



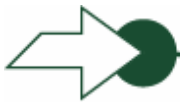
HD-TV over IP: Who Pays the Bill?

An opinion by The IP Development Network

The IP Development Network has an in depth understanding of Internet, Telecoms and Media convergence. We provide Strategic Product Analysis & Design services to Service Providers, carriers, equipment manufacturers and investors in the UK market.

For more information on The IP Development Network please go to www.ip-dev.net





Act Now or Go Bust

Investment in LLU reduces the cost of incremental internet bandwidth by 91%, but even with LLU, a 2 hour 1080p HD movie costs the ISP £2.10 to transport.

The Step Change HD-TV is a step change in bandwidth requirements, needing up to 65 times more bandwidth than MP3 audio. A 2 hour HD movie is over 9 GB of data.

Whether you plan to sell "IP-TV" or simply continue as an access provider, you are going to have to carry this traffic and these data volumes are going to make a dramatic impact on your costbase: each 2 hour HD DVD sourced from the internet costs an IP Stream based carrier £22.16 to deliver.

ISPs need to act now to set the principles that allow them to survive as increasing amounts of HD film content flows over their networks.

Benchmark transport costs It is worthwhile comparing the cost of current and future internet use:

Content	Transit	IP Stream	LLU
50 Minute Album - MP3 Encoding	£ 0.01	£ 0.14	£ 0.01
2 Hour HD at 1080p	£ 1.03	£ 21.13	£ 1.07

ISPs must act now HD content is becoming increasingly available. ISPs need to act immediately to put products in place that allow them to charge for the bandwidth this content will demand.

Bandwidth charging is a key strategic move for the following reasons:

- It protects against the cost exposure from HD content
- It establishes a principle, before the market evolves
- It allows ISPs to introduce their own content later at lower rates

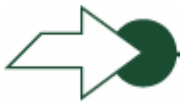
Revenues to match costs ISPs simply cannot afford to allow users to download HD content from the Internet without charging them to cover the costs. Covering the cost of downloads is critical to the short term financial future of service providers.

Establish a principle Users cannot be allowed to expect HD films to be free. It is vital to establish bandwidth charging now, before expectations are set that movie downloads are free. ISPs failed to generate revenues from the increasing volumes of music downloaded to iPods and saw their costs increase as usage grew. They cannot allow this to reoccur with HD, where files are 65 times larger.

Users need to understand that there will be delivery charges for HD content sourced from the Internet and it is vital that ISPs establish this principle long before the mass adoption of the HD over IP technology.

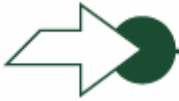
A position from which to grow ISPs have an inherent cost advantage delivering their own materials over those of 3rd parties, because they can be multicasted and cached. This means that the transport must only be paid once. This cost advantage needs to be translated into a price advantage. For this reason, they need to set transport costs now for 3rd party content that they can undercut with their own content later.





- A repeat of the MP3 scenario? Because ISPs are not yet ready with their IP-TV platforms, content agreements, networks or price plans, there is a significant risk that Internet-based distributors will win the lion's share of the HD market as they did with music. ISPs need to decide now which way to go and take firm action to establish their new business models.
- Bandwidth charging gives options ISPs are at a crossroads. They need to decide where their future revenues are going to come from. There is up to £100 per user per month of line rental, broadband, calls, mobile and TV spend (see previous research).
- ISPs can go two ways
- The TV Model – ISPs become the service front end, delivering converged access, web, messaging, telephony, applications, music, film and TV content
- Promises significant revenues from targeted advertising
 - Requires extensive infrastructure and media rights agreements
 - Bandwidth charged as Films and Music, rather than as MB and GB
- The Internet Model – ISPs become a network utility, carrying data requested by users buying directly from the web (Skype, iTunes, Google, P2P)
- Consumer bypasses the ISP and buys directly from producer
 - ISP has simpler, access & voice based business model
 - Service Provider sells a dumb pipe and charges for utility usage
- In today's "free" market, putting up prices is not an option, but ISPs will need to recover extra bandwidth charges from Internet TV downloaders.
- A necessary move to usage charging Flat rate pricing models will not work. Whereas in the past, ISPs have been able to 'absorb' power users, with HD files that are 9 GB, one user downloading one file poses a significant cost risk to the ISP, whether they are LLU or not.
- Some of the elements are already in place. Most contracts define a "fair" usage but do not deal with what happens if usage is "unfair". The problem with this is that more and more users are going to be caught by these policies and their usage deemed unfair.
- Service Providers need to change their terminology and accept that unfair usage is simply chargeable usage. Charges for "unfair" usage will eventually catch more and more users (as baseline bandwidth usage increases) until the Internet Model is truly a usage-based utility.
- Bandwidth does not equate to value The weakness of the Internet Model is that consumers do not understand bandwidth charging because bandwidth does not equate to value: it costs the same for Amazon to mail a CD as an HD DVD, yet over the internet, the cost of delivering the HD DVD is likely to be 100 times greater.
- A Digital-TV Divide There are likely to also be serious issues caused by the 30% of the population who are unlikely to be unbundled. Charges for such customers at current IP Stream rates will be prohibitive (eg. £25 per film), so IP Stream pricing will need to decrease by 90% or there will be a Digital-TV Divide.





Content control removes cost... If users opt to buy from the Internet, LLU ISPs will pay £2.10 every time an individual user downloads an individual file.

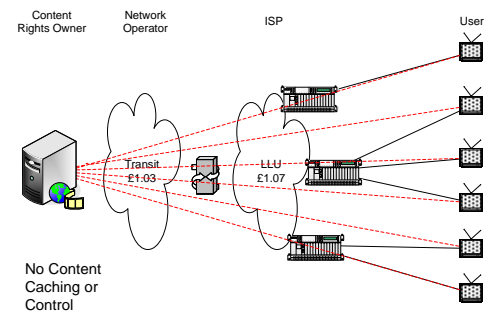
If the ISP has control of what is on offer through an Electronic Programme Guide (EPG), it can multicast and cache content closer to the users, reducing network costs through capital investment. Each file still costs £2.10, but critically, the same file can be served to multiple users without incremental network costs making the cost of an individual user trivial.



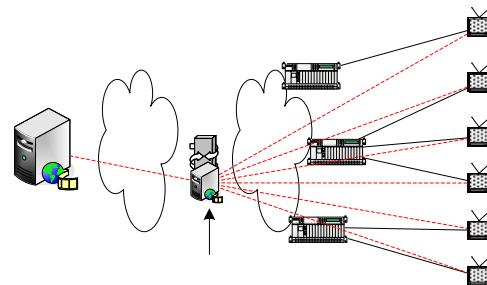
...but requires capital investment Deciding to become a content aggregator or broadcaster under the TV Model requires significant capital investments in content architecture (ref: Home Choice), but delivers a valuable product.

Gains from multicasting & caching

IP Stream offers neither multicast nor content caches at this time. As a result, ISPs incur costs per instance of the same file being retrieved.



Where HD video is concerned, ISPs need to be aware. Each file can cost up to £22.16, every time a user demands it.



By deploying central content caches, the Transit cost becomes one-time, rather than per instance. Distributing these caches to individual exchanges is needed to make the LLU expense a one-off too.

Multicasting is central to cost effectiveness. Can you afford to keep paying for the same 9 GB file over and over again?

Cost per User for 2 Hour HD 1080p	IP Stream	LLU Unicast	LLU Multicast
1 viewer	£ 22.16	£ 2.10	£ 2.10
5 viewers per exchange	£ 22.16	£ 2.10	£ 0.42
20 viewers per exchange	£ 22.16	£ 2.10	£ 0.11
100 viewers per exchange	£ 22.16	£ 0.70	£ 0.04

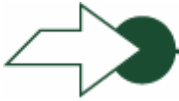
Note: above 30 viewers backhaul links are Gigabit instead of 100 Mbit.

Do consumers want more choice?

BARB viewing figures showed that in the week ending 25th June 2006, only 17 channels (out of 187 surveyed) reached more than 10% of the audience and that 78% of viewing time was spent on those 17 channels.

Only a very limited number of users actually take advantage of the choice on offer today. The promise of infinite amounts of on-demand content is a fine concept, but its real-world attractiveness must be questionable, especially as users will have to pay per view in order to cover the costs.





Conclusions for ISPs For sure, the cost of incremental backhaul will fall as increasing amounts of fibre capacity is deployed. This cannot be relied upon to make the numbers work and measures are needed today to ensure the ISP survives beyond the very short term.

An average TV viewer watches just under 23 hours per week. As HD content, this is 448 GB per month and means that the ISP needs over 11.5 Mbps of backhaul capacity per household. On LLU unicast this would cost £119 per household per month. Multicasting is a commercial imperative, but platforms are not ready today. Unfortunately for the ISPs the availability of content is ahead of the delivery capability, so they need to act now to prevent short term, acute financial pain.

ISPs need to do the following in order to defend their current position and develop their ability to deliver the HD applications to their customers:

- Change “fair” usage policies into usage-based charging products
- Educate user base on bandwidth
- Decide whether to be a broadcaster or an access provider
- Deploy multicasting & caching infrastructure at network edge

ISPs cannot rely on fair usage policies as their policies for dealing with unfair usage are so crude. Charging for usage will undoubtedly stifle demand, but ISPs have little choice. They simply cannot afford to give users free access to web-based unicast content when the costs they incur to deliver it are so large.

Multicasting is the only viable option to keep costs under control. It will enable service providers to offer mass market viewing for free (as part of an access bundle), but it forces ISPs down the TV route where they have little expertise and significant capital requirements.

The question has to be asked: are we reinventing the wheel? Broadcast mechanisms are already in place to deliver HD content and don't suffer from the same incremental costs as internet-based options.

Maybe the investment should instead be channelled into figuring out how the fundamental advantage of the internet – the uplink – can be used to create a service which progresses from where we are today?

The bandwidth economics This opinion paper focuses on the cost of incremental bandwidth and does not take into account network build costs. The capital economics of LLU are described in The Residential Triple Play Market Study, page 3.

An ISP has two access options: to buy IP Stream Centrals from BT or to build or lease their own LLU network.

- IP Stream Central bandwidth costs ~£206 per Mbps per Month
- On an LLU network, the cost of 100 Mbps backhaul is between £5.54 & £11.78 per Mbps per Month. The average cost is £10.38

In both cases, the ISP needs to buy Transit to and from the Internet at a further cost of around £10 per Mbps per Month.

