

DIGITAL



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The OTT hotlist

MULTISCREEN & OTT PART 1

The OTT hotlist



As the over-the-top video market continues to come of age, *Digital TV Europe* shines a light on some of the most interesting services to have emerged in recent times. Andy McDonald reports.

The over-the-top video market continues to grow as content providers big and small look to establish direct, cross-device and contract-free relationships with their viewers. While the examples in this article will offer a flavour of the new types of services that are coming through, there are a number of factors at play in what is becoming an increasingly crowded OTT market.

One major theme that can be seen in the European OTT market today is that of consolidation among broadcasters, which are opting to work together to more effectively compete against larger global players like Netflix and Amazon.

In the UK there has been much talk of a 'Kangaroo 2'-style joint platform among the public service broadcasters, with the name referencing an earlier project that was blocked on anti-competitive grounds back in 2008. In France, commercial broadcasters TFi and M6 Group and public broadcaster France Télévisions recently teamed up to launch a joint national OTT TV platform called Salto. Meanwhile in Germany ProSiebenSat.1 and Discovery plan to launch a new streaming service next year that will incorporate ProSiebenSat.1's 7TV and Maxdome services, Eurosport Player and a range of other content.

"Local broadcasters banding together in their national markets potentially makes a lot of sense," says Ampere Analysis research director Ed Border, pointing to the broader catalogue and simplified consumer experience that comes along with this. "Consumers can sign up once, and pay once, as opposed to taking three or four separate, fragmented services. Meanwhile, a lot of the tech-based costs of hosting and running an SVOD service are pooled, reducing the expenses per individual partner."

However, Ampere analyst Lottie Towler points out that there are still hurdles to overcome – even though competition concerns are dying down in the wake of the "intense market disruption" caused by the big international SVOD providers. "Loss of control of content promotion, service strategy and marketing could be a difficult adjustment for some players and depending on the market it could prove challenging for public service broadcasters to transition to a subscription-based model," she says.

Technology, media and telecoms

analyst Paolo Pescatore says that regional broadcasters coming together is "long overdue" and is arguably now not enough to compete with the global giants: "Too little, too late!" He claims that broadcasters should instead focus on their core offering – which is simply their content. "As FAANG [Facebook, Amazon, Apple, Netflix and Google] spend more on local programming, then there is no reason why they shouldn't partner with each other – a great match for both broadcasters and FAANG," reasons Pescatore. "Also, I firmly believe that local players should work more closely with telcos who have a direct relationship with their subscribers. This way, they can unlock opportunities to provide users with more immersive experiences and identify new sources of revenue."

While the global SVOD giants' consolidation of power is certainly one a key theme of the OTT market in 2018, another is the rise of the niche OTT services, which can carve out a business by offering a focused and often highly curated catalogue aimed at a smaller subset of consumers around specialist interests – including sports.

shut down its SVOD service CanalPlay, with competition and regulation key factors.

Earlier this year, T-Mobile Netherlands announced plans to shut down its mobile-first over-the-top TV service Knippr and in France local reports suggest OTT TV service Molotov is also looking for a buyer, indicating that the business model for re-streaming TV channels over-the-top is also challenging in some markets.

Here, then is DTVE's 'hotlist' of five OTT services to watch.

Sky España

The launch of Sky España in September 2017 marked a significant milestone for the European pay television giant, as it was the first time it had launched a pureplay over-the-top offering in a market where it did not already have a pay TV presence.

For €10 per-month, Sky customers in Spain can sign-up on a contract-free basis to receive 16 top Spanish pay TV channels – including Fox, AXN, TNT, MTV, Disney Junior, Nickelodeon and La Liga 1|2|3 TV.

"We have replicated the success of the Now TV model and technology, but [are] using the Sky brand to take advantage of the brand awareness in the market."



David Nunez, Sky España

"Niche services with particular angle on content proposition stand better chance to cohabit with big services like Netflix and Amazon," says IHS Markit's manager of research and analysis for broadband media, Irina Kornilova. "Crunchyroll – anime, WWE Network – wrestling, Eros Now – Bollywood – are some of the examples of companies using their niche proposition to attract 'super-fans'."

However, she says, it is harder for small generalist services to compete in the market.

Border at Ampere claims that "a degree of consolidation within the SVOD market is inevitable after a tumultuous few years," and says there have been several examples recently of even some larger players closing down operations – for example, Canal Plus Group recently announced the decision to

On top of this, subscribers can access 3,600 hours of on-demand films and series, including Sky Original productions that are exclusive to the service in Spain like *Gomorra*, *Save Me*, *The Last Panthers* and forthcoming titles like *Patrick Melrose* and *A Discovery of Witches*.

"Sky presents a wide offer perfect for families with the most appealing series, kids content, movies and football, which is the perfect choose for the over 11 million households in Spain that still don't have any kind of pay TV services," explains David Nunez, director of Sky Spain. "We have replicated the success of the Now TV model and technology, but [are] using the Sky brand to take advantage of the brand awareness in the market," he adds, citing the OTT service that Sky runs in the UK, Ireland and Italy. In

Badlands on Filmstruck, a curated movie service aimed at film lovers.

Germany its equivalent product is branded Sky Ticket. "There is a big demand for a service like ours."

Nunez says that Sky's move into Spain was part of a strategy it had worked on and studied for a while before launch, and that Sky has seen "positive growth" in the market since it went live. While Spain is a hotly contested OTT market with rivalry from the likes of Netflix, Amazon and HBO, he believes that Sky's combination of live and on-demand content from popular pay TV channels, along with series, films and kids content, differentiates its offering.

"From our point of view, the OTT market still has room for expansion," says Nunez discussing how he sees the OTT market developing in a broader sense in the coming years. "It offers a great freedom for the user to access content and nowadays content is king. Sky is the largest European investor in TV content with an annual spending on programming of €8 billion, which allows us to have the most appealing shows and films for our users."

Filmstruck

Filmstruck is a joint venture subscription film service between Turner's Digital Ventures & Innovation (DV&I) group and Warner Bros Digital Networks, which launched in Europe earlier this year after the brand debuted in the US in 2016.

The curated movie service is targeted at film lovers, offering up a regularly refreshed selection of classic, cult, independent, art house, documentary and world film titles. Filmstruck draws on the Warner Bros library, the Criterion Collection and content from local partners. It rolled out in the UK in February and then in France and Spain in mid-June.

The European launch came after months of development and Filmstruck partnered with Accenture video services from a technology standpoint. Turner claims that the service is designed to meet a consumer need that is not being fully served – to bridge a gap in the market between the more generalist TV fare provided by the likes of Netflix, Amazon, Canal Play or Movistar+



with the artsier content found on more direct film service rivals like Mubi, France's La CineTek and Spain's FilmIn and FlixOlé.

"Rolling FilmStruck out is a significant next step for us at Turner," said Aksel van der Wal, executive vice-president, DV&I, Turner International. "We've chosen markets with a rich heritage in and love for movies, which are also rapidly developing SVOD markets, which makes them exciting markets to tap into with what we believe is a fresh and differentiated offering working with fantastic content partners. Launching these kind of new services alongside Turner's core business offering is part of the fan-centric strategy we've adopted to engage our audiences."

NextUp

NextUp focuses on full-length stand-up comedy specials and was founded in 2016 by the team behind the YouTube channel and live night ComComedy and the fee-free crowdfunding platform FringeFunder. The UK service – which counts the former president of AMC Global and Sundance Channel Global, Bruce Tuchman, as an investor – currently features more than 90 comedy specials. A new episode is released

each week and household names like Ed Byrne and Richard Herring are presented alongside new and up-and-coming talent.

"Much of the content is produced in-house and our members are able to come to live recordings and suggest acts for showcasing on the service," explains founder Sarah Henley. "NextUp is targeted at stand-up comedy fans who are digitally engaged and looking for more breadth and depth in terms of a catalogue than the mainstream providers are able to offer – our members love comedy and are keen to discover great new shows."

According to Henley, the service supports acts that represent the "breadth and diversity" of the comedy circuit and aims to give comedy shows a life beyond their initial live performances. "We noticed how many incredible shows simply died a death after the Edinburgh festival or a tour, particularly with the bottom falling out of the DVD market," she says. "Fans who couldn't make the show live never got to see it, and comedians had no visual record of their work and no way to monetise the content when it wasn't being performed live."

NextUp aims to get comedy content in front of as many fans as possible and to create an additional revenue stream for comedians. As a specialist SVOD service it

Magine



Q&A: Matthew Wilkinson, Magine Pro

Matthew Wilkinson, general manager at Magine Pro, talks about opportunities and challenges facing new entrants in the OTT TV market.

How much opportunity is there for new entrants in the OTT TV market and what are the key things that operators need to focus on in order to succeed?

We now see consumers subscribing to three or more OTT services, and although they are the smallest, they are also one of the fastest growing segments in the market. For new OTT service entrants, it's a great opportunity to grab the number three or even four spot next to the OTT streaming incumbents such as Netflix, HBO, and Hulu.

Content is arguably the driving force behind this growth. Original content, in particular, that's not readily available elsewhere, is one of the key reasons consumers sign up to more than one service. New OTT service entrants don't necessarily need to produce original content to attract subscribers though. They could explore securing rights for local or regional content that is often overlooked or not being widely distributed.

It's also important they carefully consider their monetisation model and whether it's suitable for their content and target audience. To build a sustainable OTT business, you need a clear strategy with prudent expectations of consumer pricing acceptance and service uptake.

What are some examples of potential new OTT TV markets that are currently underserved?

As viewers consume more and the move away from traditional viewing habits to OTT services, content owners have a golden opportunity to capture dark & niche markets.

Consumers are being offered a barrage of generic services that target mass audiences and offer broad programming type. However, there are niche segments that have appeal across global markets, populations and cultures. Lower tier sports leagues like American College Football, for example, typically have a wider and more loyal following, which are willing to pay a premium if it's not carried by legacy broadcasters or media distributors.

Content owners are also not limited to maximising the value of their content through distribution on traditional channels (local TV and satellite etc). They can expand their footprint and explore untapped markets by taking their content direct to consumer with their own OTT service. A significant dark market is local content for overseas expats & diaspora, where access to content via transitional means is either illegal and of low quality, or just not available.

What are the key features and functionality that OTT TV services need to succeed, from Magine's own experience of operating services?

Magine have over seven years experience operating direct-to-

consumer services in Scandinavia and Germany. We leverage our experience and understanding of good UX/UI to build platforms that fulfill our B2B partner's needs, and provide exceptional experiences for their customers.

We believe a user-friendly service that heroes content and aids discovery is key to attracting and retaining users. Our templated solutions can be independently curated and managed by our partners, giving them full control over what, where and how their content is featured.

The user experience should also be seamless. Regardless of where or what device they watch on, subscribers should be able to enjoy high-quality streams without buffering or downtime issues. And local payment solutions that enable users to pay fees easily are also essential if you're operating a global service, and especially in emerging markets.

What challenges do operators face in breaking into the OTT TV market and what solutions are available?

To avoid getting lost in the crowd, new OTT entrants need a clear differentiator and value proposition. Trying to cater to all consumers can result in you catering to none.

We are starting to see a rise in niche OTT services for this reason. Our partners PassionFlix and True Royalty, for example, offer niche content that appeals to a smaller subscriber base, which is more loyal and dedicated than the general consumer crowd. And as they are able to target a very specific audience, their marketing efforts are much more effective.

Getting a new OTT service up and running takes time and can come at a considerable cost. At Magine Pro we help our partners overcome these barriers and provide a proof-of-concept Pioneer solution, alongside a full end-to-end Premium service that is proven, cost-efficient and ensures a quick time to market.

What business models make the most sense for operators looking to build a sustainable service offering?

Subscription-Video-On-Demand (SVOD) remains one of the most popular monetisation models for OTT services, as it ensures a steady recurring revenue and has a lock-in effect on users. At Magine Pro, we also promote hybrid models that blend SVOD/TVOD and/or AVOD to ensure no money is left on the table.

Monetising through Ads means OTT services can offer limited free content to users that are hesitant to pay a Subscription or Transaction fee upfront. Through upsell activities, these free users can convert to paying subscribers, increasing average revenue per user (ARPU) and the customer lifetime value.

NextUp focuses on full-length stand-up comedy specials.

also aims to provide more breadth and depth in terms of a catalogue than other more mainstream on-demand service providers, with most of the content in its catalogue exclusive to the NextUp platform.

“We see ourselves more as a bolt-on to a Netflix or Amazon Prime subscription,” says Henley. “While I’m sure our subscribers enjoy watching the big players on Netflix, there are loads more great shows to discover on NextUp that Netflix and Amazon simply wouldn’t take the risk on. The great thing about being a specialist service is we are lean and can move quickly – if an artist wants their show to feature on NextUp, we can film it that month and launch within two weeks while the content is still fresh.”

NextUp partners with Simplestream for video delivery and is available via the web and as apps for Apple TV, iOS, Android, Amazon Fire with Roku due to launch soon. The service is also aggregated by Amazon Channels.



market. It is also the first taste of its broader SVOD ambitions, with a separate Disney-branded offering that will feature Disney, Pixar, Marvel and Lucasfilm movies due in late 2019 – a move that will see Disney pull all its movies from Netflix when its current deal with the SVOD giant expires at the end of next year.

ESPN+ is available in the US and includes live MLB baseball, NHL ice hockey, MLS soccer, alongside a range of college sports, PGA Tour golf, Grand Slam tennis, boxing and international rugby and cricket. It launched as part of a revamp of the ESPN App, creating an all-in-one digital sports platform with easy access to all of ESPN’s

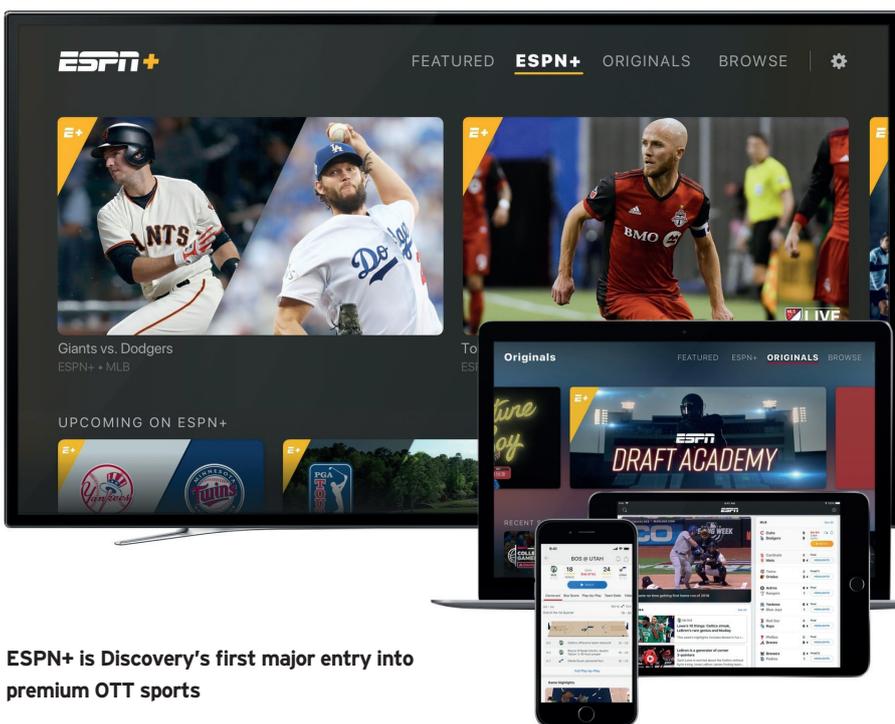
news, scores, analysis, video and audio content.

The service is the first direct-to-consumer service from Disney Direct-to-Consumer and International – the multiplatform media, technology and distribution organisation created by Disney’s Media Networks and Studio Entertainment groups. ESPN+ is powered by Disney’s majority-owned video streaming technology company BAMTech, in which it upped its stake from 33% to 75% through a US\$1.58 billion deal agreed in August 2017.

“The launch of ESPN+ marks a new era of innovation for The Walt Disney Company, defined by a direct and personal relationship with our consumers,” said Kevin Mayer, chairman, direct-to-consumer and international, The Walt Disney Company, marking the service’s release in April. “This product reflects our new direct-to-consumer strategy focused on combining our incomparable brands and unmatched content with industry-leading technology to give users an unparalleled digital experience.”

ESPN+

Launched with much fanfare in April of this year, ESPN+ is Disney’s first major entry into the premium over-the-top sports



ESPN+ is Discovery’s first major entry into premium OTT sports

ComBo

ComBo is Swedish operator Com Hem’s latest streaming service, which head of TV product Jessica Andersson describes as a “natural step forward” in the company’s product offering. The over-the-top service includes some of Com Hem’s best films and series and is designed as an add-on product for TV and broadband customers. “It’s a complement to our linear channel packages

What makes a successful OTT launch?

To get a view on how the OTT market is shaping up, DTVE asked some of the space's leading vendors to discuss over-the-top strategies and best practises. Brightcove's senior vice-president of international, Mark Blair, says that while client challenges differ, there are common themes such as: how to best reach new audiences and attract new revenue streams using pre-existing content; and how to deliver big live moments, like sports events, at scale and in a cost-efficient way.

"Great content and user experience must be at the heart of a service," says Blair. That applies to anything from "curation of the best world cinema or channel dedicated to making the best home-brewed beer." He claims that in 2018 viewers expect to be served high-quality video content, without buffering, across devices. With an SVOD model, subscription payments must be simple. With AVOD, ads must be unobtrusive.

"To make sure your service makes the cut, be different," says Blair. "Know your audience inside out, create and curate what will move them to come back. Also, don't worry about committing to high costs in order to launch - we work with a range of brands who have different cash flows."

At Kaltura, co-founder and president and

general manager of Kaltura's media and telecom business, Shay David, agrees that the consumer experience is key to a successful OTT service. "Users don't care about network quality, device management, security and DRM, billing etc. What they care about is having a great viewing experience on any device at any time."

David says that best practises for Kaltura's customers include "making sure the TV platform is in the background and the consumer experience is in the foreground". He also stresses the importance of Kaltura's 'targeted TV' solution that uses big data, machine learning and AI to create a personalised TV experience for each viewer.

Asked how he sees the market shaping up in coming years, David says: "We see massive consolidation coming on both the provider side and the vendor side. As in many other mature markets, big players will win the day. This is a good thing: consumers need choice, but they don't need the hassle of subscribing to 20 different services, they need some aggregation."

As for smaller players, hoping to compete, he recommends that they band together - either with the help of larger independent tech providers or existing operators. "In this market

there is strength in numbers."

Ostmodern's CEO Tom Williams says that there are tough challenges facing broadcasters and content owners today - not least because there is so much choice and competition for viewers' time. He believes that a successful OTT service requires content providers to identify the value proposition between the content, the technology and the audience. "It demands creating a service that is unique and does not aim to copy others' practices."

"Young people in particular are turning away from linear TV," he says. "The competition is not just found in Netflix and Amazon but in other digital interests such as gaming and social media. Simply launching an OTT service is not enough in itself."

Williams claims that the size of catalogue is not always a barometer to success as "too much choice can overwhelm a user" and abundance of poor-quality content "holds little value". Factors that do inform success, he suggests, are launching a new or updated service with a "coherent feature set" that addresses what audiences need, built in line with market changes, new behaviours, business demands and growing content. Considered UI design and careful editorial efforts by service owners are also key.

"ComBo is a complement to our linear channel packages which gives customers access to...wherever they want and at a competitive price."

Jessica Andersson, Com Hem



which gives customers access to thousands of series, movies and documentaries, wherever they want and at a competitive price."

Soft-launched in the second quarter of this year, ComBo offers content from the likes of Fox, National Geographic, Viacom and Viasat and is distributed through its existing play product, Com Hem Play, which has been around for several years. "We see an increasing demand for flexible VOD-products and our current agreement with content providers enables us to

launch a selection of premium content for a reasonable price," Anderson says of the SEK49 (€4.75) per-month offering.

The reason ComBo signals a logical way forward for Com Hem is that is essentially a standalone, 'box-less' SVOD offering - albeit one that was developed alongside the company's recently launched TV Hub, a lightweight Android-based TV device that is now its main TV-offering alongside TiVo.

Discussing the service at its launch in April, Com Hem Group CEO Anders Nilsson said that ComBo opens up a new

segment in the market for Com Hem and could be a significant growth driver over time: "We do not expect this to materially affect our near-term growth but it will allow us to tweak the functionality, content and sales channels to eventually develop ComBo into a standalone off-network TV service, catering to a much larger potential customer base."

For Andersson, Com Hem is taking on an aggregator role, partnering with rather than trying to compete against large OTT players like Netflix and Viaplay. She predicts that as the OTT market develops further in the coming years there will be more viewing of this type of content and more services launching. "At the same time complexity increases for customers, where it's getting harder to access all content through one provider and service," she says. "This is an area where we believe there still is an opportunity for development." ●

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Pay TV goes OTT

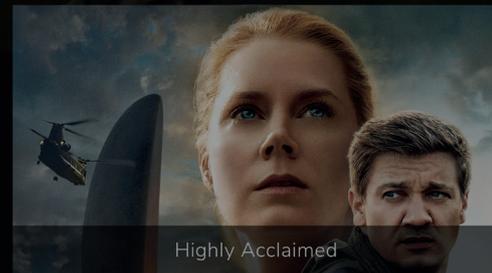
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Pay TV goes OTT

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POPULAR TV & MOVIES

Technology choices such as cloud-based delivery of advanced service and adaptive bit-rate-enabled unicast streaming are no longer the province of pure-play OTT TV providers. They are increasingly being adopted by established pay TV providers as the latter evolve to meet the challenges laid down by Netflix and others. Stuart Thomson investigates.

How far and how fast pay TV will converge with OTT TV is a question that is currently preoccupying both marketers and technologists within pay TV service provider organisations.

Faced with competition from Netflix and Amazon – not to mention Google and potentially Apple as well as traditional content partners such as Discovery and Disney – pay TV companies are operating in a world that increasingly sees OTT as the future.

Operators have for some time been investing in cloud-based infrastructure not only to deliver efficiencies but to provide a better

service. They are increasingly using the cloud to introduce more personalisation and choice for subscribers as well as to deliver reliability, scalability and security.

TV operators are in the first instance looking to address demand among their customers for access to OTT TV services such as Netflix alongside linear broadcast and catch-up TV services. Subscribers also now expect to be able to use a growing range of services on consumer electronics devices such as mobile phones or tablets as well as on the main TV in the living room.

Larger multinational pay TV operators

meanwhile also want to be able to launch services in new markets, quickly and without the need for the big infrastructure investments of times gone by.

All of these demand and supply factors – the need for faster time to market, the need for greater operating efficiencies, the need to integrate multiple content sources including those from third-party OTT players – mean that pay TV operators are increasingly turning to cloud and OTT TV technology. Telecom

Pay TV operators are turning to vendors such as Nagra to deliver OTT-type solutions.

WINDzappware

Q&A: Hermann Riedl, WIND Hellas & Patrick Vos, Zappware



WIND Hellas Chief Strategy and Digital transformation Officer Hermann Riedl and Zappware CEO Patrick Vos talk about the development of WIND's innovative new hybrid IP and DTT, Android TV-based TV service

What was WIND Hellas aiming to achieve by developing its TV service?

HR WIND is one of the biggest fixed-line operators in the Greek market and had so far been the only one without a pay TV service. We needed a service that would differentiate us. We saw that providing an advanced user experience and meaningful integration with OTT TV services presented a key opportunity. Zappware proposed the best solution to meet these needs within a very aggressive timeline. We knew that the opportunity would not last forever. We launched WIND VISION with the latest digital TV features such as catch-up TV and multiscreen, and were also the first to integrate Netflix. We are the first Greek operator to have Android TV with a huge wealth of functionality for our customers including voice search, Chromecast integration, Bluetooth and a gaming console, and tons of apps, all at zero cost to us. It is a world apart from what the legacy platforms have to offer.

What were the key challenges in delivering the service?

PV Most Android deployments are pure OTT services. This service is a hybrid DVB-T and OTT offering. What WIND understood from day one is the need for the aggregation of content and functionality across devices, all based on a single, seamless UX. Viewers want to be able to see all content on HDMI1. In implementing this we provided our back office running on Amazon Web Services, and our new Nexx4.0 user interface running on Android TV on a hybrid set-top box. We got the green light to go ahead with the project last March and the first boxes for user trial and testing were available in January, so that means we had nine months from scratch to test and build a headend, dishes, the back-office in the cloud and set-top boxes ahead of a full trial in January leading to a commercial launch at the end of April.

HR We had some changes during the project. We didn't know initially if we would launch with Netflix. We acquired sports rights that come with special conditions in terms of rights management and concurrency in the CDN. We deployed lots of new technologies. Only 10 or 11 operators have launched Android TV in Europe before us, and even fewer have deployed a hybrid solution. The ABR unicast system is very future-proof and safe but not many people have delivered ABR unicast live streams to the set-top box. Our WiFi deployment is very successful. More than half our boxes are being connected to WiFi and it works. That is the power of a unicast solution. We are really using the latest technology to make an impact.

What benefits did Android TV provide for WIND?

HR The UI embodies our proposition of combining all free-to-air channels with Netflix, YouTube and Google Movies, all as one experience. WIND VISION customers have all the Android apps available at the touch of a button. We didn't even need to do our own transactional VOD offering. On Android TV users have Google Play movies without need to provide minimum guarantees but with the advantage of carrier billing. It is an advanced service with features that we would never have developed on our own. I have access to the best SVOD service in the world and TVOD as well. On the other hand we also have unique content with Greek channels that are not offered by any of the pure OTT players, and pay TV channels, all delivered via one EPG. The overall technology solution was provided end-to-end by Zappware – and the outcome is excellent.

What did providing an end-to-end solution mean for Zappware?

PV It was very advantageous for us because we could make the best vendor selection to meet a very aggressive timeline. Normally we provide the complete UX from device to billing, but in this case we provided all the logistics of video delivery end-to-end. That gave us the opportunity to manage the whole ecosystem and that deliver a great UX. We chose Android TV from day one and moved the back office into the cloud based on AWS with micro-services to add new modules. In this fast evolving market, if you need to add features to the UX, you need a dynamic back office. Basing this in the cloud provided scalability and ease of operation and deployment of new features. The result is a very nice product as it stands, but the foundation is also there to keep up with fast-evolving trends in the future. Taking on this responsibility was also a journey that brought additional value to our proposition in the market.

What has the service been received in the Greek market?

HR WIND VISION is the talk of the town in Greece at the moment. As WIND was the coming in as the number four player in the pay TV market, people had not expected something like the experience we provide, including Netflix and an iconic set-top box design, with WiFi as an option and everything else. We organized a huge launch event and showed we were producing something that would disrupt the market. WIND VISION has made a big impact and has been a game-changer for our whole brand.

operators – particularly mobile players that have added fixed-line broadband offerings to their portfolio – are almost all looking to OTT technology as a cost-effective way to add TV to their line-up of multi-play of services. Existing pay TV operators with legacy broadcast infrastructure, meanwhile are looking to migrate to OTT/IP-based platforms to integrate third-party services and offer multiscreen and TV-focused services from a single platform.

Driving demand

The move to OTT technology among pay TV operators is driven both by demand – for an array of OTT TV services such as Netflix on the TV – and by supply – with a need among service providers to reduce costs and improve the time to market for new services.

Pay TV technology provider Arris recently conducted research among US TV consumers that showed that, in cases where they had access to a modern user interface, viewers accessed Netflix more often via their pay TV device than on pure streaming devices.

“The thing for pay TV operators is to take sources such as Netflix straight to the screen and integrate it into the TV,” says Charles Cheevers, chief technology officer, customer premises equipment at Arris.

Cheevers says the research showed that US consumers typically turn on the TV and look to see if there is anything to watch on their favourite linear channels. They then check what’s on their DVR list and catch-up TV and finally check out other sources available to them.

In the case of the latter, integrating OTT sources with mainstream pay TV delivered the best results and, he says, “if you integrate it in a light way it is not as effective as when you have deep metadata integration” that enables users to search across different content sources.

Cheevers says that pay TV viewers tend to focus on one or two dominant streaming services – the main ones being Netflix and YouTube, with Amazon trailing a distant third. “If you add those to [pay TV] you have a good chance of keeping the customer,” he says.

Charles Dawes, senior director of international marketing at TiVo, agrees that the changing perceptions of consumers is a key factor driving the move of pay TV towards OTT. “Consumers know what a video product is. When we started out it was something in the living room. Now it is in multiple rooms

and over the last 10 years we have had video on smartphones and tablets. Then you also have video to devices that are not necessarily in the home and this is also enabled by IP,” he says. “Consumers have grown to expect all this. They can get video wherever they want. We see quite a lot of people looking at à la carte offerings and picking and choosing more.”

To keep with shifting patterns of consumption, operators need to have enough flexibility to make changes and launch new services quickly. This also plays to the strengths of OTT and cloud technology.

On the supply side, says Dawes, existing operators are looking to migrate their services to IP, in part to tap into new revenue streams such as advanced advertising and e-commerce, while new players are looking to add TV at relatively little cost to broadband and voice bundles.

Cost factors are also driving the switch. Traditional broadcast channels occupy a big chunk of spectrum that fixed-line operators could use for other applications. This has to be balanced against expectations about Quality of Service. It is challenging to maintain the quality on streaming services at peak times, such as during an international football match.

more intensively not only with each other but with OTT TV providers without their own infrastructure. “Operators need to deliver to multiple screens but the next thing is the challenge of delivering both on-net and off-net,” he says. “Service providers are looking to extend their reach beyond their current physical footprint by leveraging the cloud and WiFi. When you are on-net you can multicast but when you are off-net, the internet doesn’t do multicast.”

TiVo’s Dawes, however, makes the point that operators “don’t have to do it all at once”. He says service providers can move elements of their service delivery to the cloud, while maintain existing bases of set-top boxes. “You can migrate to hybrid boxes and supplement broadcast delivery with IP, or you can have all-IP boxes. You don’t need a traditional Linux box,” he says. Options include the deployment of Apple TV devices, as Canal+ has done in France and alternative provider Salt has done in Switzerland, or the deployment of Android TV devices, an option championed by multiple operators.

Dawes points out that while traditional pay TV operators have worked with a four-to-five

“One thing we are doing is providing the same user experience across multiple devices and that is key for operators. They want consistency across devices.”



Charles Dawes, TiVo

Additional cost savings can include removing the need to deploy boxes with hard drives. If network or cloud DVR services can be delivered, this can represent a huge cost saving for operators.

Multiple ecosystems

Cost savings are only one element of the move to OTT technology. Big international pay TV operators are trying to maintain legacy customer bases – often in multiple territories – while trying to add new IP services for premium subscribers and trying to extend their reach either in greenfield markets or off-net in existing markets.

For Arris’ Cheevers, off-net delivery is increasingly important as operators compete

year replacement cycle for set-top boxes, and have to be prepared to launch new services in the context of that cycle, using consumer devices or operator-deployed Apple or Android TV boxes liberates them from this restriction.

This could have an impact when, for example, an operator is looking to deploy voice search and control as part of its offering. However, he points out, an operator that owns the customer premise equipment also has a number of advantages.

“If operators deploy a new 4K box they will integrate voice discovery with that. If you have a new box the remote control will have voice capability and that is still powerful for the operator,” says Dawes. Being able to provide voice search with a unified back end for content discovery is a powerful tool to ensure customer loyalty, he says.



Q&A: Simon Trudelle, NAGRA

Simon Trudelle, senior director of product marketing at NAGRA, talks about the changes driving take-up of OTT among consumers and how OTT TV technology can transform the TV experience

What are the key changes in consumer behaviour that are driving take up of OTT TV technology by service providers?

Our 2018 [Pay-TV Innovation Forum](#) research findings show consumers are clearly enjoying the new freedom that OTT TV gives them to consume the content they love, anytime and anywhere, on the screen of their choice. Yet one could argue that anytime TV – via the PVR – appeared two decades ago and anywhere TV with smartphones and Wi-Fi connections a decade later. So what has really changed? First, quality content: high-budget series are produced for on-demand consumption, and live TV events such as sports are also streamed in UHD. Second, Catch-up TV and other VOD content from the cloud are broadly available and monetised. Finally, publishing and accessing new content through apps has never been so easy. A growing share of consumers worldwide have tried and tested such services, and they appreciate this new model. However, as the [NAGRA-sponsored TV Tribes research](#) from Ampere Analysis highlighted, the pay-TV consumer market basically features five major audience segments with different content needs and consumption habits. The only thing we know for sure is that consumer behaviour will keep evolving quickly over the coming years. Pay-TV service providers – incumbent and new entrant telcos – need to keep innovating.

What advantages can OTT technology provide for pay TV operators and how can they adapt to the new market needs?

It's all about operational flexibility and feature agility. This goes from the frontend UI to the apps that are on-boarded, and the backend platform that powers and secures TV services. OTT offers potential, yet the underlying platform needs to address multiple use cases, both in terms of user experience and content protection expectations across all screens. This implies upgrading and moving key backend functions to the cloud – a move that large cablecos and telcos are acting on – while ensuring that the TV platform can be frequently and rapidly updated to address new opportunities, and leverage data analytics and AI to build intimate subscriber knowledge.

To what extent can OTT deliver a superior experience to that of traditional pay TV?

OTT content is often accessed through a very different customer journey compared to the traditional channel-based scheme that many TV viewers still appreciate as well. This means that service providers need to develop user interfaces that support and blend both navigation journeys and are consistent across multiple devices, providing a complete set of TV features, from linear to start-over,

catch-up, flexible on-demand offerings, and seamless access to multiple content sources or apps. This is why at NAGRA we developed [OpenTV Signature Edition](#), a multi-journey user interface and platform that enables service providers to address different viewers' needs. And, with support of STB platforms like Android TV, we ensure that viewers have optimised access to multiple sources of OTT video apps.

What impact has Android TV had on the market?

The market is split in two camps regarding Android TV. Large operators see a complex trade-off if they chose to do business with Google, which offers its Android TV software platform for free in exchange for access to highly valuable usage data. Conversely, smaller providers realise that Google's STB platform helps them reduce their overall TV solution costs, leapfrogging competition with apps and on-demand content. Giving up some control and value to strike a major partnership makes sense to them.

NAGRA's extensive product portfolio helps operators address these key requirements, both for large and small operators. For those wanting to capitalise on the Android TV opportunity, OpenTV Signature Edition covers all major end-to-end needs, enabling operators to quickly launch a fully-featured Android TV platform, addressing user experience, security, data analytics and hardware – while reaping the benefits it provides in terms of deployment speed, access to apps, and reduced complexity. This makes Android TV a viable monetisation option for their pay-TV services.

What are the challenges in providing an OTT TV experience that matches or exceeds that of pay TV and what solutions are available?

OTT TV and pay-TV are just the two sides of the same paid content coin and consumers don't care about the difference. As the recent World Cup showed, appetite for unicast streaming services is growing fast yet the scalability of multicast and broadcast solutions are still proving immensely valuable for high viewership events. While progress has been spectacular, we are working with industry leaders to overcome challenges to deliver the low latency experience that consumers expect. Meanwhile, service providers need to play smart and leverage their existing infrastructure while planning for seamless transition to OTT TV over time. At NAGRA, we have developed expertise and products to help our customers, large and small, just do that: evolve their business, secure their aggregator of choice position or enter new territory through partnerships.

TiVo and other vendors now need to provide a consistent experience across devices.

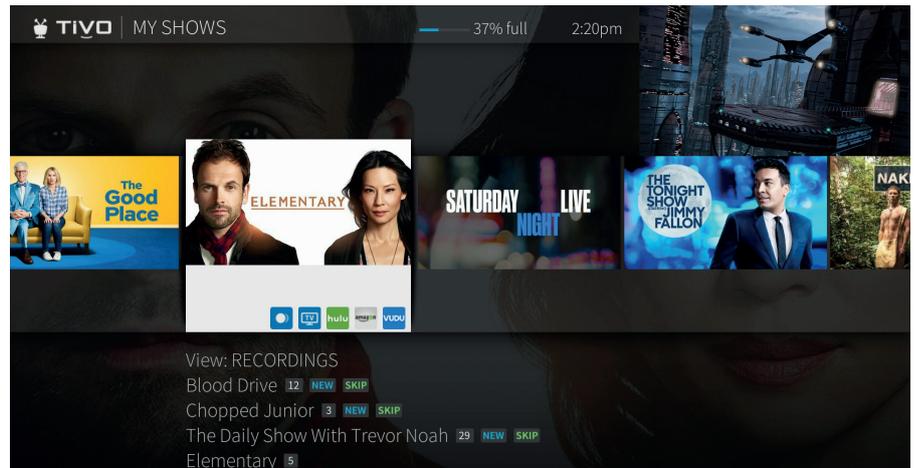
Operators also do not want their users to be pulled away towards someone else's app environment, something that has made many wary of Google until recently. "What is the app people use when they turn on their device. Are you going to deploy something that pulls them towards the operator? This is definitely something they need to think hard about," he says.

The desire to view content on screens other than the TV is another important demand factor pulling service directors towards a general use of OTT technology. Another is the growing use of features such as pause live TV and startover. DVR functionality is meanwhile increasingly delivered from the cloud. All of this means that operators are delivering an ever-growing proportion of content that is viewed via unicast IP streams. Consumers expect to be able to switch seamlessly between viewing content on one device and another with the same or a very similar overall look and feel to the service.

Cheevers says that Arris' research has also shown that viewers are being driven to OTT even when they want to watch live broadcast content. Younger viewers, he says, may want to view live content and may even prefer watching it on a big TV screen, but increasingly they want to watch in private, enabling them to engage with peers on social media at the same time. To accommodate this, operators may deploy 'hub-like' set-tops that can help distribute video to multiple screens around the home over WiFi.

Simon Trudelle, senior director of product marketing at user experience and security technology outfit Nagra, says that the user interface needs to be specific to the functionality and screen size of the particular device being used but at the same time to have the same features across all screens. To enable this, Nagra has developed software such as its recently launched Open TV Signature Edition that is designed for operators to deliver services across multiple devices with relatively little development work.

For TiVo's Dawes, the shift towards delivering services over IP to multiple devices rather than over a defined, managed network to a set-top has fundamentally changed the relationship between technology supplier and service provider. "It is now about more than providing middleware. We are a platform



supplier and that is something that has changed. We provide the complete platform, part of which is traditional middleware for set-top boxes," he says. "One thing we are doing is providing the same user experience across multiple devices and that is key for operators. They want consistency across devices."

Dawes cites the latest generation of TiVo's user experience software, TiVo Experience 4, which is designed to provide the same UX across Linux boxes, Android managed and unmanaged devices, other streaming devices and the web.

In the face of these multiple pressures, pay TV operators have an interest in simplifying their own delivery infrastructure, to the greatest extent possible.

"These groups are trying to define one or two reference platforms and are trying to extend their reach in every market," says Trudelle. "What they do will depend on the culture of the company. There is a lot of focus on regional ARPU and operators will take pragmatic decisions based on what infrastructure they have and how much it will cost to move to a new architecture."

Challenges

While OTT technology can provide many benefits, it is only relatively recently that operators have seen it as a viable way to provide TV services under their own brand.

"Challenges include scalability and reliability," says Gideon Gilboa, SVP of product and marketing, media and telecom at Kaltura. "It is easy to deploy an OTT TV service if it isn't used a lot."

As soon as service providers are dealing with

live TV and people watching something like the World Cup – even if that is delivered over broadcast infrastructure rather than streamed, but is part of a hybrid broadcast-OTT platform – operators face the challenge that every click of the remote control goes back into the cloud rather than just to the set-top.

Gilboa says that it is challenging to deploy a hybrid system that delivers on-demand content and long-tail channels over IP but relies on a broadcast technology to provide primetime live channels, particularly because operators will be using the cloud to provide metadata and personalisation features, even on the broadcast channels.

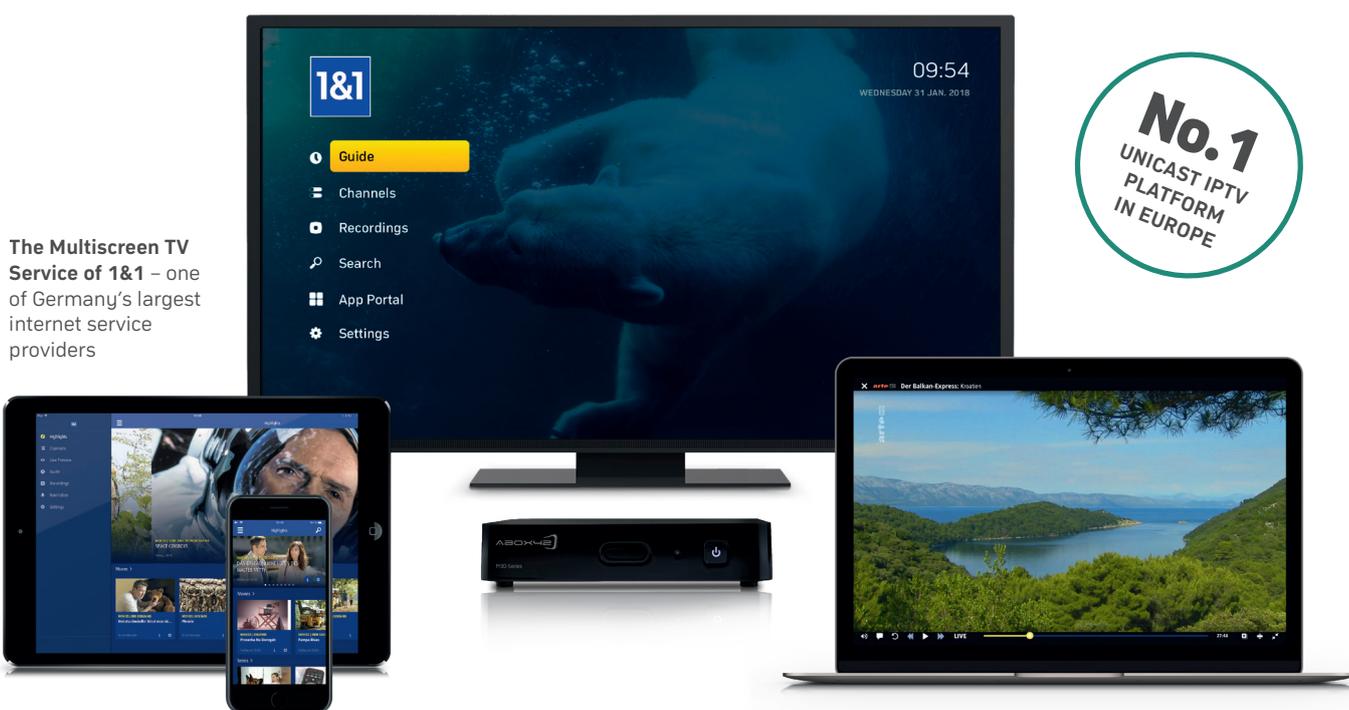
"You need to be able to implement a single content management system that controls everything from live to VOD and is not just a VOD-oriented CMS," he says. "You have to have the ability to integrate multiple metadata sources. Every pay TV operator wants to integrate YouTube and Netflix, but you also have to include pay TV features such as blackouts and parental controls."

Because operators want to be able to deliver new services to legacy pay TV boxes, deployments are often complex. "For a few of our customers that are pay TV operators migrating away from a legacy system, the costs are prohibitive. What we have done, along with launching a low cost OTT hybrid set-top box with the logic in the cloud, is to still enable legacy boxes with partial OTT features," says Gilboa.

In addition to dealing with multiple network and distribution technologies in the case of large multi-territory operators such as Kaltura customer Vodafone, video providers have to provide a mix of IP and broadcast services that have different characteristics as part of a

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“Pay TV set-top boxes behave differently from video-on-demand-only mobile and IP services,” says Gilboa. “Even if you are delivering video over broadcast cable, every click of the remote goes back into the cloud, and the behaviour of a live TV event with hundreds of thousands of viewers pressing pause to take a bathroom break at the same time creates a real challenge of scalability.”

There is a need, he says, to create smart caching mechanisms and capabilities that allow operators to keep the show on the road, and to proactively monitor what is happening. Smart caching helps improve the robustness of the platform and prevent outages.

Despite the challenges, says Gilboa, using OTT TV technology can enable operators to deliver services up to 60% faster than launching a new operating company to deliver a bespoke pay TV system.

Nagra's Trudelle says that growing demand for anytime, anywhere consumption means that operators are under growing pressure to optimise the use of bandwidth. The key tool to enable delivery in an un-managed environment is adaptive bit-rate encoding, but this has its own challenges.

“If everyone watches the World Cup using

adaptive bit-rate video, then it puts a lot of stress on the infrastructure. Our service providers are trying to strike the right balance. Those with infrastructure in place need more bandwidth to serve on-demand and unicast demand. They are trying to push the decision point for that right to the edge of the network. If they can bring a lot of content to the home in

infrastructure for some time to come, with less popular channels progressively being moved to unicast, on-demand streams.

With regard to ABR, Arris's Cheevers says that Netflix has led the way. Netflix's use of ABR has made streaming the preferred mode of consumption rather than download to watch.

ABR may be necessary even where

“The thing for pay TV operators is to take sources such as Netflix straight to the screen and integrate it into the TV.”



Charles Cheevers, Arris

multicast mode and then switch to unicast to serve different devices in the home, they will do that,” he says.

Trudelle says that multicast adaptive bit-rate technology is on the horizon and solutions are “getting to a point where it could be used” but some issues remain, including how quality expectations and thresholds will be managed.

He says that mainstream channels that are typically still consumed in a linear fashion are likely to continue to be delivered over broadcast

bandwidth to the home is sufficient to support high-resolution streams immediately. Even with fibre connections to the home, consumers still need to deliver the content around that home via WiFi, with varying reliability. The challenge becomes more pressing in the case of live video, when streaming of popular content such as football matches can be up to 20 seconds behind the broadcast signal.

Cheevers points out that more and more content is now becoming OTT by default

Vodafone's example: converging technology in multiple markets

Vodafone is a multinational operator with legacy cable systems in a number of markets and no TV presence at all in others. The company tapped OTT TV technology specialist Kaltura to deliver an experience that combines IP-delivered services with local broadcast channels.

“We are seeing a big transition of OTT technology into the mainstream TV distribution business,” says Gideon Gilboa, SVP of product and marketing, media and telecom at Kaltura. According to Gilboa, Vodafone wanted “a solution with OTT at its core that embraces local TV distribution too”.

Gilboa says that Vodafone wanted OTT features delivered alongside local pay TV channels from a single back end infrastructure to the set-top box. The big challenge, he says, is to “make OTT carrier grade” and to integrate the OTT system with multiple broadcast infrastructures in multiple territories.

“Vodafone had hardware-centric, own-

premise pay TV headends for every market except where they didn't have any, along with expensive consumer premises equipment,” he says. “They moved to an elastic multi-country, multi-tenant software-based system for all countries.”

The result, he says, was a 50% reduction in total cost of ownership and the ability to launch new services 60% faster than was previously the case.

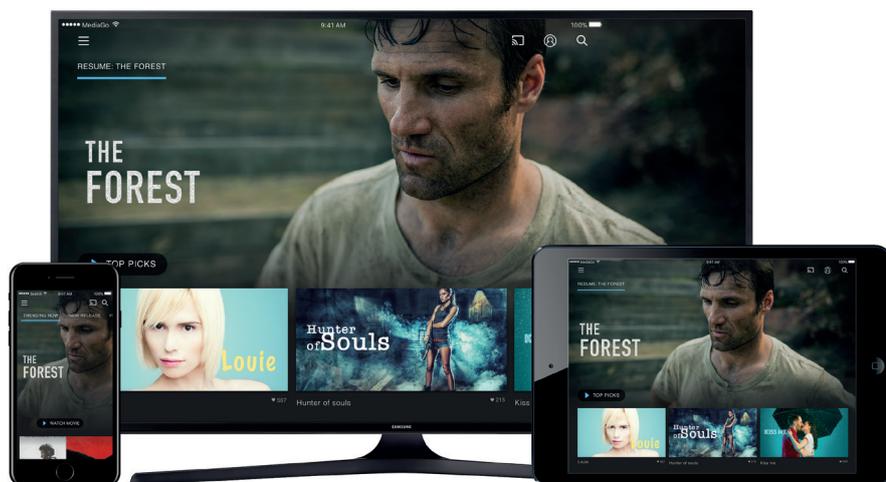
For Vodafone, it was important for Kaltura to be able to support different services that use different combinations of broadcast and OTT technology, using the same cloud system from a public cloud infrastructure.

As far as possible, says Gilboa, integration of different elements and customisation of the platform is pushed out to the edge of the network. The company adopted a single set-top strategy with multiple front ends for DVB-T and DVB-C hybrid deployments as well as IP-only boxes where necessary.

“We are trying to keep the core of the platform the same across the market as a common layer,” says Gilboa.

Building an OTT TV infrastructure, he says, had created more opportunities for user engagement and making money from subscribers. In legacy markets, viewership had increased and the net promoter score for the service had risen. The introduction of advanced cloud-enabled features such as personalisation and cloud DVR along with the ability to switch easily between screens enables pay TV providers to offer a similar experience to Netflix or HBO Now.

For telecom operators looking to add TV to a broadband and phone service, OTT TV provides a cost-effective way to do this with the benefit that operators can tap into the likes of Google's wealth of content in the case of Android TV or third-party OTT services rather than go to the trouble of striking content deals and aggregating services themselves.



Kaltura's TV platform has been deployed by Vodafone across multiple networks.

Ultimately, the adoption of OTT technology by pay TV providers is not just about cost and bandwidth optimisation but about the future of media in general.

The rise of the use of data as a key tool to enable service providers to differentiate their offerings points to an emerging tension between content owners and distributors as the pay TV landscape becomes much looser and less well-defined.

Content owners can now acquire the technology or hire vendors to build a direct-to-consumer play, delivering what are effectively premium services to the likes of Android or Roku devices, providing access to the big screen in the living room.

For Trudelle, what he describes as 'super-aggregators' will remain relevant in this emerging landscape.

He suggests that they may evolve into something more like large department stores, where leading brands can house their own concessions – although the fate of high-street department stores in the age of e-commerce may give some pause for thought here.

"There will be a role for some aggregation to make life easier for the consumer," says Trudelle. "If you look at the strategy of Netflix, you see them being integrated into the search experience with deep linking back into their app. The big difference with the past is that channels had to be part of a bundle. In a more fragmented world that has to change, but they still need to be visible."

For Kaltura's Gilboa, OTT is above all about greater personalisation, and he argues that consumers could ultimately benefit from personalised packages as well as a personalised user experience and advertising.

"OTT is meeting mainstream TV distribution," says Gilboa. "A lot of viewing today is 'traditional TV' viewing and that will change, which is one thing. But the second thing we are seeing is that those operators that have already started down this path are thinking about what comes next. If you build the foundation of a cloud system that delivers scalability and security and the robustness of pay TV, the next thing is to differentiate your services by leveraging the data you have about subscribers to create 'total TV' – that doesn't just mean recommendations but personalisation across the board." ●

because of the popularity of functionality such as time-shifting. A broadcast signal is instantly exchanged for a unicast stream when the user presses pause or opts for catch-up. Even in the case of live sports events, which are typically viewed in real time, unicast is becoming more popular as viewers pick their own camera angles and separate themselves further from the traditional common viewing experience.

Consumer premises

One motivation in adopting OTT TV technology on the part of pay TV operators has been to reduce the need to invest in expensive consumer premises equipment. OTT enables service providers to move towards adopting a bring-your-own-device approach or to adopt an off-the-shelf platform such as Android TV in order to cut the costs of integrating multiple OTT services.

"Android TV brings some benefits to operators. There are some pre-packaged functions including the app store and the ability to validate OTT services," says Trudelle. "Access to Google media services is also something that make sense, along with voice capability and unified search."

Trudelle says that operators remain concerned "about giving away a lot of insight to Google" and big pay TV operators are typically not going down this route. For smaller operators looking to add TV to a basic fixed broadband play, Android TV makes sense. However, he adds, work still has to be done to integrate TV functions that are not part of Google's core area of interest.

"Some telecom operators just want to get

some content and VOD and are fine offering a hundred apps, some of which open up services to linear channels," he says. "Larger operators want a strong play and need hybrid capabilities and linear channels. They will put more emphasis on SVOD and apps for specific demographics and the younger viewers because they are building platforms' for all subscribers and they want an experience for everyone."

Whatever the choices they make in terms of their CPE investment, for cable operators – and satellite TV providers – OTT is being adopted in the context of an overall switch to IP video and away from broadcast technology. For cable, simulcasting channels in QAM and IP – for time-shifted and multiscreen viewing – makes less sense as consumption pivots towards the latter. "For cable, IP video means DOCSIS 3.1, WiFi access and a good IP set-top," says Cheevers. It takes a while to get all those in place – as well as the necessary back office. You will increasingly see the primary connection become IP for new customers. "When you pause QAM channels today, the signal switches to an IP stream through DOCSIS and a hybrid gateway or IP box, rather than QAM unicast. VOD is also now IP."

According to Trudelle, the transition to IP and OTT video can happen smoothly if operators look first to invest in their back-end architecture. "Once that is in place, the transition can happen in a smooth way and it becomes a capex decision. How fast do you want to go to replace existing boxes," he says. However, adds Trudelle, TV viewers are not passive participants in this process. "Some customers don't want to give up their boxes, and that can present a marketing challenge," he says.

DIGITAL



August 2018

Multiscreen & WiFi

MULTISCREEN & OTT PART 3



Home truths

Whole-home connectivity presents both a challenge and an opportunity to service providers. It is a clear pain point for the customer but it is technically difficult to solve and risks creating a huge support challenge. Adrian Pennington reports.

Broadband networks have improved dramatically to the point where service providers can almost guarantee a certain level of connectivity to the home. Most providers' networks have enough core capacity to ensure that customers aren't competing for bandwidth in the way that we used to experience during peak hours, in the earlier days of the internet. The last mile is usually pretty reliable too, barring a digger cutting through a customer's fibre line.

In the fixed-line environment comprising the core network and the last mile network, the broadband service provider is in control and

can expand capacity as required.

Inside the home, though, there's a different story. WiFi has evolved from an amenity to an expected utility. It has become an enabling platform for a growing number of smart home products and systems. WiFi connectivity is an important part of life at home – but in most cases it is not fit for purpose and it is the service provider that gets the blame.

“To say that it is important to invest in WiFi would be a huge understatement,” says Charles Cheevers, CTO, customer premises equipment at Arris. “WiFi is the primary home connection. It is how children get to do their homework and how adults pay the bills

or find a way to fix that broken water pipe. It is a consumer's front door bell, their security system or smart light-switches that they rely on to work smoothly when they're on holiday. If service providers do not ensure that reliability is embedded within a WiFi system, customers will desert them faster than they can say 'WiFi'.”

Service providers realise that the bottleneck has shifted into the home. The topic, according to Cheevers, is currently at the top of their agenda.

Service providers are trying to tackle two fundamental problems with connectivity, as outlined by strategic consultants Cartesian.

First, WiFi operates over the radio spectrum,

which is a finite resource – service providers can't simply add more spectrum, as they can in the fixed line world.

Second, service providers can't control the radio spectrum. "Imagine if a service provider sold you services over the copper line to your home but at any point several other customers could start using the copper line at the same time, with no warning," says Graham Harvey, head of WiFi services. "There would be chaos."

The reason for the bottlenecks are explained further by Nokia's digital home marketer, Laszlo Gyalog: "First, performance can be hampered by interference. Most people are familiar with interference from other WiFi sources but not a lot of people are aware of non-WiFi interference sources, like microwave ovens, Bluetooth devices and the like. Understanding interference sources is a must in order to mitigate the problem, for example, through channel hopping and/or band steering," he says. "Second, coverage: you may have decent WiFi in the living room – or wherever the router is placed – but less so in other rooms. Third, complexity: today, you have to be somewhat of an engineer to install a WiFi network; arranging SSIDs, choosing the correct WiFi channel, and so on."

In-home bottlenecks

There are other causes of WiFi bottleneck issues. Consumption of 4K video, online gaming, cloud services, regular software update downloads and other higher bandwidth services is on the up and on more devices – connected TVs, consoles, PCs, tablets, smartphones. These services expect to be delivered by WiFi right across the home – a requirement that cannot always be met by a standalone router, particularly in larger homes.

The average home now has more than seven WiFi connected devices, and the average daily connection time per WiFi device is 10 hours, according to an analysis by technology outfit AirTies. "This makes WiFi one of the most used services in the home, alongside utilities such as water and electricity," the company states.

"4K video streaming or the addition of outdoor security cameras adds to bandwidth intensive applications which service providers need to address – both inside and outside the home," adds Arris' Cheevers.

In small homes and apartments, a

conventional standalone router may be sufficient to provide whole-home WiFi connectivity. In larger homes the router will need help in providing whole home coverage, particularly if there are many rooms in the house and multiple floors.

The challenges encountered in achieving whole home WiFi coverage include range. WiFi coverage needs to be provided throughout each floor of the home and perhaps to multiple floors – even to the garden. WiFi signals from conventional routers attenuate significantly each time they propagate through a wall, a floor, furniture etc. making it difficult to cover the outer reaches (e.g. the back bedroom) of the house effectively.

A second challenge is construction. The construction of some homes may preclude the propagation of WiFi from room to room and floor to floor. Stone and concrete floors, foil-backed plasterboard walls and underfloor heating systems are all major obstacles to WiFi generally.

Speed is also a challenge. How can high-speed – perhaps 1Gbps – wireless speeds be provided all around the home? Using conventional routers such WiFi speeds are

is a 'tree' topology where WiFi is extended from the core gateway using repeaters/extenders that can only make a single hop, to a gateway or another extender, thus requiring multiple hops for data flow between extenders. Another is to use 'Mesh' topology in which every extender connects with each other simultaneously to manage data-flow dynamically.

Some providers are now reselling whole home WiFi retail systems (e.g those of Netgear Orbi, Linksys Velop). "It is of course easier and cheaper for the service provider to support their own whole-home WiFi solution than someone else's," says Yildirim.

The effectiveness of the multi-node WiFi solution's algorithms to handle client roaming (between nodes) is also a key consideration. Such a solution cannot be considered successful if it provides extremely high throughput to a client device but fails to quickly and effectively pass that client device between its nodes when the client roams.

"Another potential performance bottleneck in multi-node WiFi solutions is the inter-node communication paths," says Harvey. "Hardwiring the individual nodes – via Ethernet – may not be practical but having a

"Maximising whole-home connectivity in the future will depend on changing the relationship between the service provider and customer."



Graham Harvey, Cartesian

only possible in the same room as the router or perhaps adjacent rooms.

"Service providers are bringing faster internet speeds to the home, but far too many consumers can't actually experience that performance because of outdated WiFi gear," says AirTies chief marketing officer Oz Yildirim.

Conventional WiFi relies on a single access point (AP) from a router/gateway to serve the entire home, but that approach is no longer sustainable to support today's super-connected homes and streaming video consumption habits. When it becomes apparent that a single AP won't handle the load, the logical answer is to add more APs, but many houses lack the wired infrastructure to install additional APs.

Two technological approaches predominate today to add and connect APs. One approach

dedicated backhaul 5GHz connection between nodes will significantly improve system performance."

While a single, centrally located AP is the most efficient way to get WiFi throughout the home, it is not always easy to locate the AP centrally. "This means that the requirement for another WiFi extender in the home is not removed. In order to support 4K video services reliably, almost 40% of homes will need at least a single additional WiFi extender," says Arris' Cheevers.

Mitigating churn

Increasingly, service providers are engaging with vendors that offer the possibility to manage WiFi systems, so that, if there is a

AirTies provides a Mesh WiFi system for operators.

problem with WiFi, at least they can help their customers.

“We are moving from a level of expectation for video on mobile where consumers are ‘OK’ with some buffering and will tolerate some performance issues to expectations of broadcast-quality reliability,” says Simon Trudelle, senior director, product marketing, Nagra. “For operators the challenge is that if something goes wrong in the home they will get the customer call and a related cost, including possibly sending a technician on site. Operators have to get it right. It’s a big factor in their reputation.”

In fact, a UK/US consumer survey released in 2017 by AirTies found that more than half of all subscribers have called their service providers to complain about their home internet or WiFi performance.

“Most consumers simply don’t distinguish between the internet and WiFi,” says Yildirim. “To them, those two terms mean the same thing, which presents a major challenge, as well as opportunity, for service providers. Consumers are paying for faster and faster speeds, but don’t experience consistent high-quality internet around the house. They run a speed-test app, see the results, and call their service provider to complain.”

The same survey found that 78% of respondents would prefer if their ISPs provided them with their in-home WiFi networking gear, versus purchasing it themselves through retail outlets.

Not surprisingly, according to AirTies – developer of a managed Mesh WiFi system – in homes without WiFi Mesh extenders, only 50% have consistent, high-quality WiFi coverage throughout, and 25% have noticeably poor coverage. “Service providers understand this bottleneck and are turning to WiFi Mesh for the solution,” claims Yildirim.

It is not just outdated WiFi gear but a lack of WiFi software intelligence that is seen as a primary cause of in-home internet bottlenecks.

“One of the most critical issues facing service providers is their lack of visibility and control over their subscribers’ in-home WiFi experience,” says Yildirim. AirTies’ Remote Manager is a cloud-based platform that provides home WiFi performance data, management, and analytics to support field technicians, network engineering, and customer care.



Instead of waiting for something to go wrong, and the customer calling the service provider with a complaint of ‘my broadband isn’t working’, the service provider needs to proactively look for signs of connectivity problems and communicate that to the customer.

“Maximising whole-home connectivity in the future will depend on changing the relationship between the service provider and customer,” says Cartesian’s Harvey.

“To truly benefit from whole home WiFi the solution needs to be self-healing, self-optimising – always using the best channel/band – and needs to provide a real-time management tool including recommendations to effectively and quickly solve any remaining issues,” agrees Gyalog. “Retail systems lack these management capabilities.”

Gyalog says Nokia’s WiFi portfolio combines capabilities like real-time channel monitoring, real-time spectrum analysis and real time link monitoring with a Mesh topology, “and provides a real-time management tool to provide the helpdesk with a holistic view on the in-home network.”

Other vendors of whole home WiFi systems with management capabilities include Plume and Huawei. It’s a key feature of the WiFi Certified EasyMesh too. The standards initiative from the WiFi Alliance enables home WiFi networks to combine gateways and access points from multiple vendors, including those supplied by a broadband provider and those bought via retail.

Based on the Multi-Access Point (AP)

specification and using CableLabs’ research, WiFi Certified EasyMesh is supported by vendors including Broadcom and Arris. The latter’s support of the standard in its HomeAssure whole-home WiFi solution means its gateway and WiFi extender products will be compliant. AirTies and SoC providers Intel and Marvell have also backed the standard. Liberty Global, which has installed its modem and WiFi gateway Connect Box in more than 10 million homes worldwide, has backed the initiative too.

“Importantly for service providers, all of this means that they are taking on a new type of problem with in-home connectivity,” says Harvey. “They can’t simply throw more hardware at the customer and rely on it working – they need to be able to provide ongoing service and support, to help the customer solve problems in an ever-changing environment.”

Level of speed

The benchmark speed/throughput that service providers want to deliver in subscribers’ homes varies, but the trickier issue they grapple with is consistency.

“Explaining to subscribers why their internet performance varies from room to room, device to device, and even minute by minute, is a real headache for service providers,” says Yildirim who argues that Mesh WiFi enables service providers to deliver consistent, quality internet in every corner of the home.

Depending on the whole home WiFi

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system (entry-level; high-end), anything from 100Mbps to 300Mbps in every room is possible. Often there is a trade-off between raw speed and stability – operators are trying to find solutions that can give them the best of both worlds.

“There may be occasions when raw throughput is the key selling point. Take an update to a game on a console, which might be 5GB. Gamers have to wait for the software update to complete before they can start playing – at 20Mbps, that’s 30 minutes of waiting; at 100Mbps, only seven minutes; 500Mbps, one minute, and so on. In these cases, raw throughput really makes a difference,” says Harvey. “However, for other use cases, it’s reliability that matters. If a large family has a fibre connection to the home guaranteeing a 100Mbps connection, it should be pretty confident about the ability to stream Ultra HD to the main TV set, another HD stream to a tablet in the kitchen, and a couple more HD streams to devices in upstairs bedrooms. That’s only 40Mbps of total bandwidth and yet WiFi can often fail to deliver in this kind of scenario. Each device is in a different location, with a different connection strength. Interference can affect any one of the connections at any time, and the WiFi network needs to intelligently cope with all of this, trying to maintain a stable connection to all devices at all times.”

Cartesian believes no amount of investment will guarantee whole-home connectivity, at least not using WiFi. “For operators the question is how much support they are willing to provide, and how they charge for it,” says Harvey.

New support requirements will mean changes to service providers’ operating models but also the ability to reduce churn, increase ARPU and reduced OPEX. There’s value alone in reducing customer service calls and enhancing brand reputation.

Liberty Global’s Connect Box monitors the signal across multiple devices for continuous optimisation. According to its chief product officer, Doron Hacmon, the level of customer satisfaction is significantly higher than before.

AirTies quotes from a survey of customers of more than a dozen service providers who have deployed AirTies Managed Mesh WiFi solution. Notably, 75% reported a decrease in churn since using AirTies; 80% agreed there has been an increase in customer satisfaction after deploying the solution; 77%

Evolving WiFi technology

WiFi technology continues to evolve and may provide additional whole home connectivity solutions.

For example, current WiFi technology 802.11ac 4x4 MIMO supports up to Gigabit speeds but not simultaneously to all devices spread within the home.

802.11ac Wave 2 technology offers support for 160MHz channels, MU-MIMO and Beam Forming and these may be able to overcome this limitation by supporting multi-gigabit speeds.

All eyes are on the roll-out of 802.11ax which promises dramatic improvements in quality, speed, and efficiency.

802.11ax or High-Efficiency Wireless

promises a fourfold increase in average throughput per user through more efficient use of the 2.4GHz and 5GHz bands and is designed specifically for high-density public environments, like trains, stadiums and airports. But it also will be beneficial in heavy-usage homes, apartment buildings and in offices that use bandwidth-hogging applications like video-conferencing.

The IEEE is not expected to have it finalised before 2019 although pre-standard chipsets have shipped and the first 802.11ax routers will debut later this year, targeted at gamers. Expect to see Mesh Wi-Fi solutions that use 802.11ax hit the market that will deliver the ultimate in-home Wi-Fi experience.

are offering or considering offering WiFi Mesh as a premium subscription service as an incremental revenue stream and 67% report there has been a decrease in WiFi related support calls after deploying AirTies.

“If problems can be solved in the home before they are detected by the end-users, this leads to satisfied customers, hence reducing customer churn,” says Gyalog.

Service providers can increase ARPU by selling whole home connectivity devices, and potentially by offering a managed WiFi service. Waool in Denmark charges €6 a month for such a service; for subscribers of their higher tier broadband subscriptions, the service is included.

“If service providers introduce a decent management tool, that gives a holistic view into the in-home network, and are able to solve issues quickly, they can reduce operational expenses. Today a WiFi related call to the helpdesk takes 20-30 minutes to solve,” says Gyalog. “If you combine this with the automatic/autonomous issue solving, this can dramatically reduce the OPEX, by also reducing the amount of calls to the helpdesk.”

In the US, Comcast’s Xfinity xFi gives customers a dashboard from which they can see the status of devices on their WiFi network, turn devices on and off, and control the times at which WiFi can be used by different members of the household.

This type of control interface can be easily extended to the management of any number of smart home devices.

“If customers are happy with their in-home connectivity, they will use their devices more intensively, which eventually will lead to a demand for higher tier broadband subscriptions,” says Gyalog.

“One of the most promising things we see happening today as that service providers are actually using premium WiFi as a differentiator from their competitors, and as a new way to monetize their broadband portfolio,” says Yildirim. “By having a premium WiFi option for subscribers, some operators are using it as an upgrade incentive to higher-tier broadband subscription plans, while others are using it to generate new monthly subscription revenues, and several are using a combination of these approaches.”

Once a whole home connectivity service is in place, this can be extended with smart home services, combining WiFi connectivity with ZigBee/Z-Wave, to control anything from webcams to smart sensors.

“If service providers want to offer even more smart-home services, ultra HD video, or high-bandwidth applications such as VR/AR, the need to have consistent, quality WiFi in every corner of the home is clearly fundamental,” says Yildirim.

“Ultimately, what customers will want to see is some or all of these features as part of a service provider’s WiFi offering,” says Cheevers. “When customers don’t see the value of their investment and experience a problematic service, they’ll start to question that investment.” ●

DIGITAL



August 2018

Live streaming

MULTISCREEN & OTT PART 4



The meaning of live

OTT has been a mainstream technology for the delivery of on-demand content for a long time, but live streaming still presents challenges, especially in the case of mass-audience events such as the World Cup. Anna Tobin looks for solutions.

The 2018 FIFA football World Cup has long been cited by the tech industry as a major staging post in live streaming going global. In the first stage of Russia 2018, international media measurement provider Conviva reported that a record-breaking 7.7 million viewers had watched the Argentina versus Iceland match via an online streaming service. UK broadcaster the BBC revealed that the England versus Tunisia match was watched by

three million people via BBC iPlayer, a record for its streaming platform.

For the 20 games played during the first week of the competition, Conviva reported that there were 393 million successful streams. Just under a quarter, or 93 million, streamed plays were lost, however, due to streaming errors and/or slow start times. That's a lot of disappointed viewers. So what needs to be done to get the service pitch-perfect ready for the Qatar World Cup in four years time?

There is a two-part answer to this question, according to Brice Clinton, senior solution consultant at business support solutions provider CSG.

"The challenges in delivering large scale sporting events to OTT streaming models are both business and technology-driven," he says. "From a business perspective, sports broadcasting rights are extremely valuable and traditional providers are often reticent to give broadcast rights up and/or share them. From



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a technology perspective, the largest hurdle to overcome in providing live sports content over OTT, is latency – no one wants to hear the next-door neighbour going crazy over a goal two seconds before they see that goal.”

Latency is seen largely as a side effect of legacy HTTP technology, which was not designed for the live streaming of 4K HDTV or even traditional digital-quality broadcast. This shortcoming of HTTP technology is not one that’s easy to overcome.

“OTT streaming is built on top of HTTP technology,” explains Nivedita Nouvel, VP of marketing at video delivery solutions provider Broadpeak. “HTTP protocol has been designed to display web pages as fast as possible and to transfer files by bursts in a best-effort mode. It is not a real-time protocol designed purposely for handling video streaming constraints. Still, it was a smart move to leverage this technology to deliver video, even live video, in order to deploy unified and standard solutions. Its usage simply has to be adapted to cope with the main current drawbacks that prevent a smooth experience with massive live streaming: high latency, often higher than 30 seconds; and low scalability due to massive usage of unicast streaming.”

Users expectations

The problem is that users’ expectations have changed. Whereas 10 years ago watching video online was a marvel and a blurry, jittery postage-stamp-sized image was perfectly acceptable, now we expect the same high quality video experience with streaming as we do with HDTV broadcast services, despite the two running on completely different distribution methods.

“Broadcast services rely on satellite up and down links that deliver content to a completely isolated network, while streaming uses IP networks and ABR encoding, which may sometimes not adjust to the bandwidth available or the amount of detail in the picture immediately. This can result in loss of synchronicity between different users and devices,” explains Christopher Mueller, CTO and co-founder of video infrastructure solutions provider Bitmovin. “Bandwidth is another challenge for live streaming, especially for cross-regional scenarios, where the viewer experience can vary from excellent to poor simply because of the infrastructure each

subscriber has access to. Nowhere is this as prevalent as in APAC, which combines the world’s fastest speeds in South Korea and Japan with regular outages in places like Nepal or Cambodia.”

The internet, by design an open network, doesn’t allow for that end-to-end quality of service that has always been expected of cable, satellite and terrestrial broadcasters who have control over their entire path and that’s the biggest challenge for live streaming, says Mark Blair SVP, international at video platform provider Brightcove. “You can come up with all sorts of other challenges around whether the bandwidth between the stadium,

“It is not always the same CDN that is the most appropriate according to the region of the world where you are streaming and also according to the network operator of your subscriber,” says Nouvel. “They can deploy local caches in the operator’s networks where the traffic is concentrated or that face specific quality issues. Streaming from a point closer to end-users increases the quality of experience – fewer contention points, higher layers – and decreases the fees paid to CDN service providers. And they can always use player analytics to control the quality of the streaming.”

Today’s streaming solutions are perfect for on-demand viewing services and this is

“Whatever delivery optimisation is made by the CDN service provider, its benefits can become invisible if the network operator does not do his part.”

Nivedita Nouvel, Broadpeak



if it’s a live sports event, and the encoders is there; whether the bandwidth between the cable operator and the home is there, etc., but ultimately it is a problem that we can’t actually solve and so the focus has got to be on how to mitigate the design problem of the internet.”

It’s this lack of control over the entire delivery network that makes live streaming so vulnerable to disruption and poor quality of experience and service. “Content providers usually rely on a CDN service provider to convey their content in the network, and they pay heavy fees to the latter based on the volume of unicast or point-to-point traffic involved. But the content ultimately has to go through a network operator infrastructure that owns the link with the subscriber,” says Nouvel at Broadpeak. “Whatever delivery optimisation is made by the CDN service provider, its benefits can become invisible if the network operator does not do his part.”

Nivel explains that “although several actions can be taken by content providers to enhance the quality of their video delivery, they can control their origin server and not rely on the one provided by CDN service providers”.

Service providers can use multiple CDNs with a CDN selector tool and assess their quality in real-time to privilege the ones that are doing best.

what they are really designed for. Services that stream high-quality content on demand to download and then play later however further give rise to the expectation that live streaming content should be available in the same high quality.

When content is streamed live over these networks, the problems start and the content suffers, says Gustav Grundström, VP of live OTT at media solutions provider Net Insight.

“On-demand services, such as Netflix, have no relation to time. For live, however, time is critical and the experience is shared by all others viewing the same scheduled event. This was very evident during this year’s World Cup, which has become one of the first to be streamed by millions of people. Media have covered how games have been ruined when fans have heard others with better connections celebrating goals before they’ve seen them, due to issues with latency,” says Grundström.

Grundström says that while it is not possible to provide a perfect live experience using on-demand technology, Net Insight’s Syc platform, which is specifically designed to solve the syncing problems for live streaming, “provides fixed and faster than TV experience for all, with playback in frame-sync across devices, a TV-like experience”.

“To improve traditional streaming made



Q&A: Pablo Hesse, Teltoo

Pablo Hesse, CEO of Teltoo, talks about the rise of live-streaming and the challenges of delivering mass-audience events over the internet.

What major changes in consumption of TV do you believe will have the biggest impact on the business in the next couple of years?

We will see the biggest impact in live TV. Right now, it is the fastest growing market segment, and it's full of opportunities. Online TV started as a VOD format because it helped to break an old paradigm: TV schedules. The same way MP3 and playlists changed the way we listen to music, VOD and streaming changed the way we watched TV. It created a revolutionary way of consuming content. Today we see how people watch VOD content on the go as if it was normal, when five years ago that sounded crazy. Now that VOD is mature, the entire industry is moving to an online TV experience that includes live content.

Live content represents a bigger challenge than VOD, but also new opportunities. We can now enjoy live events that were hard to watch before, and that allows us to satisfy an increasing consumer base all over the world. Sporting events, music festivals, industry events, education... we can reproduce all those experiences live, everywhere – and that is why live TV will be the biggest revolution in the next few years.

To what extent do you see live TV switching from broadcast to streaming?

TV will become a complete streaming experience. We have already changed the way we consume content. The internet redefined the rules, and now we want content immediately, everywhere and on all devices. Live content is one of the most demanded video formats, and it will be integrated into this new TV experience.

So, rather than thinking if that will happen or not, as industry leaders, we need to think how we are going to complete the move quickly while giving consumers a wonderful experience. Technology and infrastructure are always running behind demand and trying to meet it. It's time to get ahead and control this demand through innovative and scalable ways to give people the content they deserve in the way they demand it.

What are the key challenges in delivering live-streamed coverage of mass-audience sports events?

If you look at the live video streaming process chain there are several factors to take care of: capturing, encoding/transcoding, encryption, breaking

down the files, caching, delivery – all in real-time. It's very challenging. But, preparing to meet mass audience levels is even more complex. Live streaming is relatively new, and there is still little data, so most companies over-provision their network, through multi-CDN strategies, to create enough capacity in case something unexpected happens. That strategy is not wrong, but shouldn't we be able to stream with the certainty that everything is going to work and scale when needed?

What needs to be done to overcome these challenges?

We must think differently. Go backwards and modify what has been used in the past. The internet was never designed to distribute video, so why not stop, take a moment to think, and try different ways of doing things? We have been using standard technologies for a long time, but isn't it time to move forward and embrace new ideas? It is challenging to innovate in an industry where millions of viewers expect the highest quality, but precisely because of that, we need to be ahead of the demand, instead of always trying to meet it.

Most of the companies we have the pleasure to talk with now have innovation teams tasked with creating a new way of thinking and doing things. A new way of defining what should be done. This is what we need in our industry to overcome these challenges.

What do you see as Teltoo's role in this environment and what are the key elements of your technology?

Teltoo is a new way of distributing content. It challenges the current way of thinking, and uses technologies that are completely reliable and, even better, completely scalable. Teltoo maximizes the current infrastructure that is in place, which means a benefit for all the stakeholders involved: consumers – better content; content owners – efficient delivery; and operators – network optimization.

The key element of Teltoo is how it complements the other technologies used in the video streaming chain, and how it enhances the whole viewer experience by reorganizing the way video is distributed. Teltoo provides full control, enormous flexibility, and will soon become an essential element in the video streaming toolbox.

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Live-streaming of live events is becoming more popular.

this capability with content providers, the latter could benefit from it as well,” she says.

Though live streaming is challenging, it can be delivered immediately and in high quality, providing every possible link in the delivery chain is covered, says Kristen Vise, product marketing manager at OTT technology solutions provider iStreamPlanet. “Service providers need high availability in every part of the workflow from feed acquisition to syncing multiple camera feeds to CDN and origin integration,” she explains. “A comprehensive encoding solution is also required for high-quality live streaming. Playlists are generated optimised for specific platforms to achieve the best possible playback based on device capability. Streaming delivery must be architected for maximum coverage and automatic scalability. And, coverage-wise, the CDN should span as large a footprint as possible to ensure the best experience. Simultaneously, the solution must scale with viewership.”

Being able to deal with sudden high peaks in viewership without losing quality is particularly crucial when streaming sports programming, when viewership can spike instantly if the game takes an exciting turn. To deliver high-quality video at scale service providers must continually monitor their networks for any degradation in quality and schedule regular load testing.

“Extensive monitoring is critical for maintaining a high-quality live streaming experience. This includes monitoring source quality, encoding, packaging, publishing, CDN performance and quality of fans’ experience on every platform in all regions. By monitoring every aspect of the workflow, from ingest to the fan’s screen, providers can proactively mitigate potential issues and quickly troubleshoot when issues arise,” says Vise.

Affordable streaming

With all these checks and balances required to deliver high-quality streaming, content providers and network operators are striving to simultaneously keep costs down and monetise at every possible opportunity.

There are a number of ways that live streaming can be made more affordable says

for on-demand, there is only one thing to do; lowering segment sizes of the streaming files in order to shorten latency. This creates a chain of problems though,” says Grundström. “First, more overhead, i.e. non-video data, which mean less quality per streamed video. The second problem is less reliable streaming. The only way to overcome this is get a better internet connection and for the CDNs to distribute the streaming servers further out in the network, in order to come closer to the end-users. Sye does not have these built in limitations and uses non-file based, non-

efficiency is critical as content quality goes up, [as with] 4K, but also increases the delivery bandwidth of content overall. Along with compression, technologies like Just in Time Packaging (JIT), where the packaging of video assets for the particular screen type is managed just-in-time, rather than being stored previously, also help increase that operational efficiency across devices,” he says. “HVEC and JIT help to reduce the dreaded buffering of content. Along with those technologies, more robust asset preparation technologies and processes, like ring buffers for catch up



“The challenges in delivering large scale sporting events to OTT streaming models are both business and technology-driven.”

Brice Clinton, CSG

caching streaming, made for live, resistant to distance from the end-user.”

Improved compression

It’s necessary to leverage new compression technologies to improve the quality of experience and quality of service of live streaming says Clinton at CSG. “With new standards such as HEVC, the goal was to provide twice the compression efficiency of the previous standard, H.264/AVC. This

and start over, continue to improve the quality of content delivery in both live and VOD scenarios.”

Network operators that harness ABR technologies can further solve the scalability and latency issues, says Nouvel at Broadpeak.

“By bringing the OTT traffic into the managed multicast domain, it removes the need of an infrastructure that scales with the number of users and it creates the mandatory conditions to allow players to work properly with a limited buffer size, which is the key to reducing latency. If operators could monetise

Second-screen expectations

To add an extra layer of complexity to the live streaming business, many people watch a live stream on a second screen to enhance their first screen broadcast experience, but trying to synchronise those streaming experiences isn't easy.

"Ensuring total platform and device coverage is absolutely fundamental, and needs to be treated as a priority today," says Christopher Mueller, CTO and co-founder of Bitmovin. "Viewers using a smartphone or tablet should no longer be a minute or even two seconds behind the live broadcast signal when watching a live streamed sports event and definitely not face complete blackouts."

There's a lot of work that needs to be done around this, says Mark Blair SVP, international at Brightcove. "One of the big emerging technologies that is both exciting and necessary is around low-latency streaming technologies."

Gustav Grundström, VP of live OTT at Net Insight says that the answer to the second-screen live problem is his own platform Sye. "Second screen applications are important to get user engagement. Let the user become the

producer of extended content to the produced main feed. In order to fully leverage on a pure second screen experience it's critical to have all the feeds in sync and across platforms, this is what Sye does. Sye is faster than TV, but it can also be adjusted to align to a broadcast," he says.

Eradicate second-screen latency and you don't just improve viewer satisfaction you also unlock a whole new revenue stream from the interactive gaming and gambling industry says Blair at Brightcove. "You can't have gaming on the outcomes associated with live events if you can't deliver the streams for a couple of minutes. You need low latency to unlock the gaming side of live," he says. "There is more data than ever now that shows that the quality of the experience drives the engagement. If you're working on a paid model you particularly care about quality and engagement, because you don't want the churn to go up, which it will do if people are not getting value out of the experience. This is an even bigger problem with advertising-based experiences. If you lose engagement you lose the advertising revenue that goes with it."

service provider we are building out a platform and an infrastructure that will be able to leverage over many customers. Whereas if you're, for example, a niche sports provider building all of that redundancy out for yourself, that's economically challenging and in some cases not viable."

This is why some providers of live content will decide that it makes financial sense to subcontract the actual delivery of their services to an outside operator, although they will be seeking quality of service assurance.

When it comes to making money from OTT streaming, operators are considering a myriad of ways of enhancing their offerings, with a choice of camera angles and supplementary content, for example.

Offering feeds of different camera angles, player bios, stats and highlights are ways of personalising the fan experience and must be tightly integrated with the live streaming video solution, however, points out Vice at iStreamPlanet. "Standardising every aspect of the workflow from signal acquisition to encoding to publishing into the CDN and even monitoring allows for a more efficient and cost-effective solution. In addition to workflow standardisation, service providers should automate every part of our platform from ingest to encoding to CDN failover. Automation drives costs down by removing extra people and extra tooling from the equation. In turn, standardisation and automation also allow for scalability and with scale comes cost saving benefits."

With augmented reality and virtual reality now evolving for OTT streaming and more HDR and 4K content being readied for

Mueller at Bitmovin.

"First, through using a multi-codec approach to reduce bandwidth demands and CDN costs. By encoding your videos using a multi-codec approach you can double the quality while still reducing your bandwidth consumption and maintaining maximum device reach. Roughly 83% of the internet users in the US could be reached with H.265 or VP9; a live streaming provider targeting this market using these codecs will immediately reduce their CDN costs, while consuming less bandwidth for end users," he says. "Combining this with a player that works on all devices and platforms to reduce overheads of maintaining multiple players will also help. By adapting the bitrate to the specific content, such as per-scene adaption encoding, each stream can be optimised further to reduce CDN costs and make necessary improvements both affordable and economical."

Economies of scale will also naturally drive prices down, but as the live streaming industry is still in its infancy and investments still need to be made and software and hardware are

constantly evolving, costs are unlikely to fall any time soon.

"Whilst we all talk about how fast live-streaming is growing and how big it has become, if you compare it to traditional viewing it's nowhere near the same scale. As the scale [grows] we need to see the economies



"Streaming uses IP networks and ABR encoding, which may sometimes not adjust to the bandwidth available or the amount of detail in the picture immediately."

Christopher Mueller, Bitmovin

of scale factor in," says Blair at Brightcove. "The cost of delivering the products and services will get driven down as that happens, but that's going to take time to happen. One of the things that I think really plays to companies like Brightcove's strengths is we're already being able to capitalise on some of those economies of scale, because as a cloud

streaming, those looking to stream content have their work cut out getting it delivered in real time and in optimum quality.

Qatar 2022 will come around quickly. Whether those World Cup football matches will be streamed truly live to perfection is not yet a certainty. The game plans are already being worked on though. ●