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NAGRA KUDELSKI

How Device Innovation is Changing the Pay TV Landscape

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Videonet gives platform operators, broadcast groups and channel owners information and analysis that helps them transform themselves for the era of connected and multiscreen TV and advanced data- driven advertising. Videonet is part of Mediatel Events Ltd, a jointly- owned events and publishing business formed by Hubble Media Ltd and Mediatel in July 2016.

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How Device Innovation is Changing the Pay TV Landscape

How Pay TV operators can segment the consumer market more precisely and deliver service and pricing innovations thanks to a new breed of customer premise equipment and a more agile Pay TV device ecosystem. The report considers Pay Lite services and OTT onboarding, the potential for tailored CPE bundles, and implications for content security. By **John Moulding**

Segmentation of traditional Pay TV

Segmentation of consumers into higher spenders and lower spenders is nothing new in Pay TV. Historically, Pay TV operators have used entry-level packages to entice consumers who might not otherwise be interested or who are on the verge of giving up their subscription. But the segmentation we now see in the Pay TV market is different.

First, the lower-cost packages are being offered through the same companies but away from their traditional platforms, often under independent brands, using completely different delivery technology – online streaming across open networks to what are often unmanaged connected devices. These are the so-called skinny bundles – or Pay Lite. NOW TV from Sky, Sling TV from DISH Network and more recently DIRECTV NOW from AT&T are examples.

The attempt to attract lower-cost users (using Pay Lite) is now more determined and the demographic target broader. Where lower-cost incentives were often temporary in the past, responding to short-term customer acquisition problems, the Pay Lite low-cost market already has a permanent look about it.

As Guy Bisson, Research Director at Ampere Analysis, the UK-based research and forecasting firm, points out, Premiere in Germany (the predecessor to Sky Deutschland) had a EUR 5 starting offer last decade as an attempt to kick-start a struggling Pay TV market. "French and Scandinavian operators experimented with a la carte and low-cost offers througout the 90s and noughties. There have always been skinny bundles and experiments around low-entry price points; this is not new."

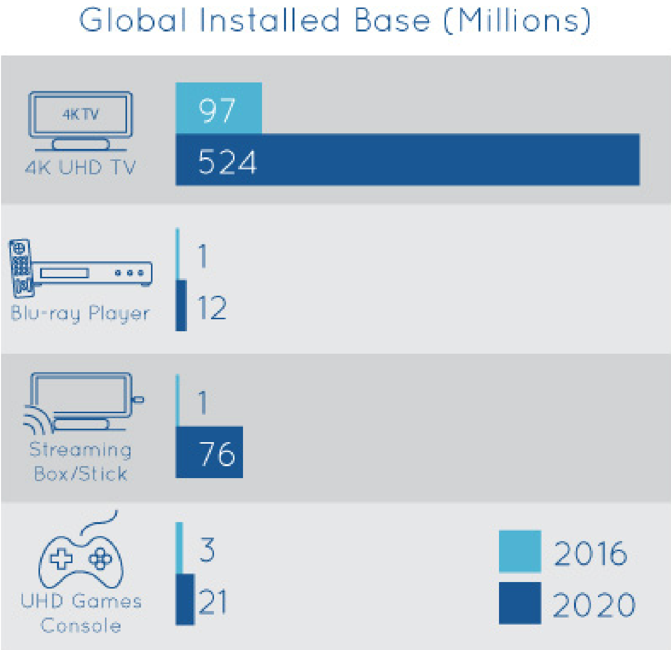
Then, prices could be raised when customer acquisition became easier. "Back then you had the choice of either taking Pay TV or not taking it. Now there are other options like Netflix, Amazon and, for transactional video, iTunes."

This change in market fundamentals makes it harder to raise the floor price if you want to keep targeting less affluent consumers. "You cannot go backwards. Ten years ago you could constantly change packages and experiment but with [online] SVOD services coming into the market and offering something that is half-decent at a very low price point, there has been a reaction to that [from traditional Pay TV providers]. The lower cost option is here to stay now," Bisson declares.

He thinks Pay Lite options are how some operators will now target the lower-ARPU market. Does this development mean we will see less price/bundle segmentation on the traditional TV platforms? He thinks so, certainly in Europe.

"In the U.S. it is slightly different and there will be more segmentation within the traditional Pay TV offer because it was more expensive to start with," he notes. And yes, there is such a thing as luxury Pay TV and operators should make sure they keep delivering it to satisfy their power users who are less price sensitive and want all the best content.

Simon Trudelle, Senior Product Marketing Director for Multi-Screen & Cloud Services at NAGRA (which provides multiscreen solutions, customer premise equipment and content security), told Videonet two



Futuresource Consulting illustrates uptake in various device categories.

years ago: "We are seeing a paradigm shift on the marketing side. We used to sell Pay TV as a big bundle with one or two content options, but generally we wanted to sell the whole package. Now there is an opportunity to aim more precisely at a given market segment."

Trudelle now predicts that in the long-term the line between what is a skinny online Pay TV offer and a lower end traditional package will blur. As online video delivery technology becomes more efficient and copes with greater scale, and the streaming user experience becomes equivalent to broadcast, we will stop differentiating between the two. "You will deliver the right package to the right segment with the right technology and we will be able to focus on the real business of consumer marketing."

In this continuum, some consumers will be television traditionalists who put the big screen experience first, with second screens as the complement. "And there are consumers who want to be exposed to content on the second screen initially, using the big screen as their second step. At some point, content packaging will reflect those differences in consumer priorities. That chasm between skinny OTT and traditional broadcast will blur."

Ironically, as OTT and broadcast technologies and their user experiences become more like each other, the evolutionary roadmap for Pay TV operators could reach an important fork. "The U.S. market could split into two major markets, one more broadband-centric, in urban areas, and one more broadcast-centric in rural areas where broadband is not so good," Trudelle suggests.

A growing low-cost paid video market

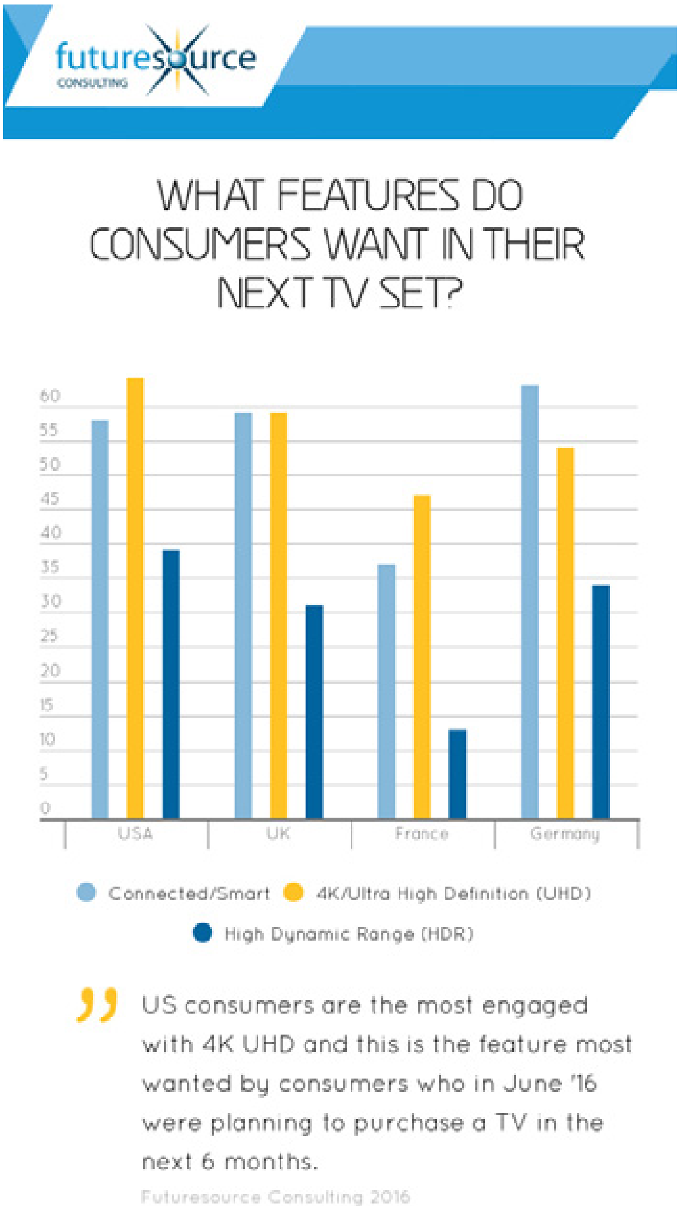
Pay TV operators are targeting a wider pool of consumers for two main reasons. The first is to fight off born-online competitors who might otherwise build empires in the low-ARPU market that could later be used as a stepping stone into the higher-ARPU market. The second is to make sure they do not leave money on the table in homes where there is an appetite for some paid content, but not EUR 30 worth of appetite. In a simple example, there are UK consumers happy to buy some Sky Sports day passes but not subscribe to Sky Sports.

The competition that is forcing operators to diversify is strong and getting stronger. It is exemplified, of course, by Netflix. Speaking at OTT World Summit in November, Brett Sappington, Senior Director of Research at Parks Associates (the market research and consulting company) outlined a significant increase over the last two years in U.S. homes subscribing to more than two OTT services.

"In the third quarter of 2015 there was a significant bump in the number of services and as supply increased so did the demand for those services. That demand also suggests that existing Pay TV services were not fully meeting all the demand from consumers, who were still finding areas of video where they wanted more content."

His company has found that millennials consider the online user experience with OTT services just as good as Pay TV, despite lower video quality. "A significant number of them see online video services as being easier to use than regular TV services," Sappington added.

The online competition from the non-traditional market comes in many forms, from what are effectively virtual pay operators like Sony's PlayStation Vue to the anticipated YouTube Unplugged service (scheduled for a 2017 launch).



Tristan Veale, Analyst for Media & Entertainment at Futuresource Consulting, a research and forecasting company within CE and entertainment, believes Amazon is now a pseudo Pay TV platform.

"In the U.S. Amazon offers third-party paid-for channels, like Starz and Showtime, through its Prime user interface with integrated billing through your Amazon account. Amazon Fire TV is now the leading streaming device in the USA, UK and Germany and has a 4K/UHD variable. Amazon is a leading innovator in this sector."

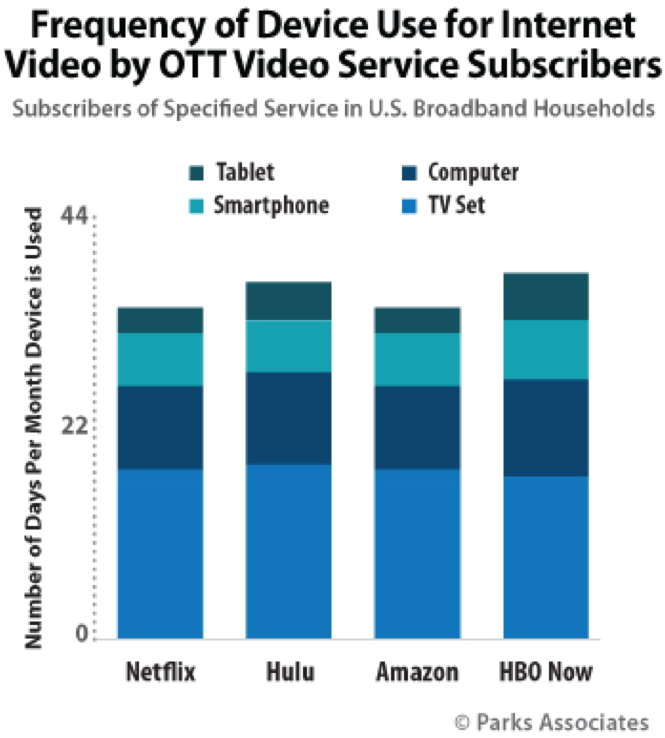
Ampere's Bisson warns that in the U.S. the content that drives people to paid subscriptions is changing, with top flight sport and movies less important than they once were. "With all the segmentation across the entire [video] ecosystem including SVOD, other content is driving people's decisions - including drama, comedy, high-value reality TV and documentaries. Skinny bundles with segmented packages address that change, and so does SVOD."

It is not just the traditional Pay TV market that has become more finely segmented thanks to the multiscreen revolution – the entire video market has. Competition for Pay TV eyeballs could intensify further as more streaming video is watched on the television set (as opposed to just mobile devices).

Sappington observes: "Streaming through set-top boxes, streaming media players, game consoles, Chromecast and other platforms is really starting to take hold. The greatest thing to happen in OTT video is that it is going back to the television."

How Pay TV providers are chasing new opportunities

Brett Sappington (Parks Associates) outlines the different approaches that traditional Pay TV providers are taking to defend their turf and chase new markets. Verizon, the U.S. telco and mobile operator,



Courtesy of Parks Associates

launched its Go90 mobile-only OTT service in 2015 as it moves to become more of a mobile-digital company. The American cable giant Comcast provides an operator OTT video service called Stream (which includes HBO) but only to Comcast broadband homes.

AT&T has launched a nationwide streaming Pay TV service called DIRECTV NOW, exploiting content and broadband connections. DISH Network provides the Sling TV skinny online bundle, which includes premium sport from ESPN.

When seeking to engage millennials and other online-friendly consumers, Pay TV operators are also onboarding popular OTT services. For some companies this is as much about driving their broadband business as keeping control of home entertainment. This is certainly true of Deutsche Telekom, which partners with Netflix and others.

Virgin Media is a long-term advocate of the marketplace model, where you open your platform to a selection of third-party OTT content. It was the first major Pay TV provider to onboard Netflix and has just become the first to integrate Hayu, the SVOD service from NBCUniversal that is dedicated to reality TV. Cablevision has partnered with Hulu.

This model is not without risks. Sappington points out: "Hulu have recently announced a live TV service that puts Cablevision in the unfortunate position of having a company integrated on their STB that has a competitive product."

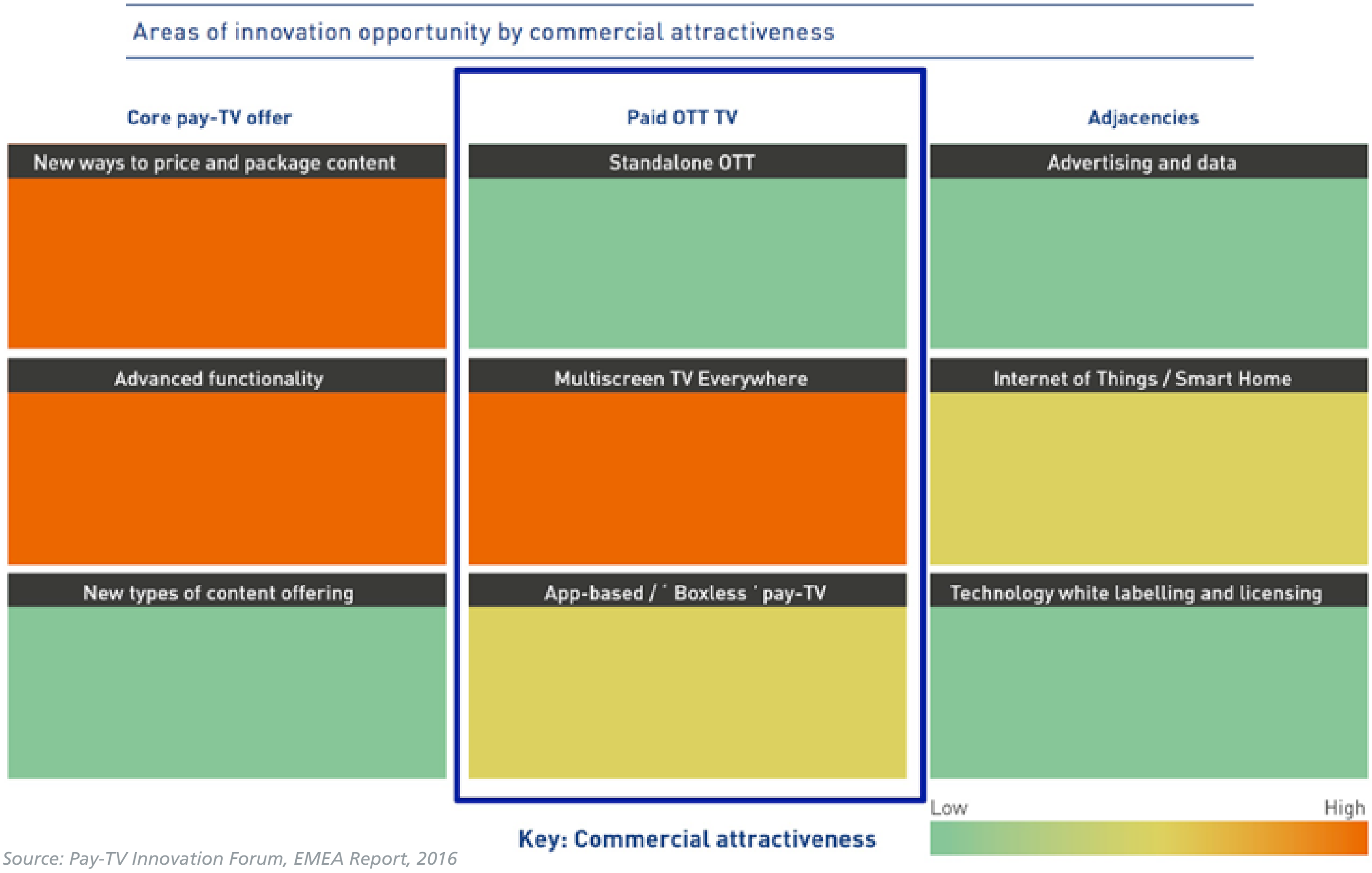
Some companies have launched what are viewed as 'Netflix killers' – their own SVOD services. They do not always work, as with the now-defunct Shomi service from Canadian cable operators Shaw and Rogers.

The Pay Lite, online skinny bundle

At the Akamai EDGE 16 conference in San Francisco during October, Roger Lynch, the CEO of Sling TV, gave a revealing insight into the big thinking behind this standalone Pay TV OTT service. Charlie Ergen, the CEO at DISH Network, called him in 2009 to discuss the future of TV. "I flew to Denver. He had a big satellite TV business and was worried it would reach saturation and he wanted to think about what came next. I was interested in how the Internet could be used to replace satellite TV. He brought me onboard to build a new company that ended up being Sling TV.

"We thought it could be done in a couple of years but boy, were we wrong. The tough part was not the technology but getting the programmers onboard because it had the potential to disrupt an industry that had been so good for them. We argued that disruption was coming anyway and we were able to get them, but it took much longer than we thought."

Lynch views Sling TV as a mobile-first service and says we should compare it to a music service like

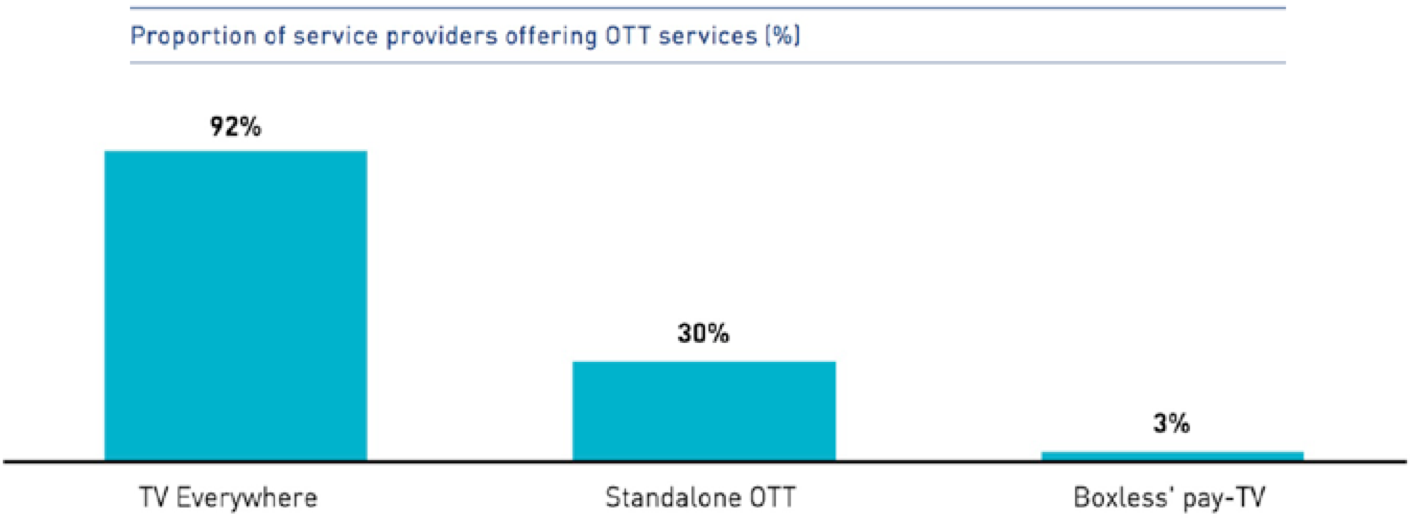


Source: Pay-TV Innovation Forum, EMEA Report, 2016

Spotify rather than a Pay TV service like Comcast or DISH Network. "When consumers engage with Spotify for the first time they download a mobile app and start a free trial. There are no contracts and there is no installation. That is how most people start a relationship with Sling TV."

Launched at CES 2015, Sling TV won multiple awards for its no-contract, $20 per month multiscreen service. Originally it targeted the millennials that traditional Pay TV was not reaching, covering cord-cutters and cord-nevers, some of them in broad-band-only homes. Since launch it has expanded its remit to attract a broader demographic including people in existing Pay TV homes.

"There is a growing number of people frustrat-ed with high prices and long-term contracts and



This graph shows the detailed breakdown of the Paid OTT TV innovation opportunity highlighted in the first Pay-TV Innovation Forum graphic (see top of this page).

Source: Pay-TV Innovation Forum, EMEA Report, 2016

Brett-Sappington, Parks Associates

equipment fees," he told the Akamai EDGE audience. Recent Sling TV marketing campaigns have focused on the idea of taking back control, with the strapline, 'Take back TV'.

At NOW TV in the UK (the Pay Lite service from Sky), control is a big part of the marketing message, too. Speaking at OTT World Summit recently, James Alexander, Strategy & Proposition Director for NOW TV, said the market differentiator is the marriage of Sky content with the low cost and flexibility of OTT. "The service is for customers who are reluctant to commit to full Pay TV and who feel more comfortable with a more flexible approach."

He thinks there has probably been a latent demand for this kind of service for years or even decades – and technology and commercial developments have finally made it possible.

Sky has started to target the lower ARPU pay market even more aggressively this year, thanks to the NOW TV Smart Box (developed by Roku). This combines streaming with a DTT tuner and so receives Freeview, the dominant free-to-air bouquet in the UK. Now you can move between terrestrial broadcast and NOW TV streaming without switching HDMI inputs.

Jonathan Broughton, Senior Analyst, Television Media at IHS Technology, believes this hybrid box means NOW TV is now a direct challenge to the bundles available from TalkTalk and BT (both of whom provide modestly priced Pay TV offers on a traditional platform).

Alexander says there is no cannibalization of the traditional Sky satellite service since NOW TV is 'self-segmenting' and marketing is aimed at Freeview homes and the company never advertises in pay channels. "NOW TV provides growth for the Sky group as a whole, rather than taking from Sky," he declared.

Chromecast

Chromecast is the world's largest brand in digital media adaptors with 19% global market share

Source: Futuresource Consulting

Although Sky and DISH Network are very positive about their Pay Lite services, the wider industry is unsure about this model, based on research by the Pay-TV Innovation Forum earlier this year. This is a global research programme conducted by the media consulting firm MTM (and sponsored by NAGRA) that interviewed Pay TV executives across Europe (and later other markets). It found that European Pay TV providers found they were "quite sceptical about the commercial attractiveness of new standalone OTT services."

"Despite the recent boom in standalone service launches, industry participants believe that few Pay TV service providers are well-positioned to build a successful standalone OTT business," the report stated.

The role of technology in service segmentation

As in previous decades, the segmentation of the Pay TV market is still closely associated with technology. Guy Bisson points out: "Our research shows that high value Pay TV customers who take sports and movies and other top tier content tend to be very driven by technology. They are keen on the latest technology and high functionality – things like HD and DVR."

So far, there has also been a clear functionality gap between Pay Lite services and the traditional Pay TV platforms, with the former generally having lower resolution and no personal recording capability - only on-demand assets.

The current difference between the Sling TV and DISH satellite services illustrates the point. With DISH you get the Hopper whole-home entertainment gateway, including DVR with 2Tb of memory and 16 tuners that mean you can watch TV on seven televisions at the same time, including six fed by Joey client set-top boxes. The top Sling TV package, Blue, currently supports three concurrent streams.

The DISH satellite package includes the PrimeTime

$20
30+ channels

The starting price for Sling TV, the standalone OTT 'Pay Lite' service from DISH Network

14 days
£6.99

The free trial period for the NOW TV entertainment package, and its ongoing monthly price

Zero

Contract commitments for customers of Pay Lite services

Anytime feature (giving you a constant recorded loop across all the major broadcast networks) and AutoHop (the ability to automatically skip advertisements on popular recorded shows). A subscription also gives you comprehensive multiscreen viewing and whole-home music services.

The functionality gap between traditional and Lite Pay TV services is hardly surprising. Sky Q (Sky's default DVR platform that comes with powerful whole-home, multiscreen functionality) and Hopper are supported by long contract commitments and decent ARPUs. But the functionality on the Lite services could move nearer to what we once enjoyed on a basic Pay TV offer. Sky already provides HD at 720p for NOW TV.

Guy Bisson thinks there is a possibility that if the functionality gap between Lite and basic traditional services narrows, churn could result. "Can you offer HD or better on a Skinny bundle without cannibalizing the main package? I don't think so," he says. "I don't know where the [functionality] line is that will prompt churn. For some people it is the availability of HD and for others it would be DVR storage and for others it would be [DVR recording] series link."

"The reasons for staying with a high-end service are being eroded all the time. Each person may have their own inflection point where they don't need the full package anymore."

This is a risk some operators are willing to take. Vivek Khemka, President, Echostar Corporation and CTO at DISH Network, is not prepared to limit the features on Sling TV in order to maintain a deliberate technology dividing line between Lite and traditional. He does not even rule out 4K content on the Sling TV service.

7.7%

Year-on-year growth in set-top box shipments (2016 versus 2015). Source, IHS Markit Set-top Box Intelligence Market Monitor – Q2 2016

"Sling TV is differentiated around the business model – no contract, no commitment, no installation; you sign-up and watch TV in a few minutes. We have aggressively delivered smaller packagers rather than a big bundle. You do not have all the programming that DISH offers, and that is by design," he points out. "Sling TV is still evolving and we do not intend to make it in any way inferior to the full Pay TV experience.

"We have a philosophy where we want to embrace change and if people want streaming TV, then so be it. There is no reason to fight that or prevent it from happening by making Sling an inferior service."

Delivering a more tailored bundle of CPE

The Pay Lite market is still dominated by the 'bring your own device' model, with consumers watching the services on laptops, tablets and connected TVs. Sky has bucked the trend, marketing its own Roku-made streaming STBs via retail. While this new market segment has emerged, there have also been important developments on traditional platforms and networks, where greater device diversity is making service differentiation and market segmentation easier.

SoftAtHome, a leading software provider for connected devices, illustrates the point. David Souhami, Director, Product Marketing Management at SoftAtHome, which develops software for service provider customer premise equipment (CPE), notes that his company now provides standard and premium set-top boxes, OTT set-top boxes for traditional operators, and casting devices.

The latter are for millennials. "They are for when consumption starts on tablets and smartphones, to take control of the screen. Alternatively they can be used by operators to address the second TV in the home," he explains. "While Orange was deploying its 'universal box' five years ago, it has now started to offer three different types: a premium box, a traditional one and a casting device through an HDMI dongle," he adds.

Anthony Smith-Chaigneau, NAGRA

This diversification also applies to broadband services. Swisscom now supports three separate broadband offers using different gateways that harness SoftAtHome software.

SoftAtHome identifies five distinct segments for broadband home gateways: basic router; triple-play (TV and broadband); fibre boxes with integrated GPON; hybrid solutions with DSL plus LTE mobile; and advanced (fibre with advanced services like network attached storage and IoT).

Souhami believes any operators focused on the low-cost service segment will be challenged, increasingly, by OTT players. Everyone should use their device strategies to move higher up the value chain. "It is essential that operators invest in premium devices or innovative offers. This is where the ARPU is higher. It generates added value and new services emerge as major reasons for subscriber retention. But creating high-end devices is not the objective. Creating high-end services is the goal."

The smart home, and the IoT more generally, are areas where service providers can look to add value. Success in this market will require new software platforms and the devices themselves will need new radio technologies beyond Wi-Fi. "If they do not act now, operators risk losing the home to OTT players such as Google and Apple," Souhami warns, adding that operators who have tested the market are starting to integrate IoT into their premium boxes.

Anthony Smith-Chaigneau, Senior Product Marketing Director for UI-UEX, Middleware and Devices at NAGRA, says increased device diversity will make it possible for Pay TV operators to tailor the in-home device ecosystem to the precise needs of each household, exhibiting far greater flexibility (and cost-efficiencies) than in the past. So instead of providing a bunch of set-top boxes to support whole-home viewing, an operator can provide a primary gateway and dongle (stick-sized USB or HDMI set-top boxes for televisions in the kitchen and bedroom), for example.

"You ask consumers what they want, whether they want PVR or whether they want pure streaming. Once you know their precise expectations for home entertainment you marry that to the equipment you have. This is a different approach to operators saying this is the equipment you have to take," he explains.

Smith-Chaigneau thinks Pay TV operators can now offer this wide product portfolio from within their own development and manufacturing ecosystem. He likens it to the way that a home security company (or indeed a broadband service provider) could provide both the router/gateway and the door and window switches – taking care of everything from small to large.

"You provide a more diverse package of customer

Glenn Hower, Parks Associates

premise equipment and if it is supplied from within the Pay TV ecosystem it is easier to control and manage going forwards. With your own devices you also get the analytics."

Yet more ways to deliver and market Pay TV

There are unprecedented levels of innovation in how video, including traditional TV, can be distributed. At IBC in September NAGRA introduced its TVkey solution, which is a USB-based conditional access dongle, providing high (smartcard) levels of operator-controlled security for content delivered directly into a television. The device also allows operators to implement their own branded user experience and EPG on any compatible TV. The small form factor of the TVkey dongle and its relatively low price means it could be pre-packaged with all new TVs in order to drive Pay TV take-up.

As with a CAM (like the popular CI+ modules in Europe), the television set acts as the receiver, carrying the broadcast tuners and performing the demodulation. Content from multiple tuners can be processed simultaneously (the link copes with speeds up to 100Mbps). Globally encrypted content is passed to the TVkey, which returns the content to the television using unique local control words. The control word is only good for one television, countering content redistribution.

This solution works on one-way broadcast systems (the TV set does not have to be connected) and can help put Pay TV services in front of consumers who do not already subscribe to a traditional service. As Simon Trudelle points out, "People are buying new televisions, setting them up on Wi-Fi and various video apps appear. They could sign-up to some of these and then, when they are later exposed to a Pay TV option, they wonder if they really need it."

Christopher Schouten, Senior Product Marketing Director for Content Protection at NAGRA, picks up the story. "TVkey has the potential to work extremely well in retail promotion, making it available to everyone that purchases a new television – subject to marketing deals. You can only do this kind of marketing with a lower-cost device. This is a way to expose people to Pay TV content at the lowest possible fixed price, with services visible immediately just like they are with OTT apps. A Pay TV operator would have a partnership with a television set maker and both will profit from the arrangement."

Samsung is the lead television manufacturer for this initiative – a deal announced in September. A demonstration on the NAGRA stand at IBC showed a production TVkey dongle helping to deliver the

50/50

Half of HD Plus viewers in Germany watch via set-top boxes and the other half get access via a CI+ CAM

15%

Worldwide year-on-year growth in digital media adaptors (for video streaming)

Source: Futuresource Consulting

HD+ satellite service on a widescreen TV. NAGRA and Samsung plan to establish an independent TVkey corporate body in 2017 to license the technology to other TV manufacturers and security vendors to encourage widespread deployment.

The TVkey/Samsung combination meets all MovieLabs requirements for Enhanced Content Protection (including Secure Media Path and support for watermarking and operator-controlled device service revocation). It therefore supports 4K-UHD, HDR and early release content. Indeed, one of the main market opportunities is to make it available with 4K televisions that people are bringing home from shops.

The system harnesses hardware content protection inside the USB device and a NAGRA designed root of trust that is found inside secure chipsets that go into televisions.

The ambition is that in future, when someone turns on their new TV, as well as seeing Netflix, Amazon and other online services, they could see a Pay TV operator option and sign up through a web portal or call centre. Crucially, operators could use this opportunity to provide free trials.

"We believe there are people out there who are not Pay TV subscribers, who will buy new televisions and can be persuaded to take Pay TV after a free trial - and perhaps upgrade to a bigger package with a set-top box," says Trudelle.

TVkey provides a low-cost option for emerging Pay TV markets, including those where consumers are already used to flexible contract and pricing options, like in Latin America. Alexander Sacher, VP Media Platform Solutions for SES and the CTO at HD Plus, recognizes the potential.

SES owns MX1 (formed when SES Platform Services merged with RR Media) and HD Plus and helps to deliver and monetize video services across linear and non-linear platforms. MX1 is focused on back-end services and distributes over 1,000 TV channels, manages playout for 440 channels, and delivers syndicated VOD content to over 120 leading SVOD platforms.

45%

In Q1 2016, Smart TV ownership grew to 45% of all U.S. broadband households

Source: Futuresource Consulting

HD Plus (which uses the brand name HD+) is focused on B2C and end-customer propositions for broadcast and broadband. These companies and their many years of operational know-how allow SES to offer an end-to-end turnkey solution for TV platform customers worldwide. The all-in-one offering comprises SES video services and SES satellite capacity.

"We build end-to-end TV platforms and we are currently working in Africa and South America and with customers who want to target expat communities in Europe, like with Asian content, via satellite and OTT," Sacher reveals. "A typical TV platform customer might want to concentrate fully on content acquisition, sales and marketing while we take care of all technical services, including how you get onto all kinds of end devices.

"TVkey is interesting in this context as it lowers the investment for both the operator and the end-customer. Whether the service is subsidized or the consumer buys the hardware, the cost is significantly lower than for a conditional access module. And there is no sacrifice in terms of security."

There is plenty of innovation in Conditional Access Modules, which are ready for 4K and come with Wi-Fi for on-demand services

Sacher likes the way countermeasures and operator access control could be managed efficiently with this device, too. "TVkey is a perfect addition to the turnkey solution we can offer customers."

Christopher Schouten sees TVkey as an important complement to the CI+ CAM module, something that could be used in markets where CI+ standards are not enforced. Meanwhile, CAMs have a life of their own and are another source of Pay TV device innovation right now. Schouten points to what Mediaset has achieved with a new Wi-Fi CAM that enabled the Italian Pay TV provider to introduce on-demand services.

The CAMs at Mediaset (supplied by SmarDTV) provide an alternative to a hybrid set-top box, removing the need for a new box and accompanying remote control. "When you add Wi-Fi to the CAM you can create a Chromecast-like experience," Schouten explains. "Mediaset customers can use a tablet or smartphone to select content and then play it on the main television without any additional user interface on the television set."

What the consumer experiences is rich discovery and navigation followed by a 'send to TV' experience. For the operator the result is happier customers, more content consumed, and very high levels of content security. The broadcast signals are protected by a NAGRA smartcard in the CAM. The on-demand content, streamed via the CAM to the television sets, uses NAGRA's PRM (Persistent Rights Management) DRM.

The power of conditional access modules as a way to get services onto television sets is undisputed. HD Plus in Germany now has two million subscribers for its 21 channel HD satellite bouquet, which launched in 2009. The service uses a retail distribution model and consumers choose from a rich selection of DVRs and set-top boxes or a CI+ module to get access to the service.

Sacher says the device split for HD+ is 50/50. This approach works perfectly in Germany where every new television has both a satellite tuner and a Common Interface (CI) slot. Whichever device you buy you get an automatic six month free trial.

Sacher thinks a distribution model where all external security devices are eliminated, the so-called 'direct-to-TV' approach, could also find a market. "That model is absolutely viable," he declares. He says this is an approach that ideally relies on a hardware root of trust inside a connected TV and most likely requires a two-way connection for security reasons. "The TVkey solution, in contrast, can be used on one-way broadcast systems and is therefore more important in markets with low household connection rates."

"The 'direct-to-TV' approach is the ultimate in

$11.84 billion
Disney

$10.27 billion
NBC

$4.91 billion
Netflix

$2.67 billion
Amazon

2015 programming spend

Source: IHS Markit

simplicity: you have out-of-the-box security for a connected television with literally no additional hardware requirement," says Schouten at NAGRA. Once again, the opportunity is to sign up new Pay TV customers easily. Direct-to-TV is yet another example of how device diversification is driving new business models and service marketing.

The direct-to-TV model requires cooperation between the television makers, chipset providers, content security vendors and platform operators. NAGRA announced in September that its NOCS3 hardware security technologies and its NAGRA CONNECT converged CAS/DRM client have been integrated into MStar SoCs for connected STBs and connected TVs.

Whole-home, 4K and Android TV

Pay TV operators still like the gateway-client model for delivering multiroom television. DISH Network provides several versions of its Joey set-top box client, which works with the Hopper whole-home system. There is a 'standard' Joey, a Super Joey (which provides additional tuners to work with Hopper, a Wireless Joey (for customers who prefer Wi-Fi to wired home networking), and now a 4K Joey (with 4K support).

Dongle set-top boxes could make it cheaper to get content to second and third televisions. However, Glenn Hower, Senior Research Analyst at Parks Associates, stresses that cost is not the driving force for Pay TV operators looking to reach around the home.

"There is a bit of a push [to reduce the cost of getting TV to multiple screens at home] but form factor has not been the priority. The biggest priority is bullet-proof reliability. Their box has to work, and it has to work the same way every time [referring to Pay TV operators]. They would much rather have the most reliable CPE hardware in customer houses possible, and move whatever software function they can into the cloud to reduce equipment costs."

When it comes to moving 4K around the home, operators will still favour set-top boxes, Hower reckons.

Reaching television screens should be the priority for 4K and UHD. According to Veale at Futuresource: "4K UHD is very much a TV screen experience. There are a handful of gaming laptops with a 4K UHD screen. Very few tablets and smartphones have 4K screens, and 4K also chews up battery life. We will see this device penetration increase as manufacturers push for higher specification everything.

"It is early days, especially in terms of content availability. The available content is the high valued content that is designed for viewing on a UHD TV, including sports, films and TV shows. While there will be a limited proportion of views from handheld or laptop devices, those interested in the quality

Swisscom & Bouygues Telecom

Two of the best known Pay TV operators using Android TV

offered by 4K UHD will always want the best, immersive experience, which means TV screen."

4K UHD is driving television set purchase decisions, too. Veale says early adopters have it on their checklist and are likely to upgrade earlier to get 4K UHD. "Generally this is not a big enough motivator to get the mass market to upgrade sooner than they would have done otherwise," he adds.

Pay TV operators should not worry that Netflix and other SVOD providers are out there with 4K services, enjoying all the adulation that comes with it. Hower at Parks says: "They should not necessarily be concerned that Netflix is gaining a competitive advantage through 4K. Netflix's value proposition is quite a bit different to Pay TV's."

Will 4K/UHD drive people back to the television set from tablets and smartphones? "The question assumes that consumers have left the television set, which our data suggests they have not," Hower advises. "It is true that consumer viewing on secondary devices has increased, but more than anything it has increased the total amount of viewing rather than cannibalized viewership on the television set."

With 4K perhaps the exception at this point, device innovation is helping everyone to distribute premium video more widely. "In the past, premium content reached TV sets via a traditional Pay TV set-top box, not to forget DVD or Blu-ray. But in competitive markets, content owners have had to diversify their means of distribution," notes Veale. "Smartphones and tablets have been major enablers of this diversity and operators find them a good means to extend reach further around - and outside - the home without rolling out additional expensive full STBs."

Android TV is another example of how the device market has diversified. This is now a platform priority for Google and their fastest growing platform today.

Swisscom is a famous Android TV convert, having used it as an open development environment to build its Swisscom TV 2.0 service. The set-top box Android software stack at the Swiss IPTV provider is effectively a customized tablet version that can receive managed UDP multicast streams (classic IPTV) as well as streaming (adaptive bit rate) video. It has also been security hardened.

Bouygues Telecom in France also uses Android TV for its Bbox Miami. While none of the Pay TV giants are using Android TV, this is proving to be more than a Tier-Two play.

Amino, the set-top box, DVR and TV software provider has recognized a need to give operators a migration path towards Android TV. At IBC 2016 the company introduced a dual-mode 4K/UHD set-top box that supports the Amino Enable STB software and Android TV. So the device supports two software stacks.

Operators can even run limited Android apps inside a sandbox within the Enable software environment while they get ready for a full Android migration.

There is a consensus that what Android TV brings to the Pay TV operator table is additional video, through OTT apps. The Bouygues Telecom implementation includes Google Play and, through it, YouTube, Netflix, NHK World, Fox News and other apps, for example. Google Cast is fully integrated, supporting casting from portable devices to televisions.

The 'traditional' Pay TV ecosystem has provided its own solutions for getting more OTT video onto set-top boxes, of course. Netflix is found on RDK devices (like at Comcast, where Netflix is now a fully integrated add-on to Pay TV via the X1 platform), on NAGRA's OpenTV 5 set-top boxes (like at StarHub in Singapore, where the SVOD service has been seamlessly integrated into the overall user experience) and on TiVo devices (as at Virgin Media and Com Hem).

'Onboarding' the best of OTT

This onboarding is a new tactic by Pay TV operators to draw people to their traditional platforms and then keep them there. It runs parallel to efforts to reach more consumers with more distribution models (like Pay Lite).

Like Parks Associates, Ampere Analysis has noted how some homes are now taking multiple online video subscription services, creating their own 'next generation bundle'. Guy Bisson has advised Pay TV operators to ditch the 'us and them' mentality and properly embrace the OTT content providers. "They are viewed as competition but that is completely the wrong attitude to have," he emphasized this summer.

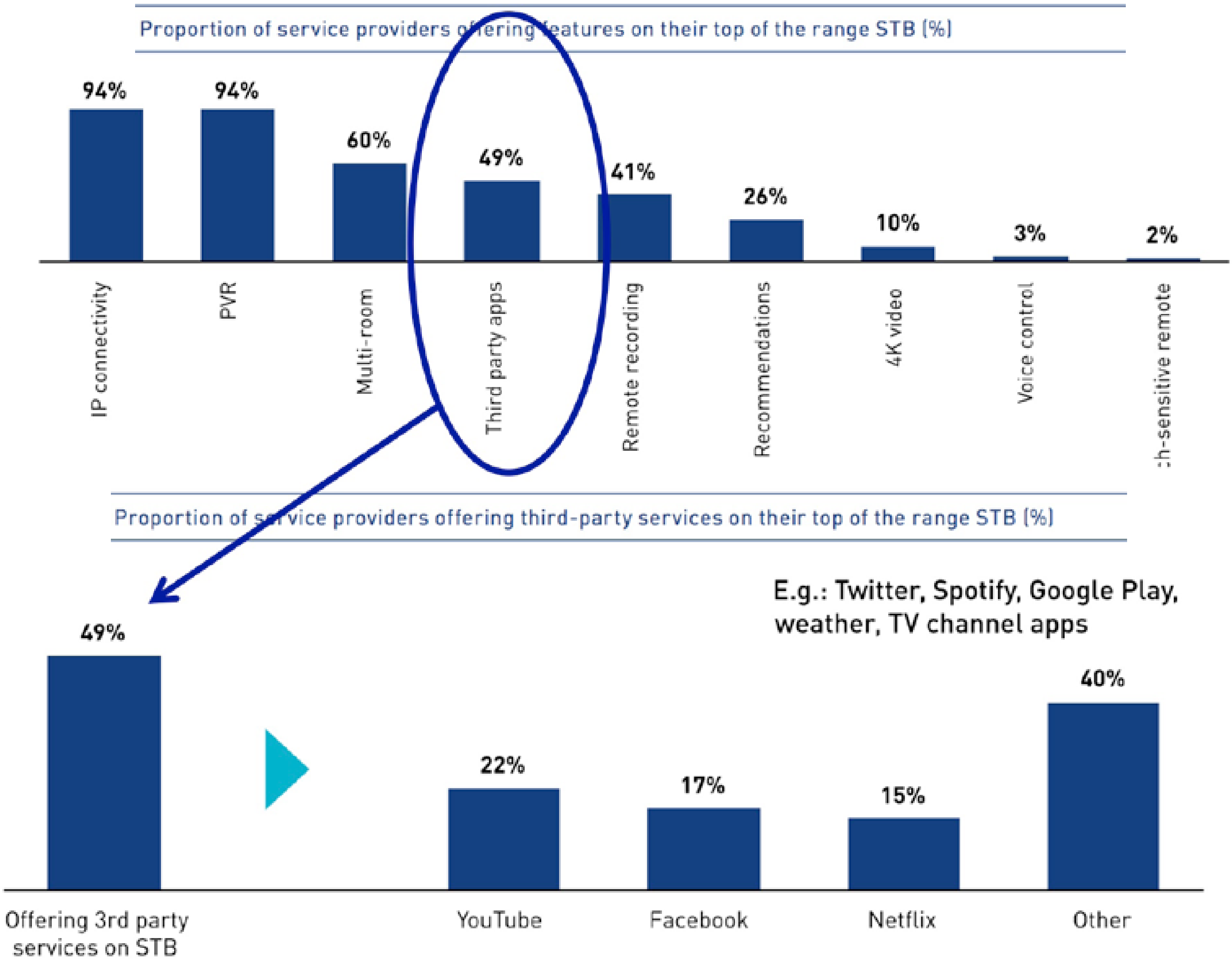
At that time, 40% of Sky customers in the UK were also taking Netflix and Ampere Analysis thinks its figures prove that OTT is complementary to Pay TV. "Those homes are also more likely to be taking Sky Sports [as opposed to only the more basic Sky bundles] and Amazon Prime Video. We are not really talking about lower-value customers who want to shave off some of their Pay TV spend and supplement it with low-cost OTT.

"We are talking about the highest value customers buying additional stuff. Lots of them are super-consumers and that is where the opportunity is," Bisson told Videonet earlier this year.

IHS Markit (the information and analytics provider) has also declared that, "In spite of posing a longer-term threat to some core Pay TV channel packages and VOD services, partnerships with third-party SVOD providers are broadly good for operator businesses. Partnerships support a customer retention strategy based around making Pay TV a go-to platform that customers use to access the video services they want."

SVOD providers may need Pay TV partnerships to grow. Paolo Pescatore, Director of Multi-Play and Media at the analyst firm CCS Insight, believes the recent Liberty Global and Netflix onboarding deal was most important to the SVOD provider. "Netflix needs subscribers and it needs them fast. It is still growing, but not quickly enough in light of its growing costs," he argues.

Simon Trudelle, NAGRA



Source: Pay-TV Innovation Forum, EMEA Report, 2016

After signing that deal, Mike Fries, President and CEO at Liberty Global, said the partnership gives his customers access to a goldmine of amazing TV and films at the click of a button. Netflix CEO Reed Hastings said: "Combining the Netflix app into the familiar, easy-to-use cable box makes both more appealing."

This win-win mentality is currently driving Pay TV operators and some of the most popular online video services towards 'onboarding' partnerships, where the OTT apps are fully integrated into the set-top box experience, with the content surfaced through the UI.

Ted Hall, Research Director, Television at IHS Markit, says the Liberty Global deal shows that even Pay TV companies with content investments of their own are ready to do business (Liberty Global has investments in All3Media, Belgian broadcaster SBS and Hollywood studio Lionsgate). He even thinks there is a softening of attitude at Sky in the UK towards Netflix.

One of the early Netflix deals was with Waoo!, the Danish triple-play provider. Some of the other partnerships (apart from those mentioned in the last section) include Deutsche Telekom and DISH Networks.

To some extent, onboarding will blur the line between traditional Pay TV and born-online video services. David Mercer, VP, Digital Consumer Practice at the research and analysis firm Strategy Analytics, observes: "Netflix is on Virgin Media and at DISH it is listed as one of the channels you can select. On Freeview Play [the hybrid broadcast broadband version of the UK free-to-air DTT platform] it is listed as a Pay TV option.

"So in consumer minds we are seeing a lot of fuzziness about what these terms mean, and there is a lot of crossover between these sectors. Netflix and Amazon are investing significant sums in content production and that will force some legacy providers to accelerate their own innovation strategies."

Hayu is another online provider that is in the market for onboarding deals. This is the online SVOD service from NBCUniversal that specifically focuses on reality TV. It is available in the UK, Ireland and Australia, delivered to devices like Apple TV and Amazon Fire (as well as mobiles). Whilst pursuing a direct-to-consumer strategy, the company is also partnering with Pay TV and has a full onboarding integration with Virgin Media.

"The importance of partnerships cannot be underestimated," Hendrik McDermott, Senior VP, Branded on Demand for Hayu at NBCUniversal International, told OTT World Summit in November. A second UK Pay TV operator will make the Hayu service available to subscribers soon, he revealed.

Pay TV operators are also onboarding apps like YouTube and Vevo. DISH Network has both available via its Hopper 3 DVR and Vivek Khemka sees another opportunity to cater for some unmet demand. "While music videos were once a driving force in TV entertainment, we've seen a shift in programming that drove this content online to sites like Vevo, where it continued to draw high viewership," he noted when the service was added.

Khemka returns to the theme of embracing changes in how people want to consume video. "I came from the mobile phone space where moving from a closed walled garden to an open garden led to more innovation and a better customer experience.

"We made Netflix and Vevo available and recently launched YouTube. We have been trying to give more of what the consumer wants; that has been our strategy on the traditional DBS [satellite] side of the business. Having the most popular apps takes away the pain-point for the majority of customers." DISH believes that onboarding helps to make its Hopper 3 device a comprehensive entertainment hub for the household.

Virgin Media is using onboarded apps to differentiate itself. The company marketed Netflix hard and the SVOD service and YouTube are available in 4K

David Souhami, SoftAtHome

on the new Virgin V6 boxes launched last month (and additional boxes around the home). When talking about the V6 box the company declared: "It has been built for apps, and services like iPlayer, Netflix and Vevo will open with lightning speed."

Onboarding is not just about keeping people closer to the Pay TV environment when watching SVOD. If more content is available via the operator STB there will be no need to dig out DVDs, either – a point made by Anthony Smith-Chaigneau at NAGRA. He also notes how families are adding more online services because one does not satisfy all their needs (even on top of Pay TV). "Netflix is the price of a beer in some countries - making it quite appealing.

> **Netflix**
>
> **WWE Network**
>
> **Hulu**
>
> **OTT video services with highest net promoter score in U.S**
>
> *Source: Parks Associates, September 2016*

"Most of our world [the Pay TV industry] is now looking to onboard stuff," Smith-Chaigneau reveals. His company is making this model much easier thanks to middleware and approved security pre-integrations, including with Netflix.

NAGRA has also introduced its IntuiTV platform for operators who want to pursue a marketplace model where lots of OTT services are brought together in one place, closely integrated with traditional TV (including live broadcast) and accessible with one remote control. Operators decide on the package of apps they want onboard.

The value proposition is content choice and the simplification of the user experience for people that like to move between different app universes for their content. This solution is offered to Pay TV operators as a managed cloud-based platform.

Greater innovation in the Pay TV device ecosystem

At CES 2014, DISH Network announced three new products, two of them physical. These were the Super Joey and Wireless Joey. There was also Virtual Joey (a client app for Smart TVs). The company has won countless consumer awards for its products in recent years, including Hopper, earning itself a reputation as consumer-friendly and a device innovator. Is the Pay TV ecosystem catching up with the open CE market in the innovation race?

Simon Trudelle at NAGRA thinks so. "It is fair to say that some of the best device innovation is coming from the TV ecosystem, where there is accumulated expertise delivering great experiences to screens." His colleague Anthony Smith-Chaigneau agrees. "If you look at the IP environment in particular, the Pay TV ecosystem is as agile as anyone else today."

There are some fundamental reasons why Pay TV device innovation is accelerating. The chipsets are getting stronger and the silicon vendors are embedding more and more functionality into a single SoC. The migration to IP makes life easier – removing the need for tuners and demodulation in IP-only clients,

David Mercer, Strategy Analytics

enabling very small form factors. 3D printing boosts experiments with form factor. Materials are changing – like plastic conditional access modules. New textures are appearing.

Even the smallest devices, including dongle set-top boxes, deliver a lot of bang for your buck – running fully-fledged middleware stacks with plenty of RAM. And there are innovations that will maintain the value of legacy STB populations too. Anthony Smith-Chaigneau lists the two obvious ones.

First, the legacy STB population benefits from optimised middleware, so that older boxes can still deliver a modern user experience. Second, more intelligence, like DVR file management and series recording, can be moved to the headend or cloud. That is before you start talking about migrating storage to the cloud.

In places, increased scale will help with innovation. Liberty Global recently announced a new generation TiVo box for Virgin Media in the UK that will also be rolled out across its European and Latin American properties. "This is the first time a single box will be deployed so widely across Liberty Global's footprint, bringing market-leading technology and benefits of scale to millions of customers," the company noted.

As a reminder of how quickly STB technology is developing, the new Virgin TV V6 box is half the size of the previous TiVo box and has ten times the power. It is ready for 4K and High Dynamic Range. And in another example of how the Pay TV device ecosystem is becoming more diverse, Virgin Media is also shipping its own tablet-style companion television screen to accompany the new gateway.

This 'TellyTablet' is an Android Smart TV, in effect, with a 14-inch HD screen and four built-in speakers (front and rear), 32Gb of memory (upgradeable with a Micro SD card), two USB ports and up to eight hours of battery life. It has been designed for viewing Virgin TV's range of apps and also gives access to Google Play store.

Having your own device ecosystem gives you some control. The idea that Smart TV apps could replace set-top boxes has lost support, even when it comes to whole-home viewing. DISH Network no longer supports its Virtual Joey Smart TV app, which was launched initially for LG Televisions. If you want the service on secondary televisions you need a real-world Joey attached.

Vivek Khemka explains: "We tried to put it [Virtual Joey] on other people's platforms, we did not see significant uptake and there is a cost for continuing to update the clients against somebody else's schedule. The support piece gets very complicated."

The traditional Pay TV industry seems to be guarding its own customer premise equipment ecosystem and the reward is a flurry of innovation that

Christopher Schouten, NAGRA

supports new distribution and service marketing.

"There are technical and security reasons why it still makes sense to build your own STB, and incorporate other apps on it," Khemka adds: "We provide very high quality support on any box that we distribute. We roll trucks and fix it."

Given the growing importance of casting, there is even a call for the Pay TV industry to develop its own casting ecosystem so it does not have to rely on Google. Pay TV casting is a way to keep operator gateways and set-top boxes at the centre of the TV experience – and all the best content (paid, not just free) can be moved from portable screens to the main television.

Souhami at SoftAtHome points out that Orange is going to deploy an HDMI dongle based on its own OrangeCast casting technology, starting in Romania (where it will deliver live TV over-the-top) and then in France, where casting will be used as part of a two-screen experience. "Alongside Airplay from Apple and Google Cast from Google, which are both proprietary technologies, operators should define a third casting standard, open this time, to be shared by all of them," he argues.

He hails the popularity of Orange HDMI dongles but notes that there are less compatible apps than you get with Chromecast. "A single operator is not enough to generate interest in the casting market through its own proprietary standard, no matter how big they are.

"At the end, success or failure of these new devices and technologies depends on the number of compatible applications, and app developers want a critical mass of devices. The next revolution will need to open this casting technology to all operators, to create a bigger compatible device footprint and compete across the world against OTT actors."

He adds: "This extension into casting is essential for operators if they do not want, in the end, to surrender TV control to GAFAN - Google, Apple, Facebook, Amazon, Netflix. This is all part of the innovation that will be needed to survive."

Not everyone is excited about casting of Pay TV, it should be noted. Glenn Hower at Parks Associates believes that secondary devices will be used for content discovery more than for accessing content and then beaming it to a television.

The diversity challenge for content security and UEX

The UEX challenges are well known when operating across multiple device types, so are merely

Five years ago Orange had one universal box. Today it provides three different devices to reach the TV. This is the new Livebox

emphasized as more customer premise equipment is supported. The key principles remain the same. Consumers must feel as if they are in a single operator ecosystem, whatever device they are watching on. There needs to be a base level of functionality and features available across all screens, with extra features based on device capability. The look-and-feel needs to be consistent.

When it comes to content security, we have already faced the first big challenge associated with increased device diversity: multi-DRM. Operators must be able to support the big DRMs like PlayReady, Widevine and FairPlay and they need to support any proprietary casting systems or other DRM schemes.

According to Christopher Schouten (NAGRA), the second big challenge is to converge multi-DRM support for streaming services with broadcast conditional access, managing them from a single system. This hybrid approach fits well with increasingly hybrid Pay TV platforms that rely on both broadcast and streaming content.

"We used to create relatively bespoke CAS (conditional access systems) for customer needs, often siloed so there was one system for card-based security, one system for cardless and one system for two-way security," Schouten explains. "That was somewhat necessary because the key objective in the broadcast world was to prevent signal piracy and siloed, differentiated security systems helped keep each pillar secure. Now piracy is increasingly moving online and systems are more secure, so the focus has moved to operational efficiencies."

TVkey is a USB-based dongle, providing operator-controlled security and user experience directly on TVs

Thus NAGRA has developed its Security Service Platform, which brings all security into a single, modular ecosystem: one-way broadcast, two-way broadcast, IPTV, multi-DRM, operator OTT streaming, home domain management, and management of concurrent streams, etc. "You create a single set of business rules and offers and they are automatically applied to any security scheme you work with," Schouten states. He calls it a cloud-capable, scalable, multi-tennant architecture.

Security vendors need to deal with diversity of security clients, of course, now ranging from classic smartcards through to direct-to-TV harnessing a secure execution environment in the TV chipsets. With a converged solution like NAGRA CONNECT you can support broadcast linear TV, IPTV, broadcaster catch-up and even Netflix with the same security client.

Co-existence and long-term economics

To the relief of the Pay TV industry, it turns out that the growth of born-online subscription video services has been largely fuelled by consumers finding new money, including at the expense of physical media (like DVD sales) and DVD rentals. A consensus has now formed that paid online video is largely complementary to Pay TV subscriptions.

David Mercer (Strategy Analytics) says overall losses to traditional Pay TV are limited. "Services like Hulu, Netflix and Hayu are not killing anything. Pay TV is not dying; in fact it has done quite well over the last 10 years."

£1.31 billion

£956 million

In 2016, for the first ever time, Britons will spend more on video streaming subscriptions and film/TV downloads (top figure) than on buying and renting DVDs (bottom figure), according to Strategy Analytics

The 'Living with Digital' research by Futuresource shows that Pay TV households are significantly more likely to own streaming boxes and sticks and also take SVOD services than free-to-air homes.

The news that SVOD will not kill Pay TV is welcome but the flipside to this coin is that Pay TV companies cannot kill SVOD. As Guy Bisson at Ampere Analysis points out: "The presence of a Pay Lite service in a market does not impact SVOD uptake."

He adds: "In the U.S. there are more Pay TV customers with SVOD than Pay TV customers who do not have SVOD. There is very high uptake of these services across the board and people with Pay TV are taking it all."

Simon Trudelle admires what Amazon, Apple and Google have achieved with their streaming devices and the way they have enabled direct-to-consumer streaming services. But they have their limits, too. They are challenged when it comes to integrating the viewing experience with broadcast TV – whereas the television industry is getting quite good at integrating broadcast TV with apps.

He points out that a lot of the value in television, including in advertising and advanced advertising, is still locked up in the broadcast world. And as Brett Sappington at Parks has observed, we are now seeing some consolidation – or to be more precise, some attrition – in the OTT space.

The more granular segmentation of the paid video market, underpinned by device innovation, is one of the most significant trends in our industry. When Sky (in the UK) announced its new NOW TV Combo offer this year, offering a hybrid DTT/streaming box, broadband and landline telephone services in a no-contract triple-play offer, it elevated NOW TV beyond OTT television to something closer to a service provider with a low cost streaming-only television option.

NOW TV Combo confirms that NOW TV does not exist just to tempt low-ARPU users into Pay Lite on their way to full Pay TV and then a traditional triple-play. It provides a parallel path to triple-play for a different consumer target.

Jonathan Broughton, Senior Analyst, Television Media at IHS Technology, believes the addition of

40%

Sky customers who also take Netflix

Source: Ampere Analysis, spring 2016

3%

Online revenues in 2015 were just 3% of total television revenues in the UK, France, Germany, Italy and Spain combined

Source: IHS Markit

3 minutes

TV viewing time in France rose by three minutes in 2015 to 224 minutes per-person, per-day, driven by growth in under-14s and over-50s

Source: IHS Markit

fixed line products to the NOW TV offer furthers the segregation between it and the single VOD catalogue design of rival services from Netflix and Amazon, too.

At the Akamai EDGE conference, Sling TV's Roger Lynch said: "The future of TV, I believe, is going to be streamed." He went on to discuss the evolution of telephony, from human telephone operators who physically connected our lines to digital switches and then software applications like Skype. "I think the same path will be followed by video and traditional TV, moving from analogue to digital and then software applications like Sling."

However the future unfolds, content economics should limit the disruption. Asked if all the new competition means Pay TV prices will ultimately and permanently fall, Guy Bisson says: "That is a difficult question because one of the main costs is sport and the SVOD and OTT players are just not in that space.

"There will always be a need for high-end packages with sports costs included. At some point, if prices are pushed down enough, the economics break down for sports and the economics for showing the latest movies start to break down. So there is downward pressure but you have to ask what happens to the entire value chain, and when that leads to a breakdown in choice, and when content quality starts to suffer."

The fundamentals of business provide at least some certainty. Still, change is in the air. The Pay-TV Innovation Forum report released for Europe in July declared that the Pay TV industry no longer enjoys a monopoly on the provision of premium film and TV services. "Industry shifts have made it increasingly challenging for Pay TV providers to be a one-stop shop for TV services," it states.

Executives surveyed for the study agreed that innovation – the development of viable new offerings – is therefore becoming more important and more urgent. Innovation in the pricing and packaging of content, including moving beyond big bundles and bundled subscriptions, were among their primary considerations, together with advanced STB functionality and better TV Everywhere offers. Some of this innovation is already on show, and new Pay-TV devices are clearly catalysts for the evolution taking place.