

Will video break the Internet?

ESOA Position Paper on how hybrid broadcast broadband TV can deliver on the ambition of video anytime, anywhere, on any device

Executive summary

The video content delivery market is undergoing a huge transformation. Major viewer trends are redefining the industry offer and have triggered the development of Internet TV services.

As the tide of Internet video continues to rise, major distribution challenges will be faced: the risk of network and last mile congestion, and possibly a new digital divide.

This paper presents hybrid options integrating satellite as an immediately available and efficient complementary route for High Definition Quality TV and video content across Europe.

With this document, ESOA submits a set of recommendations that will help the European Commission achieve broad deployment of hybrid broadcast broadband solutions and meet the objectives of the Digital Agenda everywhere in Europe.

These regard:

1. Facilitating the emergence of a hybrid broadcast broadband architecture
2. Ensuring that retail Consumer Electronic equipment is easily interoperable with the above architecture
3. Ensuring that satellite infrastructure can be easily accessed by end users, and
4. Supporting the emergence of an affordable and non-divisive Ultra HD ecosystem in Europe to support development in this area by the European industry.

ESOA is a non-profit organisation established with the objective of serving and promoting the common interests of satellite operators from Europe, the Middle East, Africa and the CIS. The Association today represents the interests of 21 satellite operators who deliver information communication services across the globe. Together ESOA Members provide invaluable communications services to the whole world including emergency communications, live broadcasting, maritime and aero communications, secure services for governments, 24-7 monitoring of industrial processes such as energy plants and a whole range of other communications capabilities that society has come to rely on.

Introduction

The video content delivery market is undoubtedly undergoing its biggest transformation since the invention of television 80 years ago. Viewers have evolved beyond a passive state of ‘watching the box’, into active selectors of content generated by traditional and new suppliers and consumed where and when they want.

Three main trends are fundamentally redefining the industry:

- **Personalised choice:** viewers watch the content of their choice when they want
- **Seamless experience** across multiple devices: from TVs and PCs to tablets, smartphones, and games consoles
- **Image quality:** viewers expect a constantly improving experience: more and better HD and Ultra HD in the future

New entrants on the market (for example YouTube, Netflix) are addressing these trends through the Internet. Their arrival has triggered broadcasters and TV platforms to develop a first-generation of OTT services (on demand and multi-screen). On-demand usage is growing rapidly but is still relatively limited in absolute terms (In 2013 in the UK, OTT services represented 8% of total media consumption¹). Even so, it is already a critical challenge for Internet networks: in Europe², real-time video represents 42% of Internet traffic at peak hours, with 25% generated by YouTube and Netflix alone (resp. 67% and 50% in the USA).

As the tide of video content flowing through the Internet continues to rise, the risk of streaming interruptions, inadequate picture quality and other poor experience issues will increase. The risk of a new video digital divide is also raised as service providers concentrate their infrastructure investment in areas with higher population density.

These challenges can, however, be resolved by revisiting the assumption that only one network (the Internet) and only one delivery technology (fibre) is the way to deliver highest standard consumer experience.

¹ Ofcom 2014 report

² Source: Sandvine Global Internet report 2H 2014

Internet video distribution: major distribution challenges on the horizon

- **More stress on the last mile:**
 - If High Definition quality TV and video content were only provided through the Internet each home would need a 30 Mbps³ connection. For Ultra HD the requirement increases to 50 Mbps.
 - The reality is that we are very far from these levels of speed: homes in Europe currently have a measured average speed of 8.7 Mbps.
- **A new digital video divide on the way:**
 - Based on current figures⁴, 38% of European homes are currently not in the reach of Next Generation Access services (i.e. 30 Mbps connection or more), meaning they are excluded from High Definition quality TV and video content and may be excluded for a long time.
 - The exclusion zone is higher for Ultra-HD: 75% of Europe's population is not in the reach of a 50 Mbps connection.
- **More stress on the network:**
 - Full OTT video consumption with HD quality would require 700 GB per month per home. Ultra HD consumption would require 2.2 TB per month.
 - This is 35 to 100 times the current average consumption in Europe i.e. ~20 GB a month⁵.

What is the impact of these challenges?

- Consumer dissatisfaction: compelling content is of little value without quality-of-delivery (e.g. a key sport events being unavailable due to network saturation or buffering of a movie).
- The overall performance of the Internet is at risk.

Is fibre really the only answer?

There exists an unchallenged assumption that High Definition quality TV and video content will be delivered to all four corners of Europe by fibre. This assumption however neglects the following points:

- Europe would need to invest a stratospheric €150 billion in fibre network access to achieve 100% eligibility to High Definition quality TV and video content by 2020.

³ Source: based on 3 concurrent HD streams. 20 Mbps sustainable correspond to ~30 Mbps advertised speed.

⁴ Source: Digital Agenda Scoreboard 2014.

⁵ Source: Sandvine 2014

- On top of this infrastructure investment, video servers will be needed to deliver video content. Scaled to the European population, they could represent an explosive €10 billion⁶ a year of distribution costs for media providers.
- The carbon footprint of an all-streaming model will be significant. One hour of standard definition video streaming generates 0.27kg⁷ of CO₂(e) from data centres and transmission. Full streaming video consumption with HD quality for all EU28 households would translate into nearly 500 MT of CO₂(e) per year.

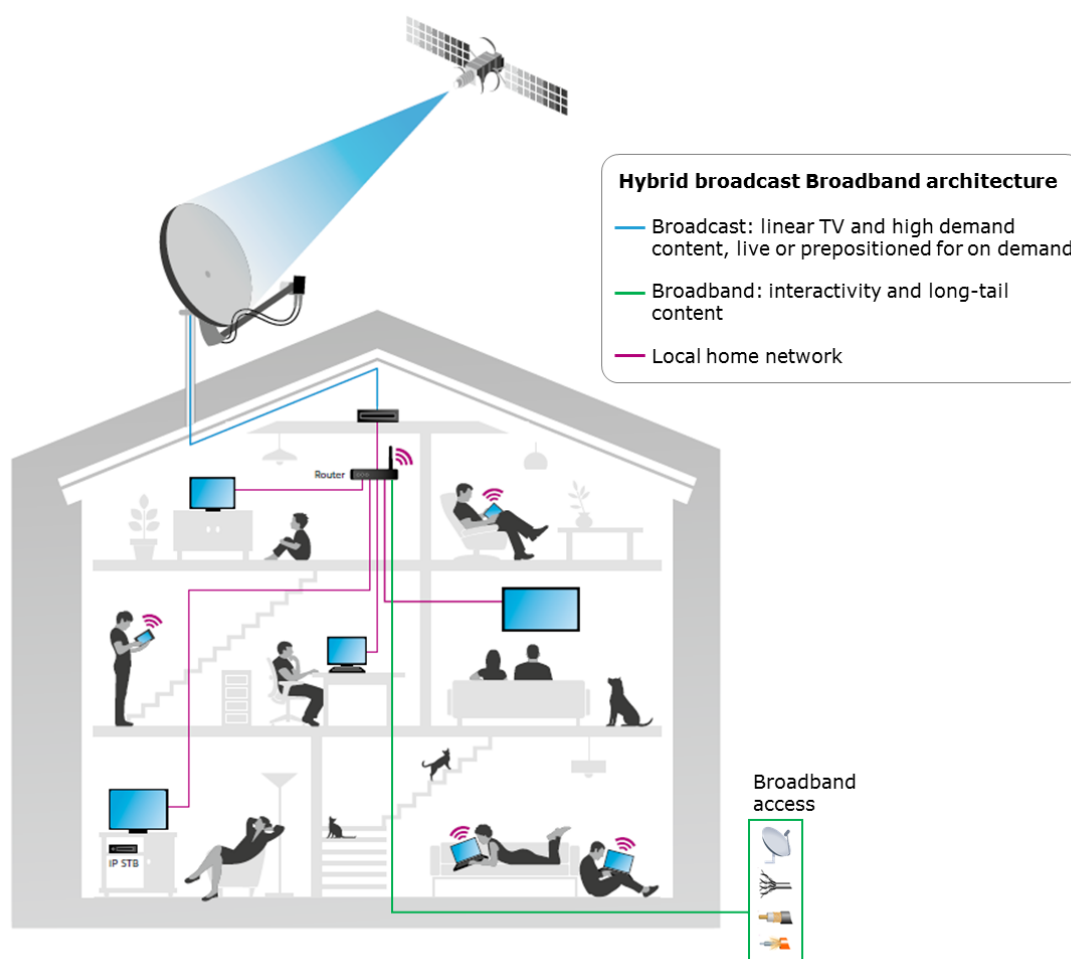
... or are there less costly and quicker-to-market complementary alternatives?

Hybrid broadcast broadband

A hybrid solution that combines satellite for linear television and non-linear high-demand content, with terrestrial broadband for interactivity and long-tail catalogue, can deliver state-of-the-art High Definition quality TV and video content everywhere, including in geographical areas where fast broadband (viz. > 30 Mbit/sec) Internet connectivity remains limited or is unavailable.

⁶ CDN costs only, based on current prices and assuming 15% annual discount for 5 years.

⁷ A. Shehabi et al., Environmental Research Letters 9 054007



A number of features point to broadcast as a continuing key pillar:

- **Aligned with mass-market habits:** the majority of video content (live and catch-up) is consumed by most viewers in a very short timeframe (few days). Broadcasting, complemented by local storage, is particularly efficient from quality and cost perspectives for managing consumer trends.
- **Bandwidth:** a single satellite video neighbourhood can deliver up to 6 Gbps of broadcast video content with guaranteed and ubiquitous high quality.
- **Multi-screen compatibility:** as 80% of tablet viewing time⁸ already takes place in the home, tablets can access broadcast-delivered live and On-Demand content.
- **Ubiquitous service:** ability to reach the broadest population with a constant and uniform quality.

⁸ Source: Google/TNS

How does a hybrid broadcast broadband solution work for consumers?

- This simple architecture requires:
 - A media gateway in the home (either a box or a functionality embedded in the TV set) that delivers live and locally stored on-demand content to all screens
 - A media gateway is part of the network, and as such is managed by the consumer's service provider (TV operator, telco, ISP, etc.)
 - It provides a transparent user experience irrespective of the infrastructure that delivers the content or the screen used
- A media gateway features the following bricks:
 - Broadcast reception capabilities using the DVB standard
 - Internet connectivity or the ability to connect to a modem
 - Ability to distribute video content inside the home in IP
 - Storage capability to deliver the highest image quality and at any time

What are the consumer benefits, today and in the future?

- The 38% of European homes currently not in the reach of Next Generation Access would immediately benefit from High Definition quality TV and video content, specifically:
 - Live TV in HD and Ultra HD by satellite
 - Short/mid-tail Video On demand content in HD (representing 80% of usage) by satellite
 - Long-tail Video on Demand content through the terrestrial network in a quality depending on Internet network conditions
- By 2020, 100% of the population would be eligible to Ultra HD quality TV and video content, as broadcast networks will continue providing most demanded content (linear and short tail On Demand catalogue) and 30 Mbps Internet connection will suffice to deliver the long tail Video On Demand content (vs 50% for the full fibre scenario).

What is the status of hybrid broadcast broadband architectures today?

Europe's satellite broadcast industry is investing to offer the "upper-end of the digital agenda" in terms of end-user experience

- Several satellite TV platforms have already implemented the distribution of the most demanded non-linear content through satellite (catch-up or on-demand video). Most satellite TV platforms are preparing to deploy media gateways that will offer the best TV experience to the widest share of their subscribers, irrespective of Internet performance in the home.
- Broadcast satellites are application-agnostic and fully compliant with this hybrid architecture. They can carry any kind of traffic: SD/HD/Ultra HD content, linear or non-linear video, DVB or IP, in addition to content protection allowing multiple revenue models for content owners.
- European satellite operators are actively investing in developing solutions and standards that will transform a hybrid model into reality. They include a number of technologies that convert DVB transmissions to an IP stream for in home multi-screen distribution, such as SAT>IP, or broaden the usage of satellite push-VoD services to all DTH homes, such as HbbTV.

Conditions for mass market deployment

- Commercial operators (TV platforms) are currently meeting the entire cost of media gateway equipment. However they have to arbitrate between an investment in hardware or in content production.
- Some regulations are creating barriers to offering High Definition quality TV and video content including:
 - A "private copy" tax on hard drives
 - Difficulties in installing satellite antennas in specific areas
- Interoperability of consumer screens (TV sets, tablets) with TV operators is not widely adopted and can increase the complexity of projects.

As a consequence, a number of TV operators are only partially implementing hybrid architectures and that too, at a slow pace. Others are waiting for public authorities to invest in the infrastructure to offer services at marginal cost meaning that the range of services can vary from one location to another.

Support from public authorities in four areas is critical to eliminate the dual risk of a new video digital divide and Internet saturation

- Public policies that promote hybrid broadcast broadband architectures.
- Incentives for commercial operators who are ready to deploy hybrid solutions.
- Mandatory adoption of specific consumer electronics standards to guarantee interoperability.
- Guidelines to facilitate access to satellite infrastructure by end users.

Broad adoption will have a significant positive impact for Europe

- All European citizens will be eligible to High Definition Quality TV and video content.
- Internet congestion will be avoided by offloading high demand content.
- Public investments will be optimised: hybrid solutions represent a fraction of fibre deployment costs for the same end-user benefit.
- TV operators and media distributors will continue to benefit from the flat distribution cost of broadcasting, enabling them to invest more in European content.
- The carbon footprint of the digital media industry will be reduced as a result of less network servers.
- Europe will once again hold worldwide leadership in a democratically available digital video industry.

ESOA recommendations to the European Commission

ESOA would like to share the following recommendations with the European Commission on how to best facilitate the broad deployment of High Definition quality TV.

1. Facilitate the emergence of a hybrid broadcast broadband architecture

The European Commission is invited to consider adopting clear measures that would favour the development and emergence of such hybrid networks.

These should include in particular:

- Inserting appropriate references to hybrid satellite-broadcast broadband networks in all relevant legislative and non-legislative initiatives going forward, including but not limited to those related to the Digital Single Market and the Digital Agenda for Europe (e.g. the EC “Guide to High-Speed Broadband Investment” 22/10/2014, the 2013 Broadband Guidelines - IP/12/1424) as an alternative to deliver Fast Internet Access (30 Mbps) when combining and integrating satellite broadcast with sub-30Mbps broadband access
- Confirming the eligibility of hybrid broadcast broadband networks to EU public funds (e.g. EFSI, ESIF), favouring access to them and advocating the deployment of hybrid satellite-broadcast broadband networks in contexts where they are clearly more effective and cost-efficient than other solutions
- Incentivizing private investors and beneficiaries of ESIF funds available to create joint ventures (at least ten percent of the available ESIF funds devoted to Broadband Infrastructure) proposing projects based on a mix of technologies demonstrating the cost-efficiency of their approach

To facilitate the emergence of such hybrid architectures, ESOA asks the European Commission to:

- Promote the inclusion in media gateways of broadcast capabilities, broadcast-broadband routing capabilities and storage capacities, in order to provide the best quality experience, irrespective of the Internet connection
- Create a favourable environment for the appearance of common technologies and standards for relevant equipment so that providers can benefit from economies of scale
- Consider lifting “private copy” taxes on that equipment, which should be considered as network equipment and not as private equipment

ESOA also requests an increase in R&D spending for satellite in Horizon 2020 on:

- New innovative applications. i.e. smart routing, transmission and filtering mechanisms, recommendation algorithms to maximize hybrid benefits
- Distribution solutions to deliver satellite content in multi-dwelling units, seamlessly to IP networks

Furthermore ESOA urges the European Commission to:

- Ensure continued and unfettered access to satellite radio frequencies that are essential to satellite broadcasting and broadband (Ku and Ka band spectrum)
- In the long-term, assess the different technology routes of video stream decryption on IP devices and the relevant calendar, through a consultation of different stakeholders

2. Ensure that retail Consumer Electronic equipment is easily interoperable with the above architecture

A mandate for all TV sets sold into the European market:

- Digital satellite (DVB-S/S2) support
- Software implementing networking standards to support broadcast delivered services via the IP (e.g. Sat>IP protocol for cable, terrestrial and satellite broadcast⁹)
- HbbTV 2.0 standard with push-VoD solution to allow VoD with guaranteed quality of service, irrespective of Internet connection
- CI+ 1.4 standard (or later) to provide broadcast (CAS) and broadband (DRM) security convergence as well as an unify user interface to navigate and grant access to any secured service coming from the media gateway

3. Ensure that satellite infrastructure can be easily accessed by end users

- Enforce the basic right of free reception of satellite services via small antennas to all citizens
- Recommend the installation of a multiscreen-ready satellite installation (reception and distribution) in new apartment blocks, connected to the wiring of buildings
- Support the provision and upgrade of satellite installation (reception and distribution) ready for multiscreen usage

In addition to these recommendations supporting the rapid availability of 'High Definition quality TV and video content' for all, ESOA also recommends the European Commission

⁹ CENELEC EN50585:2014

support the emergence of an affordable and non-divisive Ultra HD ecosystem in Europe to support development in this area by the European industry. It can do this by:

- Issuing a specific communication in support of Ultra HD that could be launched in the 2nd half of 2015
- Incentivizing Ultra HD content production through incentive schemes aimed at:
 - producers of artistic content to lower the additional costs that an Ultra HD production entails when compared to a standard HD production
 - converting existing content to Ultra HD (35mm sources do actually translate in full Ultra HD 4K quality)
 - upgrading public and private broadcasters' studio equipment
 - promoting training and certification as Ultra HD requires a new production syntax

May 2015