more nothing being added to the noise that surrounds maybe 3 or 4 watchable channels. You can order expensive movies and play games. You can pause TV and record things to watch later. The novelty wears off after a few days.

I don't care how the content gets to me, neither does anyone else. I want there to be something good on I can get adsorbed into and addicted to. Sports and movie packages. Kids packages. Public service channels. That's great, but it's all the same. Re-package and re-brand all you like. It seems companies build services that are deliberately similar to someone else's, and then they'll hold a meeting with an innovative small business where they interrogate them on what their unique selling point is.

There might be some wisdom in that the great British public like and take to things that are familiar. But in avoiding risks you always take a much bigger one. Risk avoidance has become culturally endemic. The best and most amazing things that have ever happened have been massively different and incredibly risky. They excite and inspire on a greater level. A little rock and roll would do the IPTV business a world of good.

Is this it? Is this the best that billions of dollars and some very clever people can come up with? It's not pressing my buttons, and I know I'm not alone.

I want more. I want a Hendrix. I want to get excited again.

The ironic thing is that IPTV is exciting. Really damned exciting. The possibilities and potential of it are incredible: it's democratising media-land for the first time ever, and economies in the third world are being revitalised through e-learning and technological transformation. The effects will be felt for decades and it's the next stage of the Internet walking through our door. But we get yet another cable TV. And the reception is currently a slow hand-clap.

I was at the HQ of a well-known ISP recently and they asked what they could offer in a TV service that was different to what is already out there. A lot of telcos are struggling with how to enter the race because there's not much room for anything new. Everything is targeted to young males under 35 and revolves around Freeview or an expensive LLU network. They have a point. It's not easy. There's only so many triple play and Freeview PVRs you can offer so many ways to package the same old thing.

There's always room for something new.

The more I think about it and the more the days go on, the more I am becoming convinced we need to stop looking at how to put a TV service together and what to put on, and change the way its watched entirely. I'm not talking about some hyped-up, schedule-busting on-demand system that is a marketing agency's wet dream, but a step further. We need to really come at it all from a different angle and stop being worried that people won't get it or take it up. We need to put something together that's blindingly easy to use and totally, utterly different in every way to what we're used to.

And while we're dreaming it up, we're going to blast Voodoo Chile and Red House from the rafters so the whole world vibrates to the sound of a screaming Fender Stratocaster. Viva La Revolution.

So lately I've been asking myself what I'd do if you gave me £100 million for a new TV platform, and it's a rolling mental project that I'm sure will grow into a wild beast over time.

Naturally, everything on demand. Everything. No exceptions. Damn the consequences. Just let the thing run away with itself. You watch what you want, when you feel like it.

Don't make me do anything. I want to sit back and be entertained. I don't care about the wiring or how it gets to me. I don't want to explore or search. I want the best stuff put in front of me but not pushed so much it overwhelms me. I don't want to have use my remote more than necessary. I'm not active, and I don't want red button services. I want you to tell me so I don't have to work after I've got back from a day a work.

I'd start with the whole idea of a live TV "channel" and ditch it outright. A channel is just a playlist of Digibeta tapes and/or digital files that are scheduled to go out one after another from a data centre. Enough of that. We'll have a "now playing" live transmission but from now on, you can tune into anything on the playlist scheduled to TX that day at any time, including things that haven't shown yet. When you fire up your menu, you get a list of what's playing now. Every item that runs on the TV channel playlist runs on-demand, instead of a continuous stream.

Then, every channel and file would have a label on it telling me how many people were watching it at that moment or had queued it up on their PVR to record it. They would be queued up in terms of how topical and popular they are. I would base my choices on the herd's thoughts, even if that was the truly dire American Idol. Anything that is universally derided by everyone (dating channels with bad audio, cheap porn tat) drops off the menu. I need to be able to delete anything I don't like and banish it from every appearing on my menu again. Offend my eyes, and you are gone in a puff of smoke.

Then I'd pull out the axe and take a leaf from the Stalin school of content distribution, as Universal music did recently. Release everything for free,

supported by advertising. Fight the labels and studios if we have to. If you don't want the advertising, upgrade to software that blocks them. All movies for free. All catch-up TV for free. Tell me if I've watched it in the past already and what other people think. Everything, free. No more Teleport or Box Office. That would cost a lot of money, but we have £100 million to play with of course, so we wouldn't lose too much sleep.

Stop trying to squeeze more money out of me for everything. I don't want extra charges on my bill, and I don't want to pay silly money for something I only watch once or twice. Put it all in for free and give me a real bargain. Don't give me added extras I don't need or want or lose me in the small print. In my service, everyone gets everything simple, free and packed to the brim.

The physical look of my service would be totally customisable with themes. Design, share and load your own programme guide. Download someone else's. Channels appear as animated screenshots with pictures instead of text. When you're watching something, your TV is online like MSN Messenger. Your TV is part of a simplified social network like MySpace, where you can add people and things of interest that can introduce you to new programs, movies, artists and material you'd like with a graceful and simple press on the remote. No effort needed.

Why do we even need a set-top box or remote control anyway? My Bluetooth remote is as big as an iPod mini, has hardly any buttons and is sexier than the Wii. I can carry it in my pocket and I can page it from the TV if I lose it somewhere under the piles of gossip magazines my girlfriend has left lying around. While you're at it, give my set-top box the same amount of flash memory I have on my key ring memory stick, not just the pitiful 16Mb I have now. Maybe then there would be enough to do something interesting, software-wise.

I want VideoMail. I want all my messaging available and overlaid on my screen. When I'm watching a movie, I want a discrete Outlook-style alert that I can respond to when I receive a new picture message or voicemail. When I do, my movie should pause automatically and overlay my messaging centre. I don't want to send anything, I just want to sit back, listen to my voicemail, open my VideoMail, read my text messages and laugh at the absurd MMS messages people send me. When I finish and

close the overlaid screen, the movie should restart where it left off. I'll turn the alert off if it's too annoying.

Give me TV BitTorrent so I can browse simple lists from torrent search engines with my remote to illegally download pirated movies and TV programmes onto my PVR's hard drive. Alert me when they're finished downloading and let me share them illegally with other people using the same type of P2P mechanisms I have on my PC. Let me screw with other networks and watch 24 before I'm meant to be able to. Let me make playlists to send to the beautiful girl I like who will think it's romantic that I've taken the time to make her a VoD mix tape. Liberate me.

Then give me a free piece of software I can set up on my PC that streams the illegal files directly to the living room in the right codec and aspect ratio for my TV, so I don't have to watch them on the PC or burn a disc. While we're there, give me network DVD so video on-demand isn't so boring and I can justify spending the money on something that resembles what I'd find in an over-priced Blockbuster. I want to browse the special features and look behind the movie.

I want true reality TV, so rig up all the CCTV cameras in my neighbourhood as live streams I can tune into. Let me stalk my ex-girlfriend and take incriminating snapshots when she falls out of the pub at midnight on a Friday. Let me see if the Indian takeaway is still open and whether there is any coffee on the shelf at Mr Patel's store. I want to stream what's playing on my TV elsewhere in the house, like to my PC or to another TV in another room. In fact, I want it streamed over the Internet so I can waste time in the office watching it or show my friends in Canada.

I don't want to go to the cinema on a cold winter evening. Do a deal with Odeon and bring the cinema to my house so I can watch the movie on my spanking new plasma HDTV screen with my girlfriend. When I'm bored I want to watch the popular rubbish on YouTube, so FlashVideo would stream directly onto my TV, using the PC as a decoding/relaying proxy if needs be. Tell me what's good and what everyone else thinks is good, so I don't have to bother working it out and can stroke my stomach on the couch like Bart Simpson.

But most of all, I want to know that what I've got is way beyond Sky Plus and far better than any of the other packaged me-too services you're forced to buy on the high street because there's nothing else. I want to rave about it in the pub and tell everyone how cool it is. I want to know I have all the same things they have and more. I want to be excited. I want to do things differently and in the way I want to. I want you to blow me away and stir my imagination. I don't want to have to get used to it, as I want it to just work out of the box, and be very easy and natural.

And when I connect the scart cable, it needs to be playing Purple Haze at full volume.

the great content adventure

“The problem is that they want the world, but they don’t want to pay for it”, said the BBC executive sitting opposite me sipping on his cappuccino. “They are all knocking on our door wanting all our content for free, and it’s so difficult when they don’t understand the costs involved and how this industry operates”.

The reason I started Digital TX Ltd was due to hearing this in conversation more times than I care to remember. Time and time again I’ve heard movie studios, broadcasters, TV production companies, record labels and games publishers express to me their deep concern that the enthusiasm shown by ISPs to offer premium content is not tempered by any consideration or understanding for the processes, risks and costs involved in the acquisition of rights to their intellectual property.

When you have the same conversation with ISPs, the talk is of a highly competitive market where loss leading products are the norm and margins are forever falling. The landscape never seems to stabilise for a minute, with both regulatory and market forces changing faster than the rate of the technology that is being deployed. There is frustration and bewilderment at how time-consuming licensing negotiations are with content owners, indignation at apparent arrogance and pre-paid sales guarantees, and even the most innocent of confusion as to why an industry that could seemingly prosper so effectively from technology seems to regard it with such fear and contempt.

Both industries are stepping out into a brave new world and taking commercial risks based on excitement over an as yet unproven technology. ISPs want to deploy ‘triple play’ services that include IPTV entertainment, and content owners are realising an entire new audience has emerged that they can licence the rights to their intellectual property to. Both also suffer the nagging issue of chronic piracy, but in differing ways. Ironically, they are the answers to each others’ problems. My company exists to help them understand each other and to help them build a vision of a very exciting future ahead.

The old cliché is that content is king. Now the structural issues of IPTV are reaching an initial degree of quasi-maturity (in the sense that working

deployments are in place around the world and operating effectively), and both management and engineering teams have solved what are the intellectual riddles of putting the equipment into the field, the focus is now on getting hold of the right material that will attract and keep viewers. For those that have been here before, that is an absurd way of going about things as that content takes a very long time to acquire and is the lifeblood of an entertainment business.

The business of agreeing rights over the distribution of content is almost always tedious and long-winded. If you've ever been privy to negotiations for channel carriage, record deal signings or sub-licensing, you'll know that its about as unsexy as it gets – lawyers talking to other lawyers, defining every last detail of allowances, sub-clauses and limitations, for every single time the content is re-licensed to someone new. Forget cigars, champagne and dancing girls – this is solid paperwork and a crash course in pulling teeth. And it is a big boy's game – a billion-dollar industry that everyone wants a piece of, which means you better have some serious chips to get a seat at the table.

The international movie industry is worth \$44 billion and dominated by the Hollywood studios, almost all of which are based in Los Angeles and known as the "Big 10" – 20th Century Fox, Paramount (Viacom, MTV, Dreamworks), Sony Pictures (Columbia Pictures, Tristar, MGM), NBC (Universal), Warner Bros, New Line Cinema (HBO, Fine Line) and Buena Vista/Disney (Hollywood Pictures, Miramax, Touchstone). There are plenty more (for example, LucasFilm, Pathe, Lions Gate, Momentum and of course those responsible for adult titles), but none come close to the size of these established brands. Most of these companies represented in London's Golden Square, near Piccadilly, and spend over \$2 billion promoting their wares.

The sister arm to these studios are the "Big 4" major record labels of the music industry who preside over around 70% of their own \$40 billion dollar market – Universal Music (Island, Motown, Polygram), Sony BMG (Columbia, Epic), EMI (Odeon, Virgin) and Warner Music (Elektra, Atlantic). Independent labels abound, as they have always done since the advent of phonographic media. They are mostly based in West London, particularly Hammersmith and Chiswick, and are renowned for their insularity.

The TV production industry is a fluid one, consisting of over 500 broadcasters in the UK (TV and radio) and over 3000 TV production companies. In London, most are clustered within a 1000ft radius of BT's Great Portland St tower (i.e. Soho, Fitzrovia), to take advantage of their distance-based charging of SDI circuits (uncompressed video which needs 270Mbit/s). Premium channels that have powerful audience-pulling ability tend to charge operators for carriage on digital platforms and maintain a direct relationship with the viewer (e.g. MTV, Sky One etc), whereas smaller brands have to pay for their channel to be featured. Digitisation has brought about a growing trend of moving further from the centre of London to cheaper pastures as multi-channel viewing begins to affect the income of their customers. The gorillas in this marketplace are the likes of BBC Worldwide, RDF Media, Fremantle, Endemol, ITN, Channel 4, Tiger Aspect, BSkyB, UKTV/Flextech, SMG, Celador and more.

Last, but certainly not least, is the video game industry, which is a comparatively spring chicken in comparison to the other established media groups and now closely aligned with the movie studios, with a value at just over \$30 billion. One name dominates above them all – Electronic Arts (EA). Others of note include Activision, Microsoft, Nintendo, Sony, Ubisoft, Take Two, Vivendi, Atari and Codemasters. Rewards are lucrative, and they have to be – some estimates claim that 95% of all games never make a profit for their manufacturers.

These companies are powerful, and because of the high-profile nature of their respective businesses, they are inundated with requests every day and can afford to be choosy about who they work with. Effective deal-making is dependent on long-term relationships that have taken many years to develop, with networking almost impossible as those with contacts guard them jealously as their most valuable trade secrets. Like vulture capitalists, it is often more costly to do smaller deals than the larger ones – but when we say smaller here, it's important to stress the context: small to these guys is six figures. In exactly the same way as property developers control retail, content owners control entertainment services.

Their fundamental goal is to maximise the profitability of their intellectual property, and there is no group of industries who are more

aware of, and better are exploiting, the value of it. The way this is done is through the use of release “windows”, which are basically periods of time in which their media are allowed to be distributed for a specific purpose (e.g. DVD rental, jingles etc). They break the world down into continents, countries, regions and then break it down further into “windows”, split into commercial and residential release. This allows them to create a massive list of opportunities for selling what they produce, and has worked beautifully for many years. Until now.

The internet and the digital media that comes along with it have changed the collective worlds for rightsholders – whereas analogue copies of their VHS and cassette tapes would degrade through copying and good old fashioned wear n’ tear, the latest era of technical wizardry preserves the integrity of media perfectly and makes it easy to reproduce unauthorised copies of copyrighted work. Not only that, but it is a highly disruptive and invasive protocol that eats into their core businesses. The public buy physical media – DVDs, CDs and video games, all in their packaging. Together they are worth many, many times more than their newer cousins such as Pay TV or Video On-Demand - media on-demand is a competing product and potentially takes away a more profitable sale. Those who control the licensing to works that are so lucrative do not want to be cut out of the distribution chain, and they are fighting like any other business would, to protect their primary interests. And that is what most of the P2P argument comes down to – who controls the distribution.

The very first thing anyone looking to acquire content for an IPTV needs to do is familiarise themselves with the business drivers of those supplying it. First and foremost, the entire distribution process must be secured from end to end, physically (locks and staff background checks), electronically (digital rights management, DRM), in transmission with conditional access encryption (CA), and through analogue copy protection (which generally works by exploiting the automatic gain control feature of VCRs by adding pulses to the vertical blanking sync signal). Secondly, the viewing audience must be large enough to ensure sufficient exposure for the material – when you consider most TV network audiences in the US are at the very least in the 10s of millions it goes some way to explaining their hesitance to work with young start-ups with fewer than 10,000 subscribers.

Thirdly, permitting 3rd parties to distribute content is a huge commercial risk, so almost all will demand pre-paid sales up front, typically between £500k – £1 million per studio/label in most cases. Fourth, quality must be preserved at all points of the distribution chain, which must be contractually guaranteed with service level agreements (SLAs) – that means the highest quality imagery (produced by trusted 3rd parties) and sonic perfection. Rights are negotiated for a specific region, purpose and technical platform – if it's not in the contract, you don't have permission for it. And possibly one of the most important points to understand, the rightsholder will almost always want to own the relationship with the end-user, for every new contract, distribution agreement or alteration.

The old economics price most ISPs and telcos out of the content world – BSkyB have completed monopolised the Pay TV movie (PPV) window in the UK with their Box Office service (by block-buying movies for 6 months at a time, hence the rotation schedule on Sky Movie channels), and Murdoch's enormous power in the world's media markets is a force that very few are willing to compete with. Many argue the "window" release system is now reaching the limits of its flexibility and needs to be changed to accommodate the increasing power of consumer choice through media that is offered on-demand. The length of time spent negotiating licensing and sub-licensing agreements is simply not conducive for the pace of technological change – it is now actively hindering innovation.

The question for new market entrants is viability, and the message to content owners is clear enough.- the way they do business right now is just not commercially viable to new customers. The future of TV is not single subscriber bases of millions, but in an aggregated consumer population made up from many differently-sized niche IPTV audiences. Operators wanting to deploy triple play services are faced with massive barriers to market entry, yet still are compelled to press ahead with very risky plans simply as their competitors are doing the same. Only the top 4 ISPs (BT, Wanadoo, Tiscali and AOL) have the pockets deep enough, and a subscriber base sufficient enough that will enable them to offer premium content. The will and enthusiasm from the top 20 ISPs is there, but snobbery and financial implications (such as cash flow issues generated by pre-paid sales guarantees) make such ventures an unsustainable risk. There is an answer to this, and it's in the opposite of

what the current TV market is - niche content, democratisation and innovation. More on that later.

Their current pre-IPTV compromise is to market video-download services on the internet. This is not true "IPTV" in the sense that although it uses internet technologies, it goes across the public internet and does not replace part of, or a whole TV broadcast service such as Sky or Freeview. ISPs know how to innovate, and they're incredibly hungry for new products and services to offer their attention-challenged customers. Indeed, some of the more modestly sized operators investing in small, localised LLU deployments are involved in some fascinating TV projects that are perfect for risk-minimised experiments by content owners.

Everyone wants in, and wants to beat the big guys. They want to cash in on the new iTunes phenomenon. Illegal downloading soars with the growth of broadband connections that enable huge files to arrive in no time at all. The unspoken truth is that ISPs do profit from piracy – free music, movies (read: porn), games and software are a massive incentive for new people signing up for broadband. It's not in their interests to tackle it, and as long as it's impossible for them to offer entertainment services through the cooperation of rightsholders, the problem will simply get worse.

Offering a DRM-riddled video store is an easy evolutionary step from legal music download services and easy to "white label" – but the issue is not what you can sell to people to play on their computers, it's the structure of how they are able to transport that material around their home on different devices that proves the key factor. Big names like Microsoft, Intel, Sky and BT are betting on Windows Media Center and decentralised networking (e.g. Kontiki's P2P distribution system) as the next paradigm for set-top box-powered TV services and the so-called "home ecosystem". It's not going to work any time soon, and tell anyone who argues differently to run a cold shower, take a breath and talk to ordinary Joe Public in his local pub.

People don't interact with TVs like they do with a PC, but crucially, it just costs too much. Nobody in their right mind wants to be paying another £500-1000 just to watch their photos on their TV screen. Consumer gadgets have already burn a hole in most people's credit cards to compel them to put a PC under their TV. Sky and NTL amortise the cost of their

set-top boxes against the length of a customer's subscription, and Freeview boxes cost hardly anything in Argos or Dixons. Perhaps the affluent executives that devise these new ideas and their social circle might happily indulge themselves, but for the rest of the mass market its one expense too far when they've already bought a widescreen TV, DVD recorder, Pay TV subscription, broadband connection and computer(s). Give me a very cheap, simple pay-as-you-go Linux box with network PVR that works with what I have already, and I might just think about it. But IPTV is so much more than just that – that's only one idea amongst an ocean of possibilities.

The feeding frenzy that is the newborn IPTV industry has inevitably thrown up a wild chaos that is the hallmark of new technological eras. One of the most interesting dynamics is that of the so-called content aggregator – trusted third parties that manage the rights for many diverse content archives on behalf of their owners. As a broker or agent, they provide a single point of contact that can be considerably more efficient for operators to deal with than each rightsholder and give wider access to more markets. Equally, content owners are finding it easier to grant sub-licensing contracts to one central point of contact than dealing with several hundred operators worldwide. Their reward for being the convenient middleman is a percentage of the typical revenue-share arrangement that constitutes the guts of the main licensing deal – a usual arrangement being 50% to the studio, 25% to the aggregator and 25% to the operator. In other circumstances that deal would be 60/40 in the content owner's favour.

Even technical vendors are now seeing the advantage of adding value to their core product portfolios by entering into strategic partnerships with rightsholders (for example, the recent buyout of the On-Demand Group by VoD server vendor SeaChange), or bundling in a few hours of high-definition back-catalogue material with every purchase.

The whirlwind excitement of new age always ends up with casualties, and it's likely that this particular season will see a lot of blood spilt for every innovative step forward. Aggregator start-ups are ten a penny and internet-derived content is being made available faster than its owners can chomp their teeth down on the proverbial bit. When all comers think they can get in the game, the resulting confusion hurts everyone.

Hundred of ISPs and telcos are ready and willing to open up conversations with equally large numbers of rightsholders across the world. Even the aggregators are becoming so numerous that they themselves need to be aggregated. Gratuitous advertorial aside, my company, Digital TX, is aiming to solve that very problem with a globalised 'marketplace' platform where ISPs and content owners can meet to trade access rights in a relatively automated way. New dynamics require new thinking, and the winners in IPTV will be those who can leverage the widest breadth of resources in their armoury.

If ISPs benefit from a customer's desire to download illegally, we are coming to an interesting junction in the road – if they want to offer premium content from the same rightsholders whose works are being distributed on P2P systems, will they then be liable for the illegal variety that flows so easily over their networks? Packet-sniffing is a basic network function, with identification and isolation of problem traffic relatively easy with the tools available on the market today. Indeed, a worrying development in the US is the plans of telcos to deploy heavier-duty traffic-shaping across their networks. They intend to charge content owners for prioritising the transport of their material, and build traffic quality 'tiers' that are priced according to the attention given to maintaining the integrity of transit.

IPTV allows us to use internet technologies to transmit multimedia using TCP/UDP over IP networks, meaning that an unprecedented level of inter-operation between different IP-based systems is possible (such as email, instant messaging, SMS, MMS etc). As with Sky's WapTV and cable TV systems, IPTV set-top boxes are typically browser-based and menus, screens and interfaces on a TV are written in HTML. What that means in practice is that the content for IPTV is hosted in the same way as a website, and anyone with rudimentary skills in putting together web pages can produce their own content that can be displayed on theirs and others' TV screens. What liberates and democratises the TV set may also just be our undoing.

The question for operators and regulators is how to manage the balance between opening an IPTV platform so anyone can generate their own content and innovate new TV-based interactive services, and needing to both actively control quality (read: filter crap), and provide safety from

unsuitable, damaging or indecent material. The combination of age ratings, moderation/approval and an access control list (ACL), as used by the cable companies, is not enough as it is too restrictive and very difficult to maintain. What is needed is the open structure of the internet and the relatively disciplined regulation policy advocated in television. Censorship may be a convenient in China, but it is not appropriate in the 21st century UK. Each service provider will have their own opinions and policies, but ultimately EU law will need to stipulate the obligations on 3rd party application providers (who also use built-in micropayment systems in the same way BT offers premium rate telephony for) and IPTV operators to police content displayed by set-top boxes accessed through their networks.

IP-based systems also change the world in the way that they make geography utterly irrelevant. This causes one of the largest headaches for content owners, as for decades their businesses have been based on allocating rights by continent, country, region, platform and window. IP networks stretch across the planet and as the backbone of the internet; they offer a conduit for seamlessly distributing digital content the likes of which generations past only saw in simplistic telephony. We can send video files anywhere in very little time at all, and they will never lose quality. We can move them around, change them, copy them and store them. If you're a rightsholder, those last few sentences will probably mean that by now you're in a cold sweat and foaming at the mouth. It's nothing else than an intellectual property owner's worst nightmare. The inevitable is slowly hitting home despite the wave having crashed long ago – the new business model in the absence of physical media (and the associated production cost) and where the material can be transported anywhere in seconds, is not to sell the product itself, but the rights to how, where, when it is consumed.

That's not to say it's impossible to take some of the old world with us. Cunning technologists are increasingly using a system called, amongst other things, IP "geo-coding". Based on the issues that introduced the world to conditional access smartcard systems, the theory is that through querying the RIPE database and collecting raw data about address allocation, it is possible to identify blocks of IP addresses that match to individual countries. Content can then be released to only those who have a public IP address registered in the particular country that rights

have been allocated. The BBC used this to great effect when restricting access to multicast Olympics coverage to UK viewers, and recently to their new iMP media player service. Naturally, it's possible to generate false IP addresses, use proxy servers and other tricks, so the technique has its limits.

A more silent and permanent revolution that has been overshadowed by headline technologies like HD, H.264 and IPTV, is the process of digitisation in the media world. Broadcasters want entirely digital workflow from beginning to end, as the savings are huge when compared to the baggage of physical media. The implications for the industry are enormous. One of my greatest joys when working with ISPs is seeing the wonderfully surprised look on people's faces when I tell them that most of the TV content they want to get their paws on is still only kept on VHS or Digibeta, and archiving isn't nearly as far along as it should be. Household brands like the BBC, ITN, MTV, Universal Music and co are still working out exactly how they go about putting everything they have into digital storage and not only make the investment back, but actually whether they can make a profit from doing it.

What that means to an ISP is that the content they want (or is within their budget) is that you don't get a hard drive delivered by CityLink the next day, but that the content is most likely going to need to be "ingested" if you want to offer it, i.e. pulled out of a dusty cupboard, played into an industrial encoder, stored on a storage area network (SAN) at the highest quality so it can be transcribed into multiple platform formats later (e.g. for SD/HD broadcast, mobiles, computers etc), encrypted with a CA algorithm, put through manual QA and catalogued. The policy so far has to follow the 80/20 Pareto principle that seems to govern everything in new media (especially on-demand distribution) – 80% of the viewers want to watch only the most popular 20% of your content. The business case for digitising the large bulk of produced work rests on the model in use to derive the necessary revenue from it. Ingesting content is very, very time-consuming, expensive and labour-intensive. When you add the need to screen personnel to prevent criminal piracy and the shelf life of digital storage media costs begin to spiral and rightsholders are faced with a genuinely difficult business problem that they thought was initially much smaller than their need to monetize their back-catalogue.

Herein lies a fascinating and complex new territory for content owners. What is the most profitable way to offer content from huge digital archives? Consumers will not pay for material in the way they do for pay-per-view movies, and bundling optional flat rate access fees into monthly triple play subscriptions adds pricing sensitivity that could risk making the business model unviable. Many (including Bill Gates) believe the answer can be found in so-called “Long Tail” economics, a term coined in a 2004 edition of *Wired* magazine to describe the appearance of sales statistics from internet retailers. The theory says that products that are in low demand or have low sales volume can collectively make up a market share that rivals or exceeds the relatively few current bestsellers and blockbusters, if the store or distribution channel is large enough. More and more content owners are coming to see the statistical distribution that is the signature of the Long Tail theory, such as online DVD rental and music download services. Surveys are consistently showing that niche or back-catalogue content is in higher demand than premium content.

This issue takes on greater significance when the current debate between TV production houses and broadcasters is taken into account. Generally Hollywood tends to impose its strict own conditions and restrictions on the way its content is stored and distributed, but the unique relationship that production houses share with their customers complicates how arrangements are made for IPTV. Tradition dictates those broadcasters commission independent production companies to produce programmes for them, and subsequently acquire the primary rights for a single broadcast and a repeats showing (the most profitable part for producers). The secondary rights are left with the production houses to sell overseas and in new markets. More flexibility is needed for making content available on-demand from a digital archive, for example for a “7 day catch up” service, as it’s not clear who exactly controls how it is distributed.

Ofcom’s answer to this scenario is 2 rights windows – the first for rights acquired by the public service broadcasters (“PSB”, BBC, ITV, Channel 4 & RTL/Five), across any distribution platform, across any wholly-owned channel, for a specified duration, for free-to-view UK distribution. A 2nd holdback window will then follow in which the broadcaster may limit the exploitation of rights by the producer. This restriction can be shorter

than the current five-year period and the broadcaster can retain an option to extend the duration on further payment. At the end of the holdback period, the ability to control exploitation of the programme would revert back to the producer. It is worth pointing out that the BBC is in a unique entity in this situation, in that it is required by royal charter to make its own material available in to the widest audience of UK viewers possible and commission a minimum of 25% of its output from external production houses. One of the most common sources of confusion to the question of whether BBC content is free is the difficulty in understanding the difference between true BBC PSB content and the rights to commercial content controlled by its business arm, BBC Worldwide (UKTV, Flextech etc).

With the massive reduction in storage costs provided by digital technology, there is a school of thought that we may just be heading towards commoditisation of non-premium content. Producers won't hand over the crown jewels for free (especially jewels they have spent hundreds of millions on making), but the redundant back catalogue may just come at a pretty good price as it could offer the ability to resurrect the goose that makes those lovely golden eggs. How do you charge for access to hundreds of thousands of new clips, short films and individual episodes? Is it possible to use a staggered, average-yield model as trumpeted so successfully by Stelios Haji-Ioannou of easyGroup fame? How do you offer 3rd parties access to them to include in their own applications? The most viable options would seem to be an optional blanket/fat-rate monthly access subscription, or individual "nano-payment".

The feedback from internet downloads is that access has to be fast (P2P, Grid and/or BitTorrent) and very, very cheap – consumers have got used to good quality pirated material available for absolutely nothing, entirely free. Disney used this knowledge to great effect when it released "Lost" as a download, because it was the most popular pirated show at the time. In that sense, the movie industry can consider itself lucky – the music industry failed miserably and has shown them what not to do, and piracy has eliminated the usual need for a pioneer – the one that inevitably gets scalped whilst the rest lie in waiting for it. Illegal downloading has shown them the demand (hence removed the risk of

uncertainty over whether people will consume media in that way), and saved them the cost of educating the market.

The new wave of IPTV and Video On-Demand (“VoD”) services is a disruptive equaliser, and one that now has enough momentum to resist the overtones of the incumbents’ vested interests. The 600 billion page internet with its killer applications that have come to dominate our lives was originally built on the unbelievably simple HTTP transmission protocol. IP services naturally talk to other IP services, and therein lies the power of IPTV – the fact that using IP (i.e. TCP/UDP) to transport digital video allows us an unprecedented level of integration and inter-operation with other services (e.g. email, VoIP, SMS/MMS etc) that evolves the TV entertainment model to be one of implicit viewer involvement. The fundamental shift is that we can now identify exactly what content is being played at any given moment in time, who is watching it, and how they are consuming it.

Our mission at Digital TX is to open up IPTV as a simple, intelligent and open platform that anyone can innovate around – just like the internet, but with some tweaks. The costs of producing and distributing a multicast IPTV stream in MPEG-4 on a PC are negligible (aside from a camera and/or broadband connection, you can do it in less than 30 seconds with the free VLC player for example) – small enough that anyone in the whole world can produce and distribute their own live and on-demand TV channel(s) with a broadband connection and that geographic boundaries no longer apply.

Viewers have access to an unlimited amount of content from every culture, country or social group that has access to the internet or interconnecting IP network (3rd party data centres, local council CCTV etc) – channels, movies, albums, clips, games and more. User-generated content is in, broadcaster exclusivity is out. Gone is the concept of the “walled garden” – a term used to describe a private set of exclusive private information services provided for customers for display on a device such as a cable TV set-top box or 3G mobile phone.

Any element of the set-top box’s ecosystem can be made available to developers, allowing different start-up videos, screensavers, incoming & outgoing call dial-tones, EPG menu “skins” and many others. Anything on the internet or the local area network the device is connected to is fair

game and easily portable to the IPTV environment (assuming of course that it is suitable for TV as well as a computer) – flash movies, viral film clips, software applications and all totally available in parallel to the main TV and media on-demand platform that does not exist on the internet.

A world of possibility comes with its own burdens juxtaposed, and the one staring us in the face is the need for a way to have a really intuitive and easy way to find our way around all this potential chaos. This is the Achilles heel of operators that rely on such an open platform to counter-weight the buying power of the bigger guys, and one they will exploit as a problem that they solve by offering less, premium material. PCs have bookmarks, Google and address bars, mobile phones have short codes, Teletext has pages numbers, but IPTV has a limited screen area real estate size which most couch potatoes get very angry about if it is obstructed or overloaded, and needs a way to manage all the available content that a 3 year old could use with their eyes shut. The bottom line is the user interface (UI) needs to be better than good – it needs to look and feel like it was sent from heaven itself.

Many industry pundits believe that ISPs offering IPTV services will largely be competing for, and consequently cannibalising, the same markets and that the battle will eventually be decided by those with the most powerful brands. In a brand-driven market like the UK, such words ring true. Cinemas like Odeon and UGC, who offered no competition to BSkyB's scheduled-broadcast service, Sky Box-Office, can easily and inexpensively innovate their own pay-per view living room "private cinema" experiences if they secure an extension to their existing window rights. Their brands are perfect and the platform exactly what they need to fight back against the competition from video on-demand.

One of the most interesting (albeit predictable) IPTV concepts in development now is descended from Blockbuster's "channel" on Kingston Communication's KIT service, based in Hull. Online DVD rental companies like ScreenSelect, LoveFilm, DVD2Home and DVDs365 have seen the cable "FilmFlex" and "FrontRow" services and already have strategies in place to gradually evolve their current business model for video on-demand subscriptions. The clearest way they have found to do that is to build a branded video on-demand "channel" that is accessible from the EPG or system menus on the IPTV service (the same type of

screen as featured on Sky Digital's interface). Such a "channel" can be created once and made available on multiple ISP operator platforms.

The concept is extraordinarily appealing when combined with Freeview, given Sky's scary churn rate and their customers' dissatisfaction with their movie channels. BT have also seen the possibility and added it as a cornerstone of their "Project Nevis", along with network PVR functionality (which is basically just video on-demand, but from a list of programs you specify that you would have otherwise recorded on your Sky Plus PVR). A sobering perspective is contrary evidence gathered from Video Networks' real-world experience they have found that including their on-demand "channels" into the live TV line-up has significantly increased their popularity – consumers tend to associate on-demand content with payment, making it the last resort when nothing else is on.

Aside from all the talk of rights and intellectual property, IPTV technology is breaking new ground in the types of services available through a TV or computer, and the way we consume and buy media. If you're a nerd (as most lovable ISP types are), it's easily one of the most innovative periods in multimedia for some time. Companies like Agile TV, who offer voice navigation, and the much hyped G-Cluster are offering new and fun ways to enjoy TV. The latter is a long-time favourite in most conference-attendees' diaries – their set-top software allows operators to offer immersive pay-per-play 3D video games over broadband networks, without the need for a Playstation, Xbox or GameCube to be attached (the video output from the graphics card is sent over the network like normal TV). We're talking Halo 2 rather than Sky's Digital's Pacman or Tetris.

These aren't just toys or fads – despite the mandatory adoption curve, they offer new ways to make money, new platforms to develop content for and provide added-value that helps newer market entrants to differentiate their services from incumbents. When Sky launch their new HD service this year, you can guarantee the others won't be far behind once they have let the market grow so they can migrate the mass market over to their ADSL2+ platforms.

The largest IT conglomerates who offer products and services for IPTV will bore anyone who has the inclination to listen about the thinking of engineers that has been through the grinding wheels of their market

department. They call it the larger picture – the home ‘eco-system’. Don’t get me wrong, future-proofing and seeing the whole chess board is important, but with the legacy infrastructure already littering houses all over the country its going to be a while until even the first building blocks are in place. Part of the motivation for taking the Microsoft shilling (other than that they are so hungry to undermine Siemens and grab market penetration they will pay for your entire project), is the breadth of devices that support their DRM technology – PCs, Pocket PCs, Xboxes and soon to be, set-top boxes. There will come a time where content will need to be produced multiple devices and the rights explicitly controlled to the very last second, but that time is not now when the industry just needs to catch its breath.

Its time for a new deal – a fresh partnership between ISPs and content owners to help each other usher in a new era of content consumption and technological innovation. Both share the massive excitement over IPTV and the risks involved in deploying it, and each can ease the other’s concerns. The rewards are there for the taking – we absolutely can break the back of piracy, but we need to cooperate to do it. ISPs can minimise it from their networks, and content owners can control the distribution of authentic material. We need a working group that can collaborate with regulatory agencies to smooth over potential problems before they arise and define a safer and more compelling future. What is needed is an agreed 18-month “honeymoon” period given to each by the other – the granting of extremely appealing and flexible conditions to each other’s assets and infrastructure as good will. A gesture of faith in relationships that will develop in the years to come as the dust settles on the new digital world. Let’s build that world together and do what the other platforms never had the chance to, and would have killed to have.

bursting the pay-per-view bubble

The very first bandwagon that new proprietors of digital media platforms tend to jump on once they have made the quantum leap of understanding that IPTV is about entertainment, not infrastructure, is that they want movies. Lots of them. Hollywood's best. Everything they can get their hands on. Viewers will see their fantastic movies and come running in their droves to the temple of consumer indulgence they have built.

So they spend months trying to find their way into the studios and being ignored. It's a very small world, and one that you don't get into without a multi-million dollar budget and trusted introductions. Los Angeles' traditional Jewish roots still provide the foundation of the industry today and although times may have change, old conventions still linger. The mass market nature of the pictures, their hundred million dollar marketing budgets and enduring popularity means that the industry is never short of new business.

The first and so called "golden" rule of video on-demand is that it is the primary driver and revenue-raiser for digital TV platforms – the "killer app" that brings in the ARPU from each home that the platform needs to survive. The assumption is that these movies are watched every second of every day, like DVDs are. The whole US TV market (and coincidentally, the BSkyB model) is based on paid sales, rather than the British model of advertising.

This illustrates the serious danger of assumption, because nothing could be further from the truth. You need to see pay-per-view statistics to believe them. If you did, you wouldn't be basing your business plan and platform development strategy on it. By the time you find out, it will be too late. Most services have a few thousand movies to choose from, of which less than 20 or so are the cream of the crop. They would have been available in a DVD store a while ago and of course, are the same price, or even more expensive.

There is a curious phenomenon at work with pay-per-view. Although it may drive us to subscribe, and even though we may like the option of

having those premium movies, we don't actually watch many of them at all.

And the truth shall set you free. So what is that truth? It's a lot worse in real life than it sounds. Platform owners are the only people who are able to understand how many movies a household watches per year, and they don't like telling anyone. They don't tell the studios either. The bizarre sales reporting model they use is called a "buy rate" and relates to, wait for it, the total number of purchases made over the year expressed as a percentage of the total number of subscribers the platform has.

Let's say platform X has 100,000 subscribers. If 10,000 pay-per-view purchases were made over the year, that gives the platform a 10% buy rate. Sounds simple, doesn't it? The trouble is absolutely no-one gets a 10% buy rate. Not even close. The average movie studio tends to get a 1-3% buy rate. There are 5 in total, so the maximum you could get would be 15% or so, or 15,000 purchases for our fictional example.

You can quickly begin to see why studios like platforms that have lots of subscribers, and aren't interested in small players.

And if you think that's bad, hold onto to your coffee. PC download statistics are even worse, if it's even possible. The average buy rate for these services is currently 0.02 – 0.05%. No really. That means platform X averages a maximum of 500 downloads a year. Silly window-busting schemes like DRM-riddled download to own services just aren't selling. Even iTunes' sales are down by 65% this year. Whatever is going on, the current formula isn't right. Consumers aren't amused and piracy is winning the day easily. You need volume to make money.

To fully appreciate the dire economic situation, it's necessary to understand how a VoD distribution deal works. To get in the door, you need an audience to make the buy rate attractive. The first thing you need to pay is the up-front sales guarantee. It's all about the advance. The riskiest you look, the more you're going to pay. It's essentially a fat bribe to get the studio's interest and a golden handshake to get your hands on the goods. No advance, no deal. You're going to need £500k or so per studio at the very least, and if you're in the Eastern block or

somewhere like Vietnam, just forget it altogether and do a deal with the little guy who comes round in restaurants selling illegally copied DVDs.

The normal type of deal done on an on-demand platform is a form of revenue-sharing agreement. The studio serve you up a hard drive of electronic files pre-encoded in their preferred conditional access or digital rights management system, all to the MPAA guidelines. For independent producers, you will traditionally see a 50:50 split revenue agreement, and for the majors, its 70:30 in favour of the rightsholder. When the sale is done and the operator recoups from their customer, you remove VAT or sales tax. If the studio are hard-nosed, they will demand the whole 70% immediately. If they're remotely kind, they'll share the admin and distribution costs (card processing, CRM, support, bandwidth etc) and then take their share.

If we go back to our fictional example, Platform X, we had 10,000 purchases. To make it more realistic, we'll use a typical 1% buy rate (1000 purchases in a year for one studio). With each title costing £3.75, our gross revenue for the year is £3750. Less VAT, we are down to £3093.75. Even with the most favourable deal, the studio 60% take-home is £1856.25, and the platform's remaining 40% equates to £1237.5. From that, we need to deduct costs to reach our net revenue.

Not exactly impressive is it? If we scale that to include the five main studios each on a 1% buy rate, platform X would make £6187.5 in a year from their premium pay-per-view movies. This is why the studios like Sky Digital and cable and don't pay a whole lot of attention to IPTV systems. Sky Box Office can give you anything up to 1.5 million purchases a year, and in the American market, there are 270 million people who have been conditioned for decades to buy movies on cable at outrageous prices. It might also go some way to explain exactly why Homechoice has suffered so much, and why BT might find themselves in some trouble soon.

If we gradually work ourselves back, chronologically speaking, the picture of adversity to digital media reveals itself. If premium movies need volume, these new platforms can't deliver it just yet. There's no reason to spend anything more than experimental budget on putting content onto new technological systems. Movie studios are essentially fast-return investment bankers. Like venture capital, for every 10 movies that are produced, 7 will flop, 2 will break even, and 1 will make money.

When you're spending hundreds of millions of dollars on a production, you need to be aggressive to make a return on your investment. The massively complex and never-ending chain of intellectual property rights (from the reproduction of an actors' likeness to the artwork on a DVD), the legal and commercial muscle needed just to get something to market is spectacular. All for 2 hours. After that, they bin it, take it back to the shop or forget about it.

Theatrical and cinema release recoups a significant proportion of your revenue, but the pot of gold under the rainbow is DVD sales. The lucrative market for DVD purchase and home video scales into the multiple billions, and the frightening truth is that it underpins the vast majority of the film industry. To eat into that means suicide in an already risky market. But to not change is a bigger risk. Piracy is a business model like any other, and it has volume. You can't sell ads on premium films that equate to rental value, so there is a glaring gap, even with the deduction of physical fulfilment costs for physical packaging.

Forget the premium movies, as unless you are a massive TV platform or a bored billionaire with a pet project who has a few million to bung his buddy on the golf course, you won't be getting them. Approach the studios with a way to monetise the rubbish nobody buys anymore in their back catalogue. If you want to do niche, tell them you're going to do niche. If you want to offer premium movies, there will always be a Walmart or Tesco that will outsell you even on a loss-leading basis, as they already know the power of these products to provide an incentive to get the shoppers through the door.

The opportunity is there for someone to solve it. It needs the willingness of the studios to listen and change, and for an operator to deliver the revenue that returns the investment.

The lesson for operators and retailers is very, very clear. When you are working through your profit & loss account (income statement), premium pay-per-view needs to be in it as a marketing overhead, not a form of sales revenue.

solving the home wiring problem

If you're a survey junkie, you no doubt love the sheer onslaught of silly press activity that's been happening recently in technology world. IPTV, the all-healing panacea, is so hot almost everyone wants to do it despite not having given a lot of thought to the real delivery issues that it will involve for them. The most absurd surveys were conducted by Harris and Accenture – both offering contradictory results that weren't a lot of help to anyone.

The latest earth-shattering news from our favourite black hole for public money is that consumers don't know what "IPTV" is. Profound, until you realise that they don't know what DVB is either, but they still buy digital TV. Money-guzzling consultancy one, common sense, zero. Almost as useful as mobile providers realising the killer app for 3G is voice, or telco networks deciding on interoperability principles when they are intent on using Microsoft's IPTV Edition platform.

The world is moving very, very rapidly for ISPs all over the world. Operators are charging down the road to next-generation IMS (IP multimedia subsystem) networks, and consumers are eating up bandwidth like their very lives depend on it. Telcos are becoming cable companies, broadcasters are becoming P2P networks and consumers are dazzled by the choice of the many providers that market consolidation is well underway.

No longer is it satisfactory to provide just broadband connectivity, and keep up-selling capacity – even with BT's latest Max range of products that go up to the full line-rate of 8Mbps, vanilla DSL has already been superseded by ADSL2+ in the LLU world. There is already chatter about hopping over that to go straight to VDSL2, which can offer up to 100Mbps. All of these last mile technologies are great, but if you don't have the backhaul network, you might as well be on dial-up.

The great change telcos and ISPs are facing is one that strikes at the heart of their business. Most are content never to speak with the great unwashed public, and if you look closely, you'll see that a large proportion give no contact details for themselves and offer little, unsatisfactory or no customer support. Homechoice have once again

been the first into a brave new world, and despite a number of direction changes they have settled on a course that all ISPs need to follow. They now describe themselves as providing a “*digital home network*”, and nothing could be more succinct in industry terms. Now it’s all about what you do with your connection, the value-added services you layer onto your basic connectivity products to differentiate yourself because ISPs are evolving into companies that power a customer’s home network. The vast majority of connecting hardware and services that give the *raison d’être* for wiring up the house are delivered by them – broadband routers/switches, voice over IP, set-top boxes and more.

What this means is choosing an ISP is a lot more than just switching providers at the exchange level. As networks scramble to lock customers into loyalty to their brand, potential subscribers will be walking into a relationship with a company that provides their telephone, television, media services and home automation services, on top of the basic broadband connection that powers them all. And this is not a bad thing, as we will explore later on. Consumers need guidance as to how to create and manage their home broadband networks.

Unfortunately, 2 distinct currently things stand in the way of a beautiful and harmonious future of converged multimedia services – the first being usage-based charging, and the great evil, wires-only broadband installation. The industry ridiculed Wanadoo when they mandated the use of a LiveBox for all their customers, but the joke’s on us. Wires-only packages may appear to reduce support costs at first glance, but because their flexibility allows unmitigated chaos in terms of what CPE gets used (routers, USB modems etc) or how the home is wired, ultimately it’s created more long-term problems than it has solved.

The challenge awaiting operators is the tangled mess that is a consumer’s house – the wild unknown, and generally referred to as the “*home wiring problem*”. The issue is composed of 3 sub-branches – quality of service (QoS), connectivity distribution between rooms and standardising a generic future-proofed home network architecture. The underlying difficulty when addressing issues generated by Joe Public is that up until now what exists beyond the front door is entirely arbitrary, that is to say that every home is different. Similarities exist, but the way it’s all put together is a random, scrambled chaos that is going to cost a lot of time

and money to organise at mass-market scale. The market can't be left alone to sort itself out either when it comes this issue, as much as operators would like that.

The fundamental problem for ISPs is how to connect an IP set-top box to a broadband router so that it can receive relayed video and make requests across the network. Apparently easy at first glance as each IP set-top box comes with Ethernet as standard, but much more difficult when you consider that half of your residential customers have USB modems (which aren't appropriate for triple play services), and the other half keep their gateway box in either the study or hall. That's fine for wirelessly networking PCs, but doesn't cut the mustard when it comes to supplying video as you need Ethernet. The next era of the broadband home needs to be able to connect to a reliable and high-bandwidth broadband network in every room of the house, toilet included.

The most popular setups for the 70% of homes that now have digital TV in the UK have, firstly, Sky Digital as the primary TV platform seconded with analogue in other rooms, secondly they have multiple Freeview set-top boxes. Sky offers a heavily priced 'multi-room' product that can be used to copy and/or relay the main RF signal across the house to additional set-top boxes, and broadband-based TV needs this feature as standard if it is to compete with what's on the market already. Subscribers need to be able to watch different channels in different rooms and to be able to view the same channel or video that's being tuned into in more than one room.

Portability and so-called 'place-shifting' has proved itself to be extremely compelling amongst early-adopters. Having your favourite TV programme or music video follow you around the house (or even around the world) is relatively easy, and infinitely flexible. The only real configuration issue that a home network has in most circumstances is whether it has native support for multicast protocols (PIM, IGMP etc).

All this technical amphetamine is great, but in a world where prices are rising above inflation, salaries aren't rising to meet expenditure and personal debt is at an unprecedented level, there is a greater economic concern overshadowing the IPTV market. If we carry on as we are, most people aren't going to be able to fit in their own living rooms for all the

electronic devices we have sold them. Why should they buy a new IPTV service?

We will reach a point where consumers will pause and ask themselves exactly whether our whizzbang amazing new IPTV plaything is good enough value to justify subscribing to it, or purchasing things from it. They paid up to £1000 for each PC they own, £500 per TV, £100 per DVD player, £100 for a router, and now we're asking them to pay yet another £150 for a IP set-top box. If wiring is a problem, we'll need them to pay £150 on top of that for PLC adaptors. We have to ask ourselves what is practical for most of our customers.

Sky's incredible sleight of hand under Tony Ball's leadership of 'giving away' CPE was the genius that built their subscription base in the UK. Some budget-fiddling through cunning amortisation has allowed them to soak up most of the high street, just as Freeview has done through not having a subscription to fork out for every month in perpetuity. P2P networks are spiralling in growth because they offer free movies and music. IPTV needs a killer commercial angle.

ISPs are bleeding from everywhere when it comes to their margins and most can't see a way to justify swallowing the additional cost of an IP set-top box as they are already on shaky ground. Even the leasing model used by the likes of MaLigne.TV in France is difficult to implement here because of the cash flow implications. Being a set-top box manufacturer right now is hard, but being an ISP is much harder.

Back in the early days of DSL, operators came up with the great idea of self-install broadband packages – 'wires-only' products that needed no engineers to be called out for installation, and offered the freedom for customers to choose their own equipment setup. It's worked well so far, but momentum's been so fast that we've neglected to see that we're about to run out of road as we approach a very large cliff ahead.

The curse of every analyst and planner of IPTV services is the lack of standardisation of home CPE – it's a hell that's every bit as painful as it looks. The range of router/gateway manufacturers is enormous as the industry has deepened with the general uptake of broadband. If you want to see an executive rip his shirt and howl at the moon in frustration, just bring the subject up over coffee.

You can expect to find different models from Belkin, Netgear, Linksys, D-Link, Actiontec and many more. And the bad news is that despite being built to comply with standards (PPPoA, QoS etc), they all have a complicated, unsynchronised mess of different features that don't have a hope of being pulled together cohesively. Most desperately need firmware upgrades, have ugly, incomprehensible and unusable admin interfaces, break down with alarming regularity and are OEM tin cans made in China from the cheapest components available.

The one feature they need, QoS, either isn't there, or is implemented in a meaningless way. The router is the broker of all services into the home – a bottleneck and control gateway that is crucial to the satisfactory deployment and maintenance of high-value services.

This chaos needs to be resolved somehow, which generally means mandating, and only supporting certain hardware. The biggest ISPs use this (not having to go out and choose what equipment to use in your home) as a selling point, but the smaller providers work at recruiting the more specialised market sectors – small businesses, and early-adopting techheads. BT tends to enforce the use of their own router, Wanadoo require you to use a LiveBox, and Homechoice supply you with a set-top box that includes a DSL modem. In most other ISP customer bases, it's unusual to find more than 15% of the raw subscriber base that definitely use the same hardware. The flexibility of plurality has its limits, and change invokes them very quickly.

One of the first questions and preconceptions of those who are curious about IPTV is how similar it is to streaming video on the web, or 'Internet TV'. The answer is that the process of streaming the audio and video uses the same mechanism (RTP/RTSP), but the environment in which it is transported is strictly controlled by an ISP, never going onto the public internet. Being unicast at crappy resolution, streaming video on the web is abjectly awful and bottlenecked at every point – even the bravest of souls is tempted to commit hari-kari when the dreaded "Buffering..." appears on screen. No matter whether it's Real, Windows Media, Quicktime, Flash or anything else, it's always dreadful. IPTV has a barrier to climb in the form of this particular preconception before anything else.

You can't be watching TV and have your picture break up because someone else in the house has switched on their BitTorrent client and starting eating up all the bandwidth. Video signals over IP are extremely sensitive to jitter, packet loss, delay and many other conditions that exist in a normal network. This isn't such a problem when browsing web pages, or even for phone calls. People's tolerance of problems on their TV is very, very low in comparison to their PC. In fact, most even expect their computer to do something unpredictable and leave them totally confused (the infamous BSOD, or "*Blue Screen Of Death*" being a prime example of this). The game isn't uptime of five nines, it's 100% reliability. You don't get to mess up even once.

Different types of TV signal from different broadcasters have differing bandwidth requirements. Most IPTV is now transmitted or encoded in an MPEG-4 codec variant (H.264 or Windows Media 9 typically) at the highest possible quality. For standard definition this means 1-4Mbit/s, and 6-10Mbit/s in high definition. If you're prehistoric and still using MPEG-2, the figures are 4-6Mbit/s and 25-30Mbit/s respectively. Encoding can be done using an average bitrate (ABR), but is handled efficiently by intelligently determining when additional information is needed in the stream – for example water, cartoons, sports and high action sequences require enormous detail and therefore more bandwidth. Scenes where there is little movement (e.g. talking head-style discussion or still shots) need hardly any bandwidth.

Maths geniuses will have worked out by now that trying to get TV down a phone line is a lot easier using MPEG-4 and high line speed DSL connectivity than using MPEG-2 and plain old vanilla DSL. It can be a real struggle when most people's lines aren't close enough to their exchange to have enough space to reliably handle digital TV. Standard DSL, such as the new BT Max product, does 8Mbit max as ATM line speed and nearer to 7Mbit/s at the IP layer. You can fit a 1 standard definition video stream in it with very little room for much else. ADSL2+ can handle 3 SD/2 HD channels and VDSL2 many, many more at close range (and ADSL2+ rates elsewhere). Both have the limitation of distance, but greater bandwidth at the last mile is always beneficial. No-one who has ever deployed this technology will ever tell you that the beer-mat maths actually work in the real world.

The key issue here is reliability. Just because a connection can theoretically accept large quantities of real-time data doesn't mean it will arrive properly. Rats chew through cables, water shorts out electric machinery and wiring suffers evil 'crosstalk' when it's bundled together in street cabinets. TCP as a protocol is extremely aggressive and will seek to consume the very maximum bandwidth it can, meaning controls are essential. A DSL signal is typically encapsulated using the ATM protocol (using PPPoA as the carrier layer) up to the front door, where it then is translated into IP by the home router. That has a larger implication when putting in controls – the last mile speaks a different language than the home and backhaul networks it is sandwiched between.

The controls we need to install on all parts of the network are collectively known as QoS (*"Quality Of Service"*) or *"traffic-shaping"*. These techniques are used very crudely by many ISPs right now to discipline chronic downloaders who manage to consume more than 100GB per month in data transfer. The underlying theory is the same – partition the connection into separate untouchable virtual 'channels' according to the application the data to be grouped is intended for. In a typical triple play setup, we use 3 channels which are cleverly prioritised, those being video (3Mbit/s), voice (276Kbit/s) and data (unspecified, or just the rest).

They are often not in real-time, expanding and contracting as and when necessary (a good example being video on-demand, as it only needs heavy bandwidth for the duration of a film, as opposed to live TV which is continuous). This partitioning can be done in multiple ways, but over an ATM network it is done using permanent virtual circuits (PVCs, or sometimes just called virtual circuits, VCs), and in IP-based environments such as LANs and MPLS networks, we use virtual LAN grouping (VLANs).

The trick for operators is how to get ATM and IP to play well together, which normally entails using a hybrid solution that maps ATM PVCs to IP VLANs. The ultimate goal is to move everything to IP by implementing a full IMS environment (PPPoE), which means most of UK DSL supplier community will have to wait for 21CN to be completed before they can migrate their own networks. Homechoice and KIT have both attempted to do almost everything they can as far away from a customer's home as possible. Both exclusively implement QoS in IP in their DSLAM and central office switches rather than cross streams with ATM, meaning the

traffic that arrives in your home is already sorted and prioritised before it reaches your router and no filtering is required. DSLAMs are also crucial pieces in the delivery chain that suffer bottlenecking like no other, and are designed for aggregation.

There is another argument for exclusively using IP, which is derived from the concern that PVCs are simply not inherently scalable enough when you need a minimum of 3 per home. Further along down the line, we will need to partition further and possibly far more dynamically. Gamers have different requirements from office workers, as download fiends do to grannies just getting the hang on this 'interweb' thang. Quality of service engineering may lead to more tailored and high-performance lifestyle connectivity packages.

There is still much spirited debate amongst research scientists as to whether video can be better delivered at layers lower than IP across optical networks. Almost all networks use a multi-layer topology model called the Open Systems Interconnection Reference Model (or OSI model) to illustrate and describe how the transport traffic and function. The OSI model is composed of 7 layers and is a very useful start when trying to understand the nature of transporting video over DSL.

Everything done on the backhaul network or in the DSLAM needs to be mirrored in the home network, which is very challenging to say the least. Once we prepare a standard QoS setup for our router/gateway to use, we need to consider how it administrates it between all the devices in the customer's home. The dominant type of household that uses DSL is a family home, which despite the usual chaotic mess means that wiring has to respect the order of the nest. A customer's home can't have wiring all over the place, must be installed conveniently and be easy to maintain. Interior design is a key issue that almost no ISP seems to understand – it's even more foreign than the concept of 'customer service'.

There is an incredible opportunity for small local IT businesses to provide a call-out home wiring installation service on behalf of ISPs in the same way local TV servicemen and electricians work for Sky to install satellite equipment. It's not practical for big businesses with low margins to offer localised support when they need to consolidate their interests nationally.

Sending engineers to do installations is what most consumer industry pundits call “truck roll”, and it’s universally understood to be a very expensive activity that must be out-sourced or only used as a last resort. The biggest issue with self-install packages is not being able to deliver packages in the post as the recipient isn’t present to sign for the goods that have been despatched (or CNP – ‘customer not present’), and they are too big for the letterbox they need to go through.

Truck roll eats into profits like nothing else (especially as customers hate paying setup fees), but for the high-street it is unfortunately essential. The normal accountancy that pays for it is a relatively simple twiddling of the figures to amortise the immediate cost of the installation against the fees recouped across the subscriber’s service lifespan. People like Sky have got this down to an art form as it is paid back in less than a year, but only the big names can afford it, as beside inflating customer acquisition costs, without a very understanding bank it kills cash flow dead. All the major brands use truck roll to alleviate as many support costs later on as they can – Sky, BT (broadband and the new Vision IPTV service), Homechoice, NTL, Telewest and more.

There are currently 5 choices for wiring up a customer’s home so a TV signal can be carried between all the rooms: wireless/wi-fi, Ethernet/Cat-5/6 cabling, coaxial cables, home phonenumber networking (HPNA – 128Mbit/s over telephone wiring) and Ethernet-over-powerline (e.g. HomePlug). All require additional cost and configuration of some kind. Soon after looking through all the options, it becomes apparent that we don’t have the right tools in place to make IPTV the smooth, sweet and beautiful transition it could be. Most homes being built from scratch now directly wire optical cable to the front door and are channelling hollow pipes in walls that can accommodate wires of every variety. Importantly, there is nothing to say these techniques cannot be combined and mixed to achieve the same ends as favouring one standard mechanism.

Video needs a fat, stable connection, and wireless is useless for PCs, let alone for set-top boxes. Despite innovative technologies like those offered by Ruckus (based on sectoring and directional transmission control), thick walls, connection dropping, weak security, difficult configuration, interference and instability mean that for the foreseeable future this method of communication can only be used for PCs and

browsing the internet. Using it as part of a hybrid distribution model is safe enough. Disregard and distrust anyone who says otherwise, as they clearly have never rolled out an IPTV network in anyone's house other than their own. Unless your wireless access point is in the same room as your TV and PC, you will struggle.

Messy cabling is the reason that the other options are not feasible – despite being cheap, LAN cabling (either 10/100 Cat-5 or GigE Cat-6), telephone wiring or coax cabling in a house that does not already have it installed is a nightmare of proportions most service providers cannot even bear to contemplate. If you're married, you shouldn't expect to be if you uproot your better half's delicate interior design balance with thick Ethernet cabling.

If you are feeling defiant and own the property you live in, pick an unimportant wall and attempt to channel a hole through for holding new wiring (also with easy maintenance in mind too), and spend an afternoon proving the rest of us wrong. It will take 10mins before you accept that there is a distinct problem in adapting your home for high-speed broadband connectivity. Not every room will allow you to gracefully add to cable to it so it's effectively invisible.

Then what is the solution to this most integral of problems? Without fiber or Cat-6 already installed it is Ethernet-over-powerline, or PLC (powerline communication) technology. PLC products create an Ethernet network over your existing electricity cabling in your home without any need for additional hackery. This is accomplished by using adaptors that require no software drivers and simply plug into normal electricity/AC sockets in any room.

Each adaptor has an Ethernet socket on it from which you attach a standard Cat-5 network cable. To enable a very simple IPTV setup, one adaptor is plugged into the same double-plug electricity socket as the router (and also connected by network wire to the broadband router/switch), which instantly creates a local area network all over the house that any other device can now access with another adaptor. PLC adaptor number two is then popped behind the TV (probably in a plug board), and connected to the IP set-top box again by Ethernet cable.

PLC technology has an unfortunate legacy reputation from its shaky history. It suffers stigma and preconception which sadly does not reflect the extraordinary effort that has gone into making it such an amazing product. Its bigger brother, wide-area broadband-over-power lines (BPL) failed to take off as a competitor to ADSL and was ditched by almost every electricity company that tried to market it. Early products suffered from reliability issues that plague all disruptive new technology. Infamous stories of network connections dropping when fridges were opened and being very unreceptive to power-surfing did little to help take-up of the fledgling product.

The good news is that nowadays, huge amount of work have been undertaken to stabilise and standardise the technology. It's simply the most graceful and effective home wiring solution currently in existence, and the greatest morphine for wiring headaches. PLC adaptors require no install, no software drivers, and when you plug them in, they just work both transparently and flawlessly. Even the smallest of children and the stupidest of customers can install it, unless of course they have the use of their arms.

Once one is plugged into a wall socket, a local area connection with broadband internet connectivity is available in every room in the house. They even feature built-in military-strength encryption as standard, unlike wireless. Nothing in technology is ever perfect, but PLC is proving to be a very close match to exactly what ISPs need.

There are many flavours of PLC technology and the respective bodies that are involved in managing industry standards (IEEE, Opera, UPA, HomePlug, ETSI etc), but the two most prominent are The HomePlug Powerline Alliance and Universal Powerline Association. Both organisations have a different chipset supplier that is the main manufacturer for their published standard – HomePlug technology is mostly made by the California-based Intellon, and UPA's by DS2, headquartered in Spain.

Both create OEM chips that make networks capable of 200Mbps access, twice the speed of a normal Ethernet LAN. DS2's technology has recently been adopted by Netgear, primarily due to the delay in ratifying the 200Mbps HomePlug AV standard. Most products that are already known (such as those offered by Devolo, who control 85% of the European

market) tend to be based on the HomePlug 1.0 standard, which offers 14Mbps in normal mode and 85Mbps in “turbo” mode.

But nothing comes without its baggage, and PLC technology is no exception. Despite wide support from the likes of Linksys, Motorola, Sony, Sharp and Conexant, HomePlug AV has been plagued with false starts and politicking. Everyone wants a slice of the pie as the technology’s flexibility makes it incredibly powerful. UPA gear has seen slow uptake from major brands. Adaptors typically need to be purchased from online outlets as the regulatory position is too ambiguous for high street retailers to commit to their distribution.

They are also rather costly in comparison to wireless – HomePlug 85Mbps Turbo starter kits cost just over £100/\$200 for 2 adaptors; like other network products rarely reach anywhere near their maximum speed and they must be plugged in before surge-protection equipment to work properly. DHCP negotiation needs to be more robust to ensure connection integrity, especially when an adaptor is unplugged and plugged in again.

PLC’s CSMA/CD characteristics mean TV signals can travel badly, meaning any more than 2 signals can cause problems on the same network. Offices and blocks of flats require specific configurations to avoid neighbouring networks crashing into each other. Ofcom are also yet to clearly state whether the technology’s imaginary ‘interference’ problem means the products need licensing/taxation of some kind.

Moving forward, we won’t want to live in houses where every room is full of big PLC adaptors connected by sprawling wires to a hub or switch. Industries give birth to products that are messy just to get them to market as soon as they can, and eventually over time they mature and tidy themselves up. The long-term future needs a much bigger, high-level plan for digital living. The likes of Microsoft and Siemens call it the ‘home ecosystem’, which should immediately ring alarms on anyone’s bullshit detector.

Nobody wants to digitise their home for the sake of digitising – change needs a compelling reason. Homes need to be networking environments only when applications are there that need it. Applications won’t be created for home networks until they are installed and available in a

large number of early adopters' homes. The impetus and responsibility for this needs to be from ISPs and goes back to remodelling businesses from connectivity to digital home network provision.

Many different organisations are innovating new standards and technologies that we will adsorb into our homes to power new devices and services, all designed to captivate us and secure our consumer loyalty. Video conferencing, security systems, ubiquitous internet connectivity and home automation will allow evolve as value-added services derived from broadband in the next 10-20 years. Our job as technologists is slowly shifting from the laboratory to the living room, as consumers only adopt technology that they have has value to them in their ordinary lives. We often get carried away with in-fighting, speculating and assuming the rest of the planet is as excited by what we're doing as we are.

Three technologies deserve special mention when it comes to emerging platforms for home broadband innovation, xPL, uPnP and DLNA. The first, xPL (eXtremely simPLe protocOL) is a simple and powerful open home automation protocol for standardising the auto-discovery and configuration interface between home devices, for example, turning down the stereo when the phone rings through on your TV. uPnP (Universal Plug and Play, not to be confused with Plug-and-play for PC products) comes as standard on many broadband routers is a set of open peer-to-peer network protocols that allows devices to seamlessly interact with each other over a DHCP-controlled IP network. Lastly, DLNA (Digital Living Network Alliance) is a very compelling group of technology companies aiming to promote standards for the interoperation of PCs, consumer electronic devices and mobile/handheld products.

The most amazing thing that the consumer electronics industry could do at this very moment in time is invest in PLC technology to make it of the nano genre rather than microprocessor it is now. PLC adaptors need to be implicitly built into all home devices so that as soon as they are plugged in, they have network connectivity and broadband access. That's means IP addresses for TVs, set-top boxes, DVD players, doors, VCRs, kettles, fridges, laptops, lights, stereos, kitchen utensils and just about everything we can care to name. With PLC built into all devices and/or their plugs, we have limitless possibility to innovate in the home. Right

now I may not want send my toaster an text message, but in the future it would be nice to control my home across the world and store environment 'presets' when I make a romantic evening dinner for two.

As triple-play reaches banal status, excitement has moved to so-called n-play or 'multi-play' services that include setups that are similar to the NTL-Virgin deal to provide 'quadruple play' services. Telecoms companies want our homes flooded with wi-fi, Bluetooth, GPRS and 3G to make all our voice communications digital as VoIP traffic. ISPs are also beginning to offer home PBX systems with their call packages to differentiate and add value to simple voice offerings.

True gadget fiends amongst us now have different phone extensions in different rooms, local dialling in every country and music on-hold. While most of us are getting to grips with video calling on Skype, super-nerds outgrew things like their TiVo years ago and now own a Slingbox so they can watch their TV when they are thousands of miles away in a hotel room somewhere.

It's easy to procrastinate by second-guessing. IPTV and home broadband networks involve massive change and uncertainty in a complex and ruthless market. One mistake is being made in our industry more than any other every day – and that is to assume that just because IPTV as a set of technologies, and as an industry, isn't perfect straight away that it won't happen or won't sell. As long as we stand around theorising, criticising and wondering nothing gets done. We need to look past this year and look to the next 5-10 to understand how it will affect us all. IPTV will mature and straighten itself out like any other field, so its time to calm down, take a breath and consider the best way to ride the wave.

the fall of content's kingdom

The textbook says content is king, and that saying is something every telco and ISP worldwide is contemplating after realising that if they throw enough technical people at the IPTV infrastructure problem they can put a TV network together. But putting the wires in doesn't make people flock to your service like broadband or telephony does. TV is not just a whole new ballgame but a massive leap of competence and faith. To attract customers, you need good content, and getting it is no afterthought – there are far too many IPTV projects alive in the world today where content is seconded or laughed off. It's a very deadly mistake.

It's often easy to forget the humble beginnings of content owners, but a good place to start is with ASCAP (American Society of Composers, Authors, and Publishers) and the BMI (Broadcast Music Incorporated), both created just under a century ago to protect the rights of musicians, similar to the UK's PRS and MCPS. Before the 1920s, people didn't pay for entertainment like we do today – radio stations broadcast performers live without paying them. Radio (or the "wireless") changed everything.

During wartime ASCAP members (predominantly musicians) boycotted the radio as the industry had become motivated to have their assets protected and paid for. Slowly they came to rely on the new medium until it formed the very backbone of their industry, once they were able to be compensated for their work being played on it. History repeated itself with vinyl, cassette tapes and internet P2P piracy today.

But this time content's kingdom is crumbling. Right before our very eyes, slowly and gently.

There is a war on its way between telecoms companies and content owners, coming about because of a fundamental lack of understanding between each others' business models and operational concerns. The battle lines have already been drawn in the U.S. and we will almost certainly see them coming to Europe and beyond very soon. Network operators want to charge content owners and developers for the secured delivery of their assets across their infrastructure, in the same way as

mobile carriers do. That would be fine, except that network they are talking about is the internet, and it's not meant to work that way.

The aggressive stance of "two-tiered" internet access is a result of a lot of miscommunication between the two industries, and is a looming and dangerous issue that needs to be fairly resolved if IPTV is to move forward into the mainstream. Telcos have been battering down the doors of content companies everywhere to ask for material to go on their shiny new IPTV services, but they've had it firmly slammed back in their face by rightsholders who are rightly sceptical of the technology, the audience and the lack of enthusiasm for their licensing terms.

But that is relatively easy to sort out, as everyone wants to make money. The problem has arisen with the advent of legal P2P distribution technology such as Kontiki. Broadcasters like Sky, Disney and the BBC have all worked out that they can save on costs if their distribution is decentralised – that is to say, not all streamed from one central HQ. P2P distribution offsets network traffic to the edge of the access network so that customers can download from each other, rather than the broadcaster. They still need a central P2P seed grid, but ongoing distribution costs are considerably lower.

That's great for broadcasters, but bad for ISPs. The traffic load is the same but shifted from one part of the network to another, meaning they are incurring the heavy backhaul costs that the broadcaster would have to put in if they were to do it themselves. Understandably, if you refuse to cooperate with licensing content and then use them to transport your products and services, you'll not only raise eyebrows, but probably the temperature in the boardroom with it. The impact from IPTV is going to be enormous, and ISPs have enough on their hands from the step change of just upgrading their infrastructure to deal with it.

So as a result, ISPs want delivery on their networks to be a premium service that big content owners pay for. This means the networks are paid for bilaterally, firstly by the consumer and now by the content distributor. Real-time video is orders of magnitude more expensive in comparison with other types of media, and the internet as a whole is currently evolving to be so much more than it was originally designed to be. That evolution brings costs and difficulties which the current framework can't meet. But a tiered delivery structure breaks the open

model of so-called “*net neutrality*” and as Tim Berners-Lee recently pointed out, would mean we enter a “dark period”.

There is a growing frustration with content owners and the content world in general from telecoms and technology companies. Both operate their businesses on the basis of creating, owning and licensing intellectual property. Start-ups in particular are suffering from problems such as restrictive EU legislation and not being to even talk with rightsholders, let alone do deals with them. In turn, content owners are increasingly fed up with the constant of business development executives asking the same questions and stubbornly refusing to try to understand and meet their concerns. The will is there, but the way is not. The simple consequence of this conflict is that smaller companies are being empowered, and a young ecosystem of IPTV-friendly suppliers is taking root. Necessity is once again the mother of invention.

Of course, this could be posturing by telcos to negotiate a better deal on content. It's hard to see exactly how they would have a positive outcome by following their threats through, not that it's stopped any business doing the same before now. Some of the most powerful companies in the world fill their trousers from forcing the hand of others.

Dealing with content owners is difficult – that's a universal truth. Despite the best efforts of some of the incredibly clever people they have working for them, the decision makers inevitably don't have the same level of understanding and find it hard to accept change. They've grown used to being powerful and they are part of an exclusive club that's very hard to join. They are convinced of their divine right to rule, have too many business offers to deal with and know their product is popular. They know that entertainment services need good content to survive, so wield a very big stick when it comes to upstarts who want to disrupt their comfy way of life.

Historically, they've always won because of these truths. But this fight is one they are going to lose.

For one reason, digital piracy.

ISPs alone hold the key to limiting and/or ending digital piracy. Their networks are the conduit for the illegal trade of intellectual property and they know it. It's an unwritten rule that what they sell is effectively free

movies and music, with a little browsing and email thrown in. There is nothing that can beat free (as BT will find out when they launch their “*a better free than free*” Vision service). For as long as piracy continues, it will be the number one reason that on-demand services are not taken up. There is absolutely no reason to pay for a movie or music track when you can access it for free on a P2P network. VoD is pointless when you have DVD-quality movies ripped from screeners available via BitTorrent.

The movie studios are desperate to avoid the cataclysmic failure of the record labels. And make no mistake, it was cataclysmic. If you are foolish and arrogant enough to persecute and make example of your own customers (typically pre-pubescent children, university students and the elderly), you will suffer the consequences, as they already have. The market is leading these companies in a new direction but they are resisting and clinging on to power by a thread. Those consequences mean more (not less) piracy, new software build to circumvent controls and to a certain degree, the snubbing of your products by a frustrated and resentful audience. For every lawsuit or software system, a community will naturally adapt in kind, be it with encryption or a boycott. You cannot fight an enemy who you depend on for your very survival.

Piracy is the hidden and unmentioned competitor to all digital services. Even within pay TV markets (of which the UK is not one), people watch linear broadcast television before paying for video on-demand. iTunes may have been a runaway success in the press, but the leading alternative are the likes of Limewire, Kazaa and eMule. If you contrast their usage against legal services, there is more than a mountain to climb. It's the entire Himalayas. As long as you can get hold of a raw digital copy of the media you want for free, people will just keep using P2P. Sorry, but that the way it is. Just look at the statistics. The power of your brand won't stop anything.

The industry's solution to the problem of digital files keeping their integrity (i.e. perfect replication and no degradation over time) has been to push digital rights management (DRM). In the US, we've seen the horrendous Orwellian regulation known as the DMCA (digital millennium copyright act) and more and more laws coming out to change the very nature of copyright. What we now buy is a licence (or the rights) to

access copies of a copyrighted work. We are, for all intents and purposes, hiring the work and letting investment bankers decide when and where we are able to enjoy art. That's great for the entertainment business, but it's bad for consumers, their customers.

A digital file can be transported across multiple platforms and devices worldwide, but it may only be decrypted in certain circumstances. It can be carried or transported anywhere, but only the owner to the rights may access it, wherever they have bought the rights to. Many argue that this has always been the case, even with physical media such as CDs. Not so, even if it is the legal definition on the sleeve. The irrelevance of geography really messes up the traditional rights "window" model superbly. But the studios and labels don't seem to have found a palatable alternative that allows them the level of control they want.

But DRM is worse than any alternative. Consumers absolutely loathe it and have no understanding of it altogether. Trying to explain to a novice computer owner why they can't play their music back on different devices or record it to different media is a nightmare that simply makes most people just give up. It's fine for early-adopting technophiles who understand how DRM works, but for the other 95% of the media-buying public, it's not acceptable. Worse still is that it just doesn't work at all. A simple search on the net will explain in 20 different ways how to go about cracking or circumventing most protection systems if you are so inclined (even those which are analogue-based). The industry can't keep up with an enemy that outnumbers it millions to one. Stories of locked machines, hacker rootkits being installed on PCs and so on are just the thin end of the wedge that's yet to come.

Neither businesses nor consumers buy things because of their features and benefits. A universal venture capitalist truth is that they buy things because those things take away pain of some kind. DRM creates pain, hence why it will not work long-term no matter how cleverly it is marketed. The same is true of download-to-own services, which have got off to a very shaky start. Having to pay the same price of a DVD, minus packaging, plus discs, and then undergo the hassle of burning them only for them to be scratched to pieces when lying around the house is just too much. The public implicitly understand the concept of value (even if they don't refer to it in the same way that business does), and see very

clearly that compared to buying a DVD, video on-demand and D2O has little to them.

So how do you end piracy or marginalise it? The answer lies in a combination of punitive action and providing more imaginative services. A war against piracy is like the so-called “*war on terror*” – it’s a misnomer, and corrupted English language replacing a genuine enemy with a vague abstract noun, giving a perpetual, free scapegoat for every corporate failure. Who you are going to war against are your own customers and ordinary people. We are told copyright violation is a crime, but never see the police taking it particularly seriously, unless it involves cases of organised gangs. The content industry doesn’t make any distinction between those at home and those that traffic drugs, launder money and have guns.

Guilt or the threat of legal action won’t ever work – people laugh out loud in cinemas when the copyright warning appears and just like illnesses like cancer, always think it happens to someone else and won’t happen to them. These campaigns are trying to talk old language to a new generation who have already grown up with free media and movements against the power and greed of corporations.

However, P2P networks have weaknesses too which are permanent. First, they are very slow. Secondly, the files are generally bad quality and/or badly named. Thirdly, the search results that point to them and the networks themselves are absolutely riddled with viruses and spyware. Fourth, they are generally difficult to use productively without some kind of technical expertise and have varying reliability. Fifth, they kill your internet connection so no-one else can use it. But they are free.

So its time to follow the first rule of mass media – give the people what they want. And when you give it to them, make sure its better than anything else out there they might choose instead. That involves change. At the very least, consumers want something DRM-free, very fast, high-quality, easy to use and reliable that doesn’t kill their internet connection. But most importantly, they know digital economics mean a lower distribution cost. So don’t fall into the trap of profiteering and give it to them as cheap as you possibly can. Only after you have met these prerequisites, then comes imagination to make it more compelling than P2P.

Disney realised the number one illegally downloaded TV show was “Lost”, and hence released it for free. But the problem is that the idea is practical insofar that you have the will and means to deliver it on a mass scale. That delivery relies heavily on pricing, as once again, it’s difficult to beat free. You cannot put yesterday’s models on tomorrow’s technology – it requires significant change and for the industry to wake up to exactly why people use P2P networks. They want to have a very large cake, and spend a long time eating it. No-one is able to build these legal alternatives as the licensing from rightsholders is just prohibitive.

Making great services that consumers will choose above piracy are the carrot, but a stick is still missing. That’s where P2P caching mechanisms come in. P2P traffic is absolutely enormous, second only to real-time video. Estimates vary, but in some cases it’s claimed to compose over 80% of all network traffic. In the UK, that’s anything up to 80Gbps of data flowing through the pipes alone, with ISPs paying for every MB. Even though it’s a sales incentive, at the same time its killing them and a whole raft of start-ups have seen the pain, and stepped in with an antidote. P2P caching systems work by localising traffic exchange at the edge of the access network, instead of allowing it to flow to the core, meaning a definite reduction in bandwidth.

Caching threatens backbone operators’ revenues, so they are the first proponents, and ISPs are desperate to use it to reduce their costs. But caching is a Trojan horse employed by content owners as it allows the identification of traded files, in their complete form. Identify the file and you can stop its transmission. Systems that just identify illegal files would never be bought or accepted by ISPs on their own, but when it also saves them pain, content operators have a perfect vehicle in which to invade their market to manipulate it for their own ends. Look at the investment in these companies and you will begin to see a trend. Stealth is the new strategy.

The cat and mouse game between P2P networks and content owners is fought in an ISP’s back garden, hence why they are hesitant to get involved, for like the Romans, as long as their enemies are at war with each other, they are not at war with them. And that battle is enough to make you dizzy.

The typical story tends to go something like this. Start-up bases itself in a foreign country with liberal copyright laws and builds an audience, claiming it doesn't actually promote or facilitate illegal copyright invasion. Content industry responds by suing and getting the company shut down by local authorities. Company releases product as open source. Content industry shuts down central servers. Open source community makes architecture decentralised and logs requests from clients owned by the content industry. Content owners sue individual consumers. ISP blocks ports to restrict traffic. Community upgrades to use random ports or ports reserved for other services. ISP filters by traffic type. Community upgrades again to use encryption, blocking shaping system from recognising traffic. ISP bans IP ranges. Community uses new IP ranges and proxy mechanisms.

It goes on, and on, and on, and on, round and round, ad infinitum. And throughout all, piracy just keeps growing and growing. Every warning or advert gives it more momentum. But this isn't radio. Its ordinary people. Ordinary consumers who are trying to tell us something that everyone is refusing to listen to.

A lot of the content industry's problems come from insularity, and it's a lot easier to see that when you're on the outside, as many ISPs are. Theirs is an exclusive club, massively reinforced and defended from outside influence. These are high-profile businesses with incredible popular products that see them fielding off requests from everywhere, all day long. Their cynicism has become institutional. They simply have too much business and can't get involved in it all. They have got into a habit of closing the door to new people, ideas and new business. The only way in is to know someone who can make an introduction. It's particularly bad in the US and the UK, the latter run exclusively on "who you know" as its modus operandi.

Even movie stars now complain that the big studios are simply investment banks, and it's undeniable that the benevolent age of Broadway "angels" who funded great art in a philanthropic way have been succeeded by those who are solely looking for a better return on their earned cash than the banks can give. Productions these days run into hundreds of millions of pounds and the benchmarks for success have got higher as the decades have gone on. Compensation culture from the

states has arrived slowly in Europe, and consequently every great idea is forced to be sterilised and neutered by legal departments before it's released. Great entertainment is out, profitability and returns are in.

Its evident everywhere you look. Record companies now tend to invest in fast-turnaround, cash-spinning singles instead of long-term development. Performers are so marketing-driven that they are virtually manufactured on a production line, treated as a commercial brand and commoditised. Public service broadcasters consider themselves to be in competition with commercial networks, and they are the only people with power the production companies respond to. The whole reality TV genre is based on it being cheap, and participation systems are there to prop up lost advertising income that has fallen away due to the take-up of multi-channel digital television. Video games companies are going bust ten to the dozen. Put simply, nobody takes risks anymore.

Consumers aren't stupid. They know that the quality of content has been spiralling downward for years, and the price rising. You can't blame piracy for everything. The truth is, what's out there right now is crap. It's an uncomfortable truth we all need to acknowledge, whether we agree with it or not - the perception is all that matters. Industry execs will dispute it until they are blue in the face, but only with other people in their industry, which speaks volumes. Content owners are wildly out of touch with their customers, and should expect to drift further as long as they continue to persecute them or rip them off with ever-rising prices.

Intellectual property rights are also in a state of flux as they tend to be broken down to the smallest divisions to ensure maximum profitability, such as the technical platform they run on, the country they are viewed in, and the time period they can be consumed in. All that breaks down with IP networks as they are geography-independent, run over multiple convergent devices and transport media that never degrades. You could safely say the entire content-owner world is turned upside down. It's the absolute opposite to what they are used to.

In the UK, one of the biggest battles is currently being fought between broadcasters and the production companies who depend on them for their survival. A recent breakthrough was made between PACT (the trade association that represents Soho's finest) and the BBC, which may heavily influence future negotiations. The argument is one of who controls the

rights to on-demand content designed perfectly to live in new 7 and 30-day so-called “catch-up” services offered on new IPTV platforms.

Traditionally, broadcasters commission production houses to produce programming that they then acquire the rights to originally broadcast and repeat a number of times. The rights then return to the production company to re-licence elsewhere across the world. It's understandable they are fighting for the rights to the brave new world of 30 day catch-up and replay services, but as with all these matters, the broadcasters hold the power and will win. (Editor's note: the broadcasters did indeed win as reported recently).

Europe doesn't also have the same drive to high definition (HD) that the US does, simply as the transition of picture quality from NTSC is far more profound than with our standard, PAL. There's no doubt it looks impressive, but what's less impressive is the support from any of them to help anyone use it or understand why to buy it. Sky and Telewest have gone HD-mad in the first-to-market game, as have the BBC, which has left some fun provisioning problems. Even the radio world is now looking to provide high-definition audio.

It's a big boys' train set though, as the costs of broadcasting in HD are massive – at least twice the bandwidth (6-10MBit/s @ approx £100k per Mbit) even with more modern MPEG-4 compression techniques. HD represents something bigger for Murdoch's boys though, which is a chance to upgrade existing customers to newer set-top boxes that are Ethernet and IPTV-ready.

But these wonderful gimmicks and fluff about next-generation convergence are fine at industry conferences, but as pointed out earlier, it means little to consumers who stroll into electronics shops in the high street. The problem is that the people who design these services build them for themselves or from precedents that may not hold true now or in the future. They earn huge salaries that allow them to afford endless chains of great-looking electronic devices and are big early adopters of new technology.

The anecdotal word from the bar is that people are just sick to the back teeth of paying through the nose for premium TV, ever pricier DVDs and other media subscriptions. Personal debt is rising to intolerable levels –

there is only so long they can go on buying goods in stores on credit cards and dealing with subscriptions. You can consolidate services and bills as much as you like, but each one is now getting to “bill shock” level on their own.

Joe Public is already swimming in content and total underwhelmed by it. Digital satellite and the internet provide hundreds of channels, thousands of movies and music available through P2P, and when they are not sitting down on the couch to work their way through it, it's being blared at them through posters on walls or radio playing in the office. A million-channel EPG, billions of hours of back catalogue TV episodes and classic movies, millions of music tracks and tens of thousands of video games and service applications is a daunting prospect.

That chaos is what the threatened incumbents will seize on, so the rule of the day is that the amount of content that is available needs to be directly proportionate to the ease at which it can be navigated through and consumed. In English, if you're going to make a lot of content available, make it intelligent, personalised and easy enough for grandma to use without her glasses and hearing aid.

Generally speaking, video on-demand business models tend to be rooted in the US cable and hospitality template, that is to say it is used to sell premium content on a pay per-view basis to a pay TV audience. For the top 20% of titles it works well and is a viable service, even if the 4-6 views per month are somewhat hot air in other markets, being more like 6-10 per year in reality. The key metric that establishes its viability is that no more than 7-10% of the subscriber base are viewing content simultaneously, allowing the deployed infrastructure to serve ten times what it would be if viewing were on a linear 1:1 scale, i.e. everyone on, all the time.

But the UK isn't a pay TV market, as much as the research analysts protest. Most people still have analogue terrestrial and/or are switching to Freeview (particularly in the 50-60 age bracket). Pay-per-view video on-demand just doesn't work well. The question most content owners are left asking is how to monetise their archive back-catalogue material to take advantage of the often-toted “long tail” effect where the favourable economics of digital distribution enable rightsholders to sell content that would otherwise be gathering dust in cupboards

somewhere. The problem is that people won't pay for it in the same way they pay for premium PPV content.

But even if they did, then the problem of distribution would still exist and cause pain. As it stands today, there are generally 6 accepted outlets for media assets in every country of the world – satellite, cable, terrestrial, internet/broadband, mobile and now IPTV. In each of those 3 markets and their windows, you can sell them via pay-per-view, support them with advertising or licence them to 3rd parties. The trouble is each platform is geographically limited. You'll never, ever be able to reach 99.9% of the population. Even BSkyB with its dominance of 8 million subscribers only reaches one third of all the households in the UK – you can't increase the range of a satellite. All suffer with scalability issues and can only put content in front of specific audience. IPTV fixes the problem as it gives you access to anyone with a telephone line and/or a broadband connection of some kind.

Homechoice's solution is to aggregate genres of content that are then sold on a subscription basis. Their music video playlisting service is one of the most popular parts of what they offer, along with cult shows such as the A-Team and Airwolf. Music videos are a classic example of an old business model in trouble with the new, as it's very, very difficult (if not impossible) to charge for them at all. The same is true for old episodes of soaps, dramas, classic movies and documentaries. Industry types often tout nano-payment (i.e. a few pence or cents) as an alternative to subscription, but yet again its enormous hassle for very little.

At the same time, advertising agencies and media buyers are slowly waking up to IPTV and on-demand viewing as more and more news headlines break about the new medium and what it can offer. Interactive TV terrified them as premium calls on Sky enabled them to collate viewer responses to adverts and monitor campaign effectiveness – which is a problem if your work is not quite as powerful as it could be. IPTV is massively more compelling and uses the most advanced technology available. For the first time media is provided on a transactional basis that allows personalisation to an unprecedented level of detail to a targeted, motivated audience. Brands can have their own channels, reduce their costs in comparison to other platforms and spend more money on editorial programming.

There are numerous problems the advertising world has with IPTV, not least in understanding the very basis of what IPTV actually is, does, and what opportunities it offers. On-demand viewing empowers consumers with choice, which is bad for advertisers because their trade tends to relies on almost forcing people to notice them. You don't choose whether posters are on tube carriages or whether your James Bond movie on ITV is interrupted with adverts, but you do choose whether to skip adverts using your PVR or whether to pick a program from the on-demand menu and watch it at your leisure. Put simply, half of ad-world is terrified and thinks their world is coming to an end, and the other half are so excited they could scream.

Neither of the two camps have much to fear. Advertising will always exist in linear broadcast television, even if it is multicast MPEG-4 in the case of IPTV. Non-premium content served on-demand will always have to be supported by advertising, as it can't be sold via pay-per-view. But it's going to make a real mess. The utopia that industry has always dreamed of has just appeared on the horizon, in the form of totally tailored and intelligent direct rich media marketing. Now everyone can see a different advert during the live TX of the Bond movie which is aimed directly at them and is delivered by a system that intelligently learns their behaviour patterns whilst integrating seamlessly with their phone, pc and mobile or any other web-based system they use. The possibilities are endless. It's a playground with every toy you could every want.

Random scatterbrain carpet-bombing of every target demographic group is no longer needed, which means more money for doing interesting and creative things with brands and their resources. The old world buys by 1000, which is also not a great model to put on the on-demand "long tail" future where views occur one by one incrementally, forming an aggregate audience built over a longer period of time. The catch 22 situation is when it comes to statistics, which are the bread and butter of marketing. Rate cards are based on how widely circulated your media is, and very little evidence is available for on-demand. Without statistics, advertising rates are your best guess. And your best guess tends to affect your statistics. The trouble comes from working out exactly who gathers the viewing reports – is the rightsholder of the on-demand content, the broadcaster its played out from, the owner of the IPTV platform or an independent body like BARB or ABC?

The shrewd amongst us will almost certainly be seeing the solution for themselves as we go along. The clue is Google AdWords. The viewer needs to be able to watch for free, as nobody will pay for 30min episodes of sitcoms or news clips, and the advertiser can pay a broadcaster as before during a live broadcast. The owners of back-catalogue content can't find a way to make money from their archive material, and advertisers need to find a way to survive in the new world that walking through the door whether they like it or not. The solution is very, very simple.

Give it all away free. Pay for it by marrying video-rich, interactive, personalised contextual advertising with back-catalogue on-demand content as Google does with AdWords on the web.

Content in adverts can be matched intelligently to the content in the live broadcast or on-demand title. The viewer suffers an advert of some kind (ticker on screen, loading movie, interstitial), but gets to watch for free. The advertiser pays the content owner directly (per 1000 if necessary) every time the media is watched. They can also upgrade at a later date for an ad-free service if necessary. At a high level it seems to be not just feasible, but a neat answer to a very pressing problem.

There also remains the very tricky issue of regulation of digital content. As dull and dry as it seems, it has the capability to kill businesses, which is why it needs to be taken seriously. Inevitably in all new emerging mediums, regulation is lacking so abuse occurs. When anyone can publish, the normal commercial barriers are removed, enabling anyone to abuse. Other than the difficulties of pinning down exactly where services originate, terminate and are policed, we need to work out who does the policing, how much of it there is and how it will be enforced. Children need to be protected from indecency and the new medium cannot be a means of promoting or facilitating crime. When a television picture is transmitted over the internet or IP network, is it streaming internet video or broadcast television?

And this is what we in the IPTV industry need to start doing very soon if we are to continue on the momentum that has carried this technology as far as it has gone so far. We need to start educating the people who work around this new platform and work hard to solve their problems and ease their pain. There are too many problems being talked about and not

enough answers. Really effective answers to those problems rely on intense thought and detailed consideration of each country, region and local environment the technology will be deployed in. If we continue to apply the US cable model to every part of the world, we won't just be foolish, but be staring into an abyss that we could have avoided just by stopping for 2 seconds to think about our direction.

ISPs have legitimate concerns about scalability and capital expenditure that need to be addressed by content owners. Vested interests mean those concerns won't be addressed for a long time, as they will involve cost on the part of the rightsholders. The only action that can be taken in that circumstance is to play tough and penalise offenders by blocking traffic from their websites and data-centres. ISPs need to act in unity and have a common central voice that fights their cause as the pockets of Hollywood are far greater than their own. The next step for them is raising premiums on traffic from those content providers and if necessary, litigation to get them to listen.

This future we all belong to is something we all need to contribute to, meaning whatever one side gives must be reciprocated by the other in kind. One interesting idea is to give ISPs incentives: a free movie title download for their customers for every illegal P2P download they block. Co-operation will be the only way for both parties to achieve their objectives, as open war will benefit no-one and send back in the direction towards the stone age. ISPs also need a moratorium on content licensing costs to enable them to seed the market for IPTV and video on-demand and drive adoption of these new platforms in whatever guise they are packaged. That means giving them a financial holiday (virtually free for 1-2 years) on the condition of a longer term contract for the content in the end. Currently it is a case of who blinks first: everyone wants someone else to take the risk, despite everyone facing more than one.

If you're a smaller content owner or rightsholder with ambition, there is a market emerging for you that will give you worldwide spread. Go out of your way to be IPTV friendly and work with ISPs for the first years the medium takes to get started, as you will get to charge better prices as time goes on. Produce in multiple formats, offer cheap licensing with few conditions and do everything you can to get yourself noticed and

exposed. Solve the problems they face and do what you can to help them retain their customers – broker relationships with other colleagues and partners in the content industry, offer help with content management and understanding how it all works. Your customers will help you with the technical side of things, but they need to know more about how TV and entertainment works. There's never been a better time to attack and invade Sky in their own back garden. So the message should now be clear: rock up with a container of petrol and burn it all down. Remember to bring your friends along to watch the show.

Licensing as it stands is a nightmare, a spaghetti junction that is becoming harder and harder to administrate and control across a globalised industry that just keeps moving faster as the months go by. As seen in the mobile industry, the aggregation model is springing up in IPTV as a viable alternative to private proprietary arrangements that don't scale too well, even in the open digital network domain. Small players are collecting and representing large groups of content owners and retail brands like YouTube and iTunes are offering shop windows for wide ranges of rightsholders to sell their wares. Pre-packaging, pre-bundling and pre-pricing is currently the most effective and practical way to deliver volumes of content onto digital platforms.

What is needed is a new model that addresses the inherent insecurity and unreliability of the internet but keeps its distribution economics, whilst compensating those who transport the digital data (backbone operators, delivery agents, ISPs etc). Licensing between mediator and rightsholder needs to be as automatic as possible, but flexible enough to respect the window system, allow private arrangements and give the option of exclusivity over multiple countries and platforms. The ability to scale is also deeply important, as the "long tail" of back catalogue sales means that some titles will only attract negligible consumption, but others may exceed billions of views. Dynamic pricing in different markets using different currencies, multi-lingual versioning and variable revenue-generation mechanisms (PPV, Ad-supported free view and subscription) must all be included as standard.

The information we have, and are using to build new technologies and brands is out of date and inaccurate – we cannot possibly know how people will consume media in the future, so it is prudent to acknowledge

that to a large extent the industry will need to stick its neck out and be ready to accommodate change as and when it occurs. Time and place-shifting is evolving entertainment to be a transaction that happens on demand, rather than a passive experience controlled by broadcasters' schedules and the will of those who fund productions. Peak viewing times and typical behaviour are now splintered and unfamiliar, but luckily not too far away from common sense.

Piracy has shown us what the market wants and how people consume. The quick way to commercial suicide in any business is to ignore your customers and actively resist or frustrate them. Indeed, that resistance negates any of the alternatives you want to offer them. An illegal download or VoD transaction is not a lost DVD sale in the eyes of a consumer, or even in the eyes of most who work with the technology; it is a more convenient and cheaper alternative to be enjoyed at a different time and place. They know downloads cost less than a physical disk, so patronise and profiteer at your peril. They see the financial returns reported from the opening weekends of theatrical releases, which typically are tens, if not hundreds of millions of dollars. Copying a digital file from one PC to another is their understanding of digital distribution – it's cheap, quick and essentially free.

The question is when, not if, rightsholders will be able to surmount their paranoid fear of cannibalising existing revenue channels to create new ones. The market has made its voice known – it's now a case of who responds quickest, as delay will punish the latecomers and the last will perish outright. The next step in both legal and illegal P2P content distribution is to bypass the PC entirely, and then skip the DVD player too. The next mainstream destination is the IP set-top box or media player, both which can connect to the internet directly themselves or stream video and audio from PCs by proxy. BitTorrent, eMule and Limewire are one step away from their set-top box editions.

This isn't a problem that can be controlled. The only way to stop it is to go head on, and that means holding your breath, rolling up your sleeves and accepting that these new alternative services that need to be developed require some modest sacrifice and co-operation with people outside the normal box. Aristotle famously defined the three act structure of a story (in *Poetics*) that Hollywood uses as its bible today. In

pure LA terms, the first act, or problem/setup, is one of limited distribution in a globalised age of digital media. The complication, or middle act, is piracy and the failure of the music industry. The last act, resolution, is yet to be finalised.

The content industry has a choice now it's up the proverbial tree, having rocks thrown at it (another reference to the three act structure of screenwriting), and its hero's plan has been dashed. The question is how the story ends – whether it will be a glorious feel-good last chapter where everyone wins or a terrible tragedy where the final goodbye is through death by a thousand cuts. Dramatic it will be, but that's what makes the people buy it.

the open4th platform

Just when you thought the days of the digital TV “walled garden” were over, this week Sky released its new “Sky Net” platform, which is almost as imaginatively titled as the new service to be released by the start-up “Aggregator” this year. It seems the world is taking a giant leap backward to the days of web portals and brand marketing that failed so dismally in the past. At the least Aggregator’s service will use a broadband connection, as Sky’s new train set is still firmly routed in the days of signal-noise ratios of 33.3k dial-up modems. Openly touted as nothing less than a revolution in interactive television, these internet-like services are trying to put a internet-like world on our living screens that any small business or individual can be part of. The trouble is that this “openness” is fools gold and they come with a sting in the tail – they are still fully controlled by the big boys, and they don’t quite share the philosophy that drove the uptake of the internet.

Traditionally, television platforms have been differentiated by their mechanism of transmission – satellite, terrestrial, cable and recently, DSL. Each operator has arguably relied on the reach determined by their network coverage first, and their content offering second; you can’t offer the best content in the world to people unless they can actually receive it. If you put them side by side, most offer the same type of thing, but by different means. They’re also really quite spectacularly boring and suffer from the terrible disease known as “me too”, which is almost always a quick path to obsolescence in other markets. It’s all been about TV up until now, so this first round of service extensions are a step towards broadening their range of content and staying ahead of the technological game.

The experience of using a TV service is intimately tied to the brand it’s offered under, so its no great surprise broadcasters and investment bankers scramble to design nice looking, user-friendly screens that are easy to use and as idiot-proof as possible. That in itself is not necessarily a bad thing; it’s the driving vision that accompanies it which turns the whole thing sour. Each one of these operating menus (EPGs, or electronic programme guides) is controlled by a brand, and nothing gets near it that is not totally under the control of that brand’s owner. Everything on Sky

is Sky branded and controlled – if you want to create, innovate, market or experiment, you need Sky's permission. If you want to create new services and use TV as a medium, you are accountable to Sky or NTL. Oh, and you pay through the nose for it too. These TV platforms are closed, private and proprietary. They will never been anything but that, despite the protestations of the portal people.

Now contrast that with the internet, which is nearing a head-on collision with the world of pay television. In a little over ten years, it has become the most powerful force of social change ever witnessed on this planet. It has the power to topple governments, create billionaires overnight and offers a virtually free platform for anyone to create and innovate around. The decision by academics at CERN to release their intellectual property to the world is as significant as the US-led HGP openly publishing the human genome. The internet is the great equaliser – small businesses can compete with the largest global companies, geography and distance have become irrelevant and a world has opened for the human race to collaborate in ways no-one could have possibly imagined. It did all that because it was built on a principle of openness and philanthropy.

The contrast between those two vastly different worlds go some way to explaining the difficulty technologists have had in adapting current business models for IPTV, or the confusion that comes with defining new ones. How do you reconcile a free, open platform with a closed, pay TV one? It's an extremely difficult question that the greatest of minds in the corporate world are struggling with. Not a day goes past without talk of how widely adopted IPTV will be as a 4th platform.

All the signs point to IPTV being food for the lions in the UK, with Homechoice being the most frequently quoted example. Video Networks' technical accomplishments have been nothing less than extraordinary, as have KIT's. They've made many mistakes and come in for a very serious kicking more times than journalists can count, but the biggest one is arguably that their platform is effectively doing nothing different than cable. TV over DSL is simply cable in telco's clothes – as far as Joe Public is concerned it's the same service, delivered over copper wiring. The architecture is the same, the content and menus are the same, and the commercial model is the same. The big difference between Video Networks and NTL however, other than their record-

breaking cash burn, is who provides the cabling. Whereas NTL and Telewest had to bear the expense of digging their own infrastructure, Video Networks had to suffer BT.

It could be argued that Video Networks now have the upper hand on cable, as the LLU market in the UK is becoming more fluid and friendly to those willing to invest in it. There are no roads to dig up, plenty of broadband subscribers, and a rapidly improving network that is capable of delivering new and innovative interactive services. NTL did also lay copper with their fiber deployment and even trialled HDTV over ADSL2+ in the recent past. It would seem that a better route ahead for them to expand their reach would be to invest heavily in LLU and use copper to deliver the same (but heavily adapted) type of service as there is already talk of them using IP as the transmission mechanism over their coax wiring. Naturally, there are huge technical hurdles to overcome with this approach (e.g. cable broadcasts the entire spectrum of changes rather than one at a time in the BT last mile), but if Video Networks can manage it, so can they.

So the argument about IPTV desperately needing a differentiating factor is a valid one, but is rapidly becoming a vacuous, bankrupt and fruitless search of a way to be a better cable TV. If like Homechoice, you go up against cable, or even Sky, you were bound to end up in trouble from the very start. IPTV as a platform that competes with the incumbents is understandably deserving of scepticism. You're providing the same service, with additional problems included in the bargain for free. The tragedy for the IPTV companies in the UK is that they were decades ahead of their time when they launched, but as all true pioneers eventually experience, just as they break through the ice, they have been scalped. As long as we blindly follow the crowd and revolting venture capitalist train of thought, we will be slicing inches of the wedding cake. We need to be baking a new one.

What we need to do is change our thinking entirely – "*outside the box*" as fat, political, halitosis-ridden middle managers would say. We need to stop thinking of IPTV as being differentiated by its transmission method, and fly up for the bird's eye plan view of what the next generation of TV will be like as an experience. The answer to this insidious bankruptcy of thought is deliver a new conceptual shift about what TV is. We need to

take the openness of the internet and merge it intelligently with the premium content world of pay TV in a way that respects the needs and vested interests of the big brands but is a new type of service that is open to all. We need to take the glasses off that are tinted with brand logos and stop thinking in terms of labels.

The differentiator for IPTV needs to be that it is an open platform that anyone can innovate around.

That's a small statement in words, but it has enormous implications when you think it through. There has never been a TV network in existence that has been open, and if we left it to the corporate fat cats, ever would be. There is no TV platform on the market anywhere in the world that could ever offer the same, or would ever dare. If we are going to bring the underlying power of the internet to TV, let's charge it up with 100,000 volts and set out to truly change the entire world, instead of whimpering on about whether it will be a good cable substitute. Let's take the box in the living room and set it on fire, and open it up so anyone can be a BBC. Rome wasn't built in a day, but let's set our sights on something much higher – a greater vision that would be difficult to fulfil in our own lifetimes. When you consider what we could do if we liberate ourselves from the chains of monopoly, it's incredibly exciting. No more walled gardens, no more schedules, and no more limitations. Our current TV platforms all of a sudden look like dinosaurs of a lost age.

There are important caveats to such a dreamy utopian scenario in that consumers don't take to technology like technologists do. The average pub-goer has difficulty coming to terms with programming his old VCR, let alone a shining new interactive set-top box. Sky's genius is making their platform easy enough to use that your pet could work it. We can't overpower consumers with gadgets and overwhelm them with content, as it creates awkward barriers to adoption. This is TV, after all, and carpet-bombing people with everything we can find is overkill, as is working on the false assumption that people use televisions like they use PCs.

Opening up a television platform is a profound step that can't be considered lightly – other than the technological steps, there are commercial barriers that make it a difficult process. It is television based on a new idea rather than a new infrastructure. The experience of IPTV is

a radical change from what we have all known before, as it provides true personalisation and 2-way interactivity. Viewing comes through interacting rather than passively sifting through a funnel of unordered material we didn't opt in for. The nature of on-demand content empowers the viewer and enables true freedom of choice that very few have had before, and the good news is that after the initial learning curve, it's extraordinarily compelling and easy to sell.

The infrastructure of most platforms in the UK is almost always proprietary and a closely-guarded trade secret. Each broadcaster uses their own systems that are fully customised, with suppliers falling over themselves to lock their clients into their technologies and controls. All share an implementation of the common MPEG-2 standard (for both compression and RF transport), but implement their scheduling, play-out, EPG, conditional access and middleware differently. IPTV technologies generally tend to follow open standards that enable easy interoperability, unless of course you use products provided by Microsoft, Siemens, Alcatel or any other gorilla. The fundamental architecture of an IPTV platform is based on web standards that have been tweaked – mark-up languages like HTML, XML and others. Menus are web pages that are specially adapted for TV viewing.

To develop for Sky, you need to spend extortionate amounts of money buying into Open TV's proprietary middleware and/or their own WapTV microbrowser (which uses the ETSI-certified WTVML language derived from WML). NTL and Telewest use the Two Way TV "Arc" system twinned with the HTML-based TV Navigator software originally built by the now-dissolved Liberate Technologies (now SeaChange). Freeview/OnDigital comes closest with the open MHEG-5 standard, which is an absurd declarative language created for digital Teletext services that runs through a Pantalk virtual machine. Don't even ask about Homechoice or KIT. All of these wildly different interactivity engines are implemented differently and have helped a market for cross-platform publishing spring up in the iTV world.

IPTV as technological platform owes much to its formative precedent of streaming video over the web. Typical standards (again unless you use proprietary products like Microsoft Windows Media or On2) revolve around MPEG-4 (all 22 parts), SMIL, real-time streaming protocols like

RTP/RTSP, signalling protocols like SAP/SDP, transactional messaging through XML-based web services (SOAP, WSDL, UDDI etc) and distribution systems like multicasting. Today's IP set-top boxes are more compliant with the latest W3C standards (XHTML 2, CSS 3.0) than web browsers like IE, Firefox, Opera and/or Safari. Asynchronous communications like Web 2.0's AJAX (Asynchronous Javascript and XML done through the XMLHttpRequest object) has been a staple of the iTV environment for years.

Each piece of CPE has a different integration path because of differing hardware, but the most crucial point that underpins all this effort towards interoperation and compatibility is that the IPTV community has learnt from the lessons taught to us by the web and has opted to work within an open framework that tries its best to provide standardised abstraction when it comes to integrating proprietary systems.

Using open technology standards is commercially beneficial as it allows innovators to easily cross-train an already enormous pool of developer talent that is available on the market today. Graphic designers need a re-think course to learn about TV display, and developers need to learn TV-specific extensions of middleware and differences between PC and set-top box capabilities. The barriers to building IPTV services are 1000% lower than they are for TV platforms we have today. Almost anyone can set up a demonstration service literally within hours for negligible cost. Adapting existing web applications is incredibly easy as they use the same technologies. Traditional platforms take months of training and testing to build anything the brand owners will accept, and cost a small fortune to even get involved in. Sky noticed it, hence the "Sky Net" service and micropayment mechanisms.

To the layman, an IPTV "service" (i.e. a set of screens navigated to via an EPG) is technically just a website – it is screens designed in HTML/Javascript stored on a web server that a web browser in a set-top box requests and displays. Where it differs is in CRM, payment processing and the richness of multimedia that can be displayed. Real-time DVD-quality video from within in a web application is a developer's wet dream – one that the likes of YouTube and Google Video have been edging us closer to for some time now. Video on-demand is simply digital video files (AVI, MPG, MOV etc) being streaming over an QoS-enabled IP

network using RTP/RTSP, and live video is just another of those streams, with its source set to multicast IP address and controlled with the likes of IGMP.

With this kind of technology already freely available to anyone who looks for it, we have the basis of an open TV platform that anyone can develop for – even the weekend hobbyist. Access to that platform needs to be wide open so it is truly available equally to all. Anyone's IPTV service should be accessible on any IPTV platform by any subscriber anywhere.

Indeed one of the first pioneers of IPTV services in the UK are the academic community. Dozens of universities and colleges already provide high-bandwidth network connectivity to students across multiple campuses that they typically use for trading terabits of illegal music and movies (with Direct Connect, or DC++), when not finishing their assignments. Small ISPs that are involved in specialised, targeted local-loop unbundling are plugging terrestrial TV aerials into their networks and serving up multicast TV and radio over wide area IP networks onto student PCs and into communal living areas. It's a booming business, as the same systems can be extended to hotels and new property developments. Proprietary system vendors are running their hands in anticipation of getting their hands on the not-for-profit cheque book.

The first choice that IT managers at universities face is whether to build a TV system from their beloved open-source products or buy something in that somebody has already made. What makes these projects interesting is that the heavy-duty localised infrastructure is already in place and also that the motivation for building them is not typically commercial and so you tend to have more flexibility and possibilities for innovation. The usual requirement is for putting Freeview over the LAN as IP multicast and propagating the TV channel their media students run as part of their course studies. What they want to do is usually possible with over-the-counter PC components available on the high street (such as TV tuner cards) and free software (VLC etc).

What these organisations need is to do is collaborate to build the core of a standardised, open TV platform themselves, based on open-source technology that costs very little and allows students to innovate around it to their hearts content. Building an open structure (e.g. XML API for scheduling and data tools, listing of multicast addresses, bandwidth

allowances and traffic shaping, access to network drives, providing code for applications etc) and allowing students to play obviously provides academic benefit (or “value” as moronic businesspeople would say). Working together also helps prevent unnecessary duplication of resources and expenditure.

It’s easy to see why ISPs are interested in building their IPTV networks, as they have the skills in-house and are proficient when it comes to network systems. Theoretically speaking, we should be able to see over 200 new individual TV platforms of different sizes built and launched that you could buy over the counter in Dixons, just as you can Sky Digital or Wanadoo broadband. There is no reason why you should have to use more than one set-top box, in the same way that you don’t have to swap mobiles when you change mobile provider. Boxes should be able to be “unlocked” and pre-installed with a giveaway CD from a shop. Content issues aside (and they are not small issues at all), all would be built on similar systems, using the same languages, messaging, back-end servers and infrastructure principles.

The question that arises for content developers from this is how to avoid having to build over 200 different copies of their IPTV “service” application, as it would effectively consist of over 200 versions of the same TV “website”. Openness and interoperability solves this beautifully – using the likes of HTML and RTSP means services are transferable and can work on all platforms. So if you are a Yell, Lastminute.com, Ladbrokes or Thomson Holidays, you build it once and run it across every IPTV platform simultaneously, all from the cosy warm surroundings of the data centre that houses your primary websites. The experience for a consumer is also preserved across platforms in perfect harmony, meaning their individual accounts and electronic “passports” can move with them if they choose to change TV service provider. This approach is becoming increasingly known as “*software as a service*”, or “SaaS”, although in desktop PC environments it has somewhat of a different meaning because of the more advanced capabilities of general purpose processing found in a normal computer, compared to a set-top box microprocessor.

When you empower people to innovate around your platform, the response is nothing less than extraordinary. Grid thinking and crowd-

leverage that underpins this open philosophy also helps scientists utilise spare processing power to listen for aliens and crunch genetic data. Google Maps is a prominent example – their policy of allowing 3rd parties to integrate their services into their own applications has made them the de facto standard. Anyone can integrate or innovate for free, without discrimination or tiered access. There are thousands upon thousands of developers indulging their excitement at the power at their fingertips, creating applications that the originators could never have ever considered when they first put the API together. User-generated content and technology is exponential in its popularity and applicability to normal everyday life. And IPTV is poised beautiful to exploit it – something no other TV platform could offer if they turned themselves upside down.

This is IPTV's killer app and its differentiator. It is our mission. It is the platform's USP. This is the vision we must realise and help bring to fruition. It needs to become our philosophy. We are setting out to kill normal TV as we know it.

Anyone should be able to offer their own live multicast or on-demand TV or radio channel. Anyone should be able to offer their own application portal that is accessed from the public internet. Australians living in London should be able to access all their favourite channels from their British sofa and families should be able to create slideshows of photos that relatives in any country can view whenever they want to. Subscribers should be able to explore and customise their very own TV service crafted from their own favourite content – African channels and movies for African customers, live streaming video generated from multiplayer video games for Playstation-lovers, and an infinite number of new adapted applications that are currently revolutionising the way we use the web – sites like Flickr, Digg, eBay, and MySpace.

Anyone should be able to create something that can go on a TV to be shared amongst multiple viewers and if they want to, make money from it in the same way as eBay and PayPal have created an entirely new genre of home business. Subscribing to an IPTV service should offer you a massive and unlimited amount of content that brings as little or as much of the whole world to your living room as you want. The IPTV brands of the future need to concentrate their efforts on making access as widely

available as possible and making all this content easy to find and consume. It's a strange irony that TV as a supposedly mass market medium doesn't allow that market to contribute and evolve it. Our new worldwide TV platforms have the capability to reverse the conventional broadcasting paradigm. Its not theirs anymore, it belongs to all of us.

The excitement generated by anyone being able to innovate for TV is fuelling the interest in IPTV, and rightly so. As extraordinarily inspiring and amusing it will be to unleash 200 Sky Digital's, the market couldn't support it forever, as the battles over broadband testify. The unpalatable immediate future for content providers lies in splintered disparate audiences composed of varying numbers of subscribers – 5000 here, 40,000 there and so on. These individual subscriber bases will form an aggregated IPTV audience that is not counted by the single brand, but by their demographic profile and the way they consume television, rather than how it is transmitted.

It will be possible to go even further and collate sub-audience data for specific genres and programmes that are offered on-demand. ISPs can release personalised services that are entirely designed from a generic template for a single demographic – Asian communities, gay and/or lesbian groups, expats in countries more than 1000km away and more. But what follows this gentle explosion will be the inevitable and necessary market force of consolidation – as we are seeing with telecoms, small brands will be hoovered up into bundled into larger entities.

The immediate way to populate IPTV platforms with content is to use the sea of back-catalogue archive material that sits gathering dust in broadcasters' cupboards and that which is on the internet. Normal broadcasting convention dictates that the only content available is what is scheduled for transmission rather than the full breadth of everything that has ever been produced. There is a larger commercial benefit to media companies in digitising their archives as it means what had normally reached the end of its shelf-life can be still generate money. The economics of digital distribution mean that on-demand platforms can offer a range of content that older incumbents can never hope to match unless they decide to offer IPTV as well. Allowing people to innovate almost guarantees a wave of creative new services and content created

by third party developers and brands that is unstoppable – user-generated content (UGC) also makes a massive contribution that cannot be ignored.

We all know content is king, and an open platform means truly unlimited content from all over the planet. Tens of thousands of TV and radio channels, hundreds of thousands of movies and TV programmes, vaults of music tracks and videos, thousands of flash movies and web applications and tens of thousands of games. Let's build an international multimedia network that anyone can add their own channels and content to that can join together any type of IP-based service with any other. If we combine truly universal access with the ability to access niche content from the most specific of genres, and make it simple enough for a child to use, there is nothing that any existing TV platform can do to match it except join in.

The vested interests of dinosaurs and those that work for them would mean they would have you believe that the only type of content that people want is football, movies and sex. Not so. Yes, they are extremely popular, which is why they are so highly fought over, but they are not the be all and end all of television even if the conventional rules of popularity still apply regardless of the technology they operate within. This is the only world these people know. The people that repeat this trite rubbish tend to have very little comprehension of on-demand systems or acceptance of change.

IPTV is seen as a serious threat to them so they play the infamous and highly effective FUD game (*"fear, uncertainty and doubt"*), in order to maintain control and feed precious egos that would suffer should their lack of knowledge come to be known. After the latest movies (which are in short supply and are drip fed), the most popular content for on-demand services are porn, music videos and back-catalogue TV programmes. Ask anyone you know what they would watch if they could – the chances are most will say some bizarre b-movie or old TV-series they miss.

Just imagine how history would have panned out if Churchill took people's advice and shut up, or if Bill Gates decided in advance that IBM would never buy his operating system – where we are now is the same situation as there are critics galore claiming they see a bleak future this

whole IPTV craze. The best and most revolutionary ideas are defiant and disruptive, and so is the case with IPTV. Creating an open platform is about as defiant and disruptive as you can get, which is why there will be massive resistance until the market forces mean incumbents have to adapt just to survive. Offering vertical niche content is one way to slowly build many unique audiences that can be consolidated at a later date into something much bigger. Niches are something that big boys can't offer because their economics don't allow it – it's strategically prudent to attack your enemy where his defences are weak as it helps you to find a way to invade and poison the core.

But we need balance when it comes to offering such a breadth of content, primarily being the questions of how viewers find their way around these huge libraries and how we make sure children don't access unacceptable material. The internet is the wild west of the content world – the openness of the platform and the ability of anyone to publish information means there are very few effective controls on who can access what. Bringing the openness of the internet to TV requires forethought and a structure for tiered access with PIN codes and age ratings. These in themselves won't stop everything, but they will be an important first step. Security for people is just as important (if not more so) as it is for systems and data.

As 30 seconds browsing the internet shows, not all content is presented too well, and that is putting it lightly. Sky has a very strict QA procedure for red button applications on their platform which is colloquially known as SSSL ("*triple SL*"), which is at the other end of the scale. Reaching for truly universal access and lowering barriers to entry means that there is no amount of support staff that will be able to cross-check every piece of content put out, and we don't want to be policing every little thing either.

Preserving quality is a crucial principle and a massive commercial risk – not everything is going to be good, nor will it all play by the rules. On systems with simple navigation, its imperative is to do as much work for the subscriber as possible at the back or head-end transmission centre so they can move around easily and spend their money liberally. The answer to this particular problem relies on using community recommendation and rating schemes that use popularity as a guide to what to display on

people's screens, filtered through their personal preferences. For those that doubt, Google is based on popularity, as are the music charts.

What becomes very clear when thinking through all the implications of building an open system based on the model of the internet, is how a number of centralised systems will be needed. The web has DNS, VoIP has Enum, and IPTV is missing that vital cross-platform international register of assets – a multimedia “DNS” if you will, that all operators can use and reference. An open system means a standardised billing procedure for nano and micro-payments, multilateral age ratings and parental controls, and centralised authorities such as RIPE and Nominet that can arbitrate amongst networks and content providers to ensure equality of access for all. BSS and OSS (primarily provisioning) services can still remain proprietary if necessary, but an extension of our existing IP-based service infrastructure that is tailored for video will become essential over time.

The ITU recently announced they are setting up a focus group specifically for IPTV and more and more interest is being shown in building a trade organisation that works as a “*W3C for IPTV*”. Work is currently underway to form this very body (tentatively titled as the “IPTV Consortium” or “IPTVC”), which is desperately need to coherently promote the cause of IPTV and on-demand content – to share our vision, the mission to change TV as we know it, and to maintain both open standards and cross-platform interoperability. This much energy and momentum must be channelled so it doesn't become a rudderless ship.

The difficult issue for network operators is how to react to this new era of video delivery. Scaling for video demand is extraordinarily tricky, especially as business models are still being formulated and proven in such a volatile market. The days of the “*two tiered internet*” are upon us, as services that run over copper DSL are bandwidth hungry and require 100% reliability that is not currently on offer. The cheapest way to transport media is over the internet, but since it is a bottlenecked pipe, there will almost certainly need to be a layer of specialist carriage (as a VPN) secured on tier 1 backbone infrastructure that is quality assured and heavily policed to provide the right environment for propagating multimedia cost-effectively worldwide. The Mbone project attempted this but was generally derided as it didn't have the necessary scope or

commercial backing it needed. The internet in itself is simply a spaghetti of interconnecting networks that talk to each other via peering points – yet another example of openness that has delivered the foundations of the digital infrastructure that will power the knowledge economy of the 21st century.

Carphone Warehouse has changed everything by offering free broadband with their branded telephony services, and we have taken a quantum leap that will be sending shockwaves for some time to come. The new ISP dynamic will be free broadband connectivity, pay for by value-added services that start with telecoms products and carry on with IPTV and video on-demand. Bundling will ultimately become about how many services you can squeeze in for free without making a significant loss. If you're involved in this world, you'll know that demand has skyrocketed since the beginning of the year – what was a discussion point is now a reality. We've taxied to the runway and the engines are firing up.

It's also important to remember that IPTV is a mechanism for delivering television and doesn't necessarily involve a set-top box – any IP network that has sufficient bandwidth and is capable of multicast and traffic-shaping can support multimedia services, be it a local area network or 3G mobile platform. An open platform for IPTV is a concept bigger than your television – it is of a world where there are few limits and massive potential for innovation. Integrating seamlessly between networks needs to be deliberately simple to fuel excitement in the new medium and allow it permeate into other industries and sectors. Maximum choice, heavy personalisation, a preserved experience and seamless mobility are key to our wider economy and are a boon to consumers who are tired of being locked into the prison big TV brands deliberately lock them into. Empower them, and we shall see change unlike anyone has seen in their own lifetime.

It's easy and fashionable to criticise Microsoft for a multitude of sins, their prime one being that just as the man with the hammer thinking everything is a nail, that they assume people will use TVs the way they use PCs. Whilst that may not be true for the time being, the inescapable and inevitable future is that set-top boxes will improve in capability and ultimately provide a PC-like experience on our TVs as a secondary central

machine interface to our lives that we use to get common things done. But it is dangerous to rubbish that assertion as their mistake is one of timing, not of accuracy. IP will become the dominant method of transmission, and TV will become considerably more interactive, but it will take time. 3 months is a long time in this business, but the changes we make now will impact us for decades to come.

the world that's on its way

Imagine travelling down a motorway at 110 miles per hour, passing hundreds of signs with half of you feeling you just want a leisurely drive and the other half panicking that you're late. Some of the other cars are crashing into the central reservation or veering off the left lane violently never to be seen again, some are just sitting behind you watching what you'll do, and some are cruising with you in parallel so they can wave at you from the other window. Others are just parked in the hard shoulder doing nothing.

You're so busy trying to keep up your speed, answer calls on your mobile, work out when you'll need to put more gas in and fend off what the other cars are doing that you've also forgotten the most important thing: the one thing you thought you already knew and couldn't set off on the journey without. You know where you started, but you don't know where the road leads. You're all racing so fast that nobody knows where they are going. Point B is a mystery. All that seems to matter is the mile of distance ahead, but no-one has looked at the map and or taken much notice of the road signs. Nobody has any realistic idea of what's down that long road or what it will take to both get and stay there.

Technology moves at such a breathtaking speed that we almost always lose track of everything but the race. Westminster village is unfortunately the same. NHK, the Japanese inventors of the new Ultra HD (U-HDTV) video system invented high definition video over 30 years ago in the 1970s, although it was first introduced in the 1990s and still is yet to see significant deployment at this precise moment in time, despite the predictions of its ubiquity by market analysts. Their latest thinking is that U-HDTV won't see any practical consumer installations for the next generation, or at least 25 years.

Business without mission or purpose is like life without purpose, with the additional consideration of having to be able to react to change quickly and follow the money to survive. Many companies talk mission, but its lip service to flashy self-help consultancy doublespeak or a meaningless gesture that does very little to encourage their employees in the way they think it will. Business is about people, and companies are made up

of people. Without mission or purpose, there is little chance for momentum to speed up or innovation to blossom. People react to vision as it touches their soul, not simply their need to pay the bills.

In just 10 years, the internet has come to control almost all of our lives in the Western world. Websites, email, TCP/IP and web applications have taken over as the preferred way for human systems to communicate. The bridging of international telecoms networks has created a truly globalised community and marketplace for the first time in human history. It crosses country borders and allows instant collaboration across cultures, languages and races. The more able we are to communicate, the faster we evolve. Exponential evolution of our species is closer than it has ever been.

There is one key feature of the Internet that is to thank for its growth, and it is a dire warning to those who tout proprietary computer systems and networks. That secret is its neutrality and openness. Sharing and collaborating for the greater good has spawned billions of dollars and inspired an unprecedented wave of innovation. On the Internet, everyone is equal; the small shopkeeper can compete with the large supermarket on a level footing for a slice of a global customer base. No-one has to build their own web or DNS servers, they just get on straight away with the business of putting great ideas to work, almost for free. It is transforming the economies of third world nations.

But the future of Internet is not certain. What we do know is that all electronic devices are now evolving to have Internet connectivity, and at critical mass that means any machine or device can talk to any other. We also know the US guardianship of the overall network is reaching its dusk and that there are many companies out there who will do whatever they can to carve off parts of it for their own vested interests and financial control without regard to the bigger picture. The growth in social networking and so-called Web 2.0 has demonstrated that our interactions and demands are becoming considerably more complex.

We also know that the era of simplistic first-come, first-served information delivery is no longer enough, as it has been for websites, email and radio. The advent of broadband connectivity has opened the door to telephony, music distribution and the early seeds of worldwide video delivery. The web's chaotic evolution may just be the 50 tonne

boulder in the middle of the road that we spend years crashing into until we find a way to go round it.

Put simply, we've outgrown the old Internet. The next generation is the transfer of information across the world more intelligently, and the jewel in that crown is the ability to transmit live, picture-perfect HD-quality multi-channel television across the backbone and migrate away from satellite, cable and terrestrial broadcast TV systems.

Point B is live broadcast television and universal Internet connectivity between all devices. Without vision we are lost and blind.

That's no easy task. In fact, some might say its completely impossible considering the state we are in today. But it is the next step, whether we like it or not. Naysayers and cynics will have a field day with all the barriers in place to stop us from getting there, as it's an uphill struggle that will require massive investment and risk. All sorts of stepping stones are helping us to dip our toes in the proverbial waters, such as closed/managed IPTV networks, video download services, P2P distribution systems, download-to-own and flash streaming websites (YouTube, Google Video etc). Most are free for providers and cost consumers a modest subscription fee.

Live television and high-definition radio have huge implications both commercially and technically. The first is the necessity for efficient delivery, which guarantees the consumer a familiar, high-quality and compelling entertainment experience and maintains the integrity of the results of content producers' efforts and investment. The second is for a change in the nature of the traditional entertainment business models to accommodate the globalised nature of widened multimedia distribution and support the production of new intellectual property. The third is the desperate need to create new ways to discover, promote, navigate and consume the sheer mass of digital content being made available.

The current Internet cannot handle live multi-channel television, despite the proliferation of pseudo-alternatives such as "Internet TV", streaming media and clip playback on websites. Peer to peer systems will only get us so far as they address the problem by re-balancing the bottlenecks on the network to its edge rather than its core.

Technically, live broadcast media means multicast distribution, quality of service (QoS) enablement and a last mile that is high-speed and virtually uncontended. The network environment needs extensive work to incorporate intelligent caching and localisation that minimises the traffic load on the core network backbone by only sending large video files once, or only when they are needed.

The trouble is that the Internet is a garbled spaghetti mess of proprietary networks that are all set up in a completely different way. These networks meet at junctions (public or private peering points) to form the Internet and conspire to deliver information in the quickest and most efficient way possible from one point to another. Some are multicast and QoS-enabled, some are not. There's no way to tell which route a piece of data will take when it makes its journey across the web of networks, and hence no way to guarantee its prompt delivery. There is very little standardisation between the operators of these networks, and efforts to unify them (such as the Mbone) have abjectly failed.

The irony is that most of these individual MPLS networks can do live television as it is. They already offer quality-guaranteed delivery of video from one place on their network to another. These point-to-point services are sold at a premium to private clients who want to get their TV signal from A to B reliably, for which the operators use multicast and common QoS systems, both of which are comparatively old technologies. Traffic running across these networks is generally "tagged" into 2 separate groups – public internet traffic, and private traffic. A private connection is typically implemented as a virtual private network (VPN) and can also use virtual local area network (VLAN) technology.

There is also more than enough capacity in transoceanic fiber to be able to withstand the onslaught of live television and unicast video on-demand. The fiber itself is already laid, but the cost comes through the capital expenditure for equipment to "light up" additional wavelength capacity at termination points. Scientific improvements in fiber-optic technology mean that this equipment gets more efficient as the years go on, that the demand strips its price and we can keep squeezing more and more bandwidth out of the same cable. Conservative anecdotal evidence suggests that less than 6% of the available fiber is currently being used, and of that, only 60% (~4% of the total) is constantly at work. In third

world countries, they are buying it for pennies by the metre and stringing it up in the air between individual houses.

To put this into perspective, the highest reported simultaneous traffic load passing through the LINX exchange in London's docklands is just over 100Gbit/s. To transmit all the visible channels on the Sky Digital platform in MPEG-4 AVC, you would need around 1Gbit/s (this of course excludes test channels, interactive applications, additional video tracks/camera angles and other hidden transmission variables). The first iteration of unicast video on-demand being succeeded with new super-scalar multicast variants also means that if 1000 people are all requesting the same movie title within the same 15mins, less than 20 unique streams are needed to feed the rest of the audience parasitically. Unfortunately, the vested interests of the vendors lie with shipping as many units as possible, so efficiency doesn't do them many favours.

But unfortunately proprietary, money-grabbing, risk-aversion fever has gripped the carriers. They make more money selling private point-to-point video connections on their shiny MPLS networks and have very little interest in working with their competitors to interconnect live television services across the Internet. Their primary goal is turning video carriage into a premium service that content providers and consumers pay through the nose for so they can appease investors and squeeze the last drop out of their past capital investments in infrastructure. For the next generation of the Internet (and hence the next generation of profits), we need video to be a commodity.

On the surface it's a perfectly reasonable business decision. But look further down the road, and it's absurd. These companies are in business today because of co-operation, integration and interoperation alone. If we'd have adopted the same policy at the beginnings of the Internet, it wouldn't exist. We'd all be trying to connect to JANET because of a similar campaign by all of the individuals to monopolise the network. And back then, investment in a new fangled communications technology such as the Internet was far riskier when the demand or "proof" was just blue sky conjecture.

Openness, neutrality and interoperation got them when they are today, and it is the only thing that will get them to point B. Resisting it is like turning over and ignoring everything that's come before and sabotaging

your own salvation. Telecoms is a fast-moving and risky business, and they are making a catastrophic mistake and doing nothing about it, as everyone is doing the same like lemmings running to a cliff edge. Its short-sighted madness.

One of the most common questions operators and analysts are asked is whether IPTV will happen, and if it does, whether it will deliver its promise. The answer is probably not one you'd expect. It already has happened, and already is doing. IP and internet technologies may not turn up on our doorstep or down our aerial socket tomorrow morning, but the key point to remember is that in 20 years, it will be the dominant method of broadcasting. The secret is in seeing the bigger picture. Rupert Murdoch infamously declared recently that market entrants need to operate in the mass market or in niche segments, or else they would be someone's lunch in the middle ground.

Broadcasters have already seen it, as have a lot of telecoms companies. Cable operators are using IP over their coaxial wiring, every country has one or more "triple play" operators and both BT and Sky are evolving their businesses to become so-called "hybrid" distribution that uses a combination of both traditional RF transmission and IP back-channel distribution through broadband. The last mile copper network in the UK is too unreliable for immediate real-time video on-demand so these first services will see an incremental delivery pattern starting with offline "push" downloading onto PVR hard drives that gradually change to live video. BT's 21CN upgrade and digital switchover will help to drive the migration.

Nearly all the main ISPs that control 95% of the UK broadband market now have a TV play of some kind, and there's no guarantee that they will be the right ones. The landscape is quite a bizarre and fluid tapestry of daily shifting sands that is yet to whip up into a storm. The cable companies have merged and re-branded as Virgin, BT are launching their Vision hybrid, Sky have bought Easynet, Tiscali have acquired Homechoice, Orange are consolidating across Europe and launching their BT clone, Namesco and Eclipse are launching off the Netgem and BT Max platforms. Carphone Warehouse have bought AOL UK and Pipex are acquiring to get fatter.

The revolution television is engaged in is not one of on-demand viewing or spectacular interactivity. It's far simpler than that. IPTV introduces Internet technology to broadcasting, which is a massively different mechanism of delivering video. Traditional broadcast is promiscuous, in that one signal is sent that anyone can receive. Internet technology is transactional, meaning every viewer is given their own personal copy of a piece of content, or maintains a personal link of some kind to the originating broadcaster. Transactional means a personal request is made, and a personal response is given in return to complete the 2-way bilateral process.

So what is this vision and promise, and this world that is on its way?

In its most basic form, using IP for transmission means that almost anything that can be done on the web can be done on an IPTV-enabled device, such as a set-top box, mobile phone or games console. Screens and applications can be built in HTML, Javascript, CSS, Flash and open-standard mark-up languages (WML, XUL, XAML etc); Devices can connect to email (POP3/IMAP etc), Voice-over-IP (voicemail, SIP etc), Instant Messaging (MSN, Skype, XMPP etc), mobile messaging (SMS, MMS etc) and streaming media (RTSP, DivX etc), and software applications can talk to each other and work together using protocols such as SOAP, REST and XML-RPC.

IPTV offers all the strengths of the internet, with none of its weaknesses. It means everything from the Internet, with rich-quality, interference-free DVD video on-demand. Anyone can develop these services, and reports of their usage can be generated from normal web server logs just as they are for websites. Content producers can go from limited market penetration to unlimited reach of everyone with a phone line or broadband connection. It means broadcasters and every other type of content publisher can strengthen or re-initiate much closer relationships with their viewers.

The Internet will eventually be the preferred medium for carrying broadcast television. It will be a particular boon for those who currently use satellite backhaul carriage and pay hundreds of thousands of dollars a year for the privilege, as the choice will be between millions of dollars over the years or a bill less than 10% of the cost using the net backbone. All devices will have internet connectivity and be able to communicate

with each other internationally in milliseconds, completely transparently, without respect for distance, borders or language.

The Holy Grail of IPTV and its ultimate promise is that by being powered by the Internet it can offer unlimited TV and radio channels from all over the world, and access to every piece of content every created in human history. TV menus will no longer carry a few hundred channels from broadcasters in a subscriber's country and its neighbours, but literally millions from every country in the world, of any size, made by anyone. Every TV channel, radio channel, movie, TV program, video game, music album, piece of software, picture, mobile accessory or multimedia presentation can be accessed in any country, anywhere, by anyone, on any device from wherever they are, whenever they want.

The reasoning for DRM in the new digital age resulted from some serious futurology done by the record labels rather than a panic over copyright. Digital files don't lose quality like analogue copies, and so can't be trusted to disappear into the ether after a few years with the masters being retained by the owners in a studio bookcase somewhere. They worked out very quickly that with the internet being what it is, there was no way to be able to control the distribution of digital files, but that the only thing they could control would be the ability to access the file itself. DRM reflects an old business model trying to survive a new generation's demands, but in itself is organised madness. Consumers hate it, it creates pain, its proprietary when it needs to be cross platform and transparent, and most importantly it negates the web's most powerful asset – its viral nature.

The new world means that your media will travel with you wherever you go, in any country, on any device, any time you want it. Subscribers will have a global account that is accessible on all of their devices and locations that stores their preferences, rights and demographic information (i.e. their profile). Information about customers and their personalisation preferences will be centralised, and be accessed by decentralised (or localised) delivery equipment. The rights model that divides into countries, platforms and time periods will be challenged by this new idea of portable settings and access as the purchase of the media will be tied to a person rather than a place, device or time.

That's a very scary thought for most content rightsholders. Scary enough to make you pursue racketeering of the very people who buy your products. It ranks up there with the dreaded idea of cannibalisation. It's been reported many times that movie studios don't sell cinema tickets; they sell DVDs and act as investment banks. Of every 10 movies, 7 lose money, 2 break even and 1 actually makes some money. Doing anything to upset the apple cart, like video on-demand, might tempt consumers from buying those lovely, over-priced plastic discs and mean they won't make much money. The situation is changing slowly, but isn't helped when brilliant executives are frustrated by their more senior colleagues who don't "get" digital media.

This again is utter madness. Every time a company expands, creates a new product or a trend forces them to re-position, there is the risk of cannibalisation. Cash cows and margins don't last forever, and change happens whether any of us like it or not as its life's modus operandi. Fearing that is the same as fearing a new product or life itself. Digital distribution means no physical packaging costs – all the perpetual revenues with none of the costs. It's a content producer's wet dream, and a powerful complimentary service to be offered gradually alongside what's there right now, in the knowledge that it will eventually replace it over time when consumers have adjusted. As Bill Gates rightly predicted, in the coming years, the ownership of physical merchandise will cease to exist and we will rent access to artistic works over a network for a period of allocated time.

Convergence messes everything up, and we can't pretend that yesterday's ways of doing things will fit today's and tomorrow's problems. Contracts for intellectual property are an art form that makes lawyers drool in anticipation of the juicy, chunky fees that can charge because of the length of time it will take to put the jargon together that makes up the eventual 500 page legal booklet known as an agreement. The old world is based on everything being separate. Convergence means every device does everything the others do too, and there is no more separation. All the things the devices do that was originally different to each other have now merged them into one big feature set.

Hollywood uses a very complex rights model based on multiple release calendar "windows", and sub-divides access to their intellectual property

as much as is possible to ensure maximum profitability. In practical terms, that means you can licence a title, material of likeness for a certain, region, country, territory, platform and allocated time period upon payment of an arbitrary up-front minimum guarantee based on how much of a risk you are.

It's very difficult to create new windows for new technologies when current customers have paid handsomely beforehand for their little slice of the action. Its equivalent to pushing ahead in the queue, or having to reimburse people for what they will lose from another customer having access to those rights. It's also for that reason that we are seeing all the lame "stepping stone" services like download-to-own (D2O) websites, as these can be classed as extensions to existing windows through some legal wrangling rather than anything new.

But there is an even more basic problem with IPTV that plagues the content industry, and that is one of definitions. Most people have no idea what it is, and get thoroughly confused between the variants. IPTV is an umbrella term for TV and video distributed using Internet technologies. That doesn't mean it has to use the Internet, just the technology, as you would find in a normal home or office network. As an umbrella term, it can mean full multi-channel television like Homechoice, Internet TV, Broadband TV, video downloads or P2P services, and doesn't necessarily have to be viewed on a set-top box or media player. The typical industry understanding is that it is full PAL/NTSC television transmitted over a privately-managed last mile network such as DSL.

Not having the definition right isn't a great way to start. Naturally the lawyers are grinning because it means months of pointless meandering over details and potential specification problems they can charge by the hour for. But it's not just a headache in educating people about the potential of the technology, it makes getting content onto platforms very difficult. Most productions (movies, TV programmes etc) are not completely original in the sense that they use a chain of material licensed from other rightsholders (for example the likeness of an actor/actress, DVD artwork, news footage in documentaries or music soundtracks) that has to get "clearance" for inclusion and distribution in the master production.

That clearance in the UK is typically categorised into “all TV” or “all new media”. That material hasn’t been licensed for IPTV in either category (as there is no standard definition) and they need to go back and get clearance for it again, which means additional cost. The definition will come in time, but right now it means the platform owner bears the cost of legal consultations and the subsequent additional fees needed to cover re-licensing. Its also the reason why some of the most compelling service content (such as DVD-titling on VoD movies) is too difficult to include. The chain of rights clearance is a massively complex problem that currently doesn’t have the market demand to sufficiently motivate the content industry to pursue it in detail.

A lot of understandable frustration is levelled at content providers and it’s very easy to see why. Dealing with the studios and production companies can often be like pulling teeth if the approach isn’t correct. Surprisingly, dealing with record labels is actually very easy as they’ve had 5 years or so of violent erosion into their sales from the establishment of a piracy market for digital files and the new market forcing change upon them involuntarily. As Universal’s recent gesture of opening up their catalogue for free suggests, they have come to accept a new role as wholesalers, will licence to anyone who asks to get their products distributed as widely as possible and now refuse to deal exclusively with anyone.

The market for digital distribution is already there in the form of piracy. The labels understand now what their retail customers have been telling them for years, and that is the new model in a world of universal ability is aggregation, paid for by revenue-sharing and advertising. Digital sales are now contributing up to 20% of their total revenues and the profits are piling in. If only their big brother companies in TV and movie-making would listen. They are paranoid about falling into the same trap the labels allowed themselves to walk into, but still won’t open their ears.

The attitude these two types of industry share has come to be known as the “*Ivory Tower Complex*”. The conventional way of doing things up until now has to be to spend huge amounts of money on producing high-quality content that is licensed exclusively through the rights model to one or two specific customers on a very, very limited basis. That exclusivity commands a lucrative premium. Understandably, they want

that to continue, and in some ways it will as people will always be attracted to the premium titles they produce before anything else.

Unfortunately, as the evidence from the music industry shows, the world that is coming isn't going to work like that. Content will be distributed as widely as possible all over the world, to as many different people as possible for maximum profitability. Their products will compete with those from niche markets catering to a specific taste rather than a generalised audience. That means they will lose that lovely premium, and it's quite upsetting. Luckily, the exciting news is that universal distribution will most likely make them up to 50 times more money in the long term than exclusivity would. What they lose in exclusivity, they will make back in spades through volume. The longer they resist the inevitable, the more painful it will get. Whoever strikes first will conquer.

So assuming they come to adopt this new way of doing things, there will naturally be obstacles in their path as there are with all new technologies and markets. One of the biggest is the industry's new panacea – the so-called “Long Tail”, and its “*digitisation problem*”. The Long Tail is a great idea and a potential source of a lot of lovely revenue, but it has some very crucial flaws which are currently preventing it from becoming a new model for content providers. It's the most basic of issues, namely how on earth you monetise back catalogues of content that no-one will be prepared to pay for in pay-per-view style. Digitising and storing millions of hours of archive tapes is a formidable challenge, so the only sensible business decision is to provide the most popular 10-15% of titles at first. This will mean we will see cascading availability based on viewer demand, and store-for-free/pay-for-playout businesses.

90% of the content of the world is not sellable by the conventional mechanism of pay-per-view. It's a sobering thought. Viewers just won't pay for it, even in micro-transaction or through subscription. The most popular video on-demand services are free (e.g. so-called “Catch-Up” TV services that allow you to watch programmes you missed), like all products. That leaves only one viable option as the primary means of recovering the costs of digitisation and monetising the content – advertising. Google, AOL, Universal, YouTube and others are already flirting with ways to marry advertising content with either the subject of the content being viewed and/or a viewer's personal profile and

preferences. Only a fool would follow it as the only route, and as the dotcom and Web 2.0 herd showed, there are a lot of them out there. It may not be perfect, but it's a reasonable start.

That principle demonstrates a very simple rule which applies to advertisers, their agencies and those who want to support their services using the old commercial broadcasting model. The new advertising "space" to be bought by media buyers on on-demand systems is the ability to watch for free. Subscription mounts as a premium service very nicely on top if the ads become too intrusive, and it means advertising can be dynamic and personalised rather than static and perpetual. But it also creates a further problem. Advertising always generates a surge of technological innovation for products that remove it.

There are many people saying they believe they have the answer to the problems the IPTV industry faces. Don't believe them. We can't know every problem that will arise or whether the answers will be suitable for ever, or even now. The huge revolutionary hyperbole being spouted by marketing charlatans is coming to be seen as the puffery that it is. On-demand is not a revolution, neither is aggregation as a business model. The simplest example is a common supermarket. Aggregation is the natural and sensible answer when there is massive diversity and breadth of available competing products in a marketplace.

We buy things from supermarkets who aggregate food products on-demand when we feel like it. On-demand is the most natural way of doing things mankind has ever devised. On-demand is the way we already do everything else, and have done for thousands of years. It is not a revolution.

The key question is one Rupert Murdoch is closely focusing on and is a master of. When we have all the technology in place and serving up every piece of content imaginable, how do we help people to consume it?

Technology is developed by early adopters for early adopters, and is only made a success of by commercial specialists who natively understand the social anthropology of buying products. Technology assumes customers will "pull" it or "search" for it. Tradition and centuries of experience show we need to "push" it to them in some way, whether through a review by a journalist, pushing a free newspaper in their hand or bombing them

with advertising. If they don't know its there, they can't buy it, use it or watch it. Websites that provide feedback or notifications to their users have massively higher retention rates than those who assume their customers will do all the work.

The quickest way to observe the generational difference in how people watch television is to study your parents, as they typically sit on their sofa in a virtual coma, Homer Simpson-style, whilst they are spoon fed. Prevalence relies on huge marketing budgets, and it will be no different with the next generation entertainment that IPTV provides. No-one has given a thought to the QVC and/or Saga audience, who make up the majority of people who got Freeview to its dominant position in the UK television market. Too much choice is damaging and intimidating. Google "glues" web surfing together by helping users to find their way around the web from place to place. TV is a passive social medium used for entertainment, and an experience shared by several people in the same room.

But herein lies a huge opportunity to "add value", as pretentious middle managers would say. With millions of channels, and millions of hours of content, we need help filtering through it to find the things we want to consume. The most advanced websites now do this with a mixture of community rating and recommendation engines that automate the process of making suggestions. Human intervention will almost always be needed in this process. We may meta-tag every frame, translate audio subtitling into text keywords and build up all the purchasing profiles we want, but the human condition means we will always need someone to explain and help us find our way around. And the good news is that people are happy to pay for that filtering as it takes away pain and adds quality. Nobody cares how the content is delivered.

To experience the phenomenon of choice and content overload, you just need to visit one of the latest websites based on providing user-generated content (UGC). It'll take a few minutes to get lost in it before you reach for a top 10 or most popular list. These services are reporting a new trend called the "1% rule" where 1% of their users actually generate content, 9% moderate it editorially and the remaining 90% are happy to just be entertained without getting involved in any way. IPTV opens the door for anyone to create their own TV and radio channels, and publish

their own content and software applications to anyone else in the world. The technology may be new, but the way it is consumed won't change, nor will human nature.

Even user-generated content itself isn't new. In the UK, one of the first examples was the appallingly bad TV show *"You've Been Framed!"* presented by Jeremy Beadle, where viewers sent in home video clips of them suffering dreadful accidents and/or humiliating experiences for a cheque of £250 in return. If you're planning an IPTV launch, please do not include that monstrosity.

There are also warnings to the intrepid and an industry that desperately needs to pull it socks up if it's going to make its mark in the way it wants to. IPTV currently is very little other than cable TV put down telephone lines. There is 50 years of incredible innovation ahead that could see us powering the greatest revolution the media industry has ever seen, but so far our imagination has produced 1% of what we could create if we worked hard enough and collaborated for a greater cause. The IPTV software applications on the market today are simple re-hashed clones of what is available on the normal platforms and feature very little that's interestingly different or compelling. It's no wonder customers are underwhelmed and becoming cynical.

Trying to re-create the same experience on every device just because it speaks Internet is a fool's pursuit. Screen size, battery life, usage patterns and so many other variables mean that it's impossible. We may be able to synchronise tightly and create applications that compliment each other and interoperate, but replication is the fool's gold of convergence. Video transferred across and between these applications and devices also needs to be far more intelligent in itself, with audio analysis, frame-by-frame tracking of objects and more extensive meta-labelling.

It's very easy to forget that IPTV is more than just a convenient luxury in our affluent Western cultures. We have so much choice and opportunity that we miss what it is doing for less wealthy nations who don't have our infrastructure or resources. Internet technology is transforming these countries by democratising access to the media business and regenerating economies by educating the poor through e-learning applications. These places don't second guess, weigh up spreadsheets or analyse opportunities when they see a way to revolutionise how they

live. The Third World is adopting IPTV as a technology and showing a lot more imagination than we are, despite us thinking we're the cleverer ones because we have more money flowing through our banking systems. In 20 years we will regret that complacency.

The greatest achievements, most successful companies and products, and the most world-changing revolutions have come from taking risks and stepping out into the unknown with new ideas. This preoccupation with paranoid risk adversity and sensitivity over investment portfolios has come to infect almost everything we do and it's slowly decaying our ability to produce, implement and market new ideas because of the heavy price we put on our heads for failure. There is a bigger picture at work in our world that needs to be considered that demand we act with courage and the wild energy of inspiration to achieve what this technology could empower and enable us to. Our culture is becoming more and more insular and ingrown when it needs to reach out and generate wonder in all that experience it.

And if you need a reason to do it, there a very simple one.

This world is already on its way. It's coming.

To do it will be one of the greatest undertakings the media industry has ever witnessed. But it can be done, and we will do it. Someone has to step forward. We'll lead, you follow. Pack a helmet and a strong stomach as we'll be getting blood and dirt on our hands. Consider this your invite to
to join us.

killer apps and crap

Time and time again, industry talk comes back to what the one “killer app” will be for IPTV as a platform. Most assume it will be video on-demand, as the historical business case has always rested on the fact that consumers love being able to have video whenever they want it, and subsequently rack up enough in their bills to justify the expense of rolling it out. The truth is IPTV has far more killer apps than that, just as it has share of things that should never raise their ugly heads above the proverbial parapet. In this article we explore some of things that as a next-generation technology IPTV can offer that no other platform can come close to. And unfortunately, we also touch on the blacklist of horror that anyone caught being enthused about would need to be taken out and shot for.

Set-top boxes designed for ladies

This may seem like an odd point to make in the context of consumer electronics and technical entertainment services, but the fact is that 50% of a typical IPTV audience is just not being catered for when it comes to what you actually get in your living room. Men will buy anything that looks and sounds powerful (read: silver chrome casing with blue lights), whereas women are so much more discerning and typically not remotely interested in technology. If you’ve ever seen a woman navigating her way through a clothes shop you’ll notice the feel of things available in store is all important. Apple realised this and conquered the world with the iPod – it feels beautiful to the touch, and even includes a mirror on the back to do your make-up. Get the girls with a beautiful, user-friendly ornament and you have a winner, as the guys are already sold.

Simple, standardised remote control

Sky deserve credit for being smart when it comes to putting a platform together and specifying their standard chunky remote control for all set-top boxes. They are, strangely enough, last on most people’s lists despite being the one crucial link between the viewer and the TV service. Who even really knows what 80% of the buttons actually do? How many do you truly need to operate the TV? Probably far fewer than you imagine.

The secret here is to make it like a playboy bunny – good looking and incredibly simple. Less is definitely more. Stick to on/off, up/down/left/right, select and maybe a few other optional ones for good measure.

Customisable TV menus and screens

Most platform operators make an undignified scramble to protect their brands with walled gardens and strict graphic design rules. Viewers should be able to install different EPG ‘skins’ or ‘themes’ and add simple ‘plug-ins’ to their TV navigation system (e.g. “*Delete this channel*”, or “*N mins until your program starts*”) just as with popular PC media player programs, such as Windows Media Player, Songbird, Winamp or Firefox. The default ‘start screen’ on most IPTV browsers, which is usually just a normal web page URL (e.g. an HTML page, either static text or dynamically generated by a server-side technology such as ASP, PHP or JSP), should be able to be set to any internet address, where savvy viewers could direct it to their own PC web server or external web-space.

10,000+ Unlimited TV channels

Broadcasting a TV signal that gets featured on the Sky menu is the cheapest way to produce a TV channel in the UK, but it costs over £100k per Mbit and is limited to the footprint of the Astra and Eutelsat satellite networks. Using IP and internet technologies to transmit video makes geography essentially irrelevant, and the distribution cost with it. Cable and terrestrial networks have a finite capacity which makes them even more expensive, but even Sky’s comparatively high volume is limited to service ID numbering schemes and transponder space. With the use of IPv6 (and to some extent IPv4), we have the ability to cost-effectively relay tens, if not hundreds, of thousands of individual multicast TV channels from any part of the world to the rest. Mongolia’s best channels can be resold in Peru, and Gambia’s leading broadcasters can offer pay-per view to New Zealand.

Real-time fast forward

The weakness of the extremely popular Sky+ PVR (and its alternatives, such as provided by Telewest) is that it can only allow a viewer to pause and rewind, whereas true video on-demand allows full VCR-like functionality over the network, which includes fast-forward (or ‘seek’).

Fast-forward allows a viewer to skip ads, scan past what they've seen before and flick through material in a very efficient way. This does however put an additional strain on video servers, but technology is now emerging that gives significant performance increases to counterbalance this.

DVD features for all VoD movies

The easiest (and some might say, only) way to promote adoption of a new technology or commercial proposition is to clearly demonstrate that it has increased value over what it is replacing. Evidence from many telcos across the world (including our own KIT and Homechoice) is that people watch VoD movies as a last resort because they associate it with having to pay. The other, less mentioned reason for that failure to adopt is that VoD is perceived to be a step down from DVD, that is to say, less value than it. DVD gives you menus, chapters, subtitles, languages, special features and more, whereas a VoD movie is just screening the main title. Operators should offer video on-demand with full DVD functionality as "*DVD without the disc*", and true internet connectivity that is lacking on a normal DVD player.

Viral web content on your TV

IP set-top boxes are connected to the internet and effectively work as any normal browser, like Internet Explorer or Mozilla Firefox. Most popular products tend to be installed with a mark-up language-based browser like Ant Galio, Espial Evo/Escape or Opera for reading menus and screens built in X/HTML, Javascript and CSS. Optionally, they can also have Macromedia Flash 6 built in, even though it tends to consume resources heavily. But the best part is that they also have dedicated semiconductor hardware built in that eats video for breakfast, unlike a PC which does everything in software and chokes. This browser-based environment means content developers can produce flash and shockwave animations and web movies to be included for watching on your TV. Funny viral movies are no longer stupidly large email attachments – they can be on your TV for all of the family.

Your very own TV channel

The ubiquity of broadband connections means that anyone should be able to broadcast out a live video stream from their own house or office

as IP multicast to their ISP, who can make it globally accessible to anyone all over the world. This could be the output of a video camera (yes porn lovers, the world just got kinkier) or a looping playlist of home video footage (the free VLC player is a great way to do this at very low cost). Local football clubs should be able to produce their own sports channel, councils their own 'name and shame' ASBO update, charities their own local campaigns and local businesses advertising for their services, solely through a broadband DSL line.

View any CCTV camera in the UK

Homechoice do tend to get a kicking, but they have been first to market with this fabulous idea. In the times of our surveillance society, why shouldn't we all be able to watch the CCTV that records us every day? Estimates for the number of cameras in the whole of the UK (including private premises) have been put as high as 4 million, with up to 500,000 just in the capital and 9000 to be on the underground alone. These cameras already produce half-resolution MPEG-4 footage as it is, and should be easily configurable to multicast onto public network backbones. Combine that with Google Maps, localised services and the crime-fighting abilities of anyone across the country being able to record footage at any time and fans of reality TV would be delighted – something more boring than 'The Salon'.

Highly-localised services

DSL is uniquely useful as it must be installed on a telephone line, which is mapped geographically to an exchange area, green street cabinet sub-loop and end-user premises, with its postcode and customer information. That means every transaction made between the operator's head-end and the viewer's set-top box can be intelligent, as opposed to the random scattering of typical broadcast TV. Set-top boxes should ideally ship with not just serial numbers and viewing cards, but the postcodes of the customers who have ordered them, so this information can help content developers to produce highly targeted and localised services that are massively more compelling than their precedents, such as "*Find My Nearest ...*", and the likes of GPS and mobile integration (imagine getting directions to a dinner party on your phone from someone's set-top box - they both speak IP). As the RIAA have shown with their psychotic litigation spree, IP addresses can be geographically

resolved by ISPs to individual premises and their customer accounts, which is now being used by content owners like the BBC to restrict viewing of material to certain countries.

Mapping and direction services

Google Maps' public API has generated huge levels of innovation amongst developers on the internet, and provided with open access to an IPTV platform, should be able to do the same for TV. Viewers should be able to very simply enter postcodes to destinations through their remote control (like on a mobile phone keypad, as described later) and see maps of locations on their TV screen, or directions to them using interactivity to explain a route. This type of application, like many others, should be able to be invoked by a broadcaster or operator as part of a normal video broadcast (e.g. *"press X to see a map of where this happened/where your nearest store is..."*).

VoIP integration

No self-respecting 'triple play' operator should be without some form of IP telephony control through the TV, as many are now experimenting with. VoIP uses the same type of transit as IPTV, which means it works over the same network and connection, and can talk to a set-top box quite easily. Whether you have a PBX in your home (like the excellent free Asterisk@Home package) or subscribe to an upstream SIP/Softswitch provider like Vonage and Sipgate, a TV can offer a very simple means to use your telephone in new and exciting ways as its just an IP system that can talk easily to asset-top box with an XML APU or web interface. Get visual caller display on your TV screen when someone is calling in or waiting, see the other person on their 3G video phone, listen to voicemails by browsing them like email, snoop or conference on others' calls, read SMS and MMS messages, interact with IVR applications, or change simple admin settings with your remote control.

Browse movies, photos and music on your home network

Many device manufacturers offer both wired and wireless media player units that plug into your TV via Scart cable and let you watch films, browse photos and listen to music away from your PC. Offering the same on a set-top box is relatively easy, assuming you have a reliable piece of software installed on the PC (simple media server) that will be able to

talk to it in a way it understands. The network should be abstracted – devices able to log onto a network with DHCP and also use internet connectivity can connect to PCs and other set-top boxes on a home LAN, without needing to be in 2 separate units. A set-top box should also be able to output a copy of the TV stream it is receiving and displaying as multicast onto the network it is part of, so other devices can reproduce the same TV picture in parallel.

Simple P2P network messaging

Being part of a community and interacting with others is the compelling factor that drives people to revisit social networking sites and keep using communication technology. Set-top boxes are just simple computers that offer very simple software applications that enable people to do the same, but in a considerably more primitive way. Applications need to be able to invoke a simple generic messaging system that allows the direct sending and receiving of simple data between 2 devices with separate IP addresses – such as photos, very simple text messages and themes. Instant messaging, or other text-intensive services are too much in a TV environment, but the ability to communicate small pieces of information is extremely important.

Loyalty reward schemes

Supermarkets operate loyalty cards with amazing results – the great British love of a bargain is just too much to resist for most people, even if it means giving up information on what they buy to everyone and his dog. Even Sky have tinkered with the idea, but like with others' attempts, all the experiments tended to require a physical card or tedious operating procedure. IPTV systems can implicitly identify who you are, and like in most hotel entertainment systems, can record almost everything you do if needed. Viewers should be rewarded for everything they do on an IPTV system – every transaction they take part in should be registered and credited against their subscription account by either the platform operator or third party content developers (via exposed API), be it viewing movies, listening to music, ordering accessories, sending messages, submitting photos, taking part in multiplayer games, using applications or just looking through content.

Music Recommendation

The popularity of the latest software applications that help people to discover new music they would like is reaching epidemic proportions, with very good reason. Software like the incredibly fantastic Pandora.com (based on the Music Genome Project and written in Flash) actually understands what a song sounds like to the human ear and can suggest new artists that sound similar, with its natural cousin Last.fm offering the same through human voting & recommendation. Video Networks report that their music video playlisting service (that allows viewers to compile lists of their favourite music videos, fast forward through the selection and effectively create their own TV station/channel) is by far the most popular part of their entire VoD platform. Stim TV offers rapid video previewing of artists for the same purposes, and companies like Shazam enable the identification of music through mobile phones. Having the ability to create, vote on and share playlists of your favourite music is a proven powerful driver of video on-demand.

Photo sharing

Photographs on digital cameras tend to be JPEG variants, which can be displayed by PCs and set-top boxes alike – most IP set-top boxes and media players can easily handle displaying hundred of picture files very easily. The sensation known as Flickr has shown the world how the desire to pass photos around friend can be applied to the larger world with amazing success. Set-top boxes should be able to generate slide shows with background music from photos on the local home network (i.e. from a shared folder on a PC), from webspace or specialised IPTV photo sharing walled garden applications. One of the most fun applications would be to send an MMS picture message from your mobile phone so it appears on your TV screen (MMS messages are typically received by a gateway/mmsc that relays them to an internet server) as part of a blog collection, ready to be shared with all you friends and family.

Mobile-style text entry using the remote control

Sky spent many tens of millions of pounds finding out that people don't like interacting with their TVs in the same way as their PC. If they even get that far at all, as most people are still terrified of computers. Keyboards, as explained later, are ugly, expensive, unreliable and utterly useless for the TV environment. Despite the fact that we want a viewer

to have to do as little as possible, limited text entry is important and the winning formula is to use a format that is familiar to everyone – the lettering notation on a mobile phone (i.e. the “2” key has “ABC” as its subset), and optionally T9 predictive text technology. People know how to write text messages with their thumbs, so doing it on a remote control is not a great leap to make. It won’t work for essays, but it can aid the smaller tasks in a TV user interface that viewers would find easy to pick up.

Live, real-time personalised information

We’ve had Teletext and on-screen graphics for a very long time, but being a true 2-way internet-connected medium, IPTV takes information display to an entirely new level that leaves its predecessors standing. Creating menus and screens from web languages like HTML means we can dynamically generate content and update it in real-time, but broadcast can do that too, obviously. The difference with IPTV is that we can provide truly personalised information, based on a viewer’s individual preferences and interests. That information can be anywhere (e.g. alongside or inside the video stream) and anything – sports scores and statistics, text messages from friends and family, stock market prices, billing information, notifications and reminders, IMDB and Cddb information for movies and music, flight and holiday offers and so much more. AJAX is being used for this recently in so-called “Web 2.0” software applications to great effect.

Video-centric multiplayer games

Go into any HMV or Virgin Megastore and you will see a whole range of the latest quiz DVDs the whole family can play, for example Trivial Pursuit. These generally can offer thousands of video clips and 1-frame MPEG slides that are weaved into a complex menu structure for several people in the same room to interact with. The great thing about these games in comparison to their interactive TV, PC and plain board counterparts is that they offer rich video animation as part of the experience, which is so much more compelling for the average viewer. The BBC have got the nearest to this functionality with their “*Spooks*” and murder mystery “red button” applications, and the response has shown they are hugely popular. IPTV allows us unlimited video on-demand over the network, which when stitched together with nano-

payment, great gameplay and personalisation is an unbeatable proposition. We can build leagues and tournaments for teams in their own living room, or allow groups to play each other whenever they desire, house versus house, or even pub versus pub.

TiVo-style web access

The original and the first PVR to hit the market way ahead of its time, loved by geek and layperson alike, hated by advertisers and TV networks, has never truly been beaten for functionality. One of the most lauded features was the ability to program your TiVo remotely whilst at work in the office over the internet, like many other CPE devices, for example your home DSL router. Through a simple web admin panel, you could schedule recordings and adjust settings without even needing to be in the same country, let alone the same room. Sling Media have now taken this concept even further by creating a media device (the 'SlingBox') that can behave like a media server and stream your TV through your home broadband connection to you wherever you are in the world on virtually any device. So not only can you set it to record remotely, you can watch it once it's done. They call the technology 'place shifting'.

Fun entertainment accessories

People love to personalise what they own, to make it truly theirs. PCs in offices get the Comic Sans treatment, whilst machine at home have ridiculous backgrounds, outrageous colours and other little quirks to represent the many faces of the owner's personality. Being firmly in the grip of the commercial overlords, TV has never been able to offer this – until now, of course. Viewers should be able to send each other video greeting cards, MSN-style "winks" and animations, JPEG backgrounds for their start screens and even audio effects like incoming VoIP call ringtones. Serious hard-working men call it "*chick crack*" – the rest of us call it mindless fun and a great revenue generator.

The strength of IPTV is also its Achilles heel. Being connected to the internet and/or global IP backbone means unlimited content in so many forms – unlimited TV channels, unlimited movies, videos and music and software applications galore. Anyone should be able to develop and innovate content that can be viewed by an IP set-top box. IPTV is at its

most powerful when it is unleashed as an open platform for everyone to participate in, not locked into a limited walled-garden environment controlled by a specific brand. That ability to extend and innovate differentiates it from its competitors and allows it to evolve as the audience's taste does. But the very first thing the marketing and PR departments of the big players will harp on about defensively will be a claim that the sheer amount of content available on IPTV platforms is difficult to find, confusing to use and of variable quality. The moral of the story is if you plan to use unlimited content as a selling point, you better had the world's easiest way of finding your way around it.

But the trouble is, how do we find our way around all that content? An EPG and a select button is just not enough anymore. Traditional TV has gives channels individual numbers and easy menu systems to navigate through them. Telephones use geographic dialling codes and individual number strings, and mobile phones use simple shortcodes. Web browsers and media software on a computer have shortcuts, links and address bars. As Sky have realised, IPTV currently has no accepted standard way to browse, discover and subscribe to new services. It's difficult to use URLs or protocol addresses like `http://`, numeric shortcodes do not convey what the service is (let alone the reported quality and/or popularity of its content) and text shortcodes (like a TV version of domain names) are limited. The immediate text entry-free method would be to have visual prompts on-screen inviting a viewer to subscribe to, or add a shortcut, a new service, in the same way current "press red"-style applications do today. Installing those "shortcuts" so they are ever-present on the TV guide means building an EPG menu system that is easy to navigate through, as screen real estate is highly limited on a TV.

The simple fact is whoever answers that problem will provide the de facto MO for all IPTV services that come after it, and that person will almost certainly become very rich indeed. Building an intelligent 'service manager' application requires a mixture of seamlessly intuitive user interface design and intelligence from back-end servers that store personalisation data. The natural and trusted way people communicate in everyday life is through recommending things to others and looking to see what is popular. The best known popularity algorithm is Google's search engine technology – links to websites are treated as "votes" or

endorsements to the quality of the information they point to. Google “glues” the web together – it is what fills in the gap between viewing different websites, a structured and useful way to navigate through all the 600 billion pages on the internet before you bookmark them. You can’t put a search engine on an EPG (very sloppy thinking), but what we do need is a mechanism for gluing those TV services together that a) does not confine us to a branded walled garden, b) requires little or no text entry, c) allows us to promote services over others, and d) keeps us in reach of the EPG at all times.

An important principle to bear in mind is that just because you can port anything to IPTV doesn't mean you should. Quality assurance (QA) is a very tricky game, as is parental content control, simply because with so much content it is very difficult to check every screen and video manually on a platform that is inherently open as its very nature. Many extremely powerful and appealing web applications just won't work on TV, or may work but not generate any money. The latter isn't so much of a worry when the software is on the net and not costing you hundreds of thousands of pounds a year in distribution costs, but still needs to be at the heart of any commercial service.

As The Usability Company say, If they can't use it, they won't use it. There is potential for very serious sin on an IPTV platform in terms of content authoring, so if you thought blinking text, flash intro movies and popup windows were bad, TV is 1000 times less tolerant of such evil. Its time to pick up your crucifix, garlic and holy water, take a deep breath and get ready to look horror directly in the face. Amongst the candidates for immediate euthanasia are problems like....

Don't get in the way of the TV

First and foremost, IPTV is about TV. As obvious as that may sound, it's not generally understood by a lot of content developers. Clutter isn't acceptable or even practical. That little box in the corner of the room is for video and awful reality shows, not cool software applications, as much as we love them. A PAL TV picture in the UK, despite always having “overscan”, is 720 pixels wide by 576 pixels high before taking into account the so-called “safe area” where graphics can be placed, and has a tiny fraction of the colours of a PC monitor available to it. That's not a

whole lot of room for anything. We're talking big, blocky graphics with simple gestures on the remote control. TV is about pictures, and text longer than 5 or so words is pointless and annoying. Look on any mainstream channel and you will see almost half the screen is already taken up by logos what the campaign for Logo Free TV identify as "*branding, idents, emblems, DOGs and Bugs*", to you and me, visual noise or "screenjunk". Just don't do it.

TV keyboards and typing

Bad, bad, bad idea. A TV is not a PC, and it never will be. Mass market viewers will never feel comfortable using a keyboard with a television, no matter how hard vendors protest. It just won't happen. It just sucks, pure and simple – it's either a TV or a PC, not anything in the middle. The devices themselves are hideously ugly (usually semi-transparent plastic), have the feel of cheap plastic, are insanely unreliable and cost too much for the benefit anyone derives from them. TVs aren't meant for text entry – who on earth is going to use a "contact us" style form on an IPTV screen instead of making a phone call? It's just too much hassle. Most broadcasters offering "web chat"-style services have been forced to get people to "write" in their chat messages by sending a text message. And that is the answer to this particular problem – avoid text entry at all costs, but use the remote control keypad like a mobile phone number pad for entering text if absolutely necessary.

Video conferencing through the TV

This is a favourite of conference exhibitors in the IPTV world everywhere, as it looks great to investors and directors board. But that's all it really is – a dreadful gimmick that only seems to have taken off in Asia. Most people are quite satisfied with a normal telephone for making telephone calls and just don't want or need to make video calls through their TV. First you need a tiny webcam-style camera in your lounge (a bit creepy) and are sitting least 8ft away from the screen so barely anyone can hear you. There is one very simple reasoning video calling hasn't taken off in the UK, and it's nothing to do with technology. It's because it's nice to be anonymous and invisible on the phone – no-one wants the other person to see them whilst they are talking. Conceptually speaking, the service fits well into an IPTV architecture, but in reality it just doesn't seem to work.

Websites on TV

There is no excuse whatsoever for this. Back in the dotcom days you could be forgiven for experimentation with it in the same way your parents could be forgiven for the weird things they did in the 1960s. Some hotels still offer this monstrosity for reasons unbeknown to the rest of us. Little more comment is needed as there is very little say its defence. Suffice to say that if you offer still think it's cool and want to offer this, you are truly beyond help.

Instant messaging

BT are the latest IPTV operator to want to include messaging technology in their set-top box feature portfolio. All the noise Skype and Google Talk have made around converged telephony and/or multiple-service communication products has convinced those in the higher echelons that it needs to be put in there as a killer application. Not so. Yet another example of a technology company (Microsoft) walking into an area they have limited or no experience in and don't understand (television), and then scratching their heads in wonder when no-one uses what they have built. Commercially, IM is incredibly popular (mostly in the under-30s) and technically speaking its relatively easy to integrate with other IP systems, for instance the open source IM server, Jabber, uses the XML-based standard XMPP for communication which can talk to Asterisk or any other type of messaging technology. But it all comes down to the problem of text-entry – it's not a computer. How exactly do you have an IM conversation when someone else wants to watch Eastenders?

T-Commerce

A definite sore spot for Sky, who made whole departments redundant at Osterley when their investment in it collapsed. We may laugh, but their nearest rivals didn't even get to the starting block. Entire business plans were drawn up on the belief the mass market would swamp electronic TV "stores" through browsing catalogues on their TV screen and paying with credit cards in the same way as they do on the internet. It didn't work then, and it won't work now – IPTV as a technology is not suddenly going to transform the UK market into an audience of mail order fiends. Shopping only seems to work on TV when it is intimately merged into the programming itself (e.g. auction channels such as BidUp TV and

traditional teleshopping such as QVC). The other form of commerce that works well is premium-rate telephony (PRT) micro-payment, either through dialling a premium 090x number or sending text messages that cost several pounds a time.

URLs

These are how we access resources on the internet, be they for HTML, RSS or WML in the case of mobile phones or Sky Active. Text entry limits as discussed earlier give us a maximum of 10 characters that will be typed in using a remote control. The average URL in the form protocol/sub/domain/directory/page format just will not work as its clunky and tedious when put in the TV environment. If your IPTV service revolves around an embedded web browser (as most do) and you follow cable's lead in getting your users to type in addresses, you are staring into the abyss.

Banner advertising

Although advertising is the lifeblood of conventional broadcasting and is a central tenet of IPTV systems, banner advertising is a horror that must never see the light of day on a TV screen. Before anything else, its just awful interface design. There simply isn't space to put advertising on a normal PAL-sized screen when services need to be centred around broadcast video and placed amongst a large deal of screen space-padding to be accessible. Blinking, colour-soaked i-frame nested animated gifs are totally inappropriate for anywhere on an IPTV EPG, as are any other evil forms of product marketing, like pop-up/under screens, text links deliberately made to look like editorial (e.g. Google AdWords style). Advertising needs to be placed away from menus and screens so it does not devalue and/or detract viewers from their TV experience into more relevant and compelling places, such as TV programming, viral video material, EPG 'skins' or accessories.

Writing email through your TV

Email as a whole was never intended for TV as it's too text-intensive, whereas other types of messaging, particularly multimedia-based communication such as voicemail or MMS, are very much more adaptable. Yahoo and BT used to offer their email service through Sky Active, but nobody ever used it and it never made any money for anyone

that justified keeping it alive. Yet again, the issue is assuming something that works on a PC will work on a TV, and that TV is a personal medium when it is usually watching by more than one person at a time. It starts out as a great idea but goes rapidly downhill in the practical stakes - the initial stumbling block is setting up the details of your mailbox, for example, your POP3 server (if of course you don't use Exchange or IMAP), and then keeping your information private from anyone else who might also use the TV, for which you will need to enter a password or pin. Assuming you are happy to scroll through your emails in their unfriendly formatting and not worry about being unable to view attachments, you may still have to brave replying. That entails having a keyboard. To cut it short, it only works if you do it Blackberry-style.

Executable files

What man creates, man can destroy. What is true of lock-picking is true of any computer system. Although this isn't such a problem in embedded environments like that of a set-top box (many of which run one of several different flavours of Linux), it is still a prominent and important principle as the Windows security nightmare can easily come true elsewhere with even the slightest lapse. Nothing accessed from an external network such as the internet should ever be executable on the device. There are many operators today whose EPG and security systems are based on downloading a zip file which is decompressed on the fly to provide personalised menu information. Only certain key systems components need to download program updates to execute with full permissions on the box - core device firmware, software-based conditional access clients and middleware upgrades. Viruses, worms and/or malware on a commercial TV platform are the stuff nightmares are made of.

Personal profiles

Homechoice has this ability, and on the surface it looks like a really great and innovative idea. Mum, dad and the kids all like different things and want to do things differently - parents can set parental restrictions, flatmates can organise their services according to their individual tastes and you can separate weekday from weekend viewing. But the trouble is that in reality, nobody can be bothered to do the setting up or switching - or rather, 95% of people can't be bothered. It's like gardening with napalm - overkill for the environment. When presented with 2 options,

without fail human nature chooses the easier one. In this case, the easier option is just use the one profile in the same way you would with any other TV system that doesn't have the ability in the first place. Nice try, but no cigar.

It's very easy to forget how different a TV and a PC are when both are using the same technologies and can integrate easily. The fact you can repurpose web-based content for IPTV needs to be heavily tempered by considered judgement in discerning whether the application and/or content is itself even applicable to TV in the first place, As always, common sense applies – no essays, blogs or child porn, and plenty of padding, simple interfaces that save time and judicious use of screen space.

And don't listen to naysayers who claim IPTV doesn't offer enough to differentiate itself from the existing platforms or it is over-hyped and won't happen. The world will always be flat to some, and the key question is not whether IPTV is some panacea arriving next month to uproot everything you've ever known, it's a question of what the dominant mechanism for TV will be in 20 years time. Sometimes you just need to come down from the tech-high and take a look at what people are buying in high-street stores and what your grandmother does. We still have to deal with black and white diehard viewers and people who end up turning off their TV when told they should "*press red for more*".

iptv strategies for 25 uk brands

In this article we suggest IPTV strategies for 25 companies who operate in the UK: **Vodafone, Royal Mail, Carphone Warehouse, ScreenSelect, Ladbrokes, Odeon, 118 118, RightMove, Snappy Snaps, PlusNet, IMDB, South West Trains, Electronic Arts, Channel 4, Shelter, Jamster, EMI, Starbucks, Clubwizard, Fremantle Media, Early Learning Centre, Tate Gallery, Dixons, DirectGov and Playboy.**

Most business people that work at a high commercial level don't tend to think of things in terms of technologies or numbers, they tend to think in terms of services and applications. And so is the case with IPTV – we have some wonderful technology and a huge market momentum, but what sorts of things could we actually do with them? That requires some imagination, and if IPTV itself is offered by operators as an open environment that anyway can be part of, we can look at the internet and see be inspired by the innovation that has happened there because of the same.

There are certain groups of applications that any or all of these brands could and should offer, which aren't individual to them. The first is a live TV channel, delivered by IP multicast all over the world. Every company could have a live rolling 24hr channel displaying information about their products, services, promotions and offers that viewers could interact with in a personalised way. This could be complimented by video-based call centre and personalised help mechanisms – there is no reason to use instructions in writing when you can present them as pictures and video. This type of video on-demand service is simple support that companies could provide for their products – instructions, warranty information and much more.

A key feature of every IPTV platform needs to be the ability to use both nano and micro-payment billing – i.e. charges under 50p and under £5.00 respectively. All service providers, brands and content developers need access to this for any IPTV application to be financially viable. This functionality needs to be offered by the platform operator (e.g. the ISP or telco brand who provides the TV service) as they can map set-top box serial and telephone line numbers to individual transactions. They collect

the fees on a subscriber's final monthly bill and reimburse the service provider later. The operator can also collect very detailed information about exactly how a services are used – what was pressed on the remote control, how long it took, how long the application stayed on screen for, what was the most popular section and so on, but privacy concerns need to be rectified before this information is made available commercially to third parties..

Vodafone Live! TV Edition

Mobile phones can now integrate with IP networks through their GPRS/3G capability, and the first mobile operator to make a call in the UK has a “Live!” service that is perfect for an extension into IPTV. Viewers should be able to listen to their voicemail through their TV, read their SMS and MMS messages, send picture messages so they appear on the TV screen (and subsequently forward to friends, other email accounts etc), view their account details, buy accessories they can send to their phone directly (backgrounds, ringtones, games etc) and optionally display their location in the world if their phone is programmed to allow it.

Royal Mail TV Post Office

Having so disastrously missed the boat with this whole “email” thing and being de-monopolised, the Post Office should embrace technology with all its energy. Aside from converting its own in-store retail TV service to a national IPTV platform, the simple things are sometimes the best. Viewers should be able to call up a suite of electronic services via their TV that are tied into their own postcode (installed by the IPTV operator before dispatch), for example entering tracking numbers for record delivery via their remote control and seeing a visual representation of where their package is in the world. The postcode-mapped data services should also be made available to third parties for developing their own IPTV services, such as UpMyStreet.

Carphone Warehouse TalkTalk Extra

Having invested in Opal Telecom to expand into local loop unbundling (LLU), Carphone Warehouse has a perfect platform to build on their CPS/mobile service (“TalkTalk”). Having a triple-play service with “Carphone” in title is a bit silly when talking IPTV, but assuming they

don't go straight in for the kill, a simple suite of services collated in a branded portal that enabled you, say, listen to your voicemail and get caller display through your TV, view your bill, send messages and easily change basic settings would be a great enhancement to the brand.

ScreenSelect On-Demand

The consumer brand from the online DVD rental drop shippers, Video Island, has a strong following and has become a force to be reckoned with in the home entertainment subscription market. The obvious choice for them would be to create their own ISP-neutral, branded wall garden VoD service that could be pre-installed on multiple IPTV platforms offered by ISPs. You should ultimately be able to watch any of the 35,000 titles they currently offer, all on-demand over your broadband connection with full DVD features (menus, chapters, special features etc). If a title isn't available on demand, it could be supplied to you as a PC download or via traditional post.

Ladbrokes Interactive

As of the most tech-savvy and forward-thinking companies, Ladbrokes could have a ball with IPTV, as they have the richness of the Sky video platform with the interactivity of the web at their fingertips. Almost everything is in place already, so content simply needs to be adapted for the new environment. Every set-top box can now become a player in a multiplayer game, and every person in the living room can enter their details to compete against each other. Virtual racing, real-time event, information, account status and beautiful multimedia integration are just some of the features they could put together to produce a truly personalised betting platform.

Odeon Home Cinema

Despite having a booking service on Sky Active and an incredibly strong brand in the outside world, Odeon have still to take advantage of the amazing possibilities open to them with IPTV platform technology. The most immediate example would be a pay-per-view (PPV) home cinema service to fight off the competition from video on-demand. A service similar to Sky Box Office that brought scheduled broadcasts (e.g. a movie starting every hour) of the latest movies into people's homes with the Odeon brand stamp on it would be extremely compelling. Assuming they

were able to secure an extension to their current rights for a new pay TV window, the video would need to be sent as IP multicast and heavily secured with both CA encryption and analogue copy protection.

118 118 TV Adventure

The immediate idea that comes to mind when thinking directory enquiries is a simple service to get number look-ups through your TV, but we shouldn't just stop there. IPTV gives us a much richer environment to work in, and can enable a more compelling experience by including video. A very enjoyable way to use the service would be to build TV programming around the action of searching, for example providing custom video clips on-demand as feedback on a viewer's actions. 118 has a fun brand that could use its characters to great effect, and also charge each look-up to the viewer's monthly bill.

RightMove Home Preview

As one of the biggest property brands in the UK, RightMove could easily adapt their existing data for IPTV, and offer it as an additional sales platform for customers to advertise their properties. The difference between a web storefront and an IPTV application is a considerably simplified interface and powerful, rich, real-time video. RightMove and their partners should provide interactive video footage and 'virtual tours' of homes that can be viewed on-demand from the comfort of the couch. Viewers should be able to look around every room in detail and what and where they look should be recorded and fed back to the company for improving their presentations.

Snappy Snaps TV Collection Point

Most digital camera on the market save digital photos in the JPEG format, which is perfect for viewing on the web or through an IPTV browser, but a lot of people are also still using analogue. Snappy Snaps could provide a software application that could be launched from a viewer's EPG that firstly sends you a message when your photos were ready to be collected, and then allowed you to browse the developed sets on your TV as a slideshow or gallery. You should then be able to send them to your phone or email, or share them with others, or pay for them to be delivered in the post the next day.

Plus.Net Digital Home

ISPs should not just be 'triple play' providers like the cable companies, but follow Homechoice's lead as an industry that provides a "digital home network". Simple connectivity is the core product, but as margins suffer and the industry looks toward added-value products that ensure loyalty, such as routers, set-top boxes, content portals and IP telephony, the focus is on what can be done with the connection. PlusNet should immediately build and deploy a branded Freeview PVR with IPTV capability built in to land-grab. The backhaul network should be partitioned into voice, video and data traffic sectors and a home wiring division should be set up with all homes being required to adhere to a common setup (same router, QoS settings etc).

IMDB VoD-Plus

As any movie buff knows, IMDB is a killer app all on its own. What it should be doing is actually what any other entertainment information supplier should be doing – opening up their database via an XML API/interface third party developers to use on either a monthly subscription, or per-transaction basis. Whenever a VoD movie or known personality is displayed in video (e.g. on a DVD-style menu), an IMDB application should be available to select to show all the details about it, rather than just a lame 2-line EPG summary. Naturally an information panel on that kind would need to be well designed and relatively discrete as not to take up too much screen space.

South West Trains TV2Go

Anyone who has travelled on a train cross country on the UK can testify to how boring it is, especially when considered in comparison to flying. SWT (with National Rail) should provide a personalised train enquiries IPTV service similar to its web cousin which could optionally charge nano-payment for transactions and remember previous routes and destinations. IPTV and VoD for laptop users (and possibly mobile, PDA and console owners) should also be offered via an Ethernet port on all SWT lines as part of the wi-fi access package, with local content storage if necessary.

Electronic Arts Power Network

EA are the largest games publisher in the world, and have an amazingly exciting opportunity in front of them with IPTV. Video games are just that – they generate video, which can be understood and displayed on a set-top box in exactly the same way as normal TV or video on-demand. EA should partner with both G-Cluster and T5 Labs to provide all their titles on-demand across multiple IPTV platforms worldwide. These companies' technology allows you to pay-per-play full resolution multiplayer games across the network without the need for a games console like the PlayStation or Xbox. All of the processing is done at the back-office level, and fun by-products are zero distribution cost and zero possibility for piracy.

Channel 4 Worldwide

As a broadcaster and publisher, Channel 4 need to be directly involved in both live IPTV and Video On-Demand. All existing channels should be encoded live at source into several MPEG-4 formats and distributed in the clear (i.e. no encryption) as IP multicast streams to every IPTV platform worldwide as pay-per-view via a tier-1 backbone carrier. Every show, episode, series and advert should be digitised and catalogued for storage in a data centre for on-demand viewing. Every viewer on every platform should be able to access anything shown on Channel 4 in the last 30 days in return for both nano and micro-payment added to the monthly bill. Channel 4 should retain rights in this 30 days window, and afterwards revert them back to the production house – which could then choose to let the broadcaster do the storage in return for a revenue share, or take the material back completely for later access on their own system.

Shelter Vision

IPTV makes great sense for charities, as it's cheap and gives them international reach. Shelter should have a live IPTV channel for each one of its campaigns, featuring what they are campaigning for and the results of what they've done in the past. They should include video clips of individual people and offer ways to donate, for example a repeated daily micro-payment on your monthly service bill. They could also offer an application that detailed your donations so far and what they have been used for.

Jamster**TV****Store**

After “*Crazy Frog*”, there aren’t too many people who will probably choose to provide Jamster with new ways to bring us more of the same. They should create a branded walled garden storefront that can be accessed across multiple IPTV platforms, that allows viewers to browse and preview ringtones. They should then be able to be bought via IPTV micropayment or premium SMS, and sent directly to the viewer’s mobile phone. Jamster should then expand into providing interactive IPTV accessories such as start screens, EPG skins, winks, backgrounds, pictures, icons and more, paid for in the same way.

EMI Music On-Demand

The ground has already been broken for the music industry when it comes to electronic media on-demand. Apple’s iTunes has been a runaway success, as has Homechoice’s music video playlisting service. EMI should immediately digitise everything in their archive without delay and catalogue it for use within third party software applications. They should attack IPTV with full force, providing music videos for playlisting and viewing through all operator’s platforms as well as live back-to-back TV channels for individual artists and genres, charging nano-payments for access and viewing. Recommendation systems should be built that help bring new artists to people’s living rooms, and viewers should be able to get all services on every device they choose to access it on.

Starbucks CoffeeRun

One definitely for the office more than the home. Assuming a postcode was either provided or pre-supplied in a viewer’s IPTV set-top box, a simple Starbucks application should allow you to locate your nearest branch on a map, “bookmark” it for when and if you use the application again, and send your order in for a pickup within 45mins. The final price of your order could then be queued against your monthly service bill in case you don’t show up.

Clubwizard TV

The first and the best, Clubwizard is the UK’s leading nightlife brand that pioneered photo galleries of club nights, electronic guestlisting and using new media to build nightlife communities. Aside from being easily able to repurpose their existing web content, photos from club nights can very

easily be displayed and ordered on a TV screen, and are video clips from the night before. Viewers should be able to choose a venue for their night by looking through past video footage of clubs, book guestlists with their remote control and watch what happened last night on their TV, the morning after.

Fremantle Digital Media Library

As one of the biggest TV production companies in Europe (with RTL as their parent), the market is looking at Fremantle to provide a lead when it comes to IPTV. They should immediately digitise every single piece of video footage they have archived for use both in their workflow system and on-demand access. This digital catalogue based in their data centre should then be made available to ISPs, broadcasters and viewers directly for inclusion in any IPTV system worldwide. The material should be able to be packaged, linked into series', available in different languages and cost a very small platform micro-payment to watch (unless part of a monthly allowance or flat fee).

Early Learning TV PlayCentre

It's easy to forget about kids, but how they love interactive systems like TV. ELC is a large and trusted children's brand that could offer a range of children's programming on-demand from various providers, such as CBeebies, Jetix and Nickelodeon. In addition to this, it's all going to be about crazy colours and personalised games. IPTV systems are highly advanced and offer significantly more powerful graphics and interaction than NTL, Freeview and Sky. ELC could offer literally thousands of child-safe pay-per-play games that are based on simple concepts for kids to enjoy whenever they wanted. Parents could implicitly set rules and maximum account charges (with top-up functionality) for peace of mind.

Tate Virtual Galleries

Art and technology mix in very bizarre and mysterious ways, sometimes with similar aims, sometimes without any common ground whatsoever. In return for a reasonable micropayment, the Tate should be able to give personalised guided virtual tours around their galleries (complete with presenter narrating) and offer merchandise directly for sale through their storefront. Viewers should be able to pause footage to discuss and get

additional information on their screen, bookmark clips for later viewing and explore exhibits in further detail (i.e. closer picture, 3D viewing etc).

Dixons

While they may not provide their own TV platform or software services on anyone else's, most people on the high street look to Dixons for the latest deals on electronic hardware and information on what kinds of TV packages they can get. The store chain would do well to install itself as a place where people can choose from a range of different IPTV services provided by a range of ISPs who operate in the area the store is based. You should be able to buy a "Freeview Plus"-style package off the shelf just as you would a Sky+ subscription. Visitors should be able to migrate from one ISP's IPTV service to another, upgrade their existing set-top box or remote, take advantage of special offers redeem loyalty points and upgrade their account for new services.

DirectGov

The government should build an IPTV portal application similar to that on Sky, but accessible from any UK IPTV platform offered by any ISP or telco. Information presented as text should be removed and replaced with interactive graphics and video, along with the option to personalise areas which are relevant for that particular household. Government agencies should also use IPTV systems in their agency branches (e.g. JobCentre Plus, UKPA, CAB, NHS) for traditional paperwork operations that can link up to home services, such as filling out forms and receiving notifications.

Playboy Interactive TV

Being one of the softer providers of adult material, Playboy have a great brand that can get anyway with a lot and are very, very hot about IPTV. Porn companies led the way for both premium rate telephony and e-commerce, and where they go in this industry is where we should all follow. If there are ways to make money we may have missed, they will find them. The scope for personalised applications and content is huge – hundreds of live pay-per-view IPTV channels, thousands of hours of pay-per-view video footage, integration with premium rate telephony (SMS and IVR) and software applications that allow the viewer to enjoy their

content in new and innovative ways (e.g. zooming in on pictures, live interaction with girls etc).

Any other brand could use one or more of these suggestions for their own IPTV service. These are just some of the ideas that have been brought up in one of many conversations, and each only took a few minutes to think of. There will many great concepts that have been missed, and some may be difficult (or even unrealistic) in practice.

The point here is to show that IPTV does offer a differentiated platform for a whole host of next-generation entertainment that is easily within our reach. What you can't do on Sky, Freeview or NTL, you can do with IPTV, provided the platform itself is open and innovation-ready. Brands that wouldn't think of providing these types of services normally have a whole world of opportunities and new revenue streams available to them.

the hare & the tortoise

The power of television is undeniable. When gorillas were first introduced to Longleat Zoo's Gorilla Island and had to be quarantined and initially segregated from each other, the wardens came up with the rather smart idea of building TVs in their enclosures to keep them occupied. The gorillas loved it so much that when they came to take it away, they protested and sulked so violently that they were forced to put them back in. Now their living quarters come with Sky Digital satellite dishes fixed to the roof. According to the zoo officials, they are particularly fond of Spongebob Squarepants and other children's programs.

What happens in nature is often a fantastic yardstick for our own technological evolution. We are all subject to natural law and develop in the way everything else does, albeit on a slightly more advanced style and pace with all the tools that help us build bigger and better tools. Digital media is an art as much as it is a science, and it subscribes to the same principles that every other business does, especially the traditional precedents it takes it lead from.

A long time ago around 300BC, Aesop, a Greek slave and storyteller, wrote a famous fable entitled "*The Tortoise And The Hare*" that we are all taught in school as an impervious wisdom of the danger of becoming complacent and how slow and steady always wins the race. In the fable, the hare is so convinced he is faster than the tortoise that he rests and falls asleep under a tree. By the time he woke up, the tortoise had already crossed the finishing line by simply plodding along at his own speed. The hare lost the race because of his arrogance and assumptive thinking.

Spend a few days flirting with either the content owning community or technology vendors and one theme strongly shines through – their consistent belief that the market for IPTV and video on-demand is so nascent that it is virtually non-existent. Consumers aren't ready for next-generation entertainment and don't understand it, they say. They are happy with what they have and are overwhelmed with choice, the story goes. These are the same sages who make up the digital distribution

teams in major studios that sell pay-per-view video on-demand but have never had a broadband connection in their home, preferring 56k dial-up.

How very, very wrong they are.

The average consumer is way ahead of any industry professional out there today. They are crying out for content, and the technology that powers it. So much, in fact, that they have already gone ahead and done it themselves without being marketed to. Unfortunately we are all being held up by the weakest link in the chain.

The secret is that the market is there, as is the content and the technology, but the delivery network to get it to them isn't.

The chances are that if you did an anecdotal survey amongst the people you know, its almost certain that they will have build some kind of video on-demand network in their home, however basic. Naturally the percentage will be much higher in the early adopting 24-35 year old male demographic, but it also extends to the middle-aged and older audiences, and across genders. Its very easy to understand why they've gone ahead and moved up a gear from daisy-chaining VHS players to watch digital video content – they are illegally downloading TV and movies over the Internet using programs like BitTorrent and want to watch them on their normal living room TV rather than the computer.

This leap of getting content from the PC to a normal TV is colloquially called the "air gap" in industry vernacular. It's an obvious and predictable transition, but a very hard one to make. The problem is generally with the location of their broadband router, which is typically in the study, hall or in a room that is nowhere near the TV. You can't use Ethernet cabling because it's too messy, you can't use coaxial or copper cabling as drilling holes in walls is too time-consuming, and you can't use wireless as its too unreliable for video.

The answer to home networking for video is powerline communication (PLC) or Ethernet over home electric cabling, which needs no install and can provide up to 200Mbps IP connectivity in any power socket in the home. Companies like Devolo (HomePlug), Corinex (DS2) and Netgem now have their products in high street stores and consumers are slowly realising their usefulness. The way to get your iPod to play on your car stereo when you only have an old cassette player is similar – buy an FM

broadcasting device for the headphone socket and tune into the signal on the car radio.

At where we are now, consumers have a massive collection of electronic hardware doing a million different tasks. They are flooded with gadgetry that fills their shelves and doesn't quite seem to do everything they want. A typically forward-thinking home has an HD-ready plasma/LCD TV, a digital TV set-top box (often with PVR or recording capability, like Sky+ or Freeview Playback), a DVD player and/or recorder, a games console (e.g. Xbox 360), 3-4 PCs and increasingly a network media player such as Apple's iTV or D-Link's streamer ranger. It's getting chaotic. The proliferation of these devices is direct evidence that the electronics industry sees the demand for digital media in the home.

This pile of silver boxes the bane of most girlfriends' or wives' lives, and is leading to a wave of consolidation. If Sky added Ethernet connectivity to their HD set-top boxes that allowed access to digital content over the local home network, that is to say doubled as a network media player, their dominance would be complete. The most frequent question amongst subscribers surveyed is why they can't use the Sky+ box to stream the music, TV and movies they've downloaded onto their PCs from the Internet onto their living room TV. Nobody wants the hassle of ripping DVDs, re-encoding video files or burning their own discs.

Setting up a basic video on-demand network at home isn't easy, and it's not made any easier by the fact that there are very places to go for help, or any companies that provide engineers that will come to your home to do the wiring for you. Ironically these companies don't exist as the perception is that the market is not there to justify their launch. Setting up that network is also very costly. At the least, a pack of PLC adaptors are needed, as is an IP device to show the media on the plasma TV screen (i.e. a set-top box or media player).

The first incarnation of the home video network was arguably the first generation Xbox that could be "mod-chipped" to allow a 3rd party program called the "Xbox Media Center" to run on it instead of the normal Xbox operating systems. Computer nerds immediately realised that it was simply a computer with hard drive embedded into it; hence it could run Linux, read video files from a disc in its DVD drive and stream out TV through its Ethernet connection. Mod your Xbox, add the Media

Center software and the movies you downloaded would play on your normal TV.

The next-generation Xbox 360 took advantage of this and added the capability to behave as a media player and stream files from shared network folders on PCs built-in from the beginning. The catch was that the only material that could be streamed had to be encoded using the Windows Media system. Each proprietary media player product that has been brought out has its own idiosyncrasies that affect its reliability and attractiveness.

Luckily there is an answer to the problem of certain devices not being able to read certain types of files or decode video created in different formats. The open-source media server TVersity is an act of genius. Install TVersity onto your PC, and you can immediately watch all the content on your PC hard drive through a web browser anywhere in the world. Put a media player connected to the TV screen on the network and TVersity connects to it perfectly. But the genius is TVersity's use of the open-source FFmpeg library to transcode any audio or video format on the fly to any other. Your xVid file is converted into Window Media video in real-time for the Xbox to pump out onto the TV. If your D-Link judders and jitters when it tries to play back H.264 content, just use TVersity to transcode it into MPEG-1, which it displays perfectly.

To get a home video network up and running in 20 minutes is easy. Buy an external USB hard drive to put your movies and music on, connect it to a PC in the study, and share it out as a network drive. Buy a PLC starter kit and connect the first electric plug to your home router, and the second into a plug by your TV. Buy a media player of some kind (D-Link, Philips, Netgear, Xbox etc) and connect it to the second PLC plug's Ethernet connection in the lounge. Install TVersity on your media server PC and tweak it to play out the right way for your media player over the power cabling. 19 minutes later, you have a home video on-demand network.

Install one of these, and you'll be amazed at just how excited people are when they see what it can do. It's about as compelling as it gets. The message is simple, yet profound. Your customers are going ahead and doing it anyway, even when there's no content for them to buy.

But that still leaves the massive collection of DVD packaging on the shelf. We all know discs will become irrelevant as times goes on and Bill Gates has predicted. Media will be streamed across the network, not from a physical product. Consumers want to be able to backup their DVD collection onto a hard drive (complete with menus, subtitling, featurettes etc), but crucially, they want to be able to burn it back onto a disc again later if they need to. Research has consistently shown that reproducing the DVD experience over a network increases video on-demand take-up by more than 40%. Network DVD is a familiar “bridge” to video on-demand that makes it easier to adopt and be perceived as great value for money.

Again this touches on another difficult problem, the one of consumers wanting the physical packaging and a sense of ownership of a product. CD artwork is especially pertinent as its part of an artist’s work and it cannot be reproduced easily on a PC. Apple’s CoverFlow application does a good job with its 3D representation of a CD and its artwork, but like books, CDs need to be held in the hand. Many smaller independent labels and artists are supplying the artwork with music downloads so consumers can take the PDF file down to the local printers and ask them to produce a top-quality copy of the physical product on-demand at their own cost.

But all of this is relatively pointless when we consider the whole point is about sending content down a broadband circuit into someone’s home. Professional video on-demand networks do work when the conditions of the network are right, and they work very well indeed. Most services are contended around a 20:1 ratio, and tend to be live in real-time with response times less than 100ms. More advanced video compression may save bandwidth, but it has its price in that the decoding hardware needs a much faster processor to provide a smooth playback experience.

The truth is that in the UK, the copper ATM network just isn’t capable of streaming media properly to a TV screen, unless it’s provided as part of an unbundled telecoms platform. We are massively behind other civilised economies despite having the most advanced TV platforms and audience in the world. So-called “Max” broadband is anything but. We cannot do live, real-time video delivery and won’t be able to for a long time. Even when we can technically-speaking, the economics will still prove too

prohibitive. Usage-based tariffs are totally opposite to what is needed for video. Regional fiber connectivity pricing to exchanges is frankly, absurd.

What we can do though is push video content progressively “over the top” or through a private ISP circuit onto some form of hard disk storage, like a PVR, media player or desktop PC for playback later. The trouble is the vast majority of IPTV set-top box devices out there as we speak have been built for deployment in countries where real-time streaming is possible and already been in effect for years. Offering a TV guide based on XML data and HTML menus is easy with an in-built browser making requests to a web server somewhere. Getting 1GB video files down the line takes a lot more, even when you can cache the most popular material at the BT exchange at the cost of co-location fees.

Until capacity increases and the BT network becomes viable for delivering video, we will have to produce set-top boxes that progressively download DVD-quality media over the Internet that we have to wait for. As most “live” streamed Internet TV now uses Flash Video, set-top box vendors need to integrate the Flash codecs onto silicon to allow us to suck download material from Google Video and YouTube for offline viewing. Centralised playlists built using XML and stored on the Internet to be edited and managed through a web browser are also a compelling feature that again broaches the divide between the PC and the TV.

Naturally downloading video content “over the top” doesn’t solve the issue of ISPs footing the bill for content distribution. Net neutrality may very well just be coming to an end unless content providers contribute to the bandwidth costs their products generate. All we need to know for now is that the audience is there and there is significant demand. We have been too caught up in the guessing game of whether consumers will take what we give them digitally to focus on the true problems, like how on earth we get the material to them without making them want to throw the TV out of the window.

Digital media is all about one thing, and almost only one thing – portability. MP3 files can be transported anywhere, and devices like iPods, Walkman phones and USB thumb drives mean your music can go with you wherever you are. Its now the turn of video, although it has bigger requirements due to its size and complexity. Wherever there is a screen on an IP-connected device, there can be IPTV. DRM in itself is

pointless for lots of reasons but the reason its desperate commercial suicide is that it negates the most powerful selling point of digital material – its portability.

Consumers want to take their media with them wherever they go, and to share the things they have heard and watched that they enjoyed and are passionate about. The world is screaming out for the content industry to provide for it. We need to be able to play our media anywhere, and we're willing to pay for it if we get what we want. And the first law of business is give the customer what they want. Because of that portability, the rights to access the digital content after we've obtained it need to be attached to an individual person, not a territory or some rights window controlled by a big media broadcaster.

P2P has created the market of distribution, whether we like it or not, and whether we choose to acknowledge it or not. The catch is that market is now becoming disintermediated by the stampede of high street customers now wanting to buy directly from content owners instead of their middlemen. It has no distributor or agent with a stranglehold they can wield to monopolise their industry. Naturally there are vested interests from those who are threatened, from the likes of high street retailers and broadcasters who traditionally buy it on our behalf and decide when we can watch it. Niche is the new mainstream when it comes to a globalised audience.

Consumers also desperately want back catalogue "long tail" content, and for simple reasons. They cherish memories, they are curious and the big production names don't necessarily distribute material that appeals to their individual niche tastes. Yes, they want the latest movies, but they are more compelled by the all-you-can-eat buffet of digital archives and enjoy getting lost in them. The trick is how to give them the choice of hundreds of thousands of hours of it so they can find their way easily and not feel totally overwhelmed.

The hare in Aesop's fable is an industry thinking it is way ahead of a tortoise consumer simply because it goes to trade shows and reads market research reports about future technology. Content owners, technology vendors and network owners need to face their fears, their commercial barriers and study the way customers consume. The high street customer isn't dumb, and is already miles ahead. But not because

of technical understanding – because of the need to work out problems in the home that should be simple and common sense. The boat's already left, and hardly anyone who wants to be on it has actually boarded. You either listen to your own customers or they speak to you by voting with their feet.

the alex cameron interview

Alex Cameron is the 26-year old managing director of IPTV start-up, Digital TX Ltd. Renowned for his irreverent style and his passion as a technology visionary, Alex regularly advises some of the biggest names in the entertainment business and is regarded as an authority in his field by his contemporaries.

1. What is Digital TX all about?

Well for the benefit of those that are unaware, “TX” is industry vernacular for “transmission”. When I first set Digital TX up just over a year ago, the company was focused very heavily on providing technology for TV broadcasters, whereas now we have broadened considerably. Digital TX aims to bridge the worlds of broadcast, IT, telecoms and the internet – all speak different languages, but need to talk with each other to exploit some of the amazing opportunities convergence between them will bring. Fundamentally, Digital TX is a consultancy that helps ISPs, telcos and content rightsholders with developing and delivering both the technical and commercial aspects of new entertainment services. My vision is one of a world where I’m always online, and can take my entertainment with me wherever I go. As it says on the website – the objective is personalised entertainment on-demand, anytime, anywhere, on any device.

However, we are currently fundraising for a unique venture that we believe will elegantly solve the inherent problems for ISPs looking to offer entertainment services, typically part of the infamous ‘triple play’. We will be able to offer network owners a safer ‘white label’ wholesale IPTV service, content owners a dynamic marketplace in which they can store and trade their intellectual property and have multi-gigabit connectivity between over 200 countries when we launch. These are exciting times for me personally and for all those working with us, as the service offering is highly compelling and enormously powerful. I would love to bore you silly with a few hours of how much I love the whole thing and how it all works, but for obvious reasons I can’t go into details just yet.

2. What's needed, in terms of infrastructure (network and household), to support IPTV?

Ok that question has quite a long answer! I think it would helpful if we define what IPTV is, as it's an all-encompassing buzzword that's being bandied about by market analysts everywhere and VCs just seem to be throwing money at anyone who even mentions it. I've heard the term 'new dotcom' spreading from several different influential people in the last week, which is a deep concern. IPTV is an umbrella term for video delivered using internet transport technology, as opposed to more traditional methods such as RF/UHF – 'internet protocol television'. That can mean streaming video on the internet, multicast services such as the BBC's Olympics applications, hotel hospitality systems or mainly as a complete substitute and competitor to the likes of Sky Digital and Freeview. HomeChoice or KIT is what I would call 'true' IPTV. It's very important to make the point that we are absolutely not talking 'TV on your PC' or 'Internet on your TV'.

Let's sweep across the whole delivery chain of DSL broadband service provider with their own LLU network, starting from the point of origination (the transmission centre, or 'head-end') and talk through it until we get to the living room, where we plug in the CPE ('customer premises equipment'). The first thing to realise is that although we use the ISP infrastructure, at no point do we break out onto the public internet – the whole network chain for IPTV only reaches to the ISP network, which is the minimum number of hops away from your front door. That infrastructure is effectively a routing platform for the broadband signal, the connection being part of the BT loop until it breaks out onto the ISP backhaul at the local exchange, and then making its way onto the wider internet through the ISP's internet connection. For this purposes of brevity, I'm going to assume that we have our head-end set-up and ready to serve up TV and movies on-demand.

Most, if not all internet transport is unicast, which is one-to-one -each person gets a personalised copy of the content they request. Live, real-time IPTV cannot be delivered this way and must be delivered using multicast technology, which is similar in nature to broadcast in that only one copy of the stream is pumped out onto the network. Multicast isn't yet available on BT Wholesale's network until the completion of the

21CN upgrade project in 2009, which is why the only providers who will be able to offer it are those who have installed their own equipment in BT exchanges (LLU). The data being sent through the ISPs network must then be traffic-shaped to provide quality of service (QoS) as people don't react too favourably when their TV picture breaks up. This tends to take the form of creating virtual 'partitions' or 'channels' for voice, video and data streams using a mixture of ATM and IP technologies that need to be mirrored in a subscriber's router. This isn't available on BT Wholesale's network either, so ISPs looking to provide content on-demand need to do as much as they can to prioritise traffic at their end, as when it goes into the BT network cloud it is virtually in the hands of fate. They also have to make the best they can out of intelligent 'best effort' delivery mechanisms, such as push/pull VoD.

Backhaul networks tend to consist of core fiber-optic 'rings' that have local nodes, called PoPs (points of presence) that connect the main ISP network to BT exchanges. The network also needs to be architected to scale and cope with potential traffic problems such as surges in demand. A variety of technologies can be used for this, like load-balancing and caching. Inside the exchange, the critical bottleneck point is the DSLAM, which connects each individual phone line to the backhaul network as a unicast connection point. Once we travel down the line to the green street cabinet, we are into the 'sub-loop' and at the front door of your home.

Triple play is usually only available with stable connection speeds of 4Mbits and over, simply as it's just too risky to do it in any less – in fact, a lot of providers are still concerned about using normal network cable, which gives you 100Mbits to play with! A lot of people will sell the hype that DVD-quality video can be done on a 1Mbit connection, but all it will show you is that they clearly haven't done it in practice. A typical QoS set-up is to divide the home connection into an uninterruptible 2.5Mbit/s for real-time video in standard definition (most of the newer MPEG-4 technology can faithfully reproduce DVD-quality at this minimum bitrate and HD at around 8Mbit/s), 256Kbit/s for voice and the rest for ordinary internet data.

When the video signal comes into the home, it needs to be processed through a router or 'home gateway' and display on the TV through a set-

top box, just like any other TV platform. The problem for providers here is the enormous range of devices that are used for managing the connection – differing models from Netgear, Linksys, Belkin and more that all implement their functionality differently. There is no standard way to configure them all, which means an engineer visit ('truckroll'), or specifying only one or two standard models of use with the service. The next issue is how to connect the set-top box to the router when they are in different rooms, as wi-fi is completely inadequate for using on a PC, let alone on a TV. The easiest way to solve this problem without wiring some form of cable into every wall is to use a high-speed HomePlug technology (85/200Mbit/s), which distributes the broadband connection through existing home electricity cabling to a plugboard behind the TV set or any other plug socket in the house. Unfortunately Ofcom hasn't got round to licensing it for use in the UK, despite the obvious demand and commercial requirement for it. The IP set-top box itself is usually a more powerful animal than the typical calculator-strength Digibox, as it needs the wallop to crunch heavily compressed video, connect external devices and run HTML-based software. This can be a £50 'thin client' box, a PVR like Sky+ or a sledgehammer solution like Windows Media Center, all of which can be hybrids of IPTV and normal Free-to-air systems, such as Freeview.

3. It reminds me of the roll-out of 3G, only without the extortionate licence fees. Or have I jumped the gun on that one?

I don't think you have, as there is always plenty of time for prohibitive regulation and the pace of technology to eclipse the capital investment available to sustain it yet. The hype is certainly similar! The biggest difference is that we're deploying on top of an existing infrastructure that mandates open standards wherever possible, and is friendly to other IP-based systems. We have no real spectrum issues other than those that the broadband and electronics industries have as a whole, such as the national frequency plan or consumer safety guidelines. IPTV is potentially open to so many different people, not just the carrier networks. The mobile carriers incur huge costs for the maintenance of their networks and are continually having to disrupt their own established models with new technologies such as DVB-H that take their customers longer to master than it does for the technology to stay still. They also have the disadvantage of having to use proprietary vendor equipment. But then

again, they have a fundamentally different business model (driven mainly by business use) and charge for every single thing that you do as a subscriber.

Killing the industry off with over-regulation before it's even got off the starting blocks is a great fear of many people, as the UK is so ban-friendly right now. Naturally you need safeguards in place, and need to have order and structure, but you can get the feeling that people are so wrapped up in the possibilities that you get totally lost on what truly needs to be managed. Although I'm not too worried when you see how totally clueless Ofcom and its advisers seem to be when it comes to gazing into the proverbial crystal ball. The very nature of IP-based systems means they are independent of geography and what we know as a television 'channel' is changing, so that poses some difficult questions about how all these things will work on paper in the coming years. Apparently the basic idea is to develop an EU-wide framework that all countries can then extend as and when necessary to meet their own ends. Monica Arino is doing some fascinating work in this area which I'd urge anyone curious to look at. The guys I feel sorry for are those looking to use WiMax as they have it quite rough, and will continue to until their industry sector and those who it depends on get their finger out.

4. So how far away is internet TV (IPTV)? How long before we see beta trials / early adopters / critical mass?

Fairly soon I think. As I've often argued, the UK is a very different market to any other in the world. We're geographically dense, both our TV and broadband markets are extremely crowded and many of the existing brands are so heavily dug in that the barriers to entry are very high. It's very easy to be a tech-head and make the mistake of expecting consumers to pick up new gadgets and services as the same speed as the people in the industry do (an insular type of thinking that's caused no end of problems for the music, TV and movie worlds), but change always takes longer than we think it does. The catalyst for all these bandwidth-intensive services will be the adoption of very high speed connections, such as ADSL2+ and VDSL2. As we're starting to deploy them now, along with VoIP/CPS, it will take at least 6 months for them to bed down before we will see noticeable demand for video-centric services.

So by my estimates, that's the tail end of 2006. If you want to see them now, order HomeChoice or take a trip to Hull to see KIT in action.

I've gone on record to say that I see 2 distinct ways for UK ISPs to get to market as carriers (note that they should not be considering being publishers or channels), and they are a) build their own platform like HomeChoice, and b) re-brand Freeview/FreeSat and add an interactive back-channel. The 3 big deployments we will see in the next 18 months will be BT's 'Freeview Plus', Sky's triple play and Wanadoo's inevitable response to the others. Wanadoo is extremely interesting as France Telecom could pull off an incredible out-flanking of the others if they included their mobile network in the proposition – I see that as their winning stroke. In all honesty, I don't quite understand why we haven't seen ISP already giving out Freeview boxes with their branding, as it's an obvious land-grab and quite simple to execute.

Rolling out these services takes a lot of time as they require a considerable capital investment and rely on relationships with content owners and technology vendors. The traditional economics only work with scale, where you have enough subscribers to justify the investment made in your infrastructure and content rights. I don't believe that model will enable anyone but the top 5 ISPs to roll out IPTV services that resemble any of the main platforms and deny us any way of achieving critical mass as we have known it before. Normally that wouldn't matter much, but the stakes are much, much higher here. I believe that the future is in an aggregated audience – one made from many splintered networks, possibly divided by the niche of content they serve. The fundamental question ISPs are asking is what they can offer that someone couldn't get from Freeview and/or Sky already. If they're not turning up much, then it's not because there's nothing there, but that they have a lack of imagination.

5. And what are the major opportunities, for content owners?

I can express enough how excited I am about the possibilities that IPTV and its integration with other IP-based services will offer. I believe that if we tread carefully and get it right, in time the change will be dramatic enough for us to realise that we would have moved into a new world of entertainment and communication unsurpassed in human history – one where geography, electronics and schedules don't apply any more. There

are more opportunities than we could ever take advantage of, and more than enough to go around. An open infrastructure based on IP will mean the end of physical media, and an unprecedented level of innovation. We have interactive video, media on-demand, immersive 3d video gaming, voice/VoIP & telephony services, mobile connectivity, web services & applications, ultimate personalisation and so much more. All of them can talk to each other and share functionality. Where do you start? Probably by trying to work out what is BS, as all with all things, the consumption of content is subject to common sense. Just because I can record 3 channels at once doesn't mean I'm actually going to. Your little shockwave movie isn't suddenly going to be the best thing in the world just because your friends can watch it at home on their TV.

It's very easy to get scared of all this change, but if the operators work together with the content owners as we are so desperately asking them to, there is no reason we can't move very fast indeed and create some amazing entertainment services. The immediate opportunity is from exploiting the basic economics of digital distribution and helping consumers to find your media and consume it. Digital means faithful, high-quality reproduction and negligible (if any) physical distribution costs. In my eyes, it's a virtual licence to print money for content owners. Using the network just makes so much sense, as Apple has shown with iTunes. Music downloads were the nemesis of the music industry, but lo and behold they are now the saviour of it. What we are effectively doing is trading physical production costs for the cost of bandwidth, which is rapidly become a commodity. But higher profit margins come with conditions. Shoppers aren't stupid, and won't stomach paying the same for a download that they do for physical media – you need to pass on those savings, if only initially.

One of the greatest opportunities is in licensing back catalogue items that are no longer commercially available – people are screaming out for it. If you ask whether they'd like to have greater choice over what they watch and the power to watch it when they want, the overwhelming majority will be very interested. And they'll be more interested in that crappy B-movie from 1984 than just having the latest 10 blockbuster movies. More and more rightsholders are telling me how they are seeing the 'long tail' behaviour model in their sales analysis and want to take advantage of it (the 'long tail' is a term coined by Wired magazine to

describe the shape of an area graph detailing sales & popularity of niche content) . This of course has a cost in the form of undertaking the long and tedious process of digitising enormous tape-based media archives that most production houses have, which is no easy task when you consider multiple formats, meta-information and encryption. The challenge we face is to help the rightsholders build sustainable business models that viewers will respond to with relish. Everything's out on the table right now – everyone can get involved and brainstorm.

Another opportunity I share with my colleagues at BT Mediahive is the potential for 'democratisation' of content. The internet has become the great equaliser, where all-comers can be as powerful as the largest brands as well as a form of communication that can foster social good. I believe IPTV has the potential to do the same for media if nurtured correctly. Niche content is a powerful force that can help to attract and sustain highly-specialised demographic audiences (Bollywood is a great example), and indeed some are of the opinion that it may be the USP that helps the newer IPTV operators compete against the big boys. With IP-based systems, there is no reason why I shouldn't be able to watch both the latest movies and user-generated content from across the world or different cultures. In fact, the cost-effective nature of digital content can also help to drive its production. Anyone should be able to have a TV channel and offer the results of their creativity instantly to anyone else on the planet.

There are also some interesting possibilities offered by encapsulating digital media in IP-based transport is that we can insert information about what is going on at that moment in time, whether that is musical score, or the co-ordinates, colour and timeline of an object on screen. This allows us to manipulate media in a way never seen before, and interact with it in fascinating new ways. As all these things are based on open standards, we can open up and share these technologies, and allow people to innovate around them to their heart's content. An early example of this is the use of RSS to provide a simple subscription mechanism for published media, such as podcasting.

Personally one of the greatest satisfactions for me would be enjoying the political dissidence from IPTV deal the death blow to the Chinese government. I vote we build a scrambling system that prevents them

from ever being able to understand what is happening in a video stream or its origin. Any technology that screws them is worth building in my book.

6. Presumably the opportunities for ISPs and cable networks are also fairly huge?

Not at huge as you might expect them to be, but there are definitely opportunities if the market is looked at soberly. Just because you can get the free VLC media player to multicast a playlist of movies on your LAN doesn't mean you can run a TV network. But equally just because others have been at the game longer than you doesn't mean nobody else should try if they see a niche.

We are at a crucial juncture now, which has a lot of ISPs scratching their heads in the wake of their international rivals going hell-for-leather with their IPTV projects – many companies are marching blindly towards triple play simply as it's what the rest of the herd are doing. This is due to the UK market being very different than anywhere else, as we mentioned before.

I don't believe ISPs should be publishers, broadcasters or channels – I believe they should be carriers/operators. They should use the BSkyB model where they provide the casing over the building blocks of the TV network (e.g. channels, satellites, viewing cards, set-top boxes etc), but not the channels or infrastructure. I was strongly against Tiscali's move to operate their own online TV channel. In my experience online 'channels' are a total red herring that just help marketing departments to spend their budget and impress their bosses, eventually fading into the ether. You don't watch TV on your PC, whatever Microsoft think. Maybe that will change in future, but not for a few years yet.

7. Telewest / NTL have lots of 'Triple Play' (TV, telephone, internet) customers. That has to be an advantage, right?

Triple-play certainly helps to retain customer loyalty, if that's what you are getting at. The basic appeal is convenience and value. But how appealing will it be when everyone offers it as standard? How many times can you re-package it? I'm interested in what comes afterwards and the opportunities to integrate systems, as the most exciting area in this whole business. The informal economics of triple play dictate that

the symbolic cut off point at which customers start to flee in their droves is around £50. If the telcos and ISPs start offering loss-leading services that massively undercut cable's rates, the crucial factor that determines whether or not they churn will be how difficult it is to transfer. We may need a standardised migration procedure, like is in place for broadband DSL.

If you already have that audience size it can really help in your negotiations for content, as at that point, the rightsholders are relying more on you for their own survival than the other way round. I need to look at cable more as we may be missing a trick here. Almost everyone I have spoken with has written them off due to their ongoing troubles and having the overheads of the nationwide infrastructure. ISPs can offer the same services without the burden of the network. There was talk of NTL trialling ADSL2+ over its own copper while back which seems to have faded into the background noise. Let me suggest an idea to you that is beginning to emerge in Scandinavia – your gas, electric, water, TV, telephone, mobile and internet all from the same provider on one bill every month. Alex Cameron launches home super-company. You heard it here first!

8. And we see that Sky has just acquired Easynet, suggesting that this could be the start of a battle for ownership of 'residential media'? Is Sky trying to make sure that IPTV growth doesn't cannibalise its 7m+ households by positioning itself for a slice of the action?

There will definitely be a battle for residential media, without any doubt – whereas before it was about increasing broadband speeds, now it's about what you can do with the speed and who can monopolise the control of the multimedia services being fed into your home. Sky have been trying to do IPTV for years now, but haven't been able to make it pay properly, even through retailing the channels directly on HomeChoice – it's taken the cable merger and BT's market entry to push them hard enough to notice that everyone is talking triple play, and all the other satellite TV companies started adding 'passthrough' broadband platforms quite a while ago. With new additions in steady decline I can imagine that it would be a very convenient way to provide new customers that they can count as 'subscribers'. From my experience,

News Corp has a particularly aggressive culture that would certainly fit the thinking.

Wherever you go, although they won't admit it, most companies are absolutely terrified of Sky. Personally speaking I don't see why it is warranted, even though they are very good at what they do and have enormous resources. Nobody quite knows whether they are in chaos, or whether all of their activity in the last few months is panic. They have a churning customer base (200 channels of crap and the same movies on loop for 6 months at a time), a looming Ofcom investigation, the arrival of Freesat, shareholder revolt and a £1 billion bond issue. That's only looking at right now – their failures in the past have been catastrophic. They are fighting a war on many fronts, and it is yet to be seen how wide their capacity is to do that in the face of such a challenging marketplace. They also have competition from a reinvigorated cable conglomerate and the incumbent telco, the potential loss of their monopoly on sports coverage, Freeview stealing their subscribers, increasing customer acquisition costs, heavy debt, a relatively inexperienced CEO and the increased costs of mobile TV and HD transmission. Now is not the time to be scared of Sky, now is the time to gather together and rip them apart while they're vulnerable.

But like all business, where you can't compete on price or resources, you compete on service quality and diversity. For all Sky's macho talk, contractual relationships with content providers and bursting wallet, there are many things they cannot compete with the smaller guys on. They are being forced out of their traditional areas away from their core competencies. At first glance, the Easynet acquisition looks logical – they own their own fiber from the Ipsaris days, have a large LLU footprint and are respected in the city. But at a closer look it begins to seem slightly more dissonant, because Easynet is a B2B supplier and its subsidiary only has a few ten thousand customers. Their network needs considerable upgrade investment and Sky's figures keep sporadically changing. The latest quoted them as planning to rollout 1500 exchanges (apparently ~90% of the population) with a £60 million cash injection, despite Cable & Wireless needing to spend 3 times that to do just over half what they plan to. No information has been forthcoming about their plans just yet, which can only mean they are still plotting.

I would have thought Pipex would have been a better bet with their larger consumer base and expanded operational capabilities to be honest. They don't have their LLU infrastructure in place yet, but judging by the speed of other companies it wouldn't take too long to implement. I can completely understand a takeover of Video Networks on the basis that they need to buy in operational expertise, but presumably their financial legacy is too risky and the relationship with Thus might prove to be a sticking point. I'd speculate that we're not going to see anything revolutionary, although I would be happy to be surprised! Their movement into IPTV has shaken a lot of people up and made them take the technology very, very seriously, which can only be a good thing.

9. What about threats? Which sectors will IPTV threaten or force changes upon? I guess the video rental industry is an obvious one...?

A fascinating question that doesn't get asked as much as it needs to. IPTV is by nature a very disruptive technology, commercially and technically. As Steve Griffiths from Breakthru always tells me, disruption tends to upset incumbents more than anyone else and usually develops via a separate ecosystem that eventually becomes part of the status quo. I hope we can shake up the big guys a bit, as their creativity (or lack of it) leaves a lot to be desired. I believe that IPTV (and convergence as a whole) will eventually effect considerable change on many areas of our lives over time.

Blockbuster had some fascinating experience in this area with their KIT experiment, and Video Networks have reported many challenges to their assumptions in regards to how people consumed what they have to offer. I don't think we will see the radical disruption of the market, predicted as an Armageddon of sorts by some people – the change is too great to happen overnight. The normal laws of TV will still apply as viewers are just doing what they have always done with different technology. When you are watching TV, you're not watching movies, and vice versa. We are seeing a lot of changes already about the way we schedule our entertainment consumption that we can learn from – primarily time-shifted viewing and intelligent suggestion mechanisms as personified by Sky+ and TiVo.

The sheer breadth of channels possible with IPTV technology and the choice they represent will place pressure on existing UK broadcasters to

keep their audiences from switching over to more interesting viewing. The possibility of competition with the people who they import their content from (i.e. NBC or HBO in the US) is a very serious one that will need attention as their popularity grows organically. Their response from the incumbents will be to say that the increased choice is increased clutter and does not equate to value. This is where IPTV providers will need to be damned hot on how they help viewers find great entertainment to watch very easily. If only Sky had a facility that said 'delete this channel', I would be much happier about paying for it.

And yes, despite the vested interests the rental business is dead in the water, which is why you will find a lot of online rental companies and larger chains looking at VoD business models in full panic mode. However I don't believe the takeover won't hit critical mass unless VoD providers install technologies that provide the full DVD experience over the network, usually called DVD On-Demand (which we have), for the simple reason that the change to VoD is effectively a step down from the added-value of DVD features and too difficult to make immediately without a bridge. They are soon going to be in the death throes, but their successors have a lot of work to do yet before they can fully replace what is there now.

10. If internet and TV develops into a long-term relationship, there could be some serious benefits for the advertising industry? I'm thinking of targeting, delivery and a response mechanism... That's a fascinating question that I'm very glad you asked as it is often taken for granted. I would love to hear your readers' opinion on this as it's a crucial issue for the success of media on-demand. I've spoken with several media buyers and the consensus so far is the same – that the industry will continue to buy per thousand viewers for some time to come and the ideas about rates put forward so far are unrealistically high. My argument has been that you can use the traditional unspecific, unmeasured carpet-bombing approach (which has been in use for decades) and pay a premium for the numbers or you can have highly targeted, smaller audiences that form a particular niche.

In terms of technology, we have a platform for advertising that is unsurpassed in the history of media. We can tie people to their individual phone line, record every press on the remote and serve each person

different media to their own potential tastes. The 2-way nature of a broadband connection allows for very detailed monitoring of their response to what they see and how they consume it. In practice this means that we can profile individual households and tailor their viewing according to their interests and tastes. My favourite quote about this type of thing is that the average viewing time for adult movies in hotels is around 12mins, and 60% of those views are by women. Life is very, very strange sometimes. I wish I could remember where I read that, but the time being I'll have to accept that I'm a blatant plagiarist!

If you're looking to know exactly where you can advertise on an IPTV service, you can put videos on when the set-top box boots up, on information screens, as a 'screensaver' when the box is idle, a 'buffer' when a movie loads and dynamically in the video streams (similar to typical broadcast TV, but you know who it is you are advertising to). We can also work with manipulating the content of the video so it is personalised to your viewer. We can go flying with this – if you have a Bluetooth adaptor in the set-top box, we can even ring your mobile phone from the other side of the room. But as always, it's about the business case and the commercial application of these toys.

Of course, it goes without saying that this needs oversight to ensure the right to privacy is protected, as we are all too aware of George Orwell's prediction of what the television would be used for and the possibility of running rampant without guidelines. There are many mechanisms we can use for safeguards, including encryption of remote data, opt-in schemes and more. New power comes with new responsibilities.

It is important to remember, however, that vested interests are definitely at work here. Many benefit from not being able to accurately measure the response to advertising and will actively resist new technology as it's a potential threat to their balance sheet. That accuracy can reveal uncomfortable truths, such as a campaign's ineffectiveness as well as its success. The BARB TV statistics have been a joke for years, despite the pleading by ad-exec's that it is representative because it measures 5000 or so households – quite how you can extrapolate to millions of viewers is quite beyond me. Even the latest 'red button' ads play it safe as they can only measure those who used their phone line for more information. The best anyone can come up with is that it is the lesser of two evils. If

you want to know which half of your money was wasted on advertising, now we can tell you.

11. I think one trend will be that internet publishers find themselves increasingly sought after, since niche is working well online, and IPTV providers / networks / operators will want to tap into niche user bases. Won't they?

I can't agree with you more on this, and I suspect that if you ask others in this industry they will open up their arms and invite you in for dinner too. I think this is going to be one of the killer apps of IPTV, provided that we can find ways for viewers to easily find their way around all that content, rather than let them drown in it. As you say, the evidence for this is already compelling, from funny viral videos, offensive shockwave games to political documentaries (I'm actually a total conspiracy nut). The bridge that allows them to cross in the world of IPTV is that they are generally built in technologies that allow them to run on IP set-top boxes as well as computers, such as HTML and Flash. There is a precedent for this in mobile as well, but the core problem for translating content there is screen size.

I believe it is going to be all about the niche audience and how they we serve these communities. These publishers are just perfect for IPTV services as they already benefit from digital distribution economics, help us discover new talent by taking risks and have minimal platform translation time. When you think about it, it is one of the only places that smaller operators can turn to in the face of heavy competition from the likes of the established behemoths. There is so much out there right now that it is difficult to know exactly where to start – despite wanting to avoid censorship you cannot automatically open access to all comers simply as there is a need to protect children from indecency and explicit imagery, to use popularity quotients to filter rubbish and to ensure equality of exposure for all.

Also bear in mind this is not solely an area for content providers, but non-profit organisations and government too. If I had my way, every CCTV camera in Britain would be hooked up as a multicast stream so we could watch what is going on outside our front doors, on the roads and anywhere else we fancy. There is an incredible possibility for us to get involved in public sector work.

12. How can the rights holders avoid making the same mistakes as the record industry did? Does Hollywood (etc) have its head in the sand with regards to the web, broadband and content delivery?

I talk with these people every day, and I cannot stand the idea of suing your customers, as its just racketeering by any other name. I'm renowned for wearing the 'wrong' kind of t-shirt into meetings, which always helps to break the ice as you can imagine! I really can't stand the attitude the industry has now, and I'm a supposed 'pirate' just as is everyone else I know. It worries me that these industries are so convinced and happy to group customers in with organised crime. What that means in practice is that I'm a customer who wants to buy, but can't with the situation as it is. Well let's be honest, the mistakes are so unimaginably bad that its going to take them a while to work their way back, but they are just acting as a business, like BT are. But then again, they made the same arguments about radio and the cassette, so don't pay to much attention to the flapping arms. Ultimately I think there will need to be a change in how licensing is done.

A lot of the criticism levelled at the content industry comes from a lack of understanding of their point of view and the business realities they face. Hollywood isn't in the business of video on-demand, it's in the business of selling DVDs. Every video on-demand stream played is a lost DVD sale in their eyes, and every perfect digital file that finds its way onto an electronic network has the potential to heavily eat into their revenues. Change isn't easy for these guys as it's effectively being imposed on them, as they don't see any reason to upset the apple cart. They're more aware of the value of their intellectual property than any other industry and are rightly sceptical the technology can faithfully deliver the picture quality, the right protection from copyright violation and the revenues that will make up for losses in other areas. They also know that carriers need content if they are to attract subscribers, and just as property developers control retail, so do rightsholders have effective control of what we do in new media.

The simplest way they can avoid the mistakes are to be the people who provide the technology before anyone else does. They need to really commit to the technology, actively work to exploit new markets, invest in R&D and be ahead of other developers, even software manufacturers

themselves. In terms of IPTV, we them to work with us. The main (forgotten) competitor to video on-demand is P2P downloading of ripped DVD movies, not video rental as you would believe. If rightsholders want to reduce piracy, they need to work with ISPs to provide the compelling alternative that will transition their subscribers from doing it – one that doesn't need 7 figures in pre-payments and crippling consumer-hated DRM just to get off the ground. Right now the policy of penalising and being authoritarian is doing them no favours, as no ISP has any reason to police content their customers download, as whether they like to admit it, music and video downloading is a key selling point of buying an internet connection. Neither will any ISP have the same audience figures of cable or satellite television networks – basing viability on the amount of subscribers reached is not embracing the true strengths of digital distribution or the realities of how media will be consumed in the coming decades.

13. What about T-commerce? Is IPTV going to make buying things easy for consumers?

We have a real opportunity to learn from the failures of the past with IPTV as we need a viable, standardised charging mechanism that everyone can agree on. We also need to make everything easy, not just buying things. My belief is that 'T-Commerce' as an internet equivalent or derivative is dead in the water and has been for years. Sky learnt that people don't like buying things through their TV very, very painfully. It might sound great in the boardroom, the annual report or in a VC's office, but there are so many things against it which should be like the effect of a cold shower on a hot day.

TV is a social and passive medium meant for entertaining people, not a PC-like environment. The remote control isn't designed for inputting your credit card details or helping you see how clothes will look on you. The things that actually started to make money for broadcasters were those things with a real-world precedent, like iTV gaming had in the Playstation. TV also has an advantage over other media in that it is more emotionally engaging than other media, and purchasing often tends to be an emotionally-driven behaviour. I believe there are many ways of making money from TV interaction, but T-commerce isn't one of them.

Where Sky did succeed and speed past their cable rivals was turning their platform weakness (one-way transmission and needing a phone line) into a powerful strength. They have built an effective micropayment mechanism based on 'drop call' premium-rate telephony and made revenue-generation standardised and simple. IPTV and video on-demand systems also have this capability, but remove the need for a phone line – transactions are logged at the head-end as itemised 'buy now, pay at the end of the month on top of your bill' purchases. The fact that IPTV platforms are built using proven technologies that integrate beautifully with other systems (web, VoIP, SMS/MMS etc) means there is more possibility for innovation than we are able to do now with closed proprietary networks that charge the earth for you to even look at documentation.

14. Will IPTV allow me to watch the next series of Curb Your Enthusiasm when it is first aired in the US? Or will geographical boundaries still apply?

As much as I'd love to preach the need to have simultaneous release dates worldwide, I don't think it's going to happen any day soon, despite the advantages. I know a lot of people who are currently watching season 7 of *The West Wing* right now as it's shown in the US, despite it not being released in the UK, so in some respects the horse has already bolted. Something tells me we definitely will have geographic boundaries as the content rightsholders will stick to what they know and do what they have always done. That means using the 'window' release system to maximise their profits. Each set of windows is worked out for every territory in every country, and charged accordingly – the rule is to subdivide as much as possible to have as many opportunities to charge as are available. This is just one example of where we as an industry will need to understand and work with the content owners, rather than push the excitement over our new technologies.

Technically speaking, being IP-based, the whole thing is geography-irrelevant, but the day to day commercial management of content moving from one place to another and the rights to view it will be where the main growth will be. You will be able to transport and/or access your entertainment from anywhere in the world, but viewing it will be dependent on whether the rights have been licensed for that region. One

of the most exciting aspects of media over IP is that the number of TV channels (or other content) is effectively unlimited, and what is being broadcasted on one side of the world can be viewed on the other, very cost-effectively. So as a UK ISP, I could syndicate, for example, Malaysia's main TV channels live across a peering exchange such as Linx without needing to downlink from a satellite or ingesting tapes. But until we get all that in place, you'll probably have to keep on using BitTorrent!

an action plan for ofcom

The government had its heart in the right place in consolidating all the major communications agencies into one. Broadly speaking, Ofcom has done relatively well, whether their palace of a reception area cost half their yearly budget or not. LLU lines are growing rapidly, our digital television market is the most developed in the world, and a sensibly conservative attitude to new technologies is being enforced. Generally the regulator has been sensitive to commercial interests, but it could do so much more.

The most striking absence you immediately notice in any office, committee or working group in Westminster is vision. It's almost like some of these mandarin houses are aimlessly drifting through each waiting to be told what to do. Vision gets you from A to B, by telling you where B actually is. Without it, we are directionless and impotent. The UK's point B is so vague that we rely on the ideas of ministers who have trouble using email, let alone understanding the new technologies that will affect all of our lives in the coming future. Vision requires you to listen, to think and to imagine. It means looking over the treetops to see the forest.

Our vision should be of a digital world where broadband internet connectivity is universally available everywhere, for everyone, at any time, on any device. Our economy needs to adapt to the changing face of global knowledge-based business by being entirely digital, forcing prices down every minute of the day (not squeezing the last pennies out of people), and empowering people to create innovative new products and services. Vision means we work out where point B is, without necessarily knowing immediately how we are going to get there. We need to define our mission, our target and where we want our country to be in the next 20 years in detail greater than is offered by superficial political pledges delivered for their feel-good factor.

Create a working group for next-generation technology (IPTV)

The world is ablaze with talk of IPTV, IMS infrastructure and a new generation of entertainment services that will offer everyone an entirely new level of choice and personalisation, but despite all the talent and

mind-power collected in Southwark and Parliament Square, Westminster hasn't noticed. Or if they have, they're not too interested in talking about it. New services and platforms require support from governmental organisations, and often take their lead from them in many ways.

Without wanting to state the obvious, the future requires foresight. Foresight comes from time spent mulling the state of play and where the next movements will be made. Time requires resources and investment, and they are needed everywhere, all the time. Ofcom is a consolidated agency formed from the ruins of a number of different agencies such as the ITC, Oftel and radio regulators. The Internet as a whole falls under telecommunication but has no real representation.

We need a very specific division and/or working group responsible for issuing guidance, reporting growth on, solving problems and chairing debate on converged media systems such as IP telephony, universal connectivity, IPTV and media on-demand. This group needs to intimately liaise with legislators, technicians, executives and proponents involved with the deployment of these platforms and services, for the purposes of aggressively encouraging their creation, and managing their contribution to both the UK's digital ecosystem and larger overall economy.

Increase terrestrial TV capacity tenfold

In the recent past, technical advances in statistical multiplexing, as well as clever smoke and mirror timesharing (e.g. CBeebies/BBC Three) have given us additional channels on the DVB-T platform. Switching the last analogue signal over to compressed digital in 2012 will also free up a large degree of bandwidth for new channels and services. The television spectrum is still used according to a plan originally prepared in the late 1950s, and Ofcom is currently looking at ways to maximise the use of the newly freed airwaves as part of their Digital Dividend Review.

Our friends across the channel have made no secret of their plans to supersede the now geriatric MPEG-2 specification with MPEG-4, which is the compression profile of choice in IPTV systems. It's also roughly 2-3 times more efficient than its predecessor, and it allows more a whole new world of quality and interactivity. What we need is RF bandwidth as a commodity, as we lack it so desperately now. Our emphasis should be on enabling the widest range of services to be deployed across the

country. There are naturally technical caveats which complicate this (some considerably so), but the point is a greater one of direction and vision. We need more space (orders of magnitude more), better compression and easier access. IP-based transmission, wide-area wireless return channel and 3G-style IMS architecture are all ambitious but exciting objectives.

Force ITV, C4 and Five to broadcast in the clear

We don't have true competition in the digital satellite TV sector, and don't listen to anyone who tells you anything else. Sky has contractual agreements with all the main public service broadcasters (except the BBC, who opened up their signals a few years ago) that require them to scramble their TV signal with their specific conditional access system (called 'Videoguard') so that only Sky subscribers are able to watch it. Their objective is to get their viewing cards and encryption system into every home as it is the fundamental basis of their media power.

You may hear a lot of fluff that the encryption is there to allow them to geographically limit who sees what, because of the limited viewing rights they have obtained from content owners – French people aren't allowed to hijack the signal and watch a movie that was only licensed for a British audience and vice versa. The truth is that when you have an audience the size of one of our public service broadcasters in a market as advanced and saturated as the UK, rightsholders are the ones who stand to lose the most by trying to mandate those types of limits.

Sky's "FreeSat From Sky" service is offered as a "lite" version of the service that a viewer can upgrade later to full premium content. You simply cannot build a satellite platform to rival the likes of Sky without all five main broadcasters; in fact there is no-one who will ever try. If these channels were broadcast "in the clear" (i.e. without encryption), anyone would be able to pick them up and competitors to Sky would spring up offering free satellite services, like "FreeSat" that the BBC and ITV are promoting. As Murdoch wins politicians' elections, don't expect to see any word from Ofcom too soon on this.

Clarify the regulation of PLC (HomePlug/powerline) technology

Powerline communication is an emerging technology that is proving itself to be easy, reliable and extremely practical for the new era of digital

home networks that are powered by broadband connections. It creates an Ethernet connection across existing electricity cabling in the home so that connectivity is available through any normal AC power socket. They are the most effective way in the vast majority of homes of achieving a robust enough video connection to a set-top box for IPTV services that are delivered over copper phone lines.

Yet you will rarely find 200Mbps PLC adaptors in the high street, and have to buy them online. This isn't because the technology isn't being adopted, it is because retailers are unsure of the laws governing their regulation, which makes them err on the safe side when doing their procurement. Apparently they generate "interference" and hence need to be policed – the BBC tells us that they cause havoc with long wave radio signals. All electrical devices must conform to international safety standards and wherever they are there will be a certain amount of RF/EM emission.

Ofcom needs to clarify this as soon as possible, as the use of these adaptors directly affects the viability next-generation telecoms services (e.g. IPTV) in the home. Even if the answer seems obvious, an unambiguous briefing is needed that people can easily reference. No-one has given a detailed explanation of this alleged spectrum pollution, but nonetheless if you want to buy a starter kit you will add them to your online shopping list, next to the Viagra.

Open up the Wimax spectrum free of charge

Wimax is just too complex, and the telecoms industry is crammed with start-ups and business plans for its use, particularly in rural areas where DSL penetration is low. Pipex owns the rights to the 3.5GHz band, and PCCW owns the 3.4GHz band. Many operators want to operate in the 5GHz range, and Ofcom is considering opening up the 3G band, 2.5GHz for non-3G use. To add to that, low-power domestic wi-fi equipment uses 2.4GHz, and there is more talk of playing with both 3.6GHz and 3.7GHz for long-haul services. Don't feel bad if you don't get it either.

Our government's objective is allegedly keeping control of our finite spectrum assets, but when it comes down to it, it's all about cash, as the 3G debacle showed. The chancellor separated operators from over £20 billion pounds, leaving them to spend further on infrastructure that was

depreciated by the time they started to see consumer uptake. Wimax is worse than that – the technology and market changes daily. Consortiums and specifications are delayed, argued over, re-ratified and changed whilst the rest of the world watches in frustration. The chaos of 3G would be disastrous for universal internet connectivity, not to mention the government's plans the broadband-powered knowledge economy.

So here is a radical plan for Wimax – open up the spectrum free of charge and let operators innovate to their heart's content. Make deployment cheap as chips. Licence operators with minimal fees and make sure guidelines are observed by all means, but let the industry grow by itself, organically. Make universal internet connectivity a truly free market and protect it from the interests of companies looking to be monopolists. We need to encourage 100% broadband coverage for the good of our overall digital economy and present alternative means of accessing other global networks that is not based on premium-rate mobile telephony or legacy copper.

Give digital radio parental guidance ratings

Some may question this as a trivial and unnecessary act, and others may wonder why it was not done before. All modern digital television services now feature parental-control mechanisms, where content that is identified as adult unsuitable and out of bounds for children under 18. Cinema has enjoyed guidance ratings system for decades that provides an easy and useful way of limiting access to potentially harmful material by minors. Digital media gives us the ability to describe content and broadcast information that helps us control how we consume it.

Technology empowers us to make more informed choices and to extend ourselves as human beings. Media now can truly be the very epitome of free speech, but equally protect those who are vulnerable. Digital radio receivers (DAB) should regularly invoke pin-protection for whole radio stations and/or individual programs that are broadcast with an 18 age rating. DJs should be allowed to swear, curse, air offensive and dissenting opinions, and use adult material if their listeners enjoy them. Use of ratings should be transparent on all devices – car stereos, TVs and computers.

Clarify EU and UK regulation of IPTV content

The EU is preparing a legal framework for all its member countries to adopt regarding broadband television content, one that cascades into our legal system for usages as a yardstick in cases where court intervention is required. So far, early IPTV services in the UK have been “closed” systems that almost duplicate cable, using IP as a transmission medium across a private copper phone line network that never transgressed onto the Internet. That pretty clearly identified it as broadcast television, leaving it to fall under conventional broadcasting law. The problem now is when IPTV networks cross the private network boundary and converge with the rather big public one – the Internet. There has been no clear, unambiguous lead from Ofcom as of yet.

Consider the following scenario – a dodgy East European porn company decides to stream its rather tasteless content as a high quality PAL multicast video stream using a QoS-assured VPN tunnel over the internet. 13 year old male UK IPTV subscribers can add their own channels and through their broadband-connected IP set-top box, subscribe to the channel. The question we face is, is that stream is broadcast TV or internet content? If it is broadcast, how do we regulate it to ensure our TV networks aren’t used for criminal activities such as child abuse or terrorism? If it is internet content, where does policing of content end once it starts with video? How do we solve problems like video spam and control channels switching addresses to evade detection?

Once the wild west of the Internet is allowed into our living rooms, the proverbial genie is very much out of the box and it’s going to be impossible to put it back in again. Who decides what we can and can’t watch? Why shouldn’t we be allowed to tune into any CCTV camera in the UK if we are monitored by them every day. Governments already monitor our voice calls, internet activity and private consumer data, but what about video calls and media consumption? With IP video, all the lines have to be redrawn as we can integrate, interoperate and converge as far as we like.

Reverse LLU economics to stimulate deployment in rural areas

There are around 6000 BT phone exchanges in the UK, of which about 25% (1500 or so) are actually viable enough for local-loop unbundling by BT’s rivals, such as Easynet, Cable & Wireless and Carphone Warehouse.

Co-locating equipment in exchanges and leasing DSLAM gear is relatively cost-effective, but when you get to running fiber backhaul, your plans come slightly unstuck as its absurdly expensive. This makes consumer unbundling only practical in heavily-subscribed metropolitan areas, where it's almost saturated already. B2B unbundling is more favourable, but only slightly so.

LLU was stimulated by Ofcom forcing BT Wholesale's hand, which drastically cut prices and opened the market for others to make money from cutting them out the loop. Whilst IPStream resellers have only just got their long-awaited 8Mb "Max" service, LLU has given us the first truly high-speed broadband using ADSL2+ and shortly will take us one louder with VDSL2. Consumers are getting a great deal. Consumers in cities that is. Anyone not in a city or large town isn't.

Reversing the current economics would redress the network imbalance we have now. The cost of unbundling needs to be inversely proportional to the available customer base and their distance to the exchange – the more hostile the exchange, the cheaper it is to work with. The government doesn't want to subsidise communities but wants to empower lovely things like tele-working and convergence. Let hungry commercial operators get in there and provide unique, localised services for those who need it most.

Licence ISPs like broadcasters

John Pluthero infamous said that what ISPs knew about customer service he could write on the back of a postage stamp, and unfortunately he was right. Most operators are content never to talk to their customers, let alone try to deal with their problems. An alarmingly large number do not even give their contact details to their own subscribers or the public. This lack of transparency or accountability is deeply worrying as limited companies appear and disappear as quickly as their bank loan for the BT central or VISP account runs dry. As we move into a new era of converged communication services, this type of cavalier behaviour is just not acceptable.

Survivors of Gio Internet and other ISPs that have gone spectacularly bust with little or no warning (often with buckets of their own customers' money) are mounting up in the same way rogue premium-rate telephony

scam artists have. BT has no interest in cutting off these customers' accounts as they are cash cows that pay for a world of useful luxuries. As long as they are paying their bills (or the likelihood is that they will), it is up to the rest of us to deal with their cynical approach to service provision. Ask any UK Online or Bulldog subscriber – provisioning, support and billing aren't exactly a speciality.

All tiers of ISPS need to be fully licensed on a national register in exactly the same way as broadcasters are. Operators should need a licence and have the appropriate diligence conducted on their affairs every year before they are allowed to deal with small businesses and/or the general public (consider full MPF unbundling, carrier pre-selection and VoIP services where access to emergency services is a key issue). Guidelines, practices and regulation need to be mandated and enforced by a central authority that can tighten up the shortcomings of such a fast-moving industry. Understandably, no-one is going to like being regulated, but it desperately needs to be done.

Create a compulsory migration system for triple play

The MAC code migration system has never been compulsory, but arguably it should be. Some people believe it one of the core reasons the market for broadband has been so fluid in the UK. Competition is a fact of life and particularly vicious in telecoms, and consumers searching for better deals have had access to a vital mechanism by which they can tidily and easily shop between providers. The system is far from perfect, but the sentiment is there.

Triple play is very different indeed. Given the problems with full (MPF) unbundling, absolute chaos has ensued while operators get to grips with what BT has been fluent in for years. You can live without broadband if you have the backup of a 56k modem, but when the phone or TV goes down, it's a very different story. Imagine subscribing to Gio Internet's triple play service – there are few worse pains a human can suffer. As work on BT's IP/IMS project (21CN) nears completion and all ISPs move to IP-based services, we enter a realm where services based on them need 100% uptime.

We need to build a form of "passport" system that enables customers to migrate between operators but leaves their services as intact as possible.

The first incidental death caused by not being able to call for an ambulance because the line was down will be a very preventable tragedy. Consumers need maximum control over who maintains this information (their migration details) and what is done with it.

Clarify the rules for advertising in on-demand platforms

One of the fundamental rules of broadcasting in this country is that television programming and commercial advertising must be clearly identified and separated from one another. Direct and indirect product promotion that falls foul of this legislation is usually guilty of “undue prominence”. Licence fee-payers are thankfully spared the product placement carnage that plagues US networks with an independent BBC, despite the attempts of wily corporations (Ahem, Coke) to bend the rules with “sponsorships” and favours. Other public service broadcasters are admirably dignified.

Video on-demand puts unprecedented power in the hands of the great unwashed, which scares ad agencies, media buyers and broadcasters silly. Advertising is a forced activity – people don’t choose it unless it is editorially compelling or a burden to be suffered for greater benefit. Putting advertising into on-demand systems is very hard as it dilutes and negates their most attractive features. It’s difficult to force advertising on people you are trying to empower with choice. This leaves advertisers with relatively few options in a world where very little is certain in terms of what works and what doesn’t. Buying by the thousand views and inflating the figures are on their way out.

The clearest route for major advertisers to invest in making their advertising more like conventional TV programming – individual brands are now spending the leftovers of their marketing budget on running their own TV channels, producing mini soap-operas for mobile phones and both bending and blurring the lines as much as they possibly can. We need clarity on just how much slack they are to be granted while we all adapt to these new technologies, and when the big stick is to be brought out for those that decide to take advantage of the situation and deliberately set out for confuse consumers for their own purposes (Where’s Lucky and/or ‘unlimited’ broadband on IPTV, anyone?).

Control monopolistic behaviour by content providers

Only one name needs to be mentioned when it comes to brutal monopolisation of content rights, Sky. Restricting them to only 5 of the 6 football rights “packages” was a cute gesture, but futile. They own the football, the cricket, the best US TV series and the entire Pay TV movie release window in the UK. Nobody expects them or anyone else to be a charity, but their hold on content is so absurdly strong that it directly affects the wider industry because it is impossible for anyone to compete on an equal footing. Ask any football fan and they will tell you that they would gladly switch to another platform (e.g. BBC1), and the vast majority resent Sky’s monthly charges. Pubs really hate them.

News International owns most of the press, plenty of world TV networks and a movie studio or two. Naturally they cross-promote each other and favour each other when it comes to trading rights to content. Their pockets are very, very deep and their influence deeper still, meaning that coercion is more common than fairness, as all cold-blooded businesspeople would understand. The trouble is that those who suffer the most are the ordinary day to day consumers who are pay subscription fees but have little or no choice as there is no market competition.

Behaviour that acts directly against a consumer’s interest needs to be stamped on with an iron fist, even if it damages a company’s commercial ambitions. Wherever there is money, power or influence, it will be sought after and abused. No one media entity should be allowed to obtain or exploit more than half (50%) of the viewing rights for any genre of content. That means Sky should not be allowed to exclusively control more than 3 football rights bundles (or cricket) or half the movies that are released for pay TV platforms in the UK. Exclusivity is important, determines the fate of businesses and forms the basis of a large amount of commercial deals, but it must be closely controlled.

None of these things are out of the regulator’s reach, nor are they impractical or damaging. The key is will – the will to move beyond the warm comfort zone we have all become accustomed to, so we can be agile enough to adapt to changes more effectively than if we were just waiting to dry off after the proverbial wave has crashed over us. No-one will dispute that these are extremely challenging goals and suggestions that would cause shockwaves, But its shockwaves we want – a regulator

brave enough to roll up their sleeves, bear their teeth and lead from the front. We have a cutesy golden retriever, when we need a greyhound.

If even 2 or 3 of these suggestions were implemented, the implications would be quite profound and stimulate both the imagination and the market ecosystem they are a part of. The question we need to ask ourselves is what kind of a world we want to live in, and where we want our country to be. Our Molotov cocktail of answers is just waiting for a Zippo lighter to make it happen.

how to set up an iptv system

There's a secret many people in the IPTV/VoD industry don't want you to know. Setting up an IPTV network is actually incredibly easy. In fact, almost anyone can do it. But if you knew that, you'd build your own and no-one would make any money by selling you proprietary products with huge mark-ups.

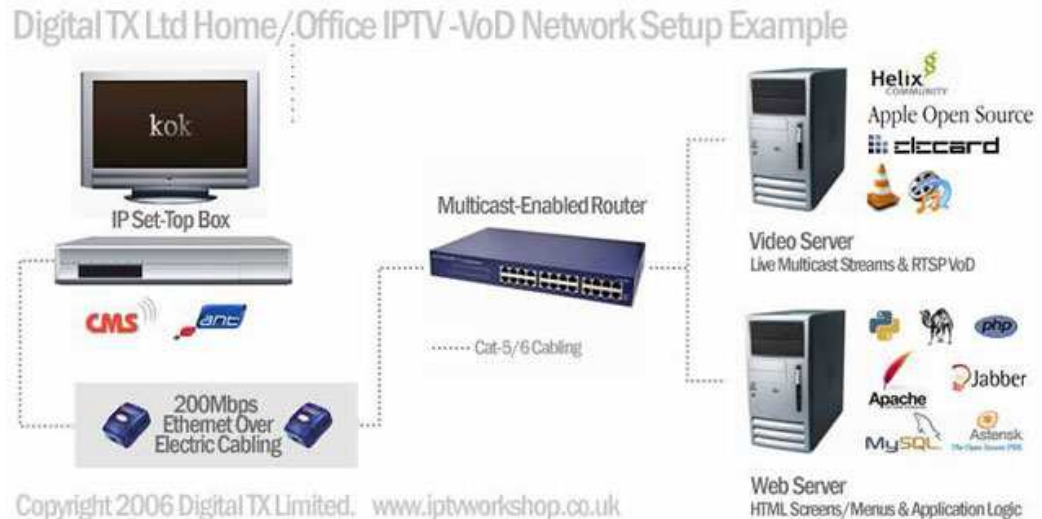
IPTV networks are basically intranets, only the web browser isn't on a PC, it is on a set-top box. If you've set up an intranet or public website, you can set up your own IPTV network and do what you want with it. You don't need massive and expensive servers, specialised set-top boxes or overly large development teams working with complex software. With the right hardware and software, it should take you less than a few hours.

But why would you want to build your own?

Maybe you could, and/or want to:

- Create an internal TV system for training, advertising or information display;
- Create an IPTV showcase for your clients so they can visualise opportunities;
- Evaluate current IPTV technology without massive expense;
- Convert your existing client websites and applications to IPTV versions;
- Cross-train your web developers so they have IPTV skills;
- Simulate a real IPTV network to test applications and ideas;
- Put your products and services on an IPTV demo platform;
- Build a great new idea or application that would work well on IPTV;
- Integrate your current web-based systems into an IPTV environment (e.g. VoIP)

This is what we're building will eventually look like:



Doesn't look too difficult does it? Let's get started.

What you'll need:

- A TV
- An IP set-top box
- A multicast-capable router
- A web server
- A video server
- 2 x PLC Adaptors
- Sample video material

In this guide, we're going to be cheap and cheerful, using free open source software (FOSS) where we can. We'll also be adhering to open standards wherever possible. Our HTML screens and menus will be housed on an Apache web server running PHP, Perl, Python & MySQL, and our video will be encoded in MPEG-4 H.264 AVC, packaged in a simple MPEG-2 transport stream. We'll stream out our video with VLC and Helix Server.

Naturally you can exchange any of those for something else that does the same thing, for example, WM9/IIS/.Net/SQL Server instead of MPEG-4/Apache/PHP/MySQL.

1. Finding a new home for the kit

Luckily, your brand new shiny IPTV system won't need much space at all. The 2 PCs (web server and video server) can be hidden away under a

desk, kept in a server room or tucked away under the stairs somewhere. Using PLC adaptors means you don't need cabling dangling around. What you will need is a space for demonstrating it on a TV. That could be on a desk, in reception or in a corner of the office with a couch.

2. Choosing the right set-top box

The most critical decision in setting up your system is what IP set-top box you will be using, as all of them run different software and have different capabilities. All of them connect to the TV using a standard scart cable or RCA sockets, and display PAL/NTSC video at standard resolution. It's preferable if they have a web-based control panel, but many have proprietary configuration screens or use simple telnet. Firmware upgrades are best served with a remote TFTP server, such as that provided by vendors like SolarWinds.

The most popular choice of software is an embedded web browser, which for all intents and purposes does the same thing as a PC web browser like IE, Firefox, Opera or Safari. The developer interface tends to be a mark-up language, usually HTML/Javascript. The main embedded client software programs in use on IP set-top boxes today are Fresco/Galio (from Ant Plc), Opera, Escape/Evo (from Espial) and Myrio (based on Espial). You can think of them of little web browser units.

There are a lot of OEM vendors of IP set-top boxes to choose from all across the world. Some examples include Complete Media Systems, Amino, Kreatel (now Motorola), Vidanti, Tilgin (formely i3 Micro), ADB Global and Netgem. Most are open to the idea of directly selling 1-10 units at a time, although in many instances it is better to go through a central distributor like Garland Partners. The cost varies, but you should be paying in the range of £100-250 GBP for each set-top box, including a remote control and/or keyboard.

In this guide, we will be using the CMS 1080 (from Complete Media Systems), running Ant Galio 2.0. The box itself supports video delivered in H.264 AVC or Windows Media. We will be using the former.

3. Setting up the network

IPTV runs over an IP network, which means it will work over your existing home or office Ethernet network. You'll probably already have a router

or switch that your desktop PCs are plugged into, although it will be best to create a new, separate network for your TV as the traffic load is much higher than a normal data network designed for internet and/or LAN connectivity.

You can use any router or switch at all, as long as it supports multicast. Any £50-200 product from the high street or online retailer will do. Check the side of the packaging or the manufacturer's documentation to see if the product you choose supports multicast natively (IGMP etc). Normal 100Mbit Ethernet is fine, although use Gigabit Ethernet if at all possible.

If you're running all the screens and video from one server (for example, a portable laptop demo), you can even just use a simple crossover cable. Don't try and run video over a wireless connection, no matter how good the reception is. HTML screens and menus will work fine, but processor-hungry compressed video is another story.

An IP set-top box is just another network client device. When it is connected to the IP network, it is assigned an IP address by DHCP just as a desktop PC would be (this can also be static). If your router doesn't act as a DHCP server, you don't have a network gateway or are experiencing problems with a crossover cable, simply download and install a free DHCP server from the internet onto your web server PC.

Your PLC (powerline communication) adaptors create an Ethernet network over existing electricity cabling, which avoids the need to have wiring everywhere when you can't use wireless. They generally come in pairs, and cost £100-200 from the high street, your ISP or online retailers. The first should be plugged into an AC plug near the router, and the second should be plugged in next to the set-top box. Both then have Ethernet sockets which you plug normal cat-5 cable into.

4. Streaming live broadcast video

The first thing to simulate on your IPTV system is live TV that can be tuned into, and this can be done in two ways. The first is easy, the second is either painful or expensive. Live broadcast IPTV needs to be multicasted 24-7 over the IP network, as unicast is too inefficient. We will be streaming live TV from our video server.

For each channel, we need to broadcast a 5 minute looping pre-captured video clip to a multicast IP address. For this, we can use the free VLC player, or the industry standard WinSend, created by Pixstream. The clip itself ideally needs to be previously encoded in MPEG-4 H.264 AVC, and formatted into an MPEG-2 transport stream. However, VLC being the Swiss army knife it is means we can convert open virtually any video file and encode it on the fly as we are broadcasting. Open your video file, and use the advanced options in VLC to stream the output onto the network as UDP, using a multicast address such as 235.5.5.5 to a random port (such as 10201).

You can test if the stream is being correctly outputted by opening the same network stream with another copy of VLC on another computer on the network. Do this for as many channels as you require. Once they are broadcasting, the set-top box will be able to tune into the multicast stream just as VLC does.

The more advanced way to provide live broadcast TV (such as Freeview) over an IP network is to convert MPEG-2 video received from a DVB receiver (a TV tuner card, for example those made by Hauppauge) into multicast format, which is known as IP encapsulation. The painful way is to code your own encapsulation program using the vendor's SDK, and the expensive way is to buy industrial hardware that does it for you (for example, Exterity, Anevia etc).

5. Preparing VoD content

Making DVD quality video across your network is split into two separate parts – getting the video files into the right format, and secondly, setting them up to stream from a video server. The bad news is that there isn't a free or open source VoD server that you can use to exactly simulate what would happen in a commercial service.

Your video material will need to be pre-encoded in the same way the live multicast video is. Software encoders from vendors like Elecard, MainConcept Cyberlink and Nero will easily compress video from most formats (MPG, AVI, MOV etc) into MPEG 4 H.264 AVC, but they will additionally need to be encapsulated in an MPEG-2 transport stream for delivery over the network. The free open-source Media Coder program produces excellent results.

Video is very temperamental and requires state control, unlike typical web protocols such as HTTP. RTP (real-time protocol) and RTSP (real-time streaming protocol) were designed to provide VCR-like controls for IP networks, and most, if not all commercial VoD servers use these technologies for delivering quality-assured video. A lot of set-top box manufacturers have adapted their hardware to be able to simulate VCR-like features using HTTP so video can be streamed directly from a web server like Apache. We will use a combination of both to stream files ending in .mpg.

The main choices for serving video on-demand over our IPTV network are the open-source Helix Server and Darwin Streaming Server, both of which come in Windows flavour, but can also run on Linux. We also have a trial of the Elecard RTSP server that can also be run on either OS. If your own network is set up to use Windows Media, you can happily and easily unicast and/or multicast video from a Windows Server PC running the free Windows Media Server.

Once the video files have been pre-encoded, they need to be placed in the directory on the video server that has been allocated as the storage folder, as well as mirrored in the Apache web directory allocated on the web server. Almost all the RTSP servers have a web-based configuration panel and will need to index/identify each file for streaming. Once these are in place, test the RTSP capacity of the server by opening a network stream to them in VLC, and once any problems are corrected, your IP set-top box will play them using its in-built API.

6. Creating screens and menus

Menus for the TV screen are created in HTML, CSS and Javascript, just as normal web pages are, using the same standard tools (Dreamweaver, Photoshop etc). The software on the device is an ordinary web browser like IE, Firefox, Opera or Safari, and overlays the web pages you create on the screen through the scart cable (OSD). Most have full support for open standards and current technologies such as RSS and AJAX. Some also include the Macromedia Flash 6 player. It's a case of write, and then refresh the browser screen, just like normal web development.

When the IP set-top box starts up and gains an IP address via DHCP, it will also request a "starting" URL of a web page from a web server, in the

same way a PC web browser (e.g. IE, Firefox) will request a default home page. Producing screens for IPTV is almost the same as building an intranet site, with the only difference being that the HTML and Javascript contains set-top box-specific code that only the set-top box understands and executes (e.g. for tuning into multicast streams or issuing RTSP commands).

Each set-top box's hardware is different, so there is a different Javascript API for each device model that must be obtained from the manufacturer. Video can be displayed and scaled as any kind of image on the page, and manipulated by normal Javascript functions. The set-IP will not come with any software applications pre-installed (or even commands on the remote to go back or refresh the screen), so the very first application you need to create is an electronic programme guide (EPG) to navigate around your service and watch video streams.

When mocking up screens in Photoshop, it is important to know that a standard definition PAL TV screen is 720 pixels wide by 576 pixels wide, before the so-called "safe area" is taken into account. Colour is considerably more primitive and much more sensitive to variance than on a desktop browser. The only input device available is a remote control with key codes similar to a desktop keyboard.

Using HTML for menu and screen displays means content can be dynamically generated using a server-side process just like any web page. The TV screen displays whatever you send it, meaning you can integrate any type of web-based system into your new IPTV network, such as the Asterisk VoIP PBX, the Jabber IM server, multiplayer game servers, your own web application or an external XML API.

7. Showtime!

Once you have your network set up, its up to you to get creating menus and screens, and adding video content onto your video server that can be played back through the TV. The production procedure is exactly the same as it is for a website, only with TV-specific functionality and usability issues. Over a few days or weeks, you suddenly have an entire TV network to yourself that you can do anything to, just as when you have your own website that you can do anything with.

Once you're happy with what you've put together, its time to sit down the boss, colleague, wife, girlfriend, boyfriend or fellow interested nerd and beam with pride as you press buttons on that remote and surf around.

frequently asked questions

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 as 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 by 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.

what you need to know

The industry and its technology moves so fast that it is easy for information to become outdated and for people to lose track of all the things they need to know. This document is a typical briefing sheet supplied in the workshop that covers all the main points that are essential for any executive or technician to understand.

IPTV stands for *Internet Protocol Television* and is an umbrella term describing TV and video delivered using internet technology instead of normal linear RF broadcast.

Video On-Demand is a service where video (a movie or TV programme) is sent over a computer network when a viewer requests it. It has all the normal VCR functions that would be found on a DVD disc or VHS tape (pause, rewind, fast forward etc) but is sent down a wire instead.

IPTV can be supplied on any device that has Internet technology built it into it, for example, desktop PCs, IP set-top boxes, games consoles, mobile phones, handheld devices, car stereos and media players.

IPTV is not new or something on its way. It has already been deployed widely all over the world, mostly by incumbent national monopolist telcos over broadband DSL networks. There are over 30 IPTV networks in Europe alone.

IPTV has also widely been adopted by companies providing B2B video services such as digital signage, retail TV, video conferencing and hospitality systems for its significant cost savings and integration with other IP systems.

“Triple Play” is an industry term for when a cable or telecoms company offers customers phone, internet and TV in one package on the same monthly bill.

“Quadruple Play” and *“multi-play”* take the triple play concept one stage further and add mobile telephony and other domestic services into the package.

The revolutionary change with IPTV is that every viewer has a personal relationship with a broadcaster through a transactional request/response mechanism, rather than just picking up a broadcast sent to anyone and everyone.

Traditional TV platforms are only different to each other in the way they are transmitted. All have the same features (set-top box, programme guide, channels etc). The UK TV market is unlike any other in the world.

At present, IPTV is just cable TV down telephone wires. It will be revolutionary only through being an open platform that anyone can innovate round – one where the philosophy of the internet is adopted as well as the technology.

For IPTV to reach its potential, video bandwidth must be a commodity. Capacity usage charging (e.g. BT *IPStream*), contention ratios and premium connectivity actively prevent deployment of IPTV services.

Although it will not appear overnight, IP and transactional delivery will be the dominant method of broadcasting in 10 years.

The eventual goal of IPTV is to distribute live, stutter-free high-definition television (HD) over the backbone of the Internet rather than satellite, cable and terrestrial networks.

The promise of IPTV is that every piece of audio and/or visual content ever created in human history will be available in digital form anywhere in the world, on any device, whenever anyone wants it.

Digital media and our preferences for it will follow us wherever we go in the world, so rights will need to be allocated to an individual rather than a country and a platform. All systems will feature centralised viewer database information and decentralised/local delivery equipment.

The most efficient way to currently offer TV and video over the Internet is to use some form of decentralised P2P system where users download from each other rather than a data centre. P2P does not reduce video traffic, it merely redistributes it to the edge of the network from the core.

Eventually all electronic devices will have internet connectivity and be able to talk to one other (so-called “convergence”). The Internet will be the communal worldwide network that they communicate across.

IPTV networks generally are based on one of 2 models – the so-called “closed” model using a private IP network (a LAN or DSL circuit like cable TV) and the “open” model, using the public internet.

IPTV content can be *real-time* (live) or *offline* (downloaded). It can also be *pushed* to a client device (e.g. overnight delivery) or *pulled* across the network.

Most ISP and telco networks are based on an old telecoms technology called ATM. The advent of broadband has meant most are upgrading their networks to be IP-based.

Almost all of the top 10 broadband ISPs in the UK now have a strategy of some kind for providing voice and television to their customers.

The most practical way for ISPs to enter the television market in the UK is to provide some form of *hybrid* TV/broadband service that adds a broadband “back channel” and PVR functionality to the *Freeview* or *Freesat* digital TV platforms.

BT’s network is ATM-based and does not support multicast. The 21CN upgrade programme will change the UK infrastructure to be IP-based and is expected to be complete just before UK Digital TV Switchover in 2012.

IPTV video is usually supplied in MPEG-2, MPEG-4 and/or Windows Media (VC-1). The favourite choice is H.264 (MPEG-4 AVC) that can produce DVD-quality video at very low bandwidths (1-3Mbit/s for SD, 6-10Mbit/s for HD). Most need the video to be encapsulated in an MPEG-2 transport stream.

Most IPTV platforms use open standards and trusted protocols for delivering audio and video in real-time, such as RTP, RTSP, resilient UDP and SAP/SDP.

A normal 8Mb ADSL connection can theoretically support up to 3 SD IPTV channels or 1 HD channel in MPEG-4, but in practice it is difficult to send more than 1 on either. A DSL connection must usually be 4Mbit/s and

above to support a live IPTV broadcast stream and 2Mbit/s for on-demand content.

Fiber (Gbit/s), Ethernet (100Mbit/s), ADSL2+ (24Mbit/s) and VDSL2 (70Mbit/s+) connections are a more preferable and reliable network speed to deploy IPTV over.

Video running over IP networks is easily disrupted, so in order to make sure the picture doesn't break up a network must implement *Quality Of Service* (QoS) rules that separate voice, video and internet data into their own "channels".

The internet is a best-effort network and does not have QoS. IPTV provided by ISPs runs across their network but does not reach the internet. QoS is achieved by mapping ATM virtual circuits (VCs) to IP Virtual LAN groups (VLANs).

An IPTV testing lab or small simulation can be purchased and installed extremely cheaply and easily (less than \$10k or £5k) on any office LAN to help cross-train developers and create example software applications.

The *Net Neutrality* or *Two-Tier Internet* debate originated in the USA, and refers to a unilateral policy being adopted by US telcos of charging content providers more for using their network to deliver content than they do themselves.

It is almost impossible to reliably transmit broadcast video over a wireless (Wi-Fi) network, even if it runs at speeds over 108Mbps. Specialist technologies exist that try to solve this problem.

The easiest way to connect an IP set-top box to a broadband wire when it can't be connected by a normal Ethernet cable (i.e. when it is in a different room to a home router) is to use PLC (powerline communication) – 200Mbps Ethernet over home electricity cabling.

The future of the broadband home is to have embedded PLC technology in all electronic devices, so they are immediately network and internet-enabled when they are plugged into an electric socket.

Live television must be multicasted over a network, which is the computer equivalent of normal broadcast where only 1 copy of a TV signal is sent instead of everyone having a personal (unicast) copy. Many

networks do not support UDP-based multicast technology, including the Internet.

Screens and menus in IPTV system are generally created in HTML, CSS and Javascript, just like normal web pages. The software on an IP set-top is usually an advanced web browser.

Almost anything that can be done on a website on the Internet can be done on an IP set-top box. Services are private intranet “websites” hosted on a normal web server but specifically formatted for a TV.

Using internet technology means any part of an IPTV system can talk to any other system that speaks internet, like Voice over IP (VoIP), POP3/IMAP email, instant messaging, text messaging, picture messaging and more.

The revenues from video on-demand alone cannot support an IPTV service. Research shows viewers in the UK watch less than 8 VoD movies a year and they are not perceived to hold as much value as a rented DVD.

The most popular VoD services on UK IPTV networks are free TV “Catch Up”, music video playlisting and cult TV programmes from the 1980s. Usage and behaviour (e.g. peak time viewing) is the same as any other platform.

VoD services compete primarily with internet piracy, PVR recording and normal live TV broadcast.

Almost all IPTV and VoD services are targeted at “early adopter” young males, totally ignoring women or people older than 50. TV is a social and sharing experience that does not take well to being made into a PC.

Like all forms of TV, IPTV is about content and entertainment, not technology. Viewers follow content and it must be “pushed” to them as with all types of media. There is no use having the world’s best technology if there is nothing on TV. Viewers do not care where content comes from or how it is delivered.

On-Demand is not a revolution. It is the way we do everything anyway, and have done for centuries. We buy food when we feel like it, on-demand. Its appeal is due to it being a very natural and familiar way of doing things.

90% of content in the world is non-PPV (pay-per-view) that viewers will not pay to watch. It must be supported by advertising. The UK is not a pay-TV market.

The “*Long Tail*” is a concept coined in a *Wired* magazine article describing the shape of a sales reporting graph for online stores like Amazon, iTunes and Rhapsody where sales of niche or back-catalogue items make more money and general sales volume than premium products.

Cameron’s Law states that the amount of content made available on a digital platform must be directly proportional to the ease of navigation through, and subsequent consumption, of it.

The “*Long Tail Problem*” or “*Digitisation Problem*” refers to how expensive ingest, digitisation and management of digital content is, and that because it is difficult to sell directly, there is no business case to do it in the first place.

The “*Ivory Tower Complex*” is a term that has come to describe the resistance shown by larger movie studios and TV production companies to distribute their content non-exclusively.

The “*1% Rule*” is a concept derived from usage behaviour analysis of user-generated content (UGC) and social networking websites where 1% of the audience will actively create and submit content, 9% will moderate it editorially, and the rest are happy simply to passively consume it.

3D video games that usually run on games consoles can be played disc-less across an IPTV network, with the pictures sent as MPEG video.

The “*Million Channel EPG*” is an industry term to describe how the TV channels a consumer can watch with IPTV are effectively unlimited and not restricted by satellite geography or street cabling.

Convergence messes up the intellectual property system that content producers use because it relies on platforms being different from one another and rights allocated by country.

IPTV has not been officially consistently defined in a legal sense for rights clearance in the content industry, and does not fit into either the accepted “TV” or “New Media” category.

The sheer mass of unlimited digital content being made available means that wholesaling, intermediation, filtering and aggregation are emerging as viable and essential business models for digital media content.

Large volumes of content means that communities and “organic” community features such filtering, recommendation, popularity, categorisation and niche/vertical “channels” are natural and essential for helping viewers buy and consume it.

The uncertain legal status of IPTV has led to the publication of the deeply unpopular *TV Without Frontiers Directive* and its extension, the *Audiovisual Media Services (AMS) Directive*, which attempt to force linear TV broadcast regulation on new media services.