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THE WINNING FORMULA FOR NETWORK DVR

CO-EXISTENCE WITH DVR

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THE USER EXPERIENCE

TECHNOLOGY CHALLENGES

CONTENT PROMOTION & DISCOVERY

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Meet Stefan De Beule, Director of Multiscreen Sales Engineering for EMEA at ARRIS. Stefan leads a team of highly-skilled video architects who analyze the needs of service providers and design multiscreen video solutions. Stefan's broad expertise and market insight covers the entire video delivery environment, and he is often consulted on strategies for personalizing the user experience with new advances like network DVR and CDN networks.
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DRIVING THE FUTURE OF MULTISCREEN

VIDEONET ISSUE 28

Videonet explores the business and technology challenges faced by the TV industry as it introduces more high-definition and on-demand content and evolves towards a multiplatform and connected TV experience.

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INTRODUCTION

For years, the story surrounding network DVR has been one of operating and capital efficiencies, thanks partly to lower cost CPE and less truck rolls. These remain important considerations but now we are seeing the emergence of clear and marketable consumer-facing benefits, most notably the ability to get your personal recordings on any device but also the option, potentially, to request more storage space. With more flexibility on pricing, operators might be able to create a new tier of DVR user. We could see the emergence of a consumer-led market just as nDVR technology reaches maturity.

John Moulding, Editor, Videonet

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INTRODUCTION:

nDVR: The New, Personalized Revenue Opportunity

By Mark Johnson, Vice President Sales, Network & Cloud Solutions, ARRIS

nDVR is a game changer for consumers. Leveraging network capabilities to store content remotely, in the cloud, means no more running out of space, no more lost recordings, and new possibilities for multi-content, multi-screen and multi-room experiences.

In our research, we see time and time again that having to delete programming to make room for new content is a big sticking point with consumers. They're willing to go to surprising lengths to avoid it, including watching ads and paying more for additional storage.

We know the need is there. The interest and motivation is there. And now, the technology is here. Consumers have been waiting for a service, and providers now have an answer.

nDVR represents a new, sticky revenue opportunity that has the potential to ring in a new generation of personalised content. Content that allows consumers to watch what they want, when they want, and where they want, without the traditional service provider considerations of storage limits and CPE upgrades.

But with the complexities of cloud-based content creating new endpoints for content distribution and new functionality, developing an nDVR solution raises its own challenges with regards to quality of service (QoS) and security.

Luckily, adaptive bitrate (ABR) coding provides a very effective end-to-end solution for delivering consumer content to a device, and is particularly efficient from the headend to the set-top box. This content delivery process inherently allows for the customisation and management of content and encryption—enabling session-based delivery, which can keep expenses in check and set the stage for new levels of personalisation.

Perhaps nDVR's greatest advantage is its flexibility and extensibility as a content-delivery platform. Not only does it open up new capabilities for multiscreen, multicast, timeshifted, and placeshifted viewing experiences, but it also has exciting possibilities for advertising and merchandising. Personalised content is a perfect lead-in to personalised marketing.

With nDVR, providers can keep ads fresh, deliver them to the second screen, activate cross-media campaigns, and even use analytics to make content recommendations and push timely offers and promotions. Analytics can also give them insight into how subscribers are consuming content, so that they can improve personalisation and deliver new, more immersive and actionable forms of advertising.

The key to this new level of personalization is an analytics framework that provides a feedback loop to channels and service providers, letting them know what the audience is doing with their content, so that they can improve the future delivery of content and recommendations.

By tapping into new sources of consumer data, harnessing the power of today's ad and merchandising platforms, and personalising content accordingly, nDVR has the potential to become an indispensable service that delivers increasingly personalised entertainment and relevance to consumers as the connected device ecosystem continues to grow, as networks evolve, and as consumers demand more and more from their entertainment.

This report outlines the impact of nDVR in Pay TV, the successful delivery of nDVR, and the implications of nDVR for advertising and monetisation. The tipping point of any service is consumer demand, and by that measure, nDVR is ripe for rollout. Implementing the right nDVR strategy for quickly servicing today's demands, while considering the rapidly evolving consumer landscape, is all that stands between providers and a new era of personalised services. ●

THE WINNING FORMULA FOR NETWORK DVR

Previously coveted by operators because of its operating efficiencies, nDVR could be driven forwards by consumer demand thanks to multiscreen access and more flexible storage and pricing. We investigate the incentives that will finally get content owners onboard, including data insights and addressable advertising, the range of user experiences we can expect, and the latest technology developments to ensure efficient and reliable delivery.

By JOHN MOULDING

pic: ©iStock.com/ AndreyPopov

INTRODUCTION: DVR AND nDVR CO-EXISTENCE

DVR has been one of the all-time great innovations in television and it remains a key differentiator for Pay TV operators in the face of competition from OTT providers. It is broadcast-centric and so plays to one of the great strengths of traditional platforms. The media strategy consultancy Decipher has argued for some time that 'pause live' is the most under-valued function in TV right now. "It is the PVR function that people always forget about when they are waxing lyrical about OTT – it is actually equally or more important than 'record'," declares Nigel Walley, Managing Director at the company.

The consultants at Decipher are huge fans of the in-home DVR but like most observers, they expect a migration towards network DVR (nDVR). They have predicted that the home media server DVR will co-exist with nDVR over the next decade, with network DVR being the end game, mainly because they reduce costs.

Other observers expect a long life for the DVR, with Jason Blackwell, Director, Service Provider Strategies for the Digital Consumer Practice at the research firm Strategy Analytics, among them. "Most of the advanced gateways being deployed still use local storage and then deliver content to multiple devices within the home. In addition, it is going to take some time before all the content rights deals and potential regulatory issues will be addressed to allow nPVR to truly reach its potential," he observes.

"THE nDVRS THAT PROVIDE THE BEST QUALITY OF SERVICE WILL BE THOSE THAT RETAIN IN-HOME STORAGE AS WELL"

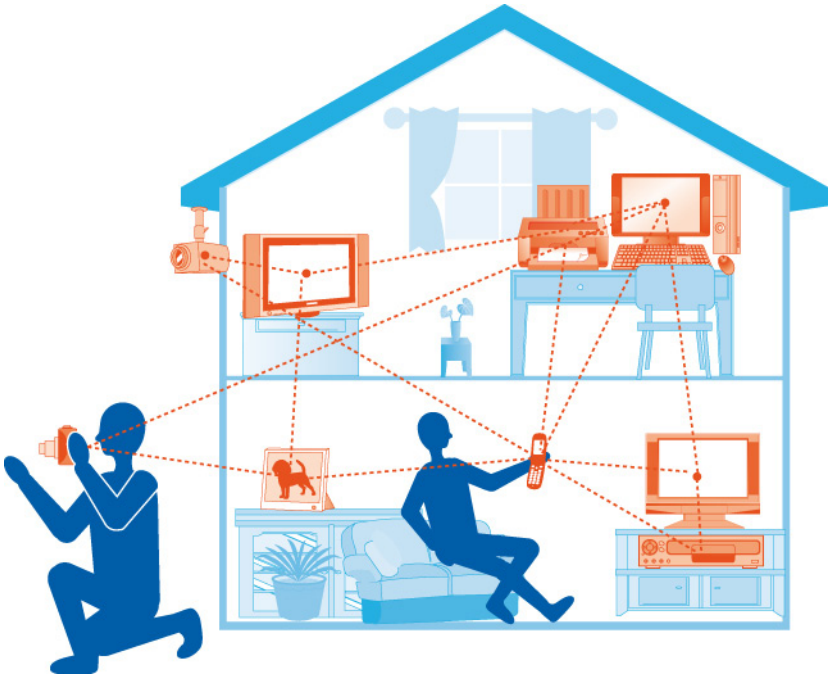
Daniel Simmons, Director at IHS Technology, another research and consulting company, says nDVR will not mean the end of STBs with integrated storage. "The nDVRs that provide the best quality of service will be those that retain in-home storage as well, using it as an edge-cache to store live buffers and the most popular recorded and on-demand content, reducing the traffic burden on the network," he predicts.

This is a good place to begin a discussion about network DVR because at some Pay TV operators the lines between DVR and network DVR, in terms of technology, are going blur to the point where we start thinking of them as a continuum, just different components of the same concept. This is evolution and not revolution. We will also see the convergence of the consumer experience so that it becomes harder to pick apart what is catch-up TV, what is TV on-demand and what is network DVR and indeed, in-home DVR.

Wherever the lines are drawn between home and network storage, DVR as a function will probably remain a competitive differentiator for platform operators. As Nigel Walley observes: "The challenger OTT companies are all shying away from including broadcast functionality in their services, let alone PVR."

One of the challenges for nDVR is going to be matching, or coming close, to the consumer expectations set by in-home DVR. However, network recording will mean more flexibility in how services are packaged, presented and priced so there is room for business models where ad-skip is disabled, maybe in return for a cheaper service, as an example. Content rights and advertising relationships will have a major bearing on what the nDVR user experience looks like in every case.

In terms of technology there are no significant barriers to adoption. The key to success is optimizing the delivery and economics of nDVR, through technologies like dynamic format packaging when dealing with adaptive bit rate streams. This is an inherently personal television offer, especially when delivered to multi-screen devices, so a lot of thought is being given to how streaming from the network might boost operator insights and help them to get closer to consumers, leading to better promotions and also addressable advertising.



nDVR might benefit from DLNA resource management (Graphic: ACCESS)

nDVR DEPLOYMENTS AND THEIR RATIONALE

Two of the biggest operators pursuing network DVR are Comcast, which is deployed with its cloud-centric X1 platform, allowing consumers to watch recordings across all screens, and Liberty Global, which is launching a 'Horizon in the cloud' offering in one of its markets where the existing Horizon platform is not yet found. Telenet made live and recorded content available on any screen starting in February 2013, with Inge Smidts, SVP Residential Marketing, declaring that the Belgian cable operator was the first to respond to the increasingly vocal demand from customers to be able to view their recordings on a tablet or computer.

ACCESS has highlighted a solution for managing where content can be sourced from ▲

AT SWISSCOM ONE OF THE MAIN AMBITIONS FOR nDVR IS TO OVERCOME THE LIMITS THAT LAST MILE ACCESS CAPACITY IMPOSES ON SIMULTANEOUS RECORDINGS

The Portuguese cable operator NOS (previously called ZON Multimedia) was an nDVR pioneer with its Timewarp service, now covering STB viewing and multiscreen devices. The company credits network DVR with increasing its competitiveness, reducing expenditure on customer premise equipment (CPE) and making the service easier to maintain and upgrade. The company has also noted how it can increase the recording, storage and streaming capacity of the service over time.

Among the marketing benefits that NOS talks about is the ability to record multiple channels simultaneously and this is also viewed as a major benefit at Swisscom, where one of the main ambitions for nDVR is to overcome the limits that last mile access capacity imposes on how many recordings you can make at the same time.

Peter Fregelius, Strategy & Innovation Head at Swisscom told Connected TV Summit in June: "80% of our customer base watches recordings from live channels and we want them to be able to record as much as possible. This was limited by bandwidth and that is one of the pain points we are solving by using nPVR." His company provides access to network recordings via the STB and multiscreen devices. The telco stated previously how multiscreen nDVR has helped to increase ARPU by persuading customers to upgrade to a premium package.

In March 2013 the company told Videonet that network DVR was delivering a significant competitive advantage. "The key benefit for our customers compared to competitor solutions is that recordings can be viewed everywhere, and not just in the home," a spokesman declared.

Simmons at IHS Technology says the main advantage of launching nDVR, as opposed to DVR, is that it enables customers to access

their recorded content on non-STB devices such as smart phones and tablets, inside and outside the home. "This helps create a premium Pay TV service by unifying content availability and the user experience across all devices. Swisscom's nDVR is a real-world example of this."

Removing DVR recorders from the home is not the key motivation behind nDVR at this stage, Stefan De Beule, Director of Multiscreen Sales Engineering EMEA at ARRIS, observes. His company provides a comprehensive set of cloud, network and CPE solutions for Pay TV including whole-home media servers and network DVR. On top of the new services enabled by nDVR, he says operators want a network recording option so they can segment the market more precisely.

Using a home gateway DVR to serve secondary set-top boxes and multiscreen clients in the home is the higher cost CPE proposition. nDVR represents the lower cost option that will tempt people in markets where Pay TV competition, or the presence of a strong free-to-air alternative, limits what an operator can charge, De Beule suggests.

THE nDVR USER EXPERIENCE

ARRIS has conducted a lot of consumer research about what people want from DVR functionality. In the ARRIS 2014 Consumer Entertainment Index, based on a survey of 10,500 people in 19 markets, 47% of respondents wanted to record two or more programmes at the same time and 30% said they would pay for the privilege. 62% of DVR owners said they have to delete programmes because they have run out of space despite 28% of the recorded content never being watched, and 74% said this caused frustration in the home.

"Not having to remember to record all your favorite shows will certainly be popular among TV viewers," declares Jason Blackwell at Strategy Analytics. ARRIS believes Pay TV operators can offer consumers more space as they need it and this could be a source of new revenue. The company also agrees with Daniel Simmons that one of the greatest benefits of nDVR is access to recordings on multiple screens.

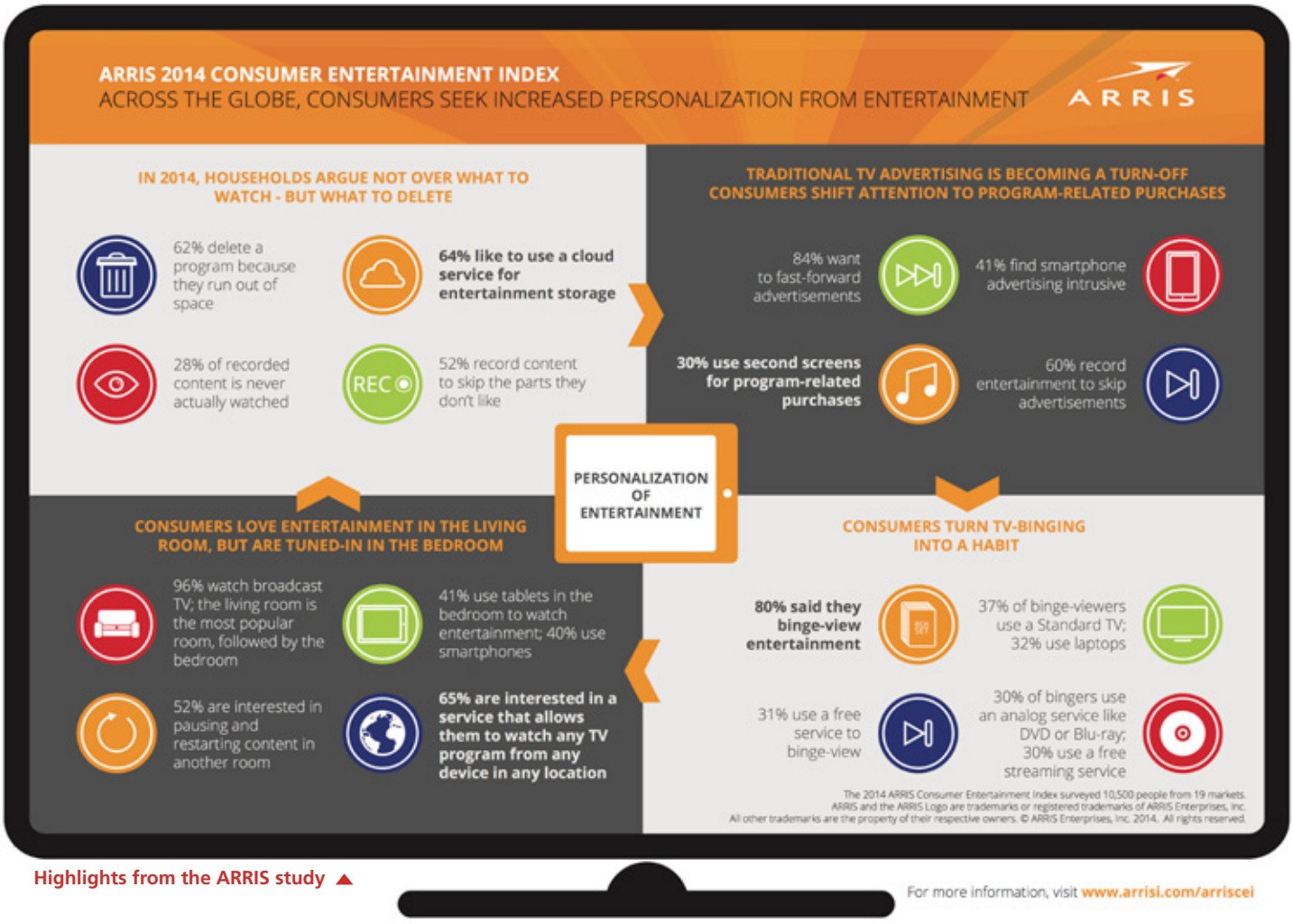
While the in-home DVR user experience has always been fairly consistent between platform operators (apart from storage capacity), there will be more variation in network DVR. Variables include how quickly content is available to watch and how long it remains available, whether you can fast-forward through advertising, total storage available and whether you have to physically schedule a network recording or if content is made available to you automatically, as with catch-up TV. Much will be determined by content rights.

"This is going to differ by region and operator," predicts Blackwell. On the question of content windows he says: "These have always been a way for content owners to regulate viewing and create monetization opportunities. That business model will continue with nPVR, just with new windows being created."

Perhaps the main user experience (UEX) challenge is how the industry handles ad-skipping, even if we accept the evidence from Thinkbox, the marketing body for commercial television in the UK, that DVR owners are not actually

WHILE THE IN-HOME DVR USER EXPERIENCE HAS ALWAYS BEEN FAIRLY CONSISTENT BETWEEN PLATFORM OPERATORS, THERE WILL BE MORE VARIATION IN NETWORK DVR

An ARRIS whole-home DVR gateway



Highlights from the ARRIS study

For more information, visit www.arrisi.com/arriscei

"WE CAN MIMIC THE DVR EXPERIENCE, INCLUDING AD SKIPPING, AND WE CAN LIMIT THE NUMBER OF ADS WHEN VIEWING ON CERTAIN DEVICES"

"militant anti-commercial ad avoiders". The ARRIS 2014 Consumer Entertainment Index found that 60% of consumers record content in order to skip the advertisements.

Expectations may depend on what you are accustomed to. "I think consumers who are used to being able to fast-forward through content and advertisements will be frustrated by any limitations that might be imposed through nPVR," says Blackwell. He predicts that content deals will be the main factor that determines the experience each operator can offer and that it will vary by region and operator.

"The idea of skipping ads is not appealing to the content owners but if there is the potential to sell a service that would allow ad skipping and generate additional revenue, they may be willing to allow it."

Stefan De Beule at ARRIS agrees. He points out that you can use largely the same technology and the same network recording to feed consumer requests for a start-over viewing session, catch-up TV or network DVR but that does not mean all on-demand content will have the same user experience. "What we are seeing at the moment is that content owners still make a distinction and negotiate different rights."

He believes nDVR technology should support all the UEX models an operator might need. "We can mimic the DVR experience, including ad skipping, and we can limit the number of ads when viewing on certain devices to match consumer expectations," he says. "It is hard to predict how it will end up. There will be lots of experiments to determine what is acceptable to consumers and what is the right mix to generate enough money for content owners while keeping users happy with their experience."

SHARED STORAGE AND CONTENT RIGHTS

Swisscom offers nDVR on STBs and multiscreen devices

In terms of operating costs and capital expenditure, the ideal scenario for platform operators is shared-copy storage, where one copy of content is available to multiple viewers. Some copyright jurisdictions demand multiple-copy mode, where one copy is recorded for each user.

In an analyst note last year, IHS Technology outlined the operational benefits in comparison to in-home DVR even if you have to store a copy per person. First, the hard disk drive is the primary point of failure of the in-home device, and the need to replace them results in costly service calls and customer dissatisfaction. "Also, as hard disks grow beyond what most families can fill, nDVR services become more cost-efficient in comparison. A centralised data centre does not need to maintain nearly as much empty overhead space."

Jason Blackwell, Strategy Analytics

The company adds that hard disk drive storage density can advance as much as 40% in a year, which makes it an advantage to purchase storage on a 'just-in-time' basis. The company expects a new boost to storage density from 2015 thanks to heat-assisted magnetic recording (HAMR) technology.

It is still content rights issues that are holding back further progress towards nDVR. Dr Daniel Hesselbarth, Director CPE & Product Innovations at Unitymedia KabelBW, the German cable operator that is part of Liberty Global, pointed out at Connected TV Summit this summer: "You can grey out events in the EPG [if the rights are not available on-demand] and maybe you can explain that for catch-up TV but you cannot explain it for PVR; people would turn away from that. We are in transition and those rights will change but for the next few years rights will be quite a hurdle."

He noted that sometimes broadcasters lack the rights for network recording themselves, and sometimes they want to keep them in a bid to exploit them directly through their own apps. Decipher expects the 'dam' to be broken by platforms that own significant amounts of rights themselves.

"Sky [in the UK] are in a position to break the rights stranglehold as they can allow the nPVR rights to any content they commission and they are not dependent on ad revenue," the consulting firm suggests. "At some point the nPVRs will be sufficiently integrated with web infrastructure that they will include sophisticated ad insertion systems that will appease the [big commercial

"YOU CAN GREY OUT EVENTS IN THE EPG AND MAYBE YOU CAN EXPLAIN THAT FOR CATCH-UP TV BUT YOU CANNOT EXPLAIN IT FOR PVR"

broadcasters] of this world.

"We believe that the rights issue will be solved piecemeal, with shows carrying licensing information in their metadata so the next generation of PVRs can tell if the show can be sent to the nPVR in the cloud or not. Where the nPVR rights are not available it will be recorded locally."

THE TECHNOLOGY CHALLENGES FOR nDVR

Alongside content rights, Decipher identifies the state of the broadband network as the other main barrier to nDVR. "The broadband network needs to work very well. The pipe from the content to your home must be reliable and have enough bandwidth to cope with the worst case: high definition football. This is especially true if live pause and rewind move into the network; just imagine the network stress just after that first goal."

Stefan De Beule believes most nDVR content will be delivered as adaptive bit rate (ABR) streams, even on the set-top box. And as we all know, the ABR marketplace is highly fragmented with multiple protocols and DRM systems to work with. You need to make content available in multiple bit rates and all these challenges are magnified when it comes to nDVR. "If you have to store each piece of content in multiple formats and encryption schemes then your storage needs are going to explode," De Beule warns.

Because of this, operators are moving towards using a single 'mezzanine' format that is stored in different bit rates. This is then translated into the formats required for different devices (e.g. HLS, HDS, Smooth Streaming and MPEG-DASH), with their appropriate encryption, when a device makes a request for a stream. This 'on-the-fly' processing is known as dynamic format packaging and just-in-time packaging. De Beule expects MPEG-DASH to become the mezzanine format of choice.

The Comcast X1 Xfinity service, which includes nDVR

OPERATORS ARE MOVING TOWARDS USING A SINGLE 'MEZZANINE' ABR FORMAT THAT IS STORED IN DIFFERENT BIT RATES, WITH PACKAGING PERFORMED ON-THE-FLY

The Spectrum streaming session delivery controller, which ARRIS now offers following its acquisition of SeaWell Networks, makes this dynamic packaging possible. This product combines real-time repackaging with dynamic session management (based on network-side ABR policy control) and targeted ad insertion and is viewed by ARRIS as a central component for the efficient delivery and monetization of network DVR. It supports other streaming services as well, both on-demand and linear.

In an attempt to make ABR streaming more efficient and

The Cox programme guide with a logged-in user ▲ *(Pic: ThinkAnalytics)*

improve Quality of Service (QoS), efforts are under way to move some control away from client devices and into network-side management platforms. The Quiptel Media Platform from Quiptel, which uses its own Q-Flow ABR streams and converts them into HLS inside the device player, allows the headend to manage the connection to all the clients in real-time, for example. The headend management system is aware of what kind of devices it is dealing with at any one moment, and how much data they really need, given their screen size, to achieve a good QoS. No device can keep hogging bandwidth it does not need at the expense of another because it is no longer in full control of the data rate allocation.

ARRIS's Spectrum session controller also supports a shift in control from ABR client to network. It can use manifest file manipulation to remove certain bit rate options from the line-up that a particular multiscreen device is offered. So a tablet on a mobile network is not going to be offered a 7Mbps adaptive stream. Every ABR session can be manipulated individually. "You can manipulate the manifest file to achieve policy control rather than allowing the client to make all the decisions," Stefan De Beule explains.

Network-side ABR session control is part of a wider interest in more intelligent resource and rights management. As an example, the DLNA, browser and home media sharing specialist ACCESS has presented a vision of how Pay TV operators can start to marry broadcast, classic VOD and CDN infrastructure and treat them as a shared resource, where the CDN becomes just another DLNA server.

The DLNA software stack then provides a central view of what each client DLNA device is capable of, what is currently happening on different devices within the home, what is being requested by them and what is being requested of them. For example, a tablet may request some HD content from the hard drive of an in-home DVR. Integrated with the CA system, the DLNA stack knows the user is not allowed to view HD on that device. The tablet would request an SD version instead but it turns out that two other devices are already streaming from the DVR gateway and there is no local transcoding capacity left.

The request could be routed to the CDN instead, rather than refused, with SD content streamed to the tablet in the correct format. This is an interesting concept given that we are looking ahead to maybe a decade of DVR and nDVR co-existence and so the potential for hybrid delivery scenarios within the same home.

EFFORTS ARE UNDER WAY TO MOVE SOME CONTROL AWAY FROM ABR CLIENT DEVICES AND INTO NETWORK-SIDE MANAGEMENT PLATFORMS

THE ROLE OF ADVERTISING IN nDVR

A lot of nDVR delivery will be ABR streaming to the set-top box, meaning we will see some technology consolidation in how we deliver video. Once you move into the streaming video environment you also enter the world of 'digital' advertising, which encompasses all-things online from search and display advertising through to online video pre-roll and post-roll. The hottest thing in 'digital' today is video, and the hottest things ▶▶

in [digital] video advertising are dynamic advertising insertion (DAI) and addressable advertising.

DAI is taking off in North America and we are witnessing early implementations in Europe. With DAI, advertising that aired in the linear show can be replaced with a new advertisement, which may or may not be addressable (targeted). So ads for bank holiday sales, no longer of value once everyone returns to work, can be replaced with ads that do have some value. In general DAI is being used once a time-shifted viewing session no longer counts towards the original linear audience ratings, being outside of the three day (U.S.) or seven day (UK) post-broadcast ratings windows (to give a couple of examples).

Dynamic advertising insertion technology could encourage operator/broadcaster nDVR rights deals. Daniel Simmons (IHS) comments: "This [ad substitution] is possible on traditional DVRs but nDVR should make it easier. nDVR will also provide the ability to do this on any device in any location. Service providers and content owners will need to cooperate to make this happen. The problem of monetizing multiscreen could well be solved through nDVR and DAI. These could prove to be the initial catalyst for cooperation."

"THE PROBLEM OF MONETIZING MULTISCREEN COULD WELL BE SOLVED THROUGH nDVR AND DAI. THESE COULD PROVE TO BE THE INITIAL CATALYST FOR COOPERATION"

He emphasizes that it is a question of when, not if content owners agree rights for network recording. "Storing all recorded Pay TV content in the network should provide a much greater level of control over its consumption and monetization. It is hard to believe this could not be mutually beneficial. The advanced advertising solutions that nDVR will facilitate, and the data insights about content performance and consumption patterns, will be hugely valuable. These things could certainly be important as part of the negotiations."

The ARRIS Analytics Framework supports 'big data' analysis and Stefan De Beule reveals: "One of the first places we have used this is an nDVR solution. A service provider can generate valuable insights for its own use and they can also provide feedback to their content partners so they know what people are doing with their content."

His company's Spectrum platform enables advertising replacement for DAI, using manifest manipulation to get the receive device to fetch video from the correct ad server. The content owner can use its own campaign management platform to determine which ads are inserted and these can be targeted. Spectrum integrates with advertising exchanges that use various data sources to decide on a good match between advertisement and viewer, based on relevance.

De Beule says, "There is a clear opportunity to remove irrelevant advertising from an nDVR session and replace it with a new ad that can be monetized, so this is a way to generate revenue around recorded content for the channel owner and the service provider."

T-Labs (Deutsche Telekom R&D) has been testing how networks cope with nDVR ▲

OTHER WAYS TO MONETIZE nDVR

Because it relies on consumer insights, addressable advertising benefits from more personalized viewing, and nDVR makes television more personal. Other developments that

Daniel Simmons, IHS Technology

EVEN ABOVE ADVERTISERS, THE BIGGEST BENEFICIARY OF VIEWER INSIGHTS IS THE PLATFORM OPERATOR WHEN MARKETING CONTENT AND OFFERS AT EXISTING SUBSCRIBERS

will help feed our knowledge about viewers include personal log-ins or the (perhaps more likely) alternative of data analytics that learns who is using a service without the need for log-ins.

Even above advertisers, the biggest beneficiary of viewer insights is the platform operator. They can market content and offers at existing subscribers more effectively, especially when 'talking' to them as individuals rather than at a household level. ARRIS believes it has the perfect technology for this in the form of its Merchandiser product.

This solution is integrated with leading content recommendation platforms, including those from ThinkAnalytics and Digitalsmiths, with the aim of encouraging impulse purchases and increasing ARPU generally thanks to incentives that are targeted on a per-subscriber basis. It can be used to promote music, games and applications but when it comes to video it is viewed as another tool in the content discovery tool kit.

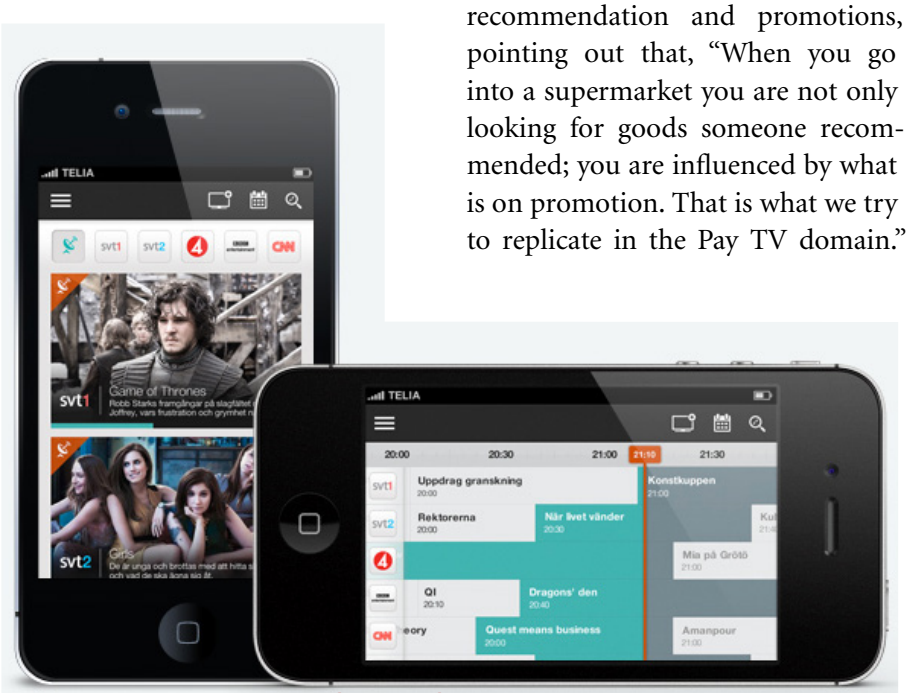
Stefan De Beule believes content discovery must be a mixture of recommendation and promotions, pointing out that, "When you go into a supermarket you are not only looking for goods someone recommended; you are influenced by what is on promotion. That is what we try to replicate in the Pay TV domain." Merchandiser can also be used to target promotions to companion screens to coincide with ads on the television.

Other ways to monetize nDVR include making it part of a higher tier offering, and so boosting ARPU, the model seen at Swisscom. Some operators are looking to charge a discrete fee for the ability to get recordings on different devices.

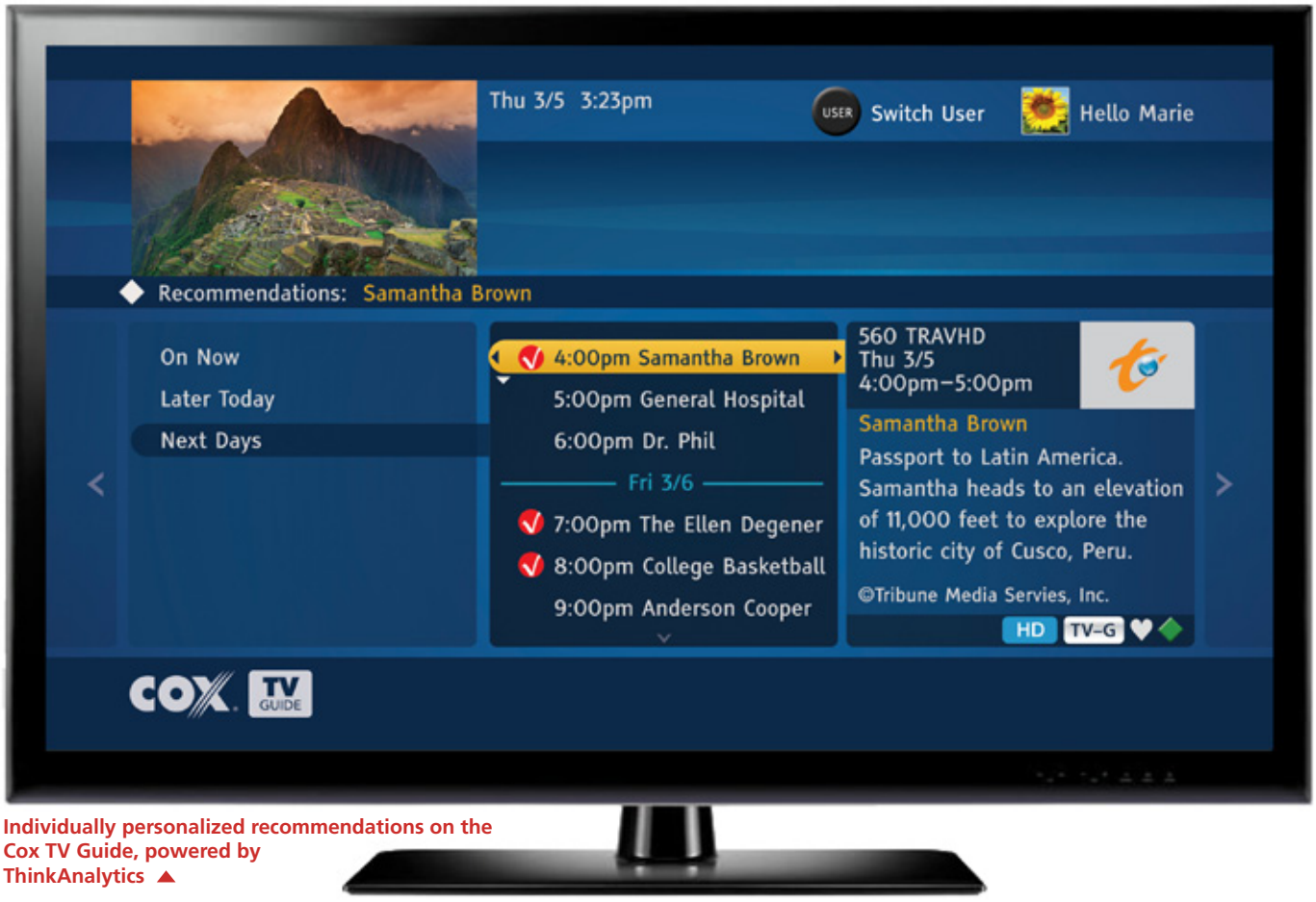
There is evidence that people might pay for more storage, enabled by network DVR. 64% of people told the ARRIS Consumer Entertainment Index they would like to use a cloud service to store their entertainment and 33% said they would be prepared to pay for such capabilities. 60% said they would be prepared to watch some advertising in return for increased storage.

"The important thing is that your technology has the flexibility and scalability, and allows enough personalization, for you to keep all monetization options open," says Mark Johnson, Vice President Sales, Network & Cloud at ARRIS. Simmons believes network storage and control will enable lots of monetization experiments. "There are a plethora of new business models that could emerge with nDVR," he declares. "Charging by storage capacity and the length of time the content is stored are two of the more obvious examples, as is charging extra for multiscreen."

He says we are likely to see freemium models where nDVR is fundamentally free but you have



Rivals to Pay TV, like Magine TV (seen here), are developing cloud time-shifting capabilities



Individually personalized recommendations on the Cox TV Guide, powered by ThinkAnalytics ▲

to pay for the removal of advertising or for the ability to fast-forward through ads. "Ad insertion is also likely to be a part of the monetization picture." Last year, referring mainly to North America, his company predicted that network DVR could make time-shifting available to more customers, especially in the cable industry, which serves more price sensitive customers than IPTV and satellite and has lower DVR penetration.

Nigel Walley, Decipher ▲

CONTENT DISCOVERY AND NETWORK DVR

In order to encourage viewing, nDVR systems can use some of the same methods employed for standard DVR. According to Billy Purser, Senior Director of Marketing at Digitalsmiths (now a TiVo Company), which provides a range of discovery solutions, "One of the methods for the service provider to deliver personalized recommendations is 'You liked this TV show, so you might also like X coming up in a few days.'" His customers leverage social discovery so they can highlight content that has a high social buzz and that is airing in the next X number of days. Linked to the discovery system, the network DVR platform can make a

"CHARGING BY STORAGE CAPACITY AND THE LENGTH OF TIME THE CONTENT IS STORED ARE TWO POSSIBILITIES, AS IS CHARGING EXTRA FOR MULTISCREEN"

Peter Docherty, ThinkAnalytics

THE PHYSICAL SCHEDULING OF A RECORDING BY A USER IS ONE OF THE STANDARD 'LEARN ACTIONS' FOR CONTENT RECOMMENDATION

recording (or make a recording available) on our behalf.

Given that operators will have the choice (maybe subject to content rights) of whether to make us physically schedule a network recording, is a 'record' request valuable as a guide to our passions? It is, up to a point. "When a viewer records content, they are endorsing that content in some way. When they watch the content, it is an even stronger endorsement. And of course, the more they watch it, the stronger the endorsement," says Purser.

Where networking recordings are made available without the need to schedule it in advance, users can be recommended the best content from 'previously', 'now' or 'next', according to Peter Docherty, Founder and CTO at ThinkAnalytics, another leading recommendations platform provider. "Where nPVR is deployed without the replay or catch-up functionality, you recommend shows in the future that would be good for that person to set a reminder or to record."

Docherty adds that the physical scheduling of a recording by a user is one of the standard 'learn actions' that his system supports. "We probably use it in all our deployments where there is a PVR. We would give further weight once the recording is actually watched."

Content recommendations can play a role in encouraging binge-viewing, as they do for Netflix and their like. Docherty says his recommendations system can line up a 'full binge' by, among other things, showing all available episodes in the season, starting from the next episode, or all available episodes in all available seasons (from the next episode).

He points out that recommendations are useful not just because they give people ideas but because they make it easier to find content they might have sought. "In some UIs [user interfaces], after watching one episode it can take four or five clicks for the user to navigate to find the next episode themselves, so just making it easy for the person to watch the next episode is valuable."

There is a school of thought that, because it has the potential to give consumers access to more storage and expand it on request, network DVR could encourage a 'box-set' and binge viewing mentality. ARRIS views this as a business opportunity, with 16% of its survey respondents saying they would pay for a service that allowed them to immediately download or stream recently completed TV series. And while Netflix may take the credit for inventing binge-viewing, most of it actually happens on free catch-up services and using DVD or Blu-ray,

Seamless discovery on the main screen with Digitalsmiths

Liberty Global's Horizon platform, which features a growing cloud element ▲

according to the ARRIS Consumer Entertainment Index.

MARKETING THE ON-DEMAND EXPERIENCE

While shared technology supports the convergence of network DVR, catch-up TV and TV on-demand services, content rights might keep them apart. If platform operators are given a free hand, will they seek to maintain these concepts as separate consumer experiences, ensuring differentiation in functionality and so possibly pricing?

DVR has a strong brand, if you want to put it that way. As Simmons at IHS notes: "Catch-up services are typically free, with DVR often being a premium service, differentiated by live pause, rewind and the fact that the user can decide what content is stored and for how long."

IF GIVEN A FREE HAND, WILL PLATFORM OPERATORS TRY TO MAINTAIN nDVR, CATCH-UP TV AND TVOD AS SEPARATE CONSUMER EXPERIENCES?

Some commentators expect a long-term convergence of the on-demand 'experiences'. Jason Blackwell at Strategy Analytics thinks nDVR and catch-up could merge, though once again, it will differ by region and operator. "It will be dependent on content rights deals, content availability windows, business models, and even type of content," he says. Nigel Walley at Decipher also anticipates a blurring of functionality between [in-home] DVR recorders and on-demand systems. "The difference will become a commercial and legal one, not a technical one," he says.

The convergence works in both directions, Walley points out. "Firstly, recording capacity is beginning to move to the cloud. Secondly, PVRs are increasingly being used to host on-demand programming, as we see with push-VOD on Sky [in the UK] or Dish Network's Primetime [Anytime] service.

"Our thinking is that over time, most consumer recording will move to the cloud, with the consumer PVR hard drive increasingly being used to support functions like start-over, where the last couple of hours ▶▶

of all the top channels are buffered, and also push-VOD promotions of HD and 4K movies." Walley says the nDVR service will increasingly blend with buy-to-own movie services. "You will effectively have a Sky or Virgin branded type of Dropbox attached to your home PVR and you will be able to allocate storage to the PVR functionality and to your movie collection."

Liberty Global will soon offer nDVR in at least one of its territories

CONCLUSION

IHS Technology expects satellite and DSL-based IPTV operators to retain storage in the home for the foreseeable future due to their relative bandwidth constraints. The company does not expect nDVR to have any meaningful negative effect on STBs before 2015, either. The roll-out of nDVR does not spell the end for the DVR – at least not for a while.

Like most things in this industry now, the medium-term will see co-existence on a market-wide basis and hybrid cloud/in-home solutions even within the same operator footprint. But Mark Johnson at ARRIS believes one factor has now tipped the scales firmly towards nDVR becoming the default offering in the years ahead.

"Network DVR is becoming compelling for consumers. It overcomes their frustrations around having to delete content. We are getting a critical mass of multiscreen devices in the market, too, and when it comes to personal recordings it is no longer good enough to limit people to their main screen," he explains. "I think there is a compelling user demand for this."

Whereas once it was operators pushing for nDVR because of their operational benefits, Johnson thinks consumer demand will eventually mean nDVR is the only type of DVR service offered to new Pay TV subscribers. ■

ONE FACTOR HAS TIPPED THE SCALES FIRMLY TOWARDS nDVR BECOMING THE DEFAULT OFFERING: IT IS BECOMING COMPELLING FOR CONSUMERS

Content discovery at NOS (ZON)

(Pic: ThinkAnalytics)

TAKE THE ARRIS 2014 CONSUMER ENTERTAINMENT QUIZ

WHAT PERCENTAGE OF DVR USERS **DELETE CONTENT** BECAUSE THEY RUN OUT OF SPACE?

- 32%
- 45%
- 62%
- 87%

WHAT PERCENTAGE OF **RECORDED CONTENT** IS NEVER ACTUALLY WATCHED?

- 28%
- 44%
- 58%
- 74%

WHAT PERCENTAGE OF USERS WANT TO **STORE ENTERTAINMENT** IN THE CLOUD?

- 27%
- 43%
- 64%
- 72%

Find out the answers at
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