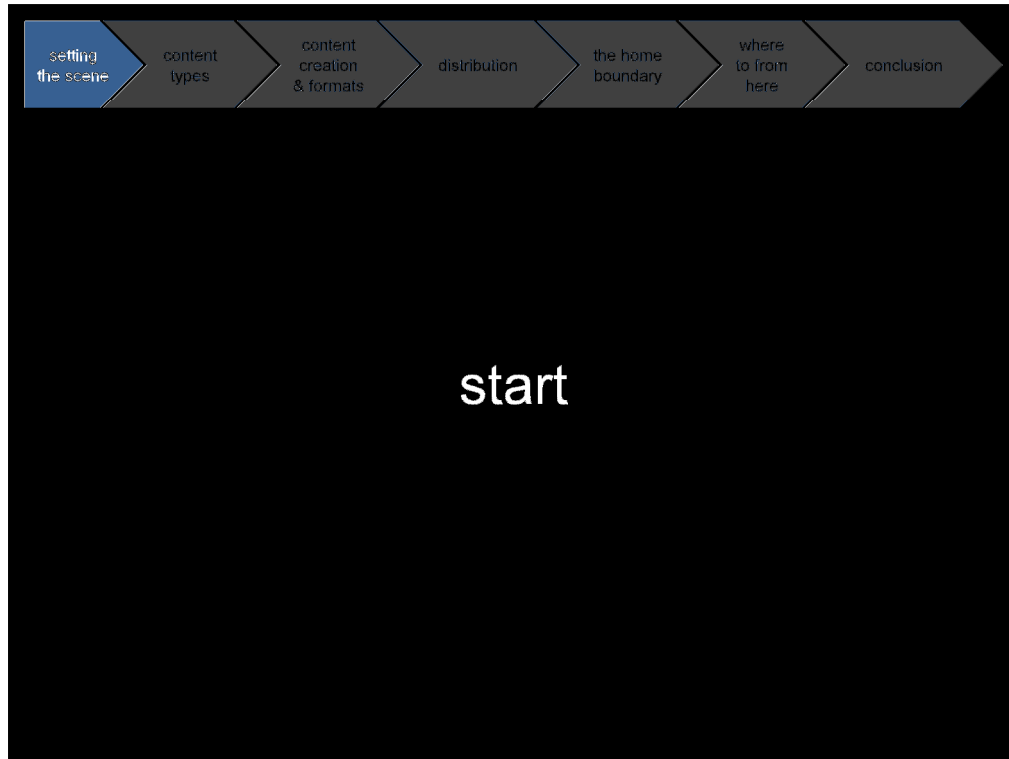


# Digital Media & Content Summit

**From the studios to the homes – How will content be delivered?**

September 2007



Okay – let's make a start



who

Who am I and why am I here?

I'm a specialist researcher in consumer devices and home networking and have a couple of patents in process which have come out of this work

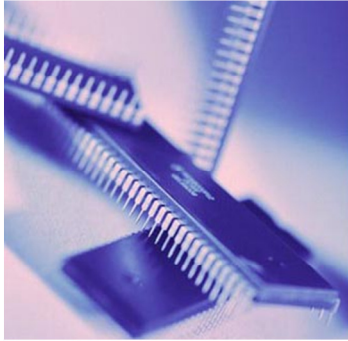
I have been conducting ongoing research into digital entertainment and internet delivered television for the past 3 years and more recently I have been tying this work into social networks and online communities.

I read a lot of research papers, I visit a lot of websites and get a lot of email, but – I love discussing this stuff, so if you would like to get in touch with me about this presentation, here's how to do it...



rob.inskeep@telecom.co.nz

My name is Rob Inskeep and I'm a...



Technology  
architect at...



Telecom

what does a  
technology architect do?

Well – that's nice, but - What does a technology architect do?

current research & venturing market

I work in the research and venturing space,

looking 3-5 years out at products & services for the New Zealand market place,

Our mandate is to think freely about what is coming up in both technology and sociological trends. sometimes we may have views for the future which are contrary to Telecom's current position. None of this today should be taken as official Telecom policy.

Today, I will be talking about...



how content will be delivered  
from the studio to the home

How content will be delivered,  
from the studio to the home...



WAIT!!

Before we can take our content on the trip from the studio to the home, we first need to need to understand a few vital points...

what is this 'Digital Content'?

What is this digital content that we're moving around?

who creates it?

Who is creating it,  
and how?

how does it get to my home?

Once it's created, how does it get to the home?

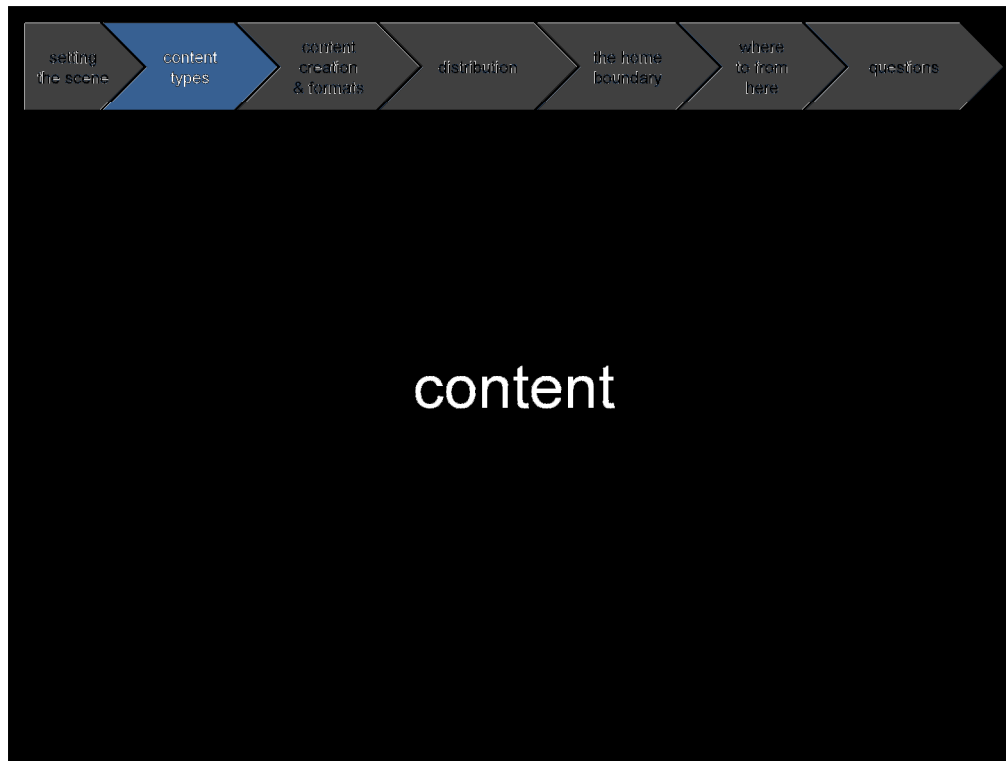


but wait there's (still) more...

Just one more thing before we get started...

How the ^\*&#\$ does it get  
around my home?

Once delivered, how does this media get \*\*around\*\* my home to the playout device?



Let's talk about the content first...





What is this content are we talking about?

Digital content can take on many forms, from News sites such as CNN, Community Collaboration Information portals like Wikipedia, and Opinion pieces from any of a zillion blogs spaces strewn across the web.

It can be Music subscription services, online radio or user generated audio such as podcasts  
 It can be gaming against your friends, or as part of a group in a far away mythical realm  
 And of course it can also be digital video, whether it's commercially produced by one of the big studios, or shot on a cameraphone and edited on a home PC.

who creates all this content  
simple = anyone  
then?

So – who is creating all this content?

The simple answer is anyone can create digital content...

$$\begin{aligned}
 \text{complex } z &= x + iy = |z|(\cos \phi + i \sin \phi) = |z|e^{i\phi} \\
 \bar{z} &= x - iy = |z|(\cos \phi - i \sin \phi) = |z|e^{-i\phi} \quad x = \operatorname{Re}\{z\} \\
 y &= \operatorname{Im}\{z\} \quad |z| = \sqrt{x^2 + y^2} \quad a = e^{\ln(a)} \quad e^a e^b = e^{a+b} \\
 z &= |z|e^{i\phi} = e^{\ln|z|} e^{i\phi} = e^{\ln|z| + i\phi} \quad \ln z = \ln|z| + i\phi. \\
 (e^a)^k &= e^{ak}, = \text{ anyone, but in different ways}
 \end{aligned}$$

the more complex answer is:

Professionals such as journalists, musicians, game designers, studio producers,  
Enthusiasts, such as established bloggers, mash up DJs, established Video bloggers & small  
production houses, and...

Amateurs, like me with an irregular, low traffic blog, the guy down the road with a sampling  
deck, a MIDI keyboard, an electric guitar, a couple of bits of software and some spare time,  
your mum and dad, with their handy cam, some editing software that came with their  
computer, and an upload service like YouTube

Yeah, so anyone... The variables being quality, quantity and an established level of trust  
with ones audience.

(That's Eulers Formula, or at least the bits of it which looked complex and scary and suited  
this slide build...)



whose content do I want?

With such a variety of content available, and multiple sources to choose it from, whose content do I want?

If anyone and everyone can create content, how do I find the stuff that's best suited to me, how do I know if the information is trustworthy, and how do I get it to my play out devices?

Am I as a user looking for information based on brand, a specific search, a friends recommendation, viral linking or is it something I simply stumble across and like the look of?

At the end of the day, ongoing consumption of content is all about trust and relevance.



help me find it

There is a huge amount of content 'out there' if we as an industry can help people find content which is relevant to them, and make it easy to access, we are half way there.



help me receive it

Now I've found this content, make it easy for me to get similar stuff in future. Price it at a level that I am comfortable with, and make the subscription and fulfilment seamless and simple.

Send it to me in the most relevant format for the device I choose to use to experience the content. Don't tell me about your technical problems, just get it to me, I want to increase your audience, I may even give you money!



help me rate it

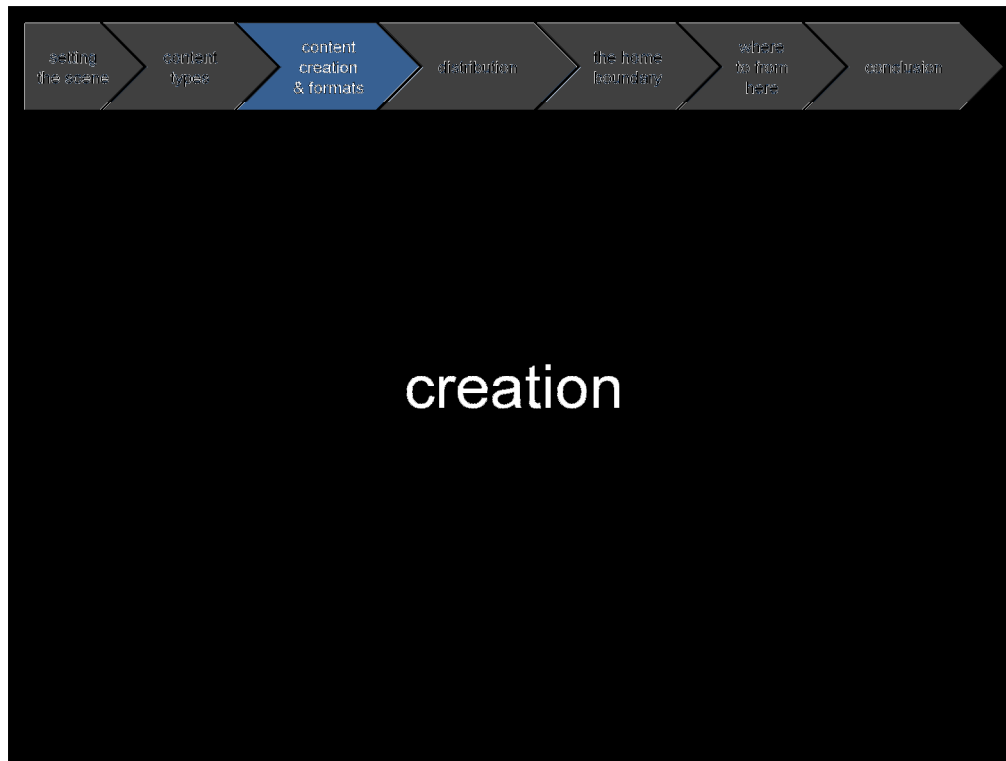
If I decide that I like content, I want to rank it so it not only gains relevance in my future searches, it helps newcomers know if the content is useful or useless – so don't forget to make it easy for me to tell you how much I like your work!



help me spread it

Once I am subscribed to content, let me tell my community, my friends and other people with interests similar to mine about my find and how much I like it.  
It wouldn't hurt to give me some credit on my account if anyone I recommend your content to ends up subscribing either ;)





Let's look at where, and how, our digital content comes into being...

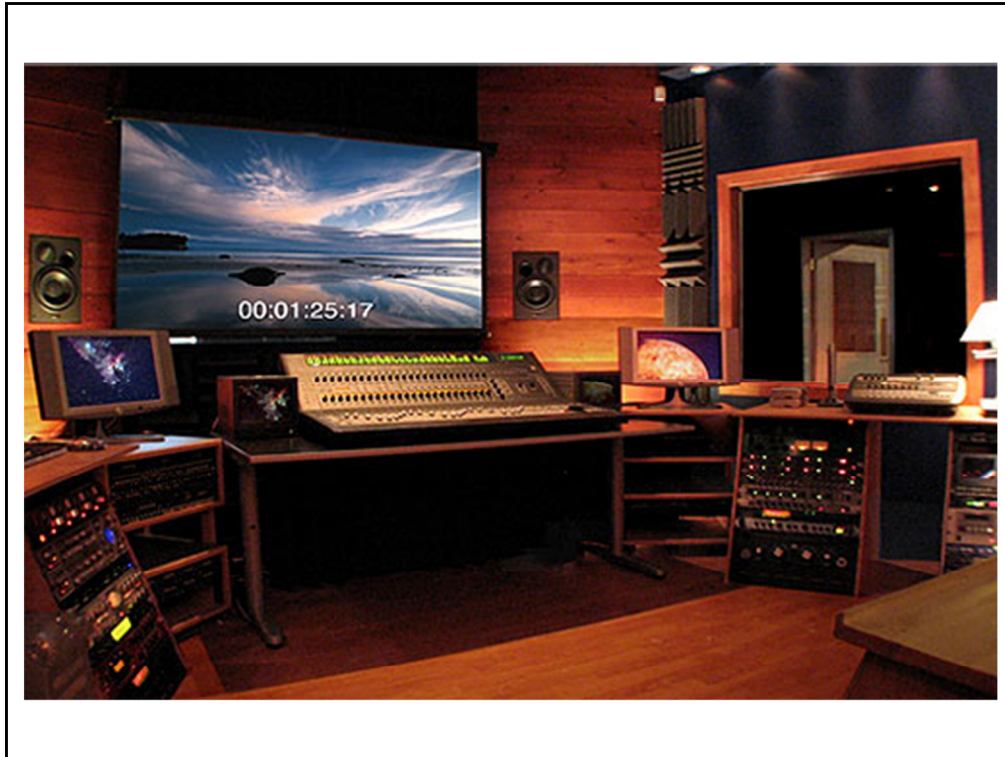
## what is a studio?

The conference brochure promised that I'd pose this question so let's look at the studio...

A studio can be defined as a “workplace for the teaching or practice of an art” so, in the digital content world, that pretty much means anywhere, physically or virtually, that we can create content.

Because we're dealing in 1's and 0's, for the most part, we can ignore the physical side of the discussion. As long as we have the tools required at our fingertips, and the data we are transforming into our end product available, a studio could be an office or an airport lounge, a specialised facility or a desk in the lounge at home.

So – what does that mean?



It means that, while this is definitely a studio



So is this...



And so is this...



The barrier to enter the content creation space

has been broken. So, what does that mean to the media industry?



anyone can create

Anyone can create content  
with tools ranging from high end, purpose built facilities, right down to the average home  
computer.



anyone can distribute

Anyone can distribute the content they have created  
Using any of a number of services.





BUT...

what they want it  
what they want it  
what they want it

To be SUCCESSFUL in distributing digital content to the masses, you need to

Understand

Who they are – Are they tech savvy and will search for content?

Or will you need to find them. How will you find them, through social networks, viral campaigns, branding exercises

What they want – Do they want a full immersion, high definition, surround sound experience of the latest blockbusters, or would they be happy with some low def content that they can watch on their phone in under 2 minutes per clip while they wait for the bus?

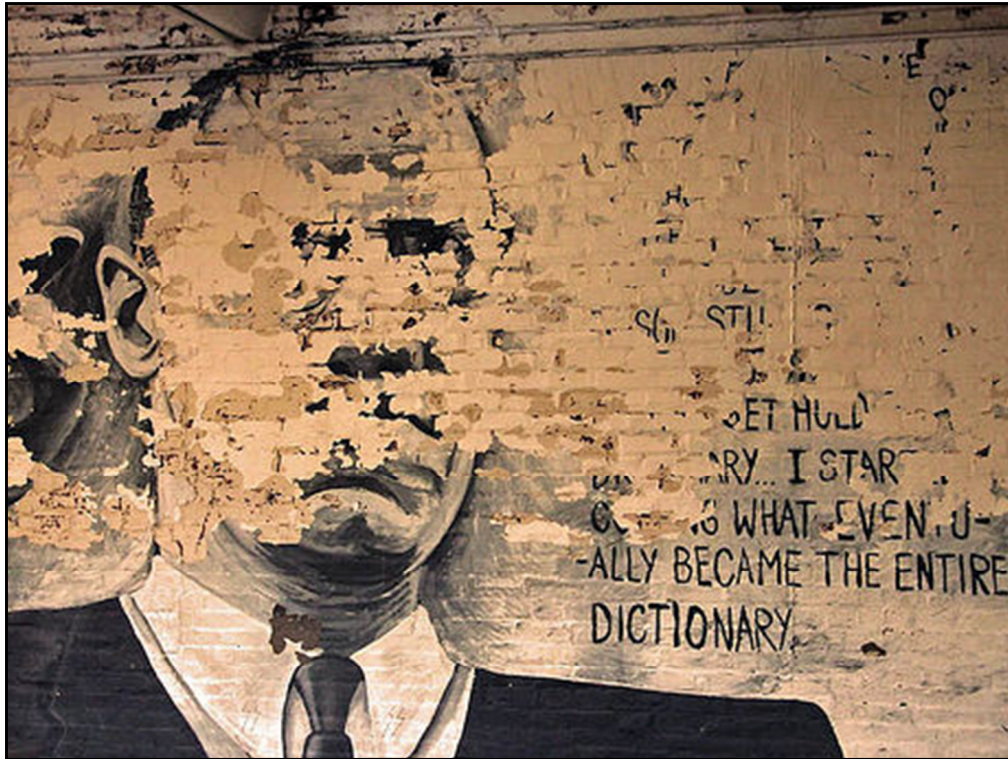
Where they want it – Is it a shared experience with the whole family on the couch in the lounge, or is it an individual one at their computer. Is it important enough to them to receive it wherever they are on a mobile device, or would they like to download it and take it away in the car with them to keep the kids quiet?



What market does your content best suit?

Is it a mass proposition?

Or tailored to a niche

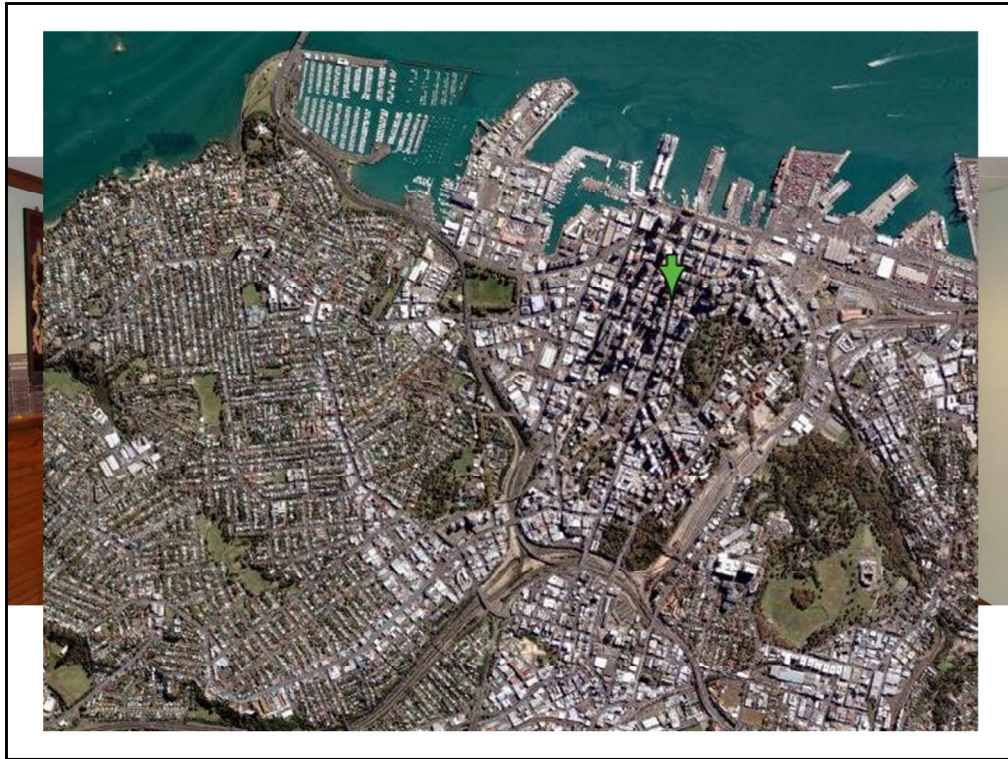


Do you want to make a profit?

Cover your costs?

Or distribute your work freely for the betterment of humanity, (or your ego)?





And how is your content going to be consumed?

Is it a 10 foot or a

two foot experience?

Which room of the house is it experienced in or,

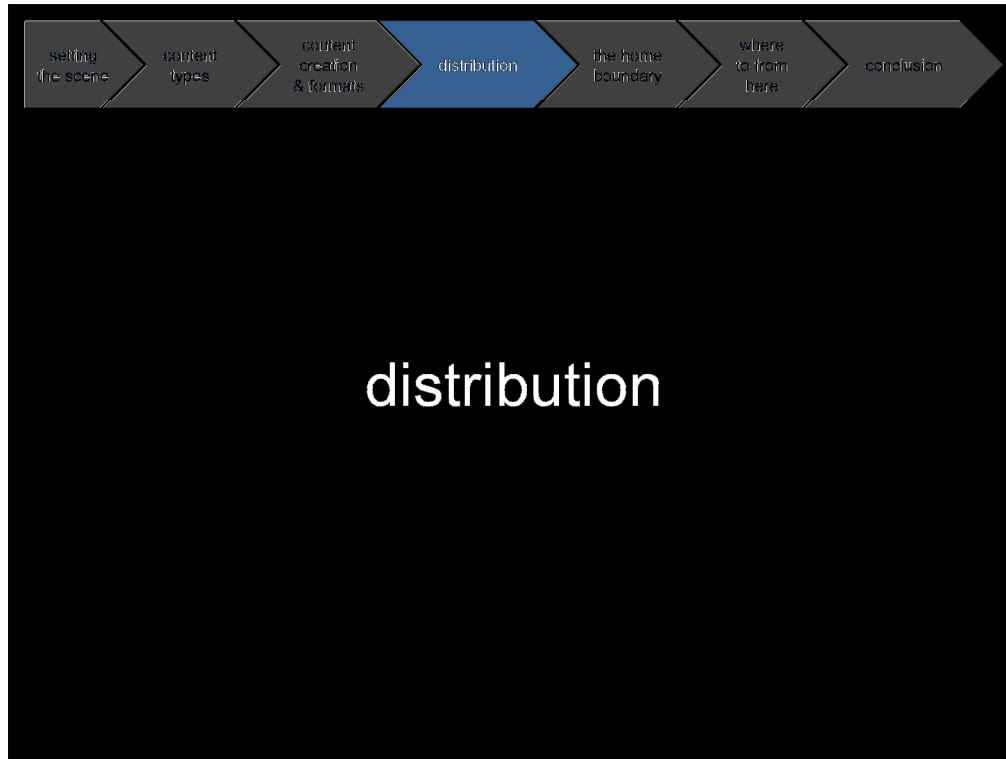
can you take it wherever you go?



What play out device is the content destined for,

what are their capabilities? There are a lot to choose from now, and an even wider range on the way. Understanding the device and what it can do is essential knowledge as it helps to determine how much bandwidth will be required between the distribution point and the device, and

what format and protection measures to apply to the content prior to sending. The end device may even require the incoming media to be transcoded to allow playback and this may in turn affect the level of experience that the consumer can expect from that device.



So, how do we distribute this content around?

In the IP world, media tends to be distributed either by streaming direct from the network, or downloading the media to the device to be played out 'locally'

more changes?

In the IP world, media tends to be distributed either by

streaming direct from the distribution network, or

Downloading the media to the device to be played out 'locally'



## quality of Content

Choosing the right distribution method for your content will depend on a number of things, which we can summarise into the three Qs

Quality of content – The production, editing and encoding quality, along with the desired quality of the end user experience all influence the amount of sustained bandwidth required to support the media stream. The quality of the stream or the monetisation needs.

Quality of Service – The resilience of the network connection to the users environment, bandwidth required for seamless delivery and the ability to cope with lost or retransmitted packets without impacting the end user experience.

Quality of Environment – Where, and via what devices will the media be experienced on and what then is an appropriate level of service to deliver. This factors in the devices local storage and the ability to deliver data to the device within the users environment.

which network should I use?

What does that mean?

It means that you (and your consumers) have choice, but

choose carefully as, if you pitch your content quality too high and allow for only one distribution method, you will quickly limit your market not only in terms of who can receive the content, but in terms of who has the capability to experience and cover your costs of distribution.

So – what are the benefits and drawbacks of each distribution method – and which network should I use?

welcoming, deployed, distribution

The most resilient, secure and costly method of distribution is a carrier grade network.

It has the benefit of establishing a connection between the distribution platform and the consumers premises at a guaranteed level. It will handle quality of service protocols to ensure the best experience is maintained.

It can be a closed and secure network with only known clients being allowed access to it.

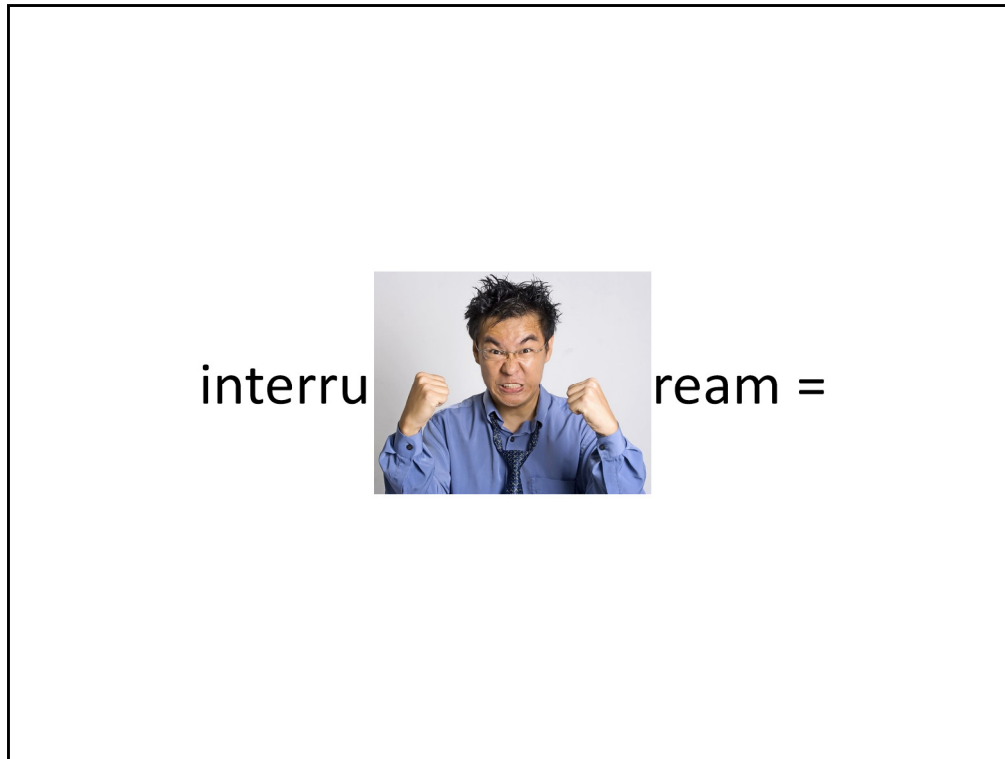
Many high end content providers will require their content only transits these well architected, robust and auditable networks as part of their distribution agreements. Worldwide, many network providers are architecting such networks and will allow for third parties to purchase capacity on them to distribute content – so you don't necessarily have to worry about hiring the technical and operational expertise required to set up and maintain one of these networks yourself.

~~over the top distribution~~  
over the top distribution

If that sounds all too hard, or your pricing is at a level which cannot cover a carrier grade overhead, or your content or user experience does not require such immediate, high quality availability - you can leverage existing networks and deliver a 'best efforts' service. These networks, such as the internet are subject to transient network conditions, as well as sharing the available bandwidth from the distribution point through to the user with the rest of the traffic on the network.

What this means is that, to deliver the entertainment experience, some tradeoffs must be made in terms of receiving the data, or the quality of the delivered experience.

[doesn't quite make sense]

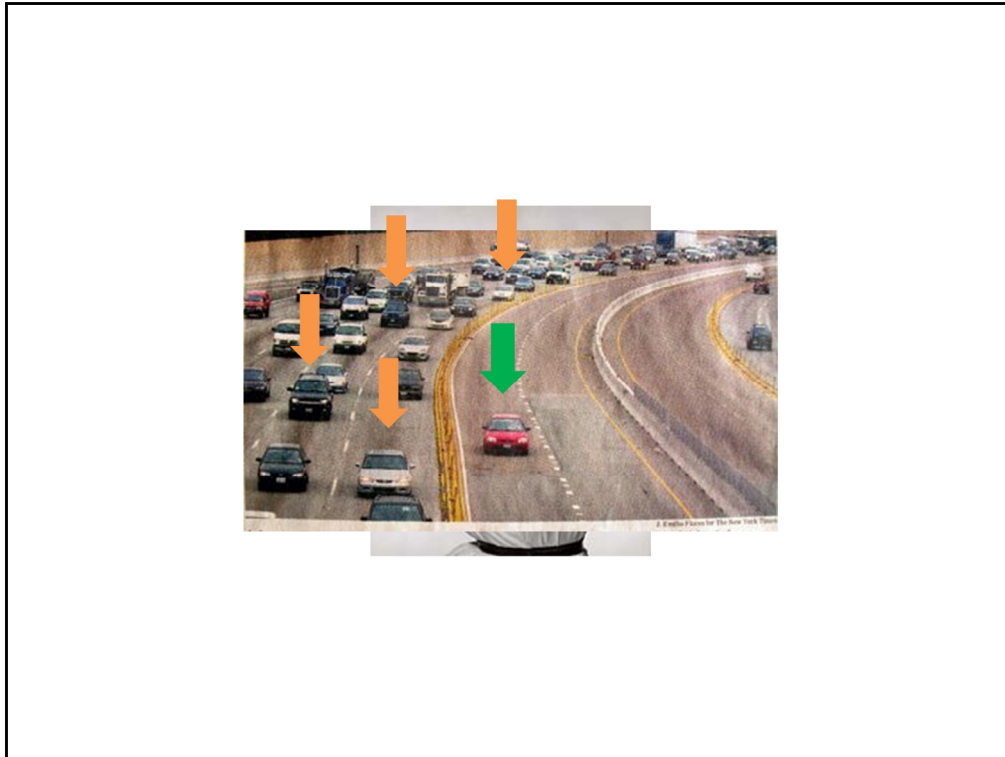


On a shared network, we still have the same essential options for distribution, being to stream or to download the media. From here on in, we will discuss \*video\* distribution as other media types tend to have significantly lower bandwidth requirements which can be satisfied by most available networks.

Streaming media – suits live broadcast of events such as news, sport, and video on demand where the content is closely protected and local storage is unsuitable. The video is streamed to the user at the same rate as it is transmitted by the service distributor.

Because of this, any interruptions to the stream caused by network congestion will directly impact the end user experience. Because the consumer will tend to be watching a live event or some high value content, viewing interruptions will make them...

Angry... And then they will call, cancel your service, or both. Either way, interruptions will cost you money and future customers. Which is why streaming services tend to encode their streams at a lower average bit rate than they expect their customers network will be able to sustain, simply to give themselves sufficient headroom to handle transient network conditions.



To provide a higher quality experience than streaming can provide, the other options involve downloading all or part of the media prior to playing out the file.

There has been some concern from the internet community, especially from network providers that the sudden increase in traffic from video downloads will bring the internet to it's knees.

In the same way that it is important perform traffic planning to handle increases of traffic on the roading network, the same goes for the information superhighway.

There are well architected and privately owned 'Toll Roads' for cars, just as there are carrier grade private networks for high value data distribution.

For the rest of us choosing to use the shared public roads (or network) we simply need to manage our traffic usage more appropriately.

“85% of all video we watch is pre-recorded so you can set your system to download it all the time”.

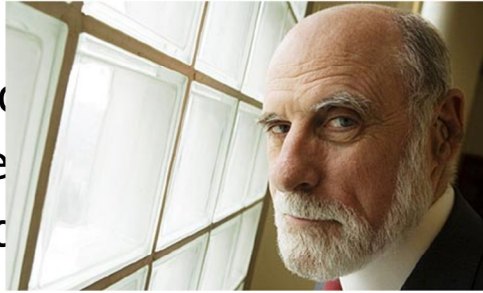


Photo Credit: Murdo Macleod, The Guardian

At the recent Edinburgh International Television Festival this impending download doom was discussed, and dismissed by one of the speakers who stated that “85% of all video we watch is pre-recorded so you can set your system to download it all the time”.

The man making this statement was this guy... Dr. Vint Cerf, known affectionately as the ‘Godfather of the internet’.

He went on to explain that internet overload has been predicted on numerous previous occasions and the network, designed for its resilience, has always managed to grow, evolve and adapt to the new demands put upon it by its users.

So, if we can assume the designer of the network knows what he is talking about, let us now investigate some of these “download now, watch later” methods of distributing media across a shared network.

## progressive download

Perhaps the most common 'over the top', video-over-the-Internet services is that of progressive download.

This is a methodology where the media file is downloaded to the client device, but starts to play out once enough data has been received to create a 'buffer' which allows the download to continue in the background while absorbing any network delays. This tends to suit short and/or low to medium resolution clips.

Similar to streaming in experience, the user is able to experience the media soon after the decision to watch the file. However, user behaviour needs to be observed as, if a file takes too long to download a sufficient amount of buffer data, the user may abandon the stream. A careful balance between quality of experience, the likely connection speeds of the customer base, and their propensity for patience must be maintained.



## video download

Video download is a nice, easily explained and deployed method. Essentially, a media file, in its entirety is downloaded to the client device before the play out begins.

While this method will suit any quality level of media, the user is expected to wait for the media to completely download before they can experience it.

Since significant amounts of data will be transiting both the distribution network and the customers home network, this method needs to be carefully architected to ensure that caching of the files occurs as close as practicable to the clients most likely to request them. This may require some customer profiling to assist with the caching at the network, and also relies somewhat on the users environment for a successful experience – if the play out device can only connect at a low data rate to the home gateway, it will take a long time for a large file to arrive ready to play, no matter how well architected the distribution network is.

## trickle feed

The last of the three main download methods is what is called a 'trickle feed'. This mechanism relies on media of interest being marked by the consumer and downloaded in the background, off peak and stored for future consumption.

While potentially easiest to deploy in a distribution sense, the customer behaviour must be very well understood to make this methodology viable in the long term as it requires the customer to be both interested in the media, and patient enough to wait for it.

However, the download delays can be mitigated by allowing subscription to program series, indicating interest in specific genres of media as well as allowing for additional downloads to be initiated based on the recommendations of friends and viewing profile similarities between the customer and others in the subscription group.

This models success is largely dependant on the ability to subscribe to enough shows to meet the users expectations, along with the destination device having enough storage to hold all of these shows.

## device security

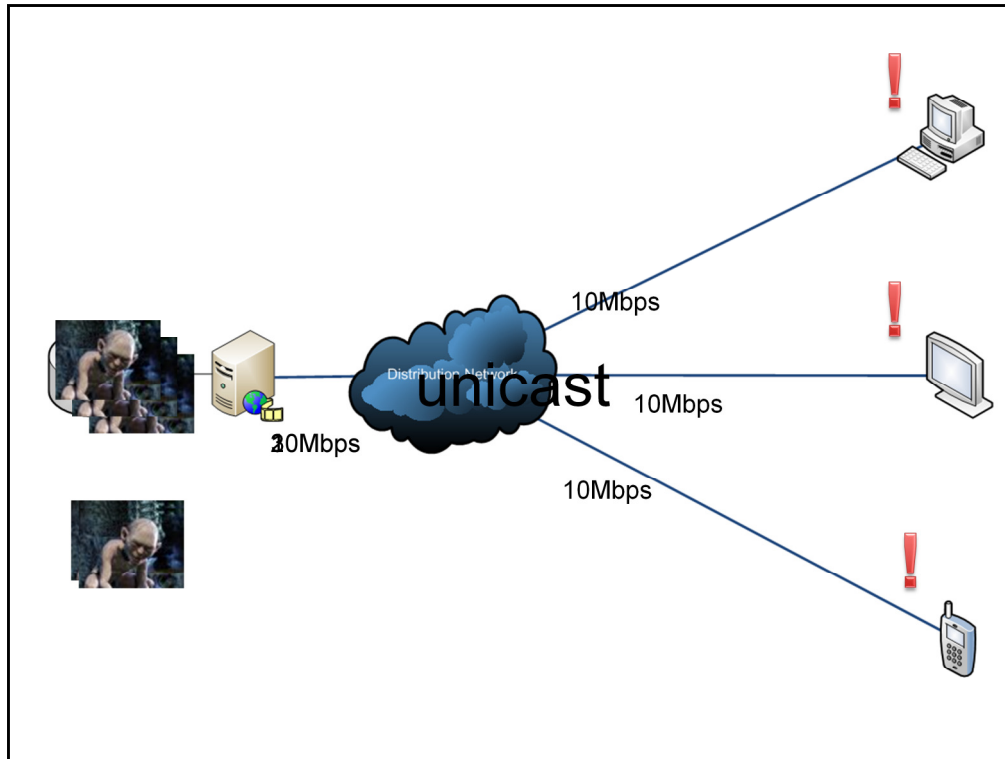
In all three of these situations, once the media is downloaded on the device, the device also needs to have sufficient security to prevent the user from shifting the content to another, unprotected device.

Often this will restrict the platforms which the user can receive the content onto, and the content owners will tend to have a set security audit procedure they use to ensure that destination devices comply with their security policies. Some example of this are NDS certified set top boxes and Microsoft IPTV certified devices. Both of these certifications ensure that the users device is identifiable and that encryption within the box circuitry is maintained until it hits the play out device.

## optimising distribution

The last point we need to cover on the distribution topic is that of optimising the distribution itself.

For getting a file from the distribution network to a device, the distributor will use either unicast or multicast for getting their files around the network.



In the unicast context,

the network looks a bit like this.

The files are stored at a central point in the distribution network

And, on request from a client,

A stream is sent from the media store, to the client device.

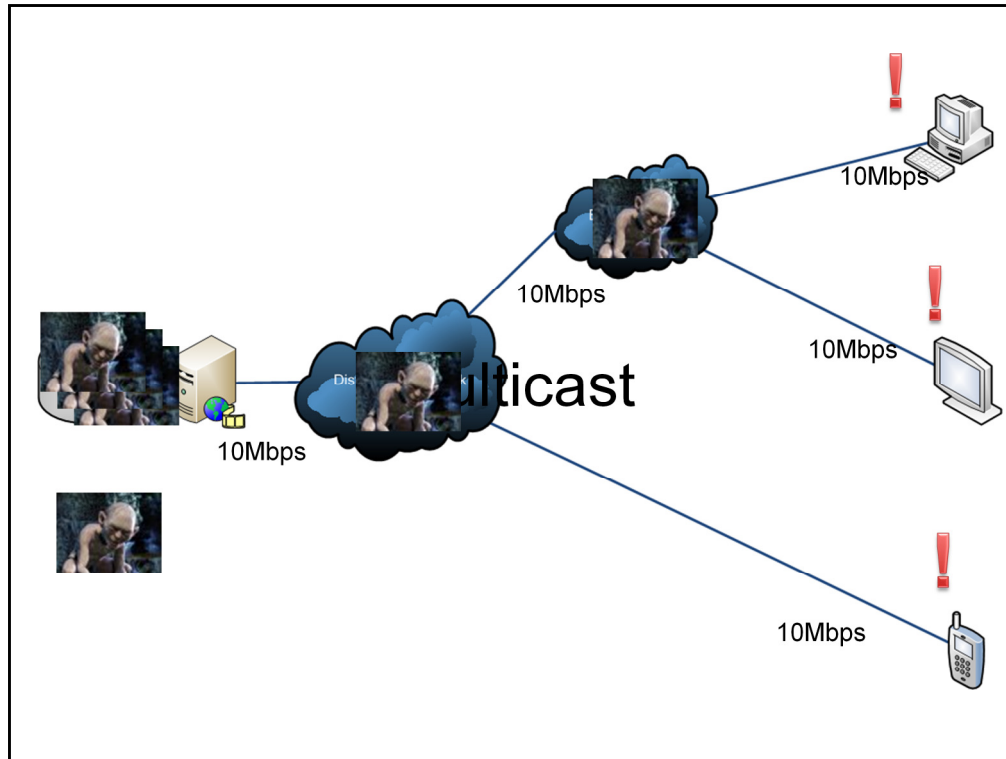
If another client requests the same asset,

A new stream is created

And sent to that client

And so on...

As you can see, this causes a significant amount of traffic between the core and the play out devices., the advantage with this method is, as each client is receiving their own stream, the provider can offer 'trick play' functionality by receiving control signals such as pause, skip, rewind etc. from the client device and make these changes to the stream, without having to worry about the security of any locally cached media.



To alleviate this core traffic, a distributor can enable 'Multi casting'. Multicasting has some specific requirements in terms of understanding and distributing traffic appropriately at a router level, but essentially

the network looks like this.

The files are stored at a central point in the distribution network

And, on request from the first client,

A stream is sent from the media store, to the client device.

If another client requests the same asset,

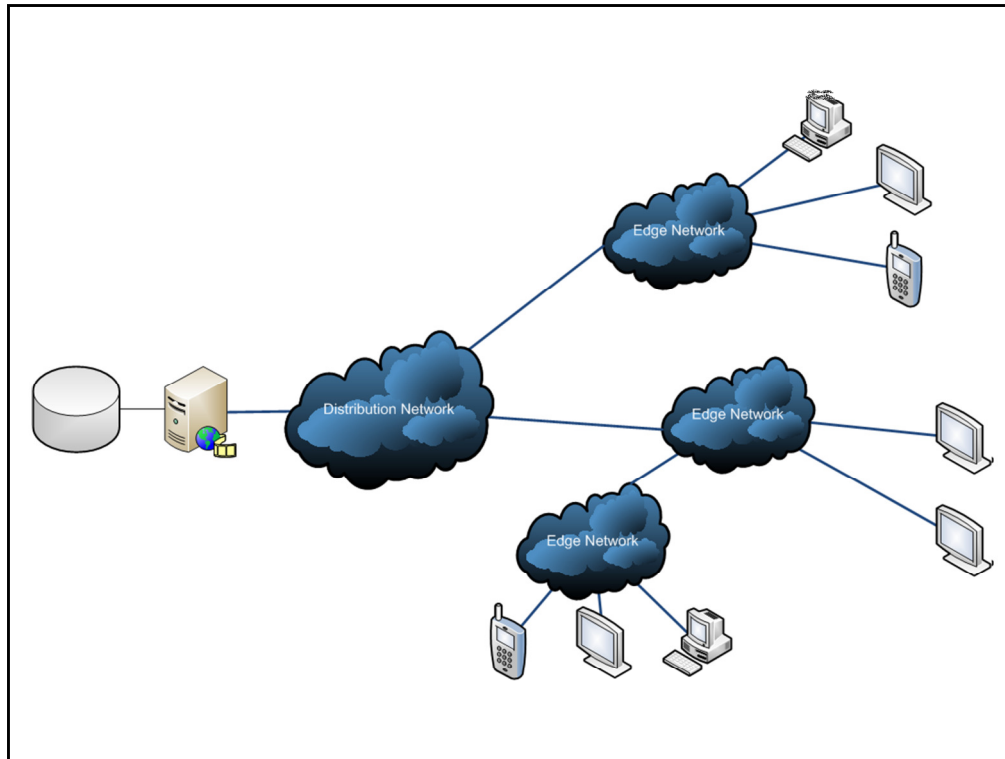
The stream simply splits from the closet distribution point

And is sent to that client

And so on...

As you can see, this reduces the amount of traffic between the core and the play out devices as each stream of 1's and 0's is only sent from the core once. This is an appropriate mechanism for live streams of media such as news and sport, and mass updates of pre-recorded data to many clients.

It does however, require a cohesive architecture to ensure that the multicast ability spans the entire distribution network, and can mean in some situations that trick play will be disabled.



To make these architectures work effectively, the distribution point should be placed as close as possible to the largest clusters of play out devices.

This reduces load on the core of the network, and also reduces latency between the clients and the distribution servers, improving the quality of experience.

To achieve this, the distributor can either place their own additional cache points closer to high usage areas, or they can partner with providers such as Akamai who operate a global distribution network, hooking into more than 1000 networks in over 60 countries.

With a partnership agreement in place to ensure Quality Of Service can be maintained across both networks, services such as these allow the distributor to increase or decrease the scale of their distribution network quickly, and in some instances, to extend their coverage to other networks which their provider also has a relationship with.

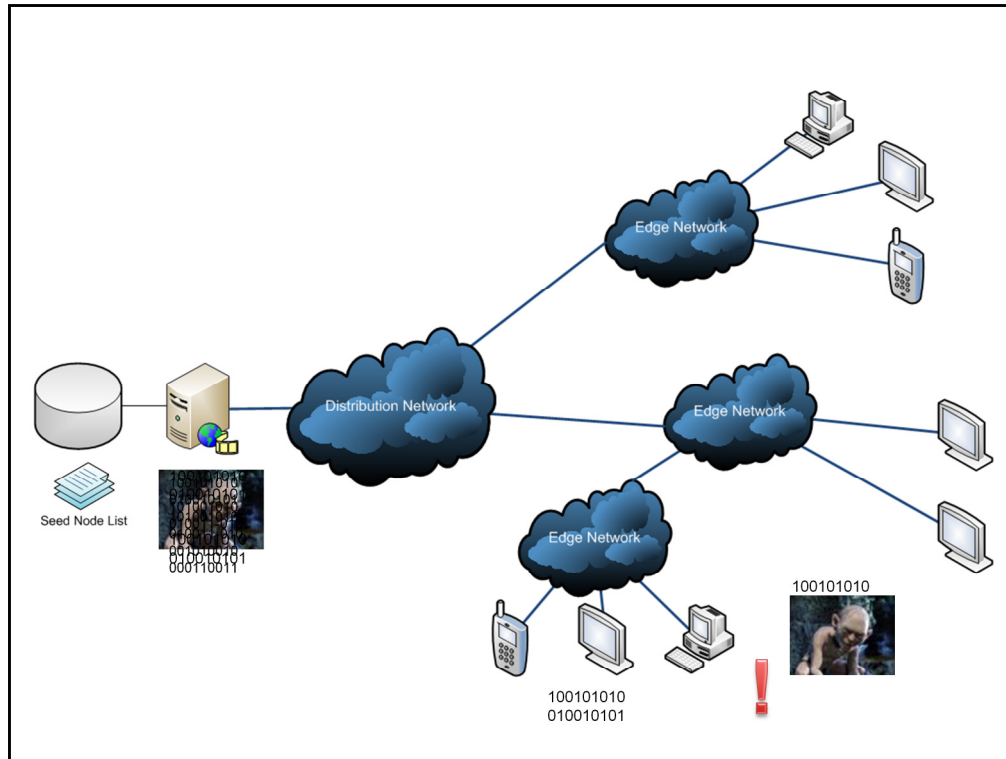


peer to peer

The final distribution methodology I will touch on is that of peer to peer networks which were originally designed to allow network users to swap files efficiently between themselves.

Peer to Peer got off to a bit of a bad start with the majority of the files transiting its networks being copyrighted music and video files, this generated a substantial amount of traffic and increased the backhaul requirements for service providers.





Now – this is a tricky slide – the grey cylinder to the left represents our directory server which holds a table of all the clients who have parts of a file.

The brown box next to it represents our content distribution network – we’ve got our magical network clouds in the middle, and our client devices around the outside.

Let’s give it a crack...

In a peer to peer network, a file is split into many parts and distributed to requesting clients or nodes.

A client will connect to a directory server and receive a list of nodes which hold the parts of the file that the requesting client is seeking.

These nodes are known as seed points and are sorted to utilise connections which are closet to the requesting client.

The first client to connect will receive the file from the content distribution network can then start re-distributing these file parts as they are received.

Subsequent client connections will then receive parts of the file from other nearby clients as the device requests the file. This allows the data to only transit the parts of the network it needs to deliver the content in it’s entirety and, the local bias of connections reduces the backhaul required from edge networks as the data will be served as efficiently as possible.

appliance nodes still gather traffic

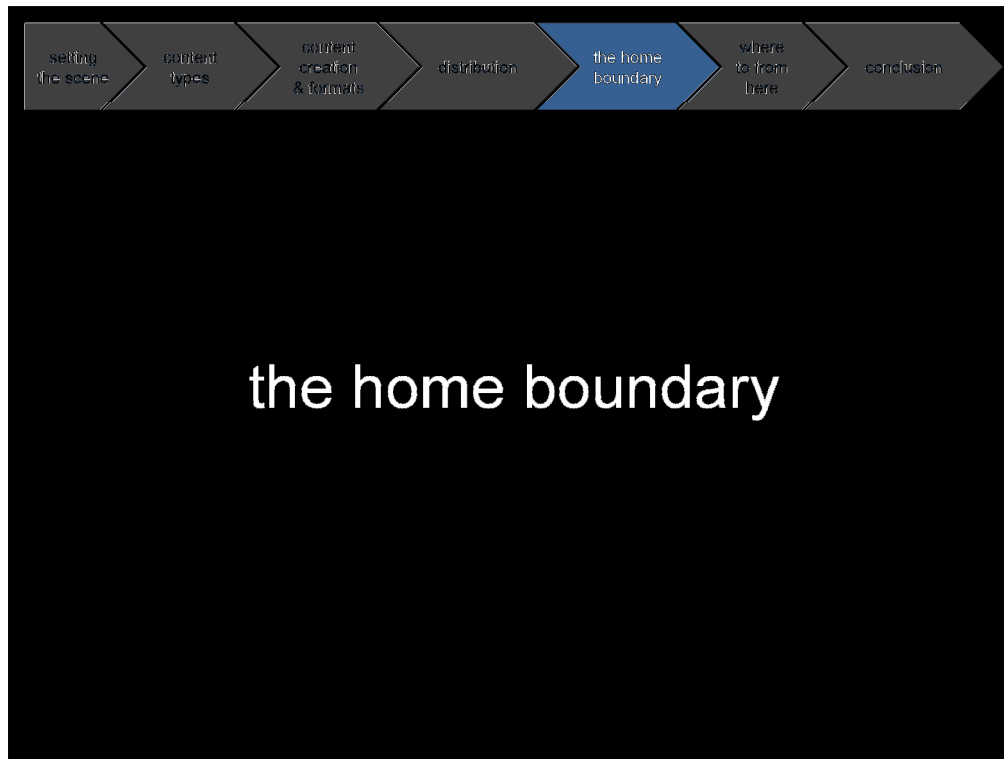
So – how do we make the peer to peer system work better?

A few slides ago we discussed the reaction to illegal file sharing was for service providers to begin shaging peer to peer traffic to reduce their backhaul requirements and slow the flow of copyrighted digital assets illegally transiting the network.

Going forward, the traffic shaping approach will need to be reviewed as there are an increasing number of **legitimate** uses of the peer to peer mechanism. The BBC is a good example with their recently launched iPlayer which is using P2P to distribute programming to it's subscriber base. Other examples include software updates from a number of games companies and of course the Joost service which uses both peer to peer and a content delivery network to distribute their content.

Peer to peer relies on good upstream rates and a high number of willing 'seed nodes'. In this respect the network operators need to review the balance of their upstream versus downstream rates as well as installing servers within their network to serve and seed content to their subscribers, reducing the requirement for out of network back-haul. Obviously, data cap measurements would also require review and perhaps in an 'in-network' P2P mechanism, this traffic would be rated differently.

As peer to peer is more efficient where there are a large number peer devices present on the network, we should also recognise that building this P2P capability into an appliance-like device with a low power draw will make users feel more comfortable about leaving their peer devices switched on and thus serving other members of the network.



This is where the story ends for many content providers and distributors. But I submit to you that THIS, the home boundary is where our work truly begins.

Up until this point, the content we have lovingly crafted as traversed our well architected network, bounced around via caching servers or peer to peer nodes. These are areas which we can, for the most part control and understand as, even transient network conditions can be monitored and reported upon so that our call centre staff have a good picture of what the conditions out on the network are.

But here, past the home boundary, things get... different.

The conditions past the wall of the house will affect the final media experience more than any other part of the journey, the ability for the 1's and 0's to get from the DSL modem to the play-out device will be determined by the choice of network technology, the quality of the picture will be dependant on the cables, and the distance they are run between the play-out device and the screen, the sound will depend on the capabilities of the play-out device, what connection type is chosen and the balancing of the speakers.

Very little is known about the devices present in most residences, and the high degree of skill required to assist a customer to set up their devices for the best experience they can deliver is prohibitive.

So – is it all too hard? Should we as an industry simply put the onus onto the consumer once we have delivered our content to their door? Well, that is certainly a popular option, but going forward, I believe that the companies who choose to extend their influence past the wall of the home and help their customers to get the best experience from the media they consume, will be the companies who can influence future media choices and build a relationship of trust with consumers who will keep coming back, because the experience is made simple and the results are better than they can get elsewhere.

## in-home networks

There are very un-normal people such as myself, with a whole LOT of data cable lovingly routed through the walls during the last renovation of their homes, there also are people who have cobbled together a wireless network which may or may not be secured, may or may not be sharing spectrum with their next door neighbours, and may or may not be capable of sustaining the throughput required to deliver media to their devices. There are a final group of people who I like to refer to as “Mum and Dad” and, though we love them dearly, they just haven’t got onto this DSL thing let alone connected more than one device to the interweb... But they will.



As discussed earlier, the choice of network is vital in determining the quality and resilience of the play-out experience. If we want to help our customers to receive the very best we can offer them, we need to educate them not only for what they need to receive their internet radio today, but what they will require to experience the mighty All Blacks taking the smack to the rest of the world in all their High Definition glory. So, for those of us who haven't set up a robust media distribution network in our homes... What are the options?

Structured cabling is the obvious, yet most intrusive option. We are beginning to see it deployed in some new homes as well as those being renovated by enthusiastic geeks (such as myself) with understanding spouses (such as my wife). If installed during the build or renovation of a home, the cost of this option is not great, and the stability and security of a physical, wired network is fantastic. But this is not an option for many of us so, what other options are there?

No new wires means exactly that, either using what structured cable already exists in the home, or deploying a completely wireless network.

Power line networks simply overlay the power cables in the home with a data stream. They require a special adapter to be plugged into each of the power points to be networked, or the chipset can be added to the consumer appliance at time of manufacture. They are affected by other appliances plugged into the power which may introduce sufficient interference to block the data stream completely. British Telecom have recently signed DS2 to supply them with kit for a self-install trial of the BT Digital TV offering. We are watching the results of this closely.

MoCa or Multimedia over Co-axial is another option employed in countries such as North

real-time? If not, how?  
support needed?

Which is the best option for the home network depends again on a number of factors.

Will the content be streamed in real-time, or can it be downloaded to the device over time?

How much of a roll does your company wish to play in assisting customers to setup their networks? The costs of a truck roll and the time on site or on the phone need to be carefully weighed against the expected savings in reduced helpdesk calls.

How does this support and configuration translate into liability should the customers home network be compromised?

How long do you expect this generation of technology to be used? What are the requirements of your next generation of content and security and how does this relate to the cost and complexity of upcoming technologies which could satisfy those requirements?



consumer target development equipment

The trend to connect consumer devices to an IP network is gaining momentum. The need to extend the home network to a number of rooms in the home is also growing and the difficulty of connecting and configuring these connected devices and managing the media which they share is increasing accordingly.

There are some new standards which can help both the consumer and the service provider deal with these complexities. But, as with any good technology standard, there are a number of standards from which to choose.

Standards such as TR-069 and DLNA as well as plans from industry heavyweights such as Microsofts 'Rally' initiative will certainly help move the complexity away from the consumer, but – as service and content providers we must also decide to what degree our support for older, legacy products and rights management capabilities should extend before they drop off the support list.

Some manufactures are choosing to address this legacy issue by driving their devices via open source systems and software and, when the company chooses to drop support, the source code is released to the community from which developers will often pickup and continue the development of the device, extending it's useful life, and often it's functionality to areas far beyond what it was originally programmed to do.

While this can be great for the consumer, it can also cause headaches for service providers who no longer have certainty as to the capabilities of configuration of the device.

## environmental issues

The consumers premises is a place fraught with inconsistency, lack of control and yet is the place where our content and services ultimately live or die.

We need to be cognisant of this complexity understanding that a customers wireless network throughput can be fine one day and fail the next because of factors outside of our control.

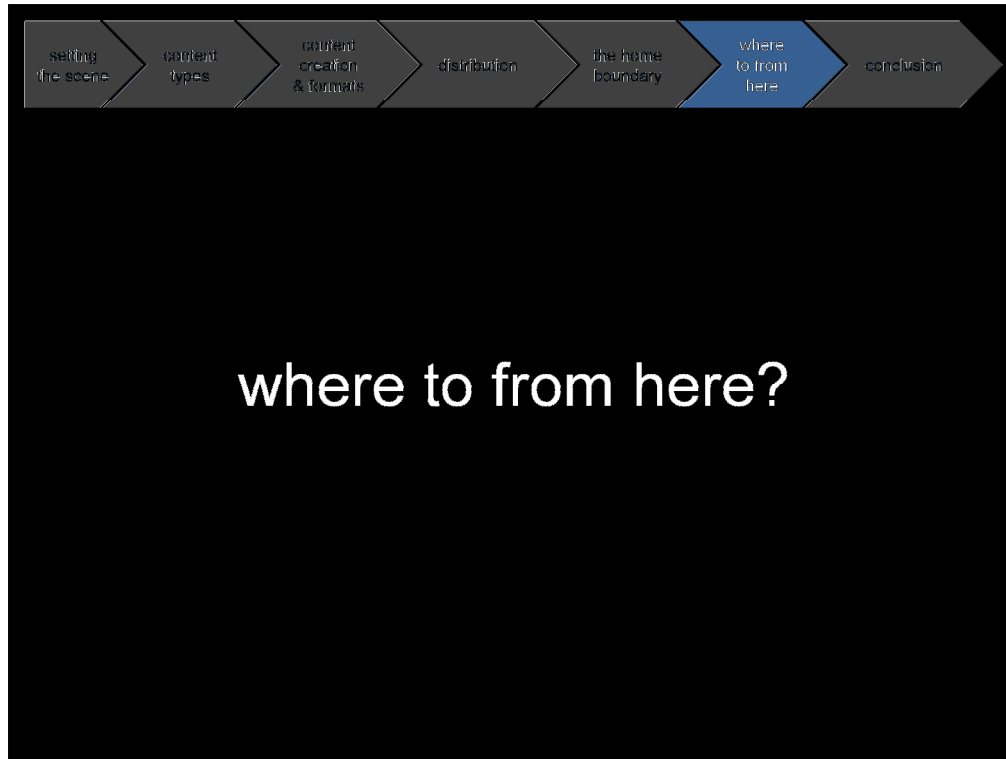
The next door neighbour may be overlapping their network over that of our customer, a DECT phone or baby monitor which also uses the shared radio spectrum may have recently been switched on. A hair dryer or washing machine may have just started up, killing the throughput on a power line network.

These are all things which the call centre staff will need to be aware of. Remotely supporting the devices is another option but requires the ability to tunnel through the customers own network through to the device to perform whatever maintenance tasks may be required.

Consumers expect devices to 'just work' and they should. I don't understand the intricacies of how my car works, it just does. The appliances we place into our customers homes should be the same, but they don't. Given the variability of network types, capabilities, the volume of available play out devices, the codecs we choose to format our content with and the security we choose to wrap around it, along with the requirements of our content partners and the ability to distribute this content to the consumers premises and then to their device, it is little wonder that few organisations are willing to take on this essential, but thorny issue.

The home boundary is the ring that binds them all and we ignore it's complexities at our peril.





This is an incredibly exciting time for our industry. We are on the cusp of a huge change which will forever change the way the we are informed and entertained. I would like to leave you with some of the challenges which we will face as we move forward into this increasingly digital future, and ask that you see them not as obstacles but as opportunities for us to face and solve together as an industry.

## digital media creation

There is a huge amount of digital content out there now, this is only going to be added to. The opportunity here is to provide appropriate technologies, tools and a platform from which we can leverage this created content and make it available to the people who are seeking it in the most appropriate format for them.

## distribution

There are a huge variety of options for distributing this content. High speeds also require a high degree of infrastructure and maintenance, this all adds overhead to the model which reduces the available margin. Seek out the most appropriate method for your audience and don't forget there are at least two sides to the distribution issue, the content distribution network to the home, and within the home itself. Neither can stand in isolation, yet only one can be closely controlled by the service provider. Make it easy for your customers to make the right choices as to what technology they require now, and in the future – and manage their expectations closely.

## digital rights and content protection

This is possibly the most contentious issue in the mix. DRM will only ever be a lock for honest people and those with the desire and time to dedicate to circumventing protection mechanisms will always win out eventually. As such content protection measures become a moving target and your content and play out devices must be able to keep up with the changes in the measure employed to protect this high value content.

If you price your content at a level that your customers are willing to pay, then the desire to use alternative means to access the asset become more of an intellectual challenge and less of a real world driver. If your customers think you are ripping them off, then they will have very few qualms in ripping you off.

Be cognisant also of your legacy customers and ensure that your licensing plans will account for forced changes in the technologies you use to protect your digital assets. You may need to provide a transcoding service for them to continue accessing changed content, or a subsidised upgrade to a more advanced play out device which supports the new protection mechanism.

## regionalisation

The IP world is without boundaries and it's a technically simple matter to circumvent many of the regionalisation restrictions currently placed on content. Be aware of what your exposure is should content you licence be played outside of the boundaries you have agreed to. Weigh up your exposure against the costs to control and prosecute such misuse, and invest in technologies which allow for traceability back to the original source of the breach.

## viewership

Understand your customers. What makes them tick, what do they like, what do they hate. If you can present your audience with compelling, relevant content in a format appropriate to their situation, then they are more likely to continue consuming your content and improving their profile, than to go elsewhere and take their chances on a completely new platform, experience and pricing regime. Get permission to help your customers improve their own entertainment experience and continue this conversation over the life of your relationship with the customer.

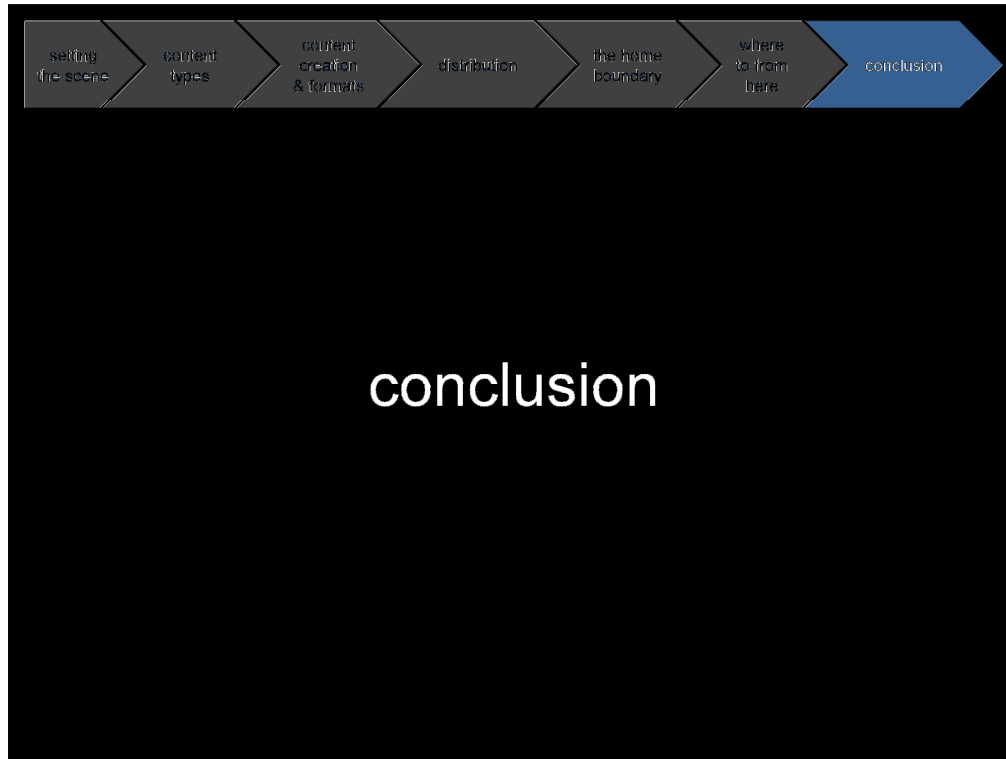
Leverage the power of groups and your customers social network. Let them comment on your content, recommend it to others, and to receive the recommendations of others who enjoy similar content.

People have a desire to communicate and belong, we are social creatures and there are very few reasons why your technology choices cannot allow for interaction with others.

## playout devices

There is a huge wave of devices coming, understand the trends and look for what you can leverage to improve your offering. If a customer's radio station choices place them in a particular demographic, then consider adding that to the profile of other entertainment devices such as their video on demand appliances.

Don't forget the customer who were with you from the start, help them to update their technology to take advantage of the latest content offerings, allow for services to support their older, legacy devices for as long as practicable.



How do we as an organisation and also as an industry deliver relevant, trusted content to our end-users in a format they value?

How can we make this delivery sustainable in terms of financial return and longevity of the solution?

I honestly believe that there IS room for both the philosophical and commercial realities to be realised, but that is not going to happen without further investigation, discussion and agreement.

For businesses to succeed in the brave new world of digital entertainment, they will need to attune themselves to the priorities, expectations and experiences of their customers and find innovative, financially sustainable ways of delivering the kind of content end-users want – where and how they want it.



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