

Satisfying Insatiable Demand with Infinite Choice

SES White Paper
July 2014

Entering the Zettabyte Era: Satellite plays a key role in future hybrid communication networks

Upheaval in the Global Video Market

The global market for video content delivery is undergoing an upheaval of major proportions; virtually all the previous limitations in this market: space, time, size, cost, complexity and functionality no longer deflect consumer demands for more content, better quality, wider access, increased choice and faster delivery.

Multiple screens are almost everywhere, from living rooms to large cinemas and from giant outdoor screens to inside pockets; they offer almost unlimited content, dozens of platforms, providers and networks. Consumers' expectation for high-speed, high-quality service anywhere, anytime, triggers a historically unprecedented demand for bandwidth and network capacity.

The network giant Cisco predicts an increase in annual global IP traffic to a mind-blowing one Zettabyte – one thousand billion Gigabytes – by 2016.¹

Heavier and heavier individual usage could require as much as a 100-fold increase – or even more – in multi-connected households' data consumption in Europe.

Can networks cope with this? Can operators afford such traffic? Can we expect it to generate residual, if any, transport value? Is the implied carbon footprint explosion acceptable? Would citizens have equal access to the content?

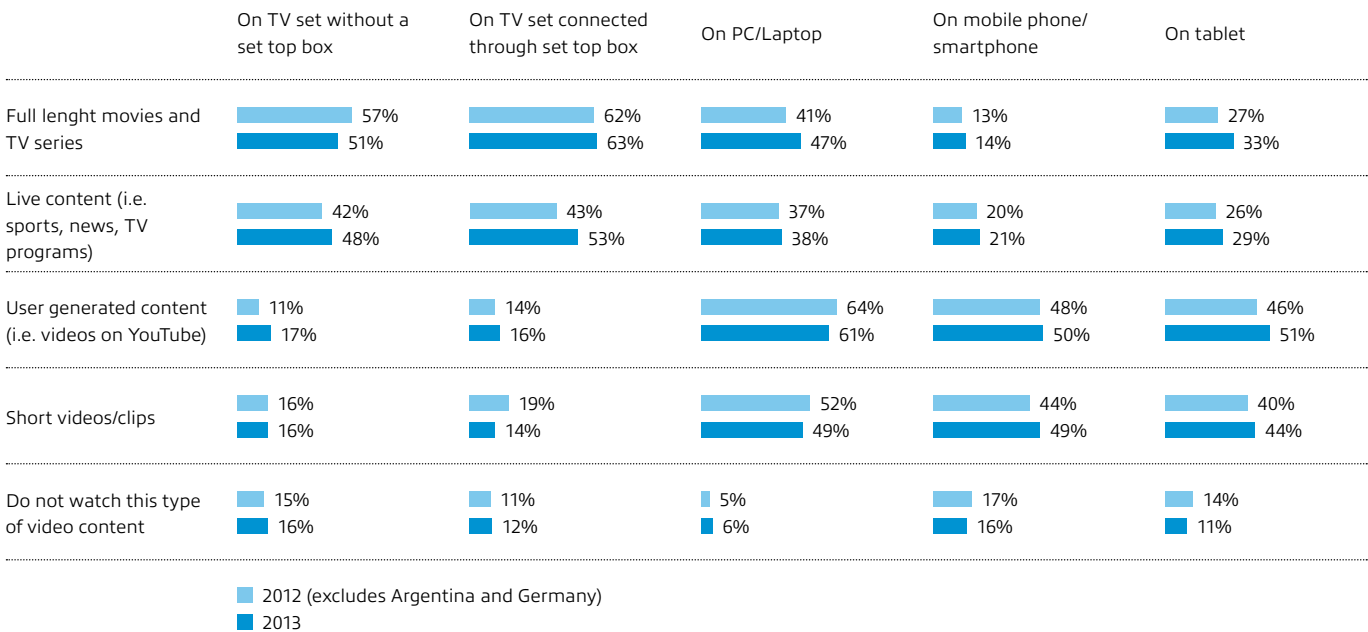
The answer to all of these questions is far from a straightforward “yes”.



Delivery to multiple screens has become something consumers expect

CONSUMPTION OF VARIOUS CONTENT BY DEVICE TYPE

What type of video content do you usually watch over the internet on each of the following devices?



Source: Accenture Video Solutions Survey 2013

The Technology Supernova

People no longer care from where they get their video. They want it anytime, anywhere and on any device.

Video is on the way to becoming an infinite and personalized choice with unimpeded access. Triple and quadruple play offers, on demand non-linear media, Next Generation Video², over-the-top content³, multi-play, mobile, M2M⁴: network architectures and infrastructures are preparing for the gigantic approaching wave of insatiable demand.

We are witnessing the creation of an explosive new communications culture in many ways similar to a kind of controllable technology supernova, signaling and illuminating the end of one galaxy and the beginning of another.

A new generation of delivery technologies is fast emerging, such as Next Generation Access (NGA) networks⁵, optical fiber in broadband networks, new mobile communication

standards and an enhancement of the Long Term Evolution (LTE) standard⁶, developments aiming at TV White Space⁷, WiFi, and fifth generation mobile networks.

These new technologies are backed and complemented by new fiber networks and innovative assets in space: ultra-high throughput satellites, low- and medium-earth orbit, geostationary high bandwidth satellites and high altitude aircraft in the stratosphere providing unprecedented broadband coverage around the globe⁸.

Understanding this technology supernova – getting the moving elements technically and commercially right – will be critical for the economic and social viability of communications media over the next decades.

² A video platform that works on any device to collect, show and share content from TV, all over the web and other communication sources.

³ OTT is video, audio and other media delivered over the Internet without a multiple system operator being involved in the control or distribution of the content. The provider may be aware of the contents of the Internet Protocol packets but is not responsible for it or the viewing abilities, copyrights, or other delivery or distribution of the content.

⁴ Technologies that allow both wireless and wired systems to communicate with other devices of the same type.

⁵ Wired access networks which consist of optical elements and are capable of delivering broadband access services with enhanced characteristics compared to those provided over existing and traditional copper networks.

⁶ Commonly marketed as 4G LTE, Long Term Evolution is a standard for wireless communication of high-speed data for mobile phones and data terminals.

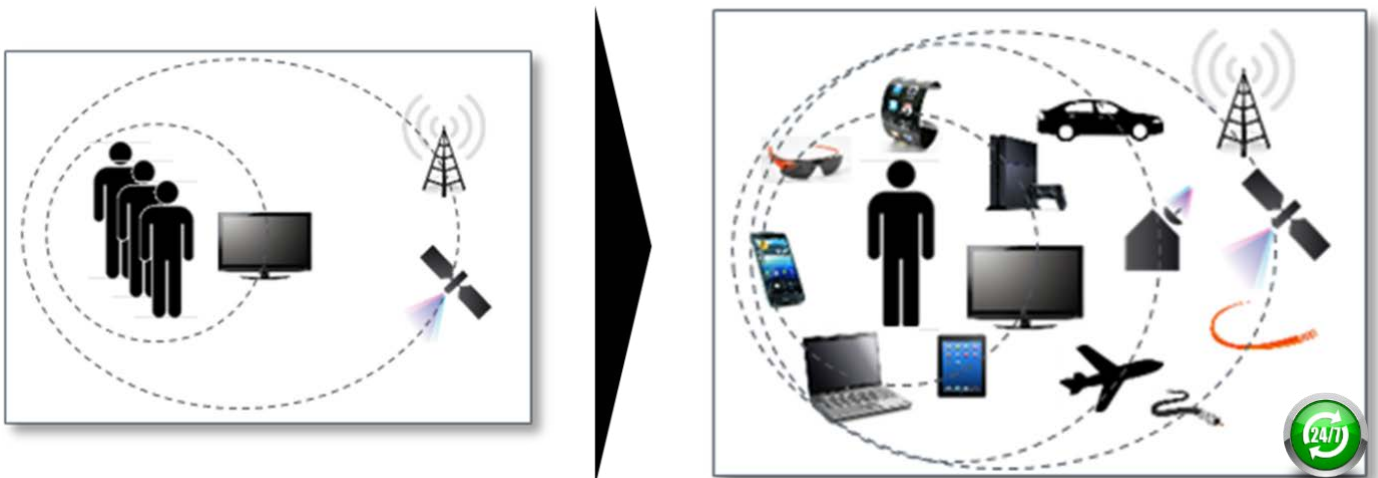
⁷ Vacant frequencies in the VHF and UHF bands available for unlicensed use where spectrum is not being used by licensed services.

⁸ Unmanned aircraft, known as High Altitude Platforms (about 20 kilometers above the earth) flying for an extended time providing communications services to a fixed geographic area.

UNIVERSAL CONSUMER PREFERENCES



FOSTERING A NEW ECOSYSTEM





Ultra High Definition (Ultra HD)

Terabytes of traffic per household, a 100-fold increase in data consumption and above all, the emergence of Ultra HD, are completely changing the equation.

Ultra HD is revolutionizing image quality, and in the process is ringing the changes in everything from program production to distribution technology.

Ultra HD (often also referred to as 4K)⁹ television sets are already available from most major TV manufacturers and are the harbingers of a new content-driven mass market.

The headline facts are dramatic: Ultra HD delivers four times the picture resolution of 1080p full HD, and will produce up to 120 images per second, with substantially more colors and more contrast, thus improving image clarity with finer detail, and greater texture. Once seen, the impact of Ultra HD is never forgotten.

Ultra HD will become the driver of a high quality video market within the next decade. It is set to bring everything else into focus. According to research, two thirds of consumers want to have an Ultra HD screen once they have seen it, and every 4th consumer would be ready to pay more to receive High or Ultra High quality¹⁰. The necessary technology has been developed and is coming to market, as is (and will be) the necessary content.

Industry forecasts agree on the market outcome, with predictions of over 1000 Ultra HD channels, over 500 million Ultra HD screens sold, and more than 400 million HEVC¹¹ set top boxes installed by 2025¹².

Additionally, it is predicted that no less than 55% of European consumers will have bought Ultra HD TV by the same date¹³.

⁹ 4K is the Digital Cinema resolution of 4096x2160 pixels. UHF features 3840x2160 pixels.

¹⁰ Ericsson Consumer Lab 2013

¹¹ High Efficiency Video Coding

¹² Sources: GfK, IHS, Ericsson Consumer Lab, Strategy Analytics 2014

¹³ Strategy Analytics Consumer Matrix 2013

What does an ideal future video network look like?

The challenge for the stakeholder companies and potential partners is a significant and onerous one.

Using today's resources, it is estimated that HD-quality video throughout Europe requires 35 times more gigabytes of video per month than are currently consumed in each European household.

Only just over half the population could receive this, leaving out 45% of the potential viewers.

Ultra HD would need 100 times more gigabytes per month per household, and this would leave out four fifths of the population¹⁴.

The bill to implement very significant and complex technology upgrades and to provide the terrestrial connections to accommodate the faster speeds on present estimates would cost no less than an estimated 150 billion euros in Europe for the terrestrial infrastructures alone.

To this figure must be added an unquantifiable extra and ongoing operating cost costing, over time, many more billion euros for the necessary ground installations.

It will certainly be a challenge for governments and private companies to foot this dimension of bill and find the necessary public funding as well as commercially attractive business models to live up to such open ended commitments.

This scenario might also introduce and establish a two-tier market of media haves and have-nots, opening a wide and long-lasting media crevice in European culture and society, which the European Commission has already issued a warning about.

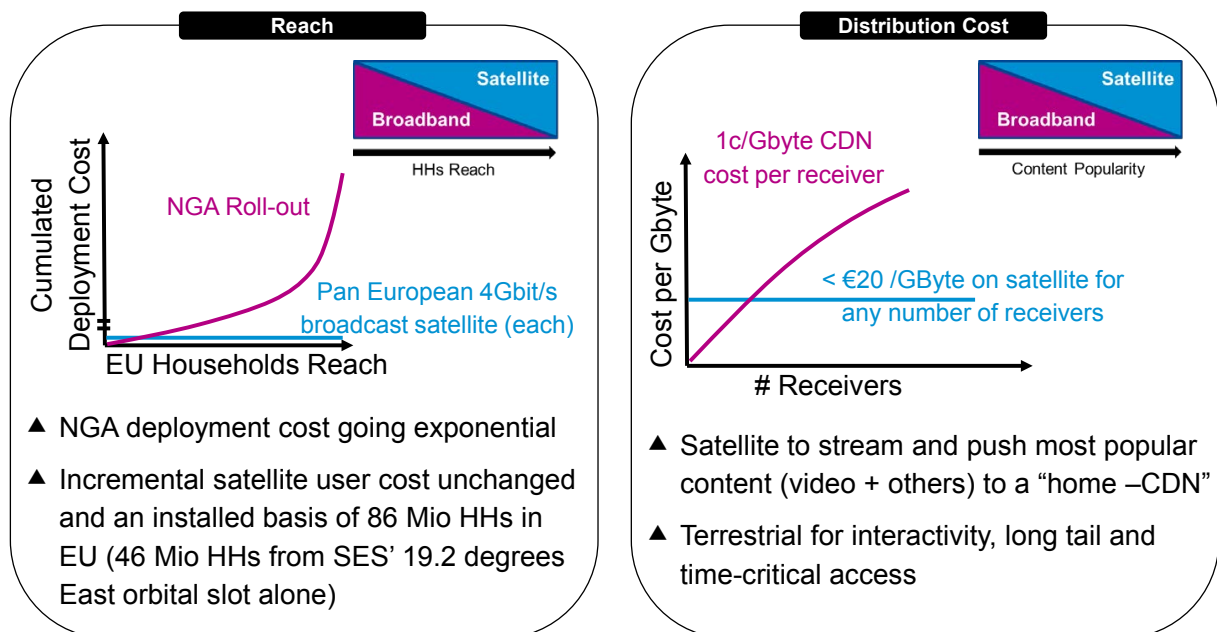
The solution to this challenge cannot therefore be monolithic.

Telecommunications operators know that they cannot spread and deploy fiber everywhere, and this explains why they have been working on complementary technologies. The limitations on the spread and reach of cable are well known, as such work inevitably involves renewed digging of trenches and holes in streets and roads across the world.

In mobile technology, network costs have started to overtake and become decoupled from revenue, and any new market such as HD must avoid the same mistake. This would happen again with Ultra HD and so there is a major premium on getting the business model right.

The operators also know that the strongest factor driving capacity demand on the internet is the growing demand for video traffic. This cannot realistically be satisfied by streaming over the non-linear networks.

In summary, as the market currently stands, there is no single technology that will create the global and popular video network offering on its own.



¹⁴ IDATE, Sandvine, Cisco VNI, Akamai, Analysis Mason, Nielsen, EC, SES

Satellite in the Zettabyte Era

But satellite has a particular value in this equation.

In delivering television directly to nearly half a billion households worldwide, satellite is already in the Zettabyte Era.

Each single satellite is a direct 4-Gigabyte-per-second-pipe, accessible to any user or household within the footprint for any kind of live, downstream and push video or non-video content.

A satellite network does not slow down or cost more when additional receivers are added because the satellite, once deployed, is consistently broadcasting into a specific geographical area and the signal is ever present.

The number of receiving households becomes irrelevant with satellite broadcast, but for a telecoms operator it is

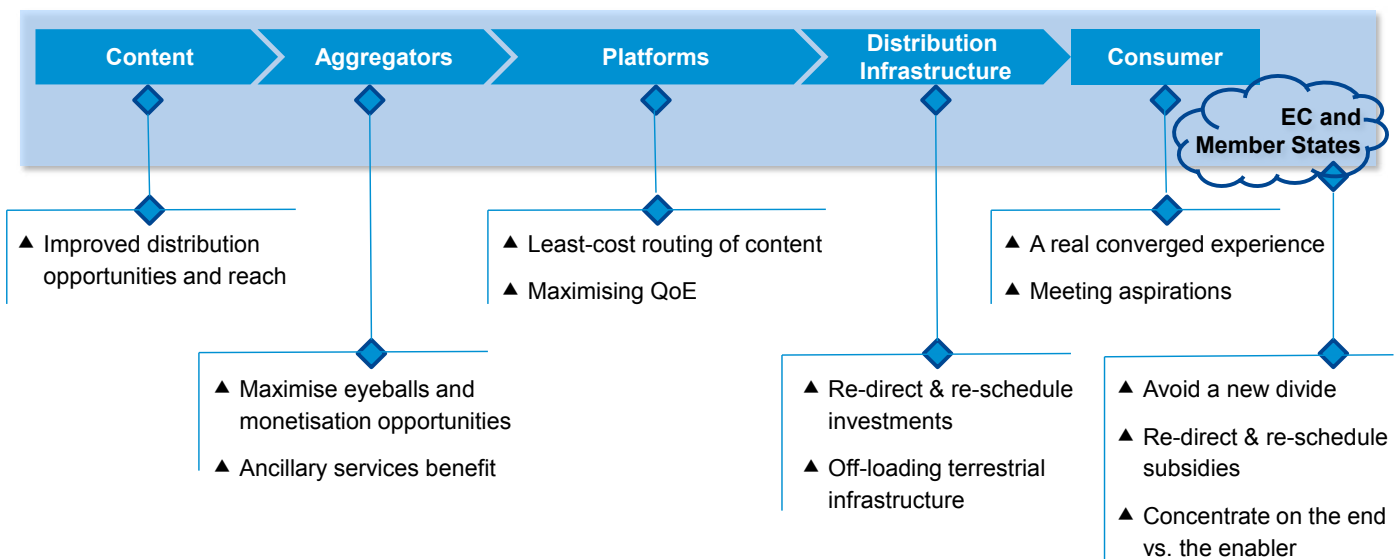
significant and substantial, knocking the previously successful business model off balance.

This is exactly where and why the business model of satellite provision needs to be placed at the center of the technology supernova.

With its unsurpassed universal capacities and its unmatched economies in one-to-many traffic, satellite is an ideal infrastructure to complement other networks and play a central role in building an optimal, smart and future-proof next-generation network.

It is therefore vital to cooperate on hybrid satellite-terrestrial solutions as they operate at a fraction of the cost. They help offload networks and redirect investments ; they accelerate the delivery of multi-play benefits, allow the distribution of a new digital dividend to citizens and thus help to avoid a new digital divide.

Towards a hybrid ecosystem



The clear conclusion is that the ideal future network is hybrid, and that it is possible, viable and capable of being created now.

In a spirit of composition and collaboration, meeting and satisfying the “insatiable” consumer demand can only be done efficiently by bringing together a wider range of industry interests.

Companies and interest groups should be encouraged and recommended to find competitive combinations of the ideal characteristics of different networks, and of the traits that can be brought into hybrid ecosystems that can compete with each other on the basis of their product and service mix.

The intent of the 5G initiatives is precisely to transcend networks and delivery infrastructures to create a ubiquitous, flexible and future-proof digital space.

Hybrid is:

- Enabling smarter networks by combining terrestrial and satellite strengths, delivering connectivity and content in the most cost and quality effective ways to the largest number of households and users
- Satellite blends in terrestrial at any network node from central offices and Internet exchanges down to wireless stations, caches or to the home.

Competition will preserve and sharpen the qualities of the new hybrid constellations in their knowledge and in the extent of their provision of what the consumer wants and will pay for. This is also particularly relevant when countries agree to invest in telecommunications infrastructure in order to accelerate the deployment of Next Generation Networks.

As with our original role a generation and more ago in feeding cable networks, and also more lately in supporting the deployment of digital terrestrial infrastructure, the satellite can again be a primary infrastructure player, bringing critical components to improve the performance quality of other networks.

Two examples point the way towards this possibility. SES's subsidiary, HD+, offers a harbinger of the change: it supplies a free-to-view ecosystem with high quality content and has built a platform that allows commercial broadcasters to encrypt and protect their signal, and provides a business model for HD broadcasting of their content, thus giving consumers access to incremental HD video.

In addition, Oi, the largest telephony company in Brazil and the second largest in Latin America, with 22.2 million landlines and 31.7 million wireless customers, also provides a view of the future. Now merged with Portugal Telecom, Oi has contracted a large part of the SES-6 satellite to transmit triple- and quadruple-play hybrid services, extend its reach and deliver uniform Quality of Experience. No less than a third of Oi TV's 200 channels are HD.



SES has also made a first inroad into this content mobility by developing its SAT-IP technology which allows the translation of satellite signals at the home reception point, namely the Wi-Fi box or the dish, into an IP signal, reaching multiple screens (laptops, desktops, notebooks, tablets and smart phones).

Our conclusion is that a new type of network needs to be a unique blend, a collaboration of capabilities. And satellite can facilitate these emerging hybrid constellations.

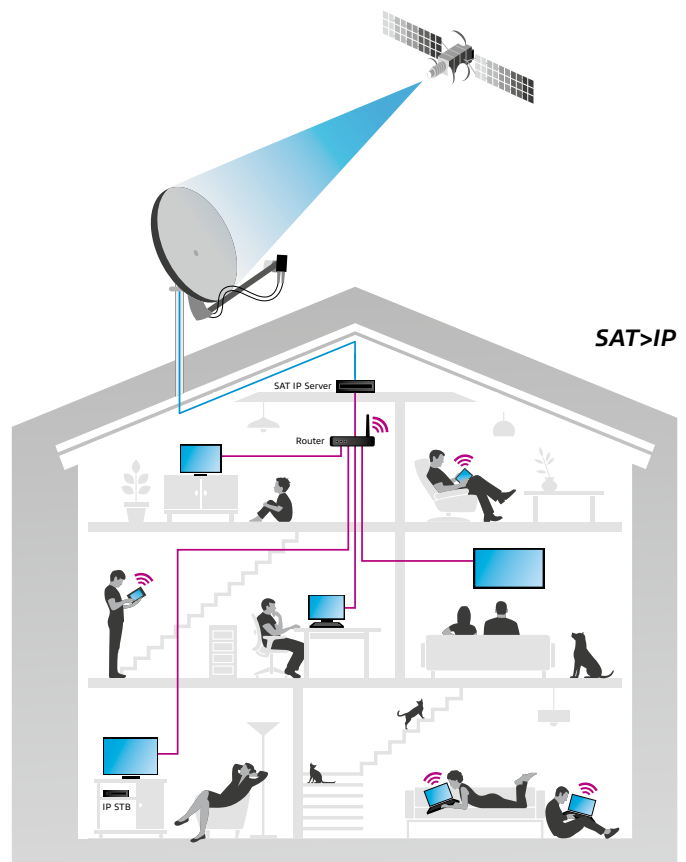
Broadcasters get revenue share, signal protection, a Conditional Access platform for additional opportunities, Hybrid Broadcast Broadband TV (HbbTV)¹⁵, replay, Video on Demand and streaming. Retail partners get recurring commissions, hardware revenues, sales support and floor traffic in exchange for point of sale coverage and technical reach. Set top box manufacturers would get their specifications implemented in exchange for providing hardware varieties.

Customers get access to a wide choice of content and in the process may care even less about exactly how the network has been delivered.

The industry, working collaboratively, should be ready and capable of fulfilling their demands.

SES believes that the technical network can be constructed to enable this vision, and enable operators to develop and offer a multitude of network choices for consumers who are becoming indifferent to particular networks or architectures.

**The future is already here.
Together all we have to do is to realise it.**



15 A pan-European private initiative aimed at harmonizing the broadcast and broadband delivery of entertainment to the consumer through connected TVs and set-top boxes. www.hbbtv.org

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