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VIDEO Executive Magazine

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The Genius Issue

By: Kurt Michel

Welcome to the summer 2019 issue of OTT Executive Magazine.

So why is this "The Genius Issue?"

Let's go back a few years. At 2016's OTT Executive Summit in New York that year, while an attendee representing IneoQuest, it was my distinct honor and pleasure to have received the "OTT Genius" award. Summit attendees select the award recipient by ballot, based on the attendee's ability to provide insight and drive the day's discussion. I was very fortunate to have spent a few prior years working with true geniuses at Akamai and IneoQuest, enabling me to share a few of the things I learned from them about OTT with the summit attendees. So it is hard to take "genius" credit for absorbing the ideas of others. The fact is, the summit was full of people I considered "geniuses" – they just weren't as "helpful" (or maybe as loud?) as I was.

But just between us, I still get great pleasure from using the "I was elected a genius – I have a trophy!" argument during family disagreements – when appropriate.

While there is no exact definition of a genius (apologies to the MENSAns out there), it does seem to apply to "a person who displays exceptional intellectual ability, creative productivity, universality in genres or originality, typically to a degree that is associated with the achievement of new advances in a domain of knowledge."[1] To

me, a person with true genius has an idea so powerful that it engulfs them, and they have no choice but to evangelize it, and bring it to life – in spite of any potential damage it might cause to their fit in the "status-quo" community. For me, personally, the adage "you know one when you see one" particularly resonates.

Back in the spring, as we considered the theme for the summer issue, we were concerned that with all of the relaxation our industry-leading readers would be enjoying over their summer vacations and holidays, there was a risk that the OTT industry might get a little too relaxed – maybe even complacent. Being the good industry advocates that we are here at OTT Executive Magazine/ Trender, we felt it was our mission to fight against this potential complacency, so we decided we needed something to overcome it. By calling this the "Genius" issue, we felt we could ask our contributors to make their articles a bit more technically and intellectually "meaty," and more challenging to the vast number of our subscribers who would be reading our magazine at the beach, or in their mountain getaway.

If you did not notice my tongue planted firmly in cheek on that last paragraph, you NEED to get to the beach.

But seriously, we have been very busy building our community recently, continuing to attract C-suite executives to our growing, 47,000-strong OTT community; not only on the technology and platform side, but also on the content side of the industry. As evidence of that, we have partnered with OTT Fest for their event in Atlanta this October. This event is focused on illuminating the power of OTT for the 21st century content creation community. Check it out!

We have more than our fair share of true "geniuses" within the OTT community… and that is a very good thing since we are reinventing the entire entertainment industry on a global scale, from a technical, creative and business perspective. Many of these geniuses have agreed to contribute to this issue. Here are just a few examples: Jeremy Harvey looks at some practical applications

Kurt Michel is Executive VP at Trender Research. He has over 30 years' experience in telecom, datacom, and networking - in development, sales, product management and marketing roles. His marketing leadership experience at Akamai, IneoQuest, and SeaChange gives him a unique, multi-faceted perspective on the volatile video industry.

of AI in "Moving Beyond Academia with AI & Video." Charlie Kraus discusses the challenges of managing latency (delay) for live streams in OTT in "Will Standardization of OTT Video Technology Simplify Online Distribution?". Scott McCloud describes his experiences in leveraging OTT technology, ironically, for improved quality and significant savings in The Country Network's OTA distribution infrastructure. Barbara Bellafiore connects the dots between blockchain and OTT in "Yes, Blockchain technology is coming to OTT," and Raymond Westwater offers approaches to "Reducing Bandwidth Cost with OTT Video Optimization." These are but a sampling of the content riches in this issue.

So pull up your beach chair, put on your sunglasses, open/pour your favorite drink, and prepare to be "Einsteined".
Enjoy!

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The Country Network: Leveraging OTT Tech For Improved OTA Distribution

By: Scott McCloud

The Country Network was my first foray into the world of OTA (over the air) television networks. I didn't know a lot about how OTA works or how the stations were getting their signals, but I knew we had to get the signals to our affiliates and do it cost effectively. In the beginning, we would build out a $3000 to $5000 server with our automation software on it and send it to the affiliate location to playout our media. This meant EVERY affiliate had to have one of these servers loaded with software requiring expensive monthly license fees. I could quickly see this was not going to be sustainable in the long run. Being mostly from a data background, I began looking at this as what it is, DATA. At its core, whether it's video, audio or documents - it's all bits of data . So why not try and leverage what I knew about data to see if there was a better way. You wouldn't buy expensive hardware to move files from one place to another, why would you need to with video?

I started looking into how Roku, Netflix and other OTT providers were getting their streams out so reliably. Of course, they have expensive CDNs and lots of bandwidth to get to all their customers - not really feasible for a small OTA company. I started

thinking about how we did not need to get a signal to millions, we just had to get it to the affiliate station in the area, so that they could send it over the antenna to the rest of their customers. We only had to have 20 to 30 active streams at a time. Why not have our own CDN for that? Wowza Streaming Engine fit the bill perfectly. At $99 a month for unlimited streaming to as many clients as our server will handle, it's unlikely we will ever outgrow it. The only hurdle left was how to deliver the signal in a format the affiliates can work with. Most affiliates are on outdated hardware, which are set up to ingest video via composite or SDI inputs. Most decoders on the market that can take an IP stream and output to SDI or composite are in the $1200 to $2000 range. Again, not really cost effective. I began working on my own decoder based on relatively inexpensive high quality Single Board Computer (SBC) boards. I ended up building my own IP based decoder, running on Linux and a small but powerful SBC and Blackmagic hardware.

Now that we had the means to deliver the content, I started hearing from our affiliate partners asking me what we were doing different, because our feed looked so much better than a lot of the other channels on their network. All of our content was produced in high quality/high bitrate to start. The better quality you start with, the better it will look after compression in the stream. H.264 compression fit the bill well, as you can get really good compression and still have great quality in the end. Video production standards typically require 20Mbps to 30Mbps for 1080p high-definition video. But with compression like H.264 we are sending HD 1080p at just 6Mpbs with excellent results. Newer compression standards now available, such as HEVC/H.265 or VP9, can yield even better bitrates with the same quality. However, these codecs also require

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much more processing power to encode and decode. Even still I believe these will become standard in the near future. Another streaming technology that is out now is SRT (Secure Reliable Transport). SRT is designed for unreliable networks, like the internet, and is basically a wrapper for UDP (user datagram protocol) streams. UDP is an alternative communications protocol to the more prevalent Transmission Control Protocol (TCP) used for web-based communications on the internet. SRT can be used primarily for establishing low-latency and loss-tolerant connections between applications across the Internet. This is perfect for us as we can use SRT to deliver "more traditional" MPEG-TS streams with packet ID (PID) data reliably across the internet. While SRT is not yet widely used, I believe it will be in the near future. It is open source, free for anyone to include in their encoders/decoders. Wowza was one of the partners in the development of SRT, so it's already included in their Streaming Engine software.

Using OTT technology and a little bit of Linux knowledge, we drove the average per-affiliate cost from $5000 plus $140 in monthly fees, to about $200 and $99 per month. We were also able to reduce onboarding time from an average of 2 weeks to as little as 3 days. With the way streaming technologies are advancing, I foresee this cost not only going down in the future but offering better quality as well.

Whether you're an OTA provider, OTT provider, or just trying to get your content to the internet, OTT technology is the future of television and media production. □

Moving Beyond Academia with AI & Video

By: Jeremy Harvey

AI is everywhere. It permeates our lives throughout the day, from the mobile devices we're constantly tapping and swiping, to more subtle uses, like that "customer service agent" you may be chatting with on your favorite website. There is no shortage of industries that AI has the potential to impact, through increased efficiency, error reduction, and even increased creativity by freeing up people's time. In fact, the number of job postings with "AI" or "machine learning" increased by 100% from 2015 to 2018 according to Indeed[1]. And AI and ML skills were dominant for the fastest growing jobs of 2018.

But while AI has already transformed many areas of our lives, including the workplace, its usefulness continues to require the human touch. On social media, for instance, AI cannot always easily judge the tone or intent of an interaction between individuals, resulting in a conversation between friends being flagged and taken down. And while Facebook, Twitter, and others are wrestling with this issue and taking steps to improve the policing of bullying, hate speech, violence, etc., the software still has a way to go, failing at least one out of five times[2].

Arriving at "Intelligence"

It is helpful to understand the subtle differences between artificial intelligence, machine learning, and deep learning and the application of these to video. The analogy of a set of Matryoshka, or nesting Russian dolls, is a good visual representation of how they relate to each other. In this scenario, artificial intelligence would be the largest doll in the set. Followed by machine learning. Lastly, deep learning as the smallest doll inside. (fig. 1) In this case, all machine learning is AI but not all AI is machine learning.

Artificial Intelligence (AI)

AI at its very basic level mimics the cognitive functions of humans to achieve a goal which can be explicitly defined or induced. This most often makes use of algorithms, a set of instructions that a computer can execute to achieve its goal

efficiently. Simpler algorithms can be stacked or more complex ones can even write simpler algorithms to execute themselves. Artificial intelligence has become an integral component of movie development; predicting opening weekend revenues at the box office, long-term gross sales revenues, and creating targeting profiles for marketing and creation efforts.

Machine Learning (ML)

Machine learning, a subset of AI, describes the way that computers can learn from data to make predictions. Because data, not humans, drives the learning process, machine learning models can change and adapt without a human to modify computer code. Machine learning models have a variety of uses, such as recommending a show that a user might like, classifying whether an image is a cat or not, detecting fraudulent credit card transactions, or parsing speech.

Deep Learning

Diving deeper, we find Deep Learning, a subset of machine learning. A deep learning architecture contains multiple layers which each learn about patterns in the data. Models can be trained via "backpropagation" — that is, recognizing when the model has made a mistake, and correcting it. The most typical example of a deep learning algorithm is a neural network with many hidden layers. Because of the huge amount of data and

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computational power required, deep learning has increased in popularity with the rise of cloud computing[3]. An example of an application of deep learning is in image processing. This can be incredibly useful in cleaning up imagery or footage automatically without human intervention.

Can AI Revolutionize Video?

As AI technology continues to improve, does it have the power to revolutionize video? According to Adobe[4], it does, "driving more intelligent production, delivery, and engagement — and a better experience for both enterprise brands and their customers."

Let the Machines Do the Work

Personalization, production, and data analytics are some areas where a video business can harness the capabilities of AI at scale. But the problem we often see is that most AI in the video space is a solution looking for a problem. It's interesting, sometimes informative, but rarely actionable for video businesses. A lot of this is a result of the 'black box' nature of machine learning. Feed the data in, let the models determine what is important, and an answer spits out the other side.

Secure your Investment

Investment in an AI-powered product, like our Customer Happiness Index (CHI®), for example, requires a tangible ROI to make sure the time, effort, and money required to bring it into service are really worth it. The three recommended activities below can help you make a more informed decision and meet your objectives for analyzing the data,
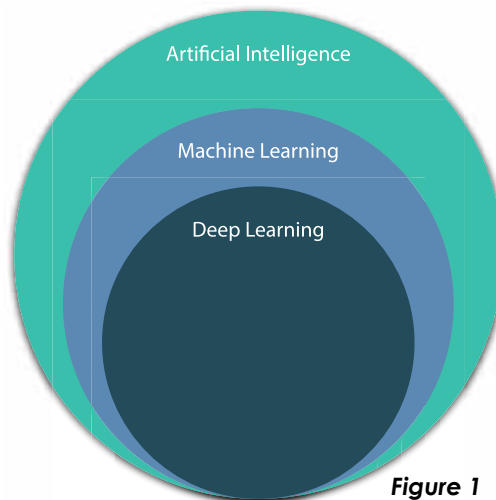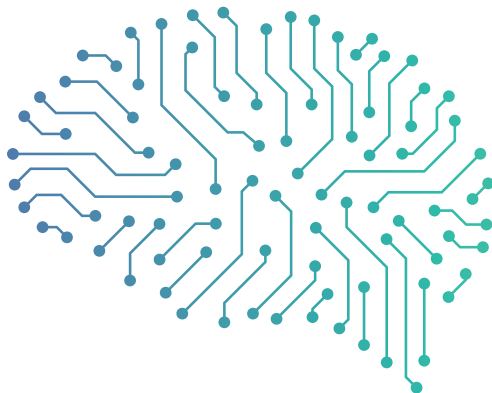

Figure 1

gleaning insights, and taking action.

1. Define

Define the actions you want to take as a result of the machine learning model completing its analysis. As the model makes its way through the dataset, identifying which elements are the most impactful to how it sorts the data is important. You should also consider what you will do with the result once you have it. Unless actionability is applied, data is just data. It's what you do with it that matters. In the case of an OTT video business, this means taking churn-prevention actions ("save actions") when the machine learning model determines that subscribers are at risk of canceling their subscription. This could be voluntary or involuntary. A properly trained model will determine which elements are the most important and rank them accordingly.

2. Interpret

Consider a model's interpretability when choosing your machine learning algorithms. Without being able to understand why your model flagged a user as at-risk for churning, you can't easily make a targeted intervention. However, models that are easy to interpret, like decision trees or logistic regression, may not perform as well as black box models like neural networks and gradient boosted trees. If the accuracy boost from more complex models is necessary, you can apply an "interpretability engine" at the end of the machine learning pipeline. At Wicket Labs, we "translate" the output of our black box models using more interpretable machine learning models. These estimate the correlation of a customer's behavior to churn risk at the individual level. We convert this data into primary reason codes, such as "no recent viewing activity" to explain why the model made its decision. In addition, we identify which behaviors are the best targets for decreasing a user's churn risk. This makes it simple to take data-driven actions for customer retention.

3. Correlate

Skip the AI when a correlation will do. Machine Learning - hiring the right data scientists and developers to write the algorithms, process the data, and compute and interpret the results - is inherently expensive. Humans have an evolved neocortex that allows for massively parallel pattern recognition and it's something that still gives us an edge over the machines in certain instances. There are many cases where correlation analysis can lead you to a confident action or decision without the time and expense of applying AI.

Preventing subscriber churn is a complex problem for video services. We have found over 60 interrelated factors ("features" in machine learning parlance) that have causal relationships with a customer abandoning a video service - sometimes intentional, sometimes not. The team at Wicket Labs developed CHI to address this challenge. In addition to revealing the happiest customers in a subscription service, "save actions" are clearly identified for each at-risk customer segment. In this specific case, AI, ML and Deep Learning techniques have been applied to identify "at risk" users, and in spite of the complexity, the payoff is clear – churn is reduced, and audience lifetime value is increased, representing a clear, tangible and profitable application of AI. □

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Yes, Blockchain Technology is Coming to OTT

By: Barbara Bellafiore

Last month's announcement (6/18/19) by FACEBOOK (FB)[1] that they are launching their Libra cryptocurrency project on its own private blockchain, with a blue-chip list of partners from Visa to Uber, from eBay to PayPal, adds momentum to the development of blockchain technology and urgency to the media industry's participation in it.

Libra (libra.org) is the name of the "new global currency designed for the digital world…backed by the belief that money should be fast…simple…secure," according to the announcement.

If you have money, you need to keep it somewhere, and that is the second leg of FB's strategy: FB is launching its wholly-owned "wallet" for Libra currency, called the Calibra wallet, through which it can track users' purchases and spending levels.

Doesn't that sound like a great way to sell and track movies, music, books, subscriptions, and rights, and to quickly and safely pay the rights-holders and distributors? Blockchain technology tracks the transactions, the currency pays for the transaction. FB is entering both arenas here.

Let's go further with transactions: Advertising is the biggest transaction in US media right now. Advertising will generate over $215 billion in revenue this year, of which the majority, $130B is forecast to be digital/internet advertising, again eclipsing TV advertising.

Who are the biggest beneficiaries of digital advertising? Right now, it's Google (37%) and FB (22%), who by 2021 are expected to be joined by Amazon, and these three are predicted to garner 70% of all internet advertising revenue. FB's impressive and growing list of Libra partners are also all significant advertisers. Do not expect Google to be a bystander to the rollout of blockchain technology or to the establishment of a currency that can be used throughout the advertising ecosystem. Neither should the media industry.

Beyond the important contribution blockchain technology will make in adding efficiency and transparency to rights-holders and distributors, it also holds the key to adding those very qualities to the entire digital advertising ecosystem. Blockchain technology has the potential to bring us closer to verifying that the right ad reaches the right viewer, that viewers' attention is more accurately valued, and to help restore advertising's role as a service not an annoyance. On the administrative and accounting fronts, blockchain technology can shorten the float time that publishers get paid by advertisers, potentially even to a real-time transaction. This is an area media companies can succeed in as the industry pursues blockchain and cryptocurrency applications.

Facebook's announcement is a wake-up call to the media industry that we are moving out of the nascent and experimental stages of blockchain technology. We've seen how quickly the internet, then mobile, now streaming video have grown. That growth is fast approaching for blockchain technology in media.

Here are 5 FAQs that help give context for the potential of blockchain technology for broadband providers and their customers. Let's start with the basics:

1. How is blockchain related to bitcoin?

Blockchain is the underlying

Barbara Bellafiore heads Bell Communications, based in Greenwich, CT, and advises clients in emerging digital media sectors, including the transforming potential of blockchain technology for media and advertising transactions. Barbara's background is in the launch of new media technologies, in both product and business development. She has held senior positions at HBO, Showtime, D&B, and several ad-supported digital startups (CEO, CMO) in sports, news, entertainment, and education.

technology upon which the bitcoin currency was developed and distributed in 2009. Blockchain's technical foundations have uses far beyond the cryptocurrencies it was developed for. It has a similar origin story to the internet, which was based on the underlying technology of ARPANET, the US Department of Defense's early network that ensured communication in case of nuclear war. Today, the internet is our primary source of communication, information, and entertainment, with over 90% broadband penetration in the US. What was developed

for one purpose turns out to have many more uses.

2. Is bitcoin real, or as real as dollars?

In my work as a media consultant, I'm asked this all the time: if bitcoin and other cryptocurrencies are "only" a software code, how can it have real value?

Rather than get into the deeper philosophy behind our concept of money itself, here's an easy way to understand the "reality" of cryptocurrencies: Do you value your frequent flyer airline miles? Do you use them for things you value like air travel, hotel stays? Have you given a ticket to someone else? Or transferred miles? Once you use them, you can't use them again. Those miles and rewards we like so much are as "concocted" as a cryptocurrency, and also exist primarily as a software code. Yet, we value them, understand them, use them.

The big difference is that as concocted as they are, those reward miles are centralized by the Airline, who can change their value at any time. In this way, frequent flyer miles are as centralized a system as our dollars, where the Federal Reserve determines interest rates. With a cryptocurrency, it is the demand and confidence of the users that determine their value. In that way, they are like "real" currencies: when investors doubt the economy of a country, the value of their money goes down. This month, confidence in crypto is soaring. Last year, it was waning.

3. How can blockchain be used in business, beyond tracking and transacting cryptocurrencies?

The financial technology sector is experimenting with blockchain technology, but the first use cases appearing are in the supply chain arena. FB has changed that landscape with the Libra consortium and its Calibra wallet.

In the supply chain world, luxury goods owner LVMH, the parent company of such upscale brands as Louis Vuitton, Givenchy, Dior, Pucci and more, is launching a blockchain solution to help their customers trace the provenance and authenticity of their products as an anti-counterfeiting measure. They also will show a product's timeline from raw materials, to weaving and tanning, to manufacturing and shipping to increase customer engagement and interest.

Starbucks is planning a blockchain system that will track beans from "farm to cup."

Both are using an Ethereum-based blockchain on Microsoft's Azure Cloud.

IBM has developed a blockchain-based food tracking network called Food Trust, in consortium with major supermarket chains and retail companies including Nestle, Dole,

McCormick, Tyson, and Unilever. French retail giant Carrefour reports an increase in sales after its early implementation of blockchain information for 20 items including chicken eggs, oranges and cheese.

In media, transactions that involve consumer payments for subscriptions and downloads, as well as advertiser payments to publishers, are ripe for the benefits that blockchain technology and possible media currencies can offer.

4. Will blockchain technology be used as a permission-only network— "walled private gardens" operated by a company or an industry—or will it be developed as an open and permissionless technology like the internet now is?

It is likely that blockchain technology will evolve as the online world did, from the walled gardens at the start, and become broader, global and open. In the online consumer world, we began with Prodigy and AOL private networks that did not connect to each other, and moved into the all-access internet we have today.

In the White Paper of the FB-consortium for Libra[2], it states that while it will be a permissioned blockchain network at the start, they are aiming to be a permissionless, all access network in five years. It is both a noble goal, and a way to capture global users at the start as the first-mover.

Just as we now have the Internet of Things (IoT) that can operate our lights, garage doors, and heat from anywhere, FB's development of Libra is already being referred to as the Internet of Money, making transactions available globally, including where individuals do not have bank accounts or credit cards.

5. What will be the killer app in blockchain technology?

Consider a FACEBOOK passport to go along with your FACEBOOK Calibra wallet. It's not that far away.

Do you remember when email that could reach anyone, anywhere was considered the killer app of the internet? There was even the promise of saving money on stamps! So much has eclipsed that early killer app. Today, the killer app on the internet is increasingly the streaming and mobile video and audio, with more new, and as-yet-unimagined ideas coming soon.

Bitcoin and cryptocurrencies are the first killer apps using blockchain technology, then supply chain tracking, and now there's the FACEBOOK-consortium's Libra currency, and the FB wallet, Calibra.

One idea deep down in the Libra White Paper is Identity: "An additional goal of the association is to develop and promote an open identity standard. We believe that decentralized and portable digital identity is a prerequisite to financial inclusion and competition." On a humanitarian level, this could address the needs of those in war-torn countries without access to birth certificates. On a marketing level, imagine the consumer reach if a FB Calibra wallet and a Libra passport/ID made travel and transactions more accessible globally. □

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The Challenges of Localizing Global Content

Interview by Kurt Michel with Joe Fregoso, MediaGeniX Dir. of Business Dev, Americas

*T*ender Research's Kurt Michel recently caught up with Joe Fregoso, Dir. of Business Dev., North America, at MediaGeniX to talk about the challenges that face content providers in today's OTT world.

Kurt: Hello Joe. Welcome to the OTT Executive Community. Could you please tell our readers a bit about MediaGeniX and the role you play in the media ecosystem?

Joe: Thank you, Kurt, for the opportunity to connect with your community and allowing us to share our perspective of the industry as a global leader in the content, rights management, and video distribution space, as well as formally introduce ourselves to the North American OTT community.

MediaGeniX is a global company, headquartered in Brussels, Belgium, with regional offices in Bangkok, Singapore, and Fort Lauderdale, Florida. We have been in the broadcast industry since 1992. Our broadcast management system (BMS), WHATS'On, is the engine behind some of the world's largest, and most complex media groups, broadcast companies, and content owners. We enable, optimize, and allow both linear and non-linear platforms to easily manage complex multiformat content workflows from end-to-end, and publish the right versions and formats to the right publication systems, backed up by a comprehensive

rights verification module.

We have more than 100 satisfied customers and broadcasters; large and small, linear and non-linear, including those born exclusively in the digital space. A few examples are Viacom, Disney, DAZN, Proximus, A+E Networks, M6, Turner, Orange, Etisalat, Zoomer Media, AMC Networks, the BBC, and BeIN Sports.

Kurt: With your rich history and current customer base, you have a firsthand perspective on what video service providers (VSPs) are struggling with today. Can you identify the top 3-5 challenges that commonly present themselves, and how you address them?

Joe: Firstly, I would like to say that most media organizations are, one way or another, being, or will be, "forced" to enter the OTT space. Whether this means to go multi-device, multi-screen, create a D2C service, or launch a separate service altogether.

Challenges in each case will vary of course and these can range from:

• Identifying what content can be scheduled on which service and when; what we call content rights and scheduling management.

• Streamlining workflows and defining the specifications of the video, audio files, etc.

Joe Fregoso is the Director of Business Development for the Americas at Media-GeniX. Joe is an accomplished sales and business development leader and senior executive in the broadcast industry, both linear and non-linear, as well as in the telecommunications industry, throughout the Americas. Prior to his role at MediaGeniX, Joe was the commercial leader for Latin America for one of the most recognized over-the-top platform providers in the world. Joe was also a key executive in the successful launch of BlackBerry throughout the Americas. In his spare time, he enjoys eating out, golfing, live music, and traveling the globe.

that are required for each device, platform, and service.

• In many cases Linear and VOD (OTT) have been run as separate services within an organization, with VOD being an afterthought service creation - especially for legacy broadcasters. So as the market and operational requirements become more demanding, there is a requirement to consolidate and streamline these processes as these services merge into one consistent offering to the consumer; and it becomes imperative that everyone has an overall view of services ranging from what content is scheduled and where, to how this content performs on various services.

• Business models are changing. And with content being distributed to a variety of platforms, revenue share calculations will become more and more complex to manage, not only with distributors, but down-stream platforms.

Our solution allows large and small players to manage this complexity.

Kurt: We have an explosion of content today – I like to call it "showverload." In addition, new delivery technologies like 5G and ATSC3.0 are around the corner. What do you see as the key challenges and opportunities in the evolving media industry?

Joe: In our view, both 5G and ATSC3.0

give Broadcast TV a seat at the digital table. The obvious challenges are operational challenges. Additionally, as 5G will improve QoE even further, this will mean additional costs, workflow complexity, and once again, further change.

Both 5G and ATSC3.0 promise the creation of new services. For example, On-demand, linear services created specifically for cars – especially when self-driving cars are launched, and opportunities for addressable advertising, rich audience insights, and personalized content that will demand intelligent platforms that will be able to handle and help capitalize on these opportunities.

Kurt: As you have an international customer base, can you tell us some of the more significant differences you see between the EMEA, LATAM, NA, and APAC markets?

Joe: Obviously, there are mature markets where OTT services are affecting the performance of traditional broadcasting, whether free-to-air (FTA) or Pay TV; The US, UK and Australia being a case in point. Yet Linear TV remains dominant in Central Europe, Asia and Africa.

Although there are many voices crying that linear TV is dead, it is surprising to see how many linear channels are being launched worldwide. Ultimately, the method of delivery of services may have changed (OTT, streaming) yet the form of linear broadcast has not. A live sports event or live entertainment show is still linear, independent of the platform that is used to reach the audience.

In Africa, and even in Latin America, monetization of services is based on totally different business models. Micro-payments and micro-services are prevalent and there is no expectation for a customer to be locked into a 12 or 24-month contract, but rather pay for what they consume, based on a daily or weekly subscription. A model that is also being adopted by various sporting event providers is charging for a single event, a digital pay-per-view model, if you will, rather than a recurring subscription fee. A good example is DAZN with their prize boxing events.

Additionally, regulations are different around the world. This means that global players need tools that ensure compliance to these regulations from country to country. In Latin America, as in Europe, there are multiple countries within the region, with different cultures and languages. To be able to localize content, media companies are turning to platforms like WHATS'On to allow them to distribute and publish the right content, as well as the right materials (language track, images, and subtitles), within the appropriate rights windows, and to the right platforms, with precision.

Kurt: You refer to the media world today as being "Content-Centric." Can you give us an example or two of the difference between a "content-centric" approach, and one that is not – perhaps a historical example?

Joe: We refer to ourselves as being content-centric! With that, I mean that content is at the center of our platform.

As I mentioned earlier, legacy broadcasters entered the VOD/catch-up world as an afterthought, but soon realized that running these services in parallel was onerous and content was not exploited to its full extent. A content-centric approach means having visibility of when you can broadcast the same piece of content, in which format and with which specs, on what services or platforms, for how long, and for how much in the case of EST and TVOD. Not being able to track the rights effectively can mean a loss of revenue.

Kurt: Much of the attention on new OTT-based services has been driven by Subscription VOD – with Netflix and Amazon driving the market. How do you see Ad-based Linear and VOD content fitting into this brave new world?

Joe: I believe that we should be careful and clear of our definition of OTT services. The examples you mention are D2C as will be Disney+ and the Warner service - and all have a global outlook. The challenge of course in being global is in also having the ability to be local both in language and content offering. Netflix, and to a lesser extent Amazon, are implementing this strategy. It will be interesting to see how quickly Disney and Warner follow suit.

It will also be interesting to see how Imdb TV (ex. Freedive) performs globally as an ad-supported service. I believe consumers will not mind ads as long as content is desirable. From an operator point of view, ad revenue will need to balance content spend. There are examples of AVOD services around the globe with various degrees of success. As choices for the consumer of SVOD based services becomes greater and therefore more expensive, we believe we will see the proliferation of hybrid models, similar to how Hulu has been operating in the US.

Kurt: I have heard some folks in the industry talking about the possible future creation of a single cloud-based content library, where content producers can publish their content with consistent formats, metadata, rights requirements, and more—and service providers can find a rich archive of material with consistent identification, metadata, and formats. Do you have any thoughts on this?

Joe: For this to be achieved in any form will require the agreement to common specs, formats and Asset ID's. The question then becomes who will own this and what will the model be for access. Up to a point, this is what SMPTE's Interoperable Master Format (IMF) is supposed to address, but whether we will reach a point of a central content storage system, I have my doubts this is feasible, at least in the near future.

Kurt: Thank you, Joe, for your time today, and your informative responses. It does seem that there is a real and growing industry need for content localization management. Good luck! □

Programmatic Advertising is The Future of TV

By: Benjamin Antier

Connected TV (CTV) and more broadly Over-The-Top (OTT) streams are the natural evolution of linear TV. Consumers wanted control over the content, and now they have more control than they could ever dream of: watch any show, on any device, at any time… for free. Of course, Subscription Video-On-Demand (SVOD) consumption is massive because of services like Netflix. However, the rise of Advertising Video-On-Demand (AVOD) services like Xumo, Pluto TV and hybrid models like Hulu or Youtube TV prove that AVOD is not going anywhere. In the US, 200M users stream content over-the-top while 300M viewers still stick to cable TV, with OTT usage projected to overtake traditional linear TV in the next few years. So one could expect the same trend to take place in the advertising budgets, with OTT spend passing Linear TV budgets, right? Wrong! As OTT consumption increases, Linear TV advertising budgets are slow to follow the watchers. Even for online advertisers, including OTT in the marketing mix still isn't common practice.

So why is the ad industry so slow to take over the OTT/CTV market? The answer comes from a combination of factors:

• Publisher, platform and app fragmentation makes it hard for the small and medium publisher to find advertisers

• Proper measurement and transparency is only starting, with some players such as Integral Ad Science leading the way

• Lack of standardization in terms of technical solution and audience segmentation

These problems are not new; the industry started addressing them on desktop over 10 years ago and on mobile within the past decade. The answer was programmatic advertising. Today, 80% of digital video ad investments have already moved from direct sales to programmatic sales. Programmatic brings transaction, delivery and measurement standardization to the ecosystem. User data is now formatted and easily tracked, allowing for modern addressable advertising.

What does Programmatic mean?

Programmatic has been used left and right in the digital advertising space, sometimes without much programming involved at all, so I thought I would take a few lines to describe what I mean by programmatic.

Programmatic Advertising means that advertising inventory is transacted in real-time in an auction-based system in which the highest bidder gets an opportunity to deliver an ad to a specific user. Each ad is then individually tracked in order to provide performance feedback to the buyer: was this ad viewed? was the user in the expected audience segment? etc...

The advantages of Real-Time Bidding (RTB) are quite obvious for publishers and advertisers alike:
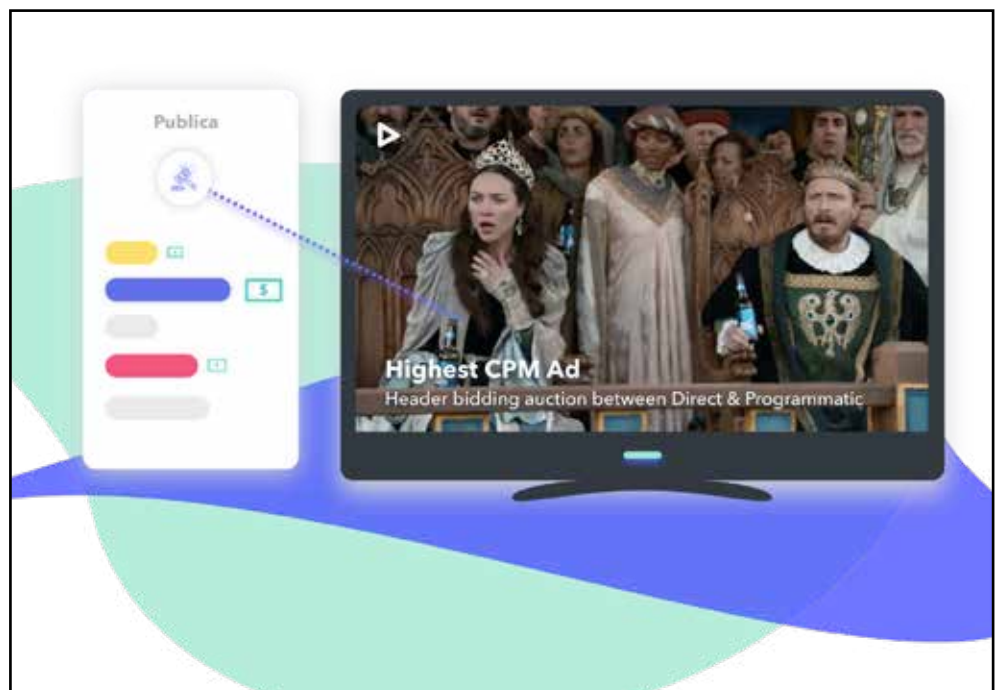
• Optimization of ad dollars to reach the right user, in the right context for brands

• Increased competition leading to improved rates for Publishers

However, programmatic has not reached the OTT space yet, despite massive

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investments in the programmatic TV space over the past year. Video Demand Side Platforms (DSPs) now provide dedicated bidding channels for OTT while Supply Side Platforms (SSPs) are doing everything they can to onboard the largest publishers on the market. Yet almost all of the available OTT inventory is still monetized through direct sales. The most advanced publishers are starting to set up programmatic deals within private marketplaces (PMPs) but 1) their usage remains limited, and 2) this is really another way of transacting directly with buyers.

Publica

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What's preventing TV from going programmatic today?

As of today, publishers and advertisers list 3 reasons why CTV/OTT inventory is not yet being sold programmatically at scale

1. Technical Limitations
2. Data and Measurement
3. Simple integrations

Technical Limitations

As the most premium of screens, TV has high expectations in terms of user experience. Ads must be delivered fast, in full HD, and should never, and I say never, repeat themselves. Well, believe it or not, most programmatic platforms still struggle to deliver such a user experience. Live ad breaks create bursts in traffic that most programmatic platforms are not designed to handle. The practical industry response, to anticipate ad breaks and pre-fetch ads, is being implemented across more and more services. In addition, delaying server-pings by a few milliseconds also mitigates the burst effect that most programmatic platforms cannot handle.

Technology also exists to solve duplicate creative issues (ad repetition), or to prevent competitive ads from running back-to-back. Creative hashing allows us to keep individual fingerprints for each video media file and to apply real-time intelligence to reject unwanted creatives in specific ad slots.

Data and Measurement

Despite being arguably the sexiest advertising format on the market, no advertiser will blindly pour its ad-dollars into OTT. They want proof that their campaign has been delivered to the right screen and to the right user. As a result, CTV ads are being packaged with delivery measurement and verification. Companies like Integral Ad Science are pioneering in the OTT space with the first-of-its-kind Ad Verification standards. Other Data providers like LiveRamp now offer OTT-specific segmentation using third party data to know if the user watching a basketball game on Hulu is in the process of buying a car or if the subscriber has started but not completed the HBO subscription process.

Simple Integrations

Solutions are already being implemented to solve for the technical and measurement challenges, but complexity remains the largest problem. Ad Tech providers often need their software to be integrated directly within the app itself in order to run any type of decisioning process. These integrations are slow, error-prone, and Publishers cannot integrate an infinite number of SDKs in the world within their apps. Server-side integrations are the way to go. Solutions which provide an all-in-one integration solution connecting publisher's OTT apps to all of the world's programmatic platforms can dramatically reduce the complexity. With this approach, a single server-side HTTP endpoint is all that a publisher needs to call in order to run an auction between 10 buyers, match users with each of them, get the highest bids, and filter out poor quality creatives or duplicate ads. At Publica, we recognized the value of this solution, and are committed to it, because we believe that solving the complexity challenge is the key to fixing the entire programmatic value chain.

Predictions

Over the next 6-12 months, all of the largest OTT app providers will have adopted their own version of programmatic monetization. Whether it is through a single platform like Publica, or partnering with many different providers, the value-creation is too large to miss. The real question is: what will happen once publishers have the ability to monetize their inventory programmatically?

Advertisers will dip their toes in the Programmatic pool, before diving in.

It will take time for advertisers to change their buying habits. The TV industry has been around for decades and although measurement is extremely limited, experience allows marketers to measure quite precisely the ROI of their TV campaigns. So OTT will (and has already started to) capture small percentages of TV budgets. As the quality of measurement and targeting improves, advertisers will quickly realize that the ROI of OTT campaigns is far greater. Once advertisers enter the ball game, I expect their media agencies to start designing OTT-specific campaign plans. A Superbowl advertiser in 5 years will deliver not one but 1,000 ads depending on who's watching and in what context. You would want to know if your ad is being shown at a watch party in front of a hundred people or in a living room of a retired couple, wouldn't you?

And that's when things will get really exciting. Once the buy-side and the sell-side converge to design OTT-specific experiences, we will start to realize the full potential of connecting the king of screens to the internet. □

Will Standardization of OTT Video Technology Simplify Online Distribution?

By: Charlie Kraus

As OTT video rapidly increases in popularity, the viewing device options and the number of digital media platforms to watch from are increasing as well. Consumers have significant control in choosing from OTT services and social media networks for entertainment options. Compelling digital content is no longer enough to capture and retain a loyal audience. Expectations are for broadcast quality experiences on any internet connected device, whenever and wherever. Consumers want engaging digital experiences, and with so many options to choose from, won't hesitate to jump between platforms to find the ones that meet their expectations. As OTT services mature, there is a drive for standardization to simplify video distribution that will allow OTT providers to focus on delivering new differentiating viewing experiences. Emergent standards will lead the next battle for differentiation; after engaging content and exclusive rights, lower latency live streaming and multi-platform support.

CMAF to the rescue?

Why is online video delivery complicated? To reach the largest possible audience across all platforms and devices, OTT services use both HLS and MPEG-DASH segmented adaptive streaming protocols to deliver online video. The differences between these protocols makes encoding and workflow quite complex. To simplify the distribution of video, Apple, Microsoft, Google, and Adobe have worked to create the Common Media Application Format (CMAF) standard. CMAF is not an alternative to HLS or DASH, but offers advantages for video publishers.

CMAF simplifies the workflow by allowing a single encoding to be delivered by HLS and MPEG-DASH, eliminating the need to pay twice to encode video streams, and simplifies the workflow. Delivering DRM protected content today requires multiple DRM encryptions and file storage for the required DRM systems. CMAF supports the Common Encryption (CENC) standard, so video files can be DRM encrypted once and stored, and decrypted by popular CENC compatible DRM solutions such as Google Widevine, Microsoft PlayReady, and Apple FairPlay.

What about live streaming latency?

As online live streaming grows in

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popularity, viewers are demanding a better viewing experience, especially focused on lowering delivery latency. A common complaint from viewers is the long delivery latency of online streams compared to the traditional TV broadcast. This creates a potential spoiler issue, where a viewer watching online receives a text from a friend viewing the TV broadcast, about action they haven't seen yet due to online latency. In Limelight Network's most recent State of Online Video survey, almost 60 percent of

viewers across all age groups stated they would be more likely to stream sports events online if they weren't delayed from the TV broadcast.

What causes this latency? The internet wasn't originally designed for streaming video. To address this limitation, HTTP-based streaming formats such HLS and MPEG-DASH were developed to allow internet streaming using the TCP/IP protocol. Video streams are encoded in segments (or chunks) that are delivered to the receiving application and then buffered before being played to accommodate potential delay in transmission and to avoid rebuffering. It means that the online video lags the broadcast sometimes by a minute or more. One approach to lowering latency is to reduce the chunk size to minimize the amount of video that is buffered before playback. This can reduce latency to as low as 6 seconds, close to the latency of broadcast delivery.

If you use CMAF to simplify encoding, you can use the Low Latency Chunk (LLC) option to deliver low latency streams. This enables delivery of a video segment by microchunks, as small as 100ms, before the full segment is calculated. With LLC, video transmission is accelerated across the workflow, including the decoder, which can start decoding before a complete segment is received. We have found that CMAF LLC works well in practice and can deliver video source to viewer device latency in as low as 3 seconds, but could be higher depending on last mile internet connectivity conditions.

This is all well and good to improve standardization of online video delivery, and address viewer complaints about long live streaming latency. But what if new technology provided a way to reduce latency to under a second, and enabled integrating live data along with the video for more interactive online experiences? We saw the limits that could be achieved with chunked streaming delivery. To enable sub-second latency delivery a new approach is required.

WebRTC (Web Real Time Communication) is an open standard for embedding secure, SSL-protected real-time voice, video and data communication capabilities into a broad range of web browsers and mobile applications. Until recently, WebRTC has typically been used to create real-time video chat solutions among groups of users. At Limelight we have deployed WebRTC to scale live streaming delivery with under one second of latency to large global audiences. This sub-second latency is achieved through the fast and efficient UDP data transfer protocol. Streams are not segmented into chunks and buffered before delivery. Adaptive Bitrate streaming is used to deliver the highest possible picture quality to each viewer, even over changing network conditions, ensuring the best possible online experience. Another advantage of WebRTC is that playback and delivery is supported by standard web browsers. Native browser support eliminates the need for plug-ins or special players. Currently supported PC and mobile device browsers include Chrome, Safari, Firefox, and Opera.

The real-time latency provided by WebRTC offers the opportunity to give viewers new experiences with live streaming video. A data sharing channel provided with each viewer stream can now enable integration of live data with video. With this technology in place, Sports fans can receive real-time statistics about a match, wager on who will score the next goal, or choose which camera angle they would like to view, right from their computer or mobile device. Gamers can have an integrated chat channel with their video. Fans of eSports can participate in event commentary along with the live in-arena audience. This capability opens up new business opportunities in sports, gaming, auctions, and more by making live viewing a more interactive social experience.

Improving Content Search

A very important pain point with consumers is the current state of content search and recommendations. The rapid increase in the number of OTT services with their walled-gardens of apps has made content search very frustrating, to the point that sometimes more time is spent searching than watching. Fortunately, there are several approaches underway that promise to improve content discovery and give viewers more control. The first efforts are expected from the big aggregators like Roku, Apple and Amazon, that will provide improved search controls at the platform level. But most consumers watch video across multiple platforms, so what is ultimately required is a way to search at a higher level. A way to accomplish this goal could be the Entertainment Identifier Registry (EIDR) https://eidr.org/, which provides a globally unique identifier system for a broad variety of audio visual content, including television, motion pictures, and radio. EIDR is designed to work with existing identification systems, not replace them, by including references to an asset's ID under other systems in the EIDR record. This feature is very useful for film and TV archives by making it easy to cross-reference with other sources. These efforts are encouraging, and are expected to provide much improved search tools for consumers. The last thing OTT providers should be doing is making it difficult for viewers to find the content they want to watch.

Benefits of standardization

Standardizing online video distribution will reduce complexity and cost for OTT providers. The current robust content delivery infrastructures have enabled the distribution of record numbers of live streams for the largest live events to millions of viewers. Efforts to standardize video distribution must support maintaining and expanding this capability as audiences continue to grow. □

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AVOD: An Excellent Opportunity for Local TV Broadcasters to Regain Viewing Time Lost to SVOD

By: Colin Dixon

Though Netflix arrived in Sweden and Denmark at the same time, online viewing time has grown much faster in Sweden. AVOD, driven by local TV broadcasters, seems to have been the difference. Can AVOD help U.S. local broadcasters regain ground against SVOD providers? Tegna and Sinclair seem to think so.

AVOD drives more viewing in Sweden

Netflix and HBO Nordic both arrived in Sweden and Denmark at the same time: October 2012. Marie Nilsson, CEO of Mediavision, observed that online viewing time in Sweden has grown faster and higher than in Denmark. She says that 14% of TV viewing time in Denmark came from online and the rest from linear TV in 2014. In 2018, 35% of viewing came from online sources. In Sweden, online viewing grew from roughly the same (13%) in 2014 to 45% in 2018.

She explained that one of the significant differences between the two markets is the prevalence of advertising-supported content in Sweden. Ms. Nilsson says that 60% of the online viewing comes from SVOD services in Denmark and only 25% from AVOD. In Sweden, 50% comes from SVOD and 40% from AVOD.

Global SVOD dominate young Danes viewing time

With 70% of all SVOD subscriptions in Scandinavia, Netflix dominates SVOD in the region. However, AVOD in Sweden is predominantly local broadcasters. Ms. Nilsson says just 7% of viewing time in

Denmark is from local providers, while 35% is local in Sweden. She told an audience of predominantly Danish media professionals at the recent Future TV Conference in Denmark that AVOD is an untapped opportunity for local Danish broadcasters.

The issue of local content reaching people in the online TV age is a difficult one for Denmark. Earlier in the conference, Julie Nygaard from research firm Wilke made the point that 19% of people rely entirely on online for their TV entertainment. Further, 19% of that group watch no local Danish content at all. A sharper focus on AVOD could help draw the global SVOD viewers back to Danish content.

US Local TV broadcasters maintain healthy balance sheet as audience ages

On the face of it, US local broadcasters appear to be doing much better than their Scandinavian counterparts. Advertising revenue remains strong, with the industry earning over $20 billion in 2018 and projected to do the same in 2020 (both election years). As well, local news, the crown jewels of local TV, remains very popular. Pew Research says local TV stations remain the most popular news source, with 38% tuning in often and 86% watching at least some of the time.

Scratch beneath the service, however, and the underlying trends aren't as good. A third of U.S. adults say the internet is the most important way they get news, and 89% say they get at least some news online. As well, the audience for local TV news grows ever older. Pew Research says that 57% of people
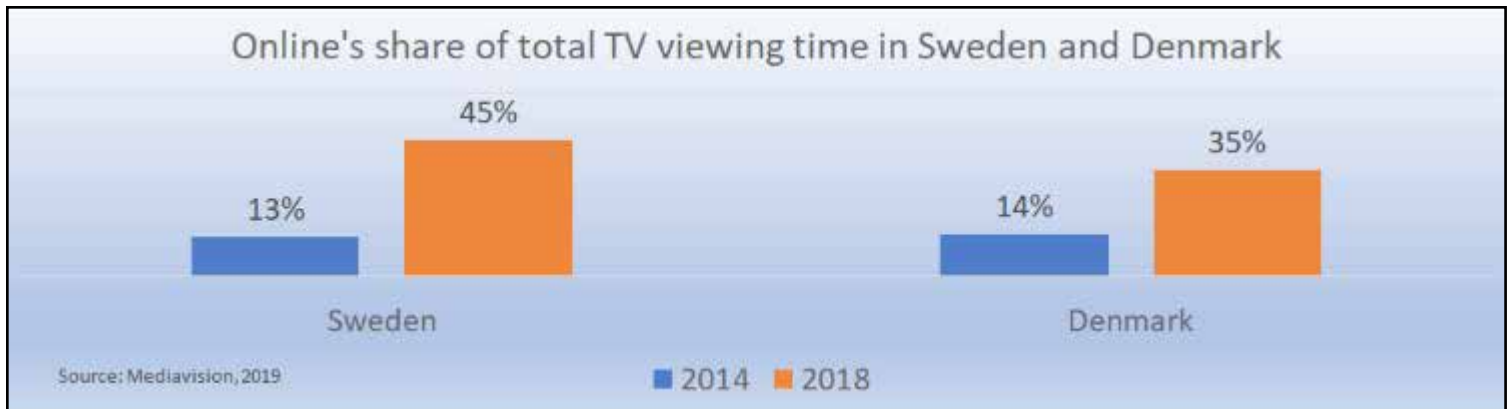
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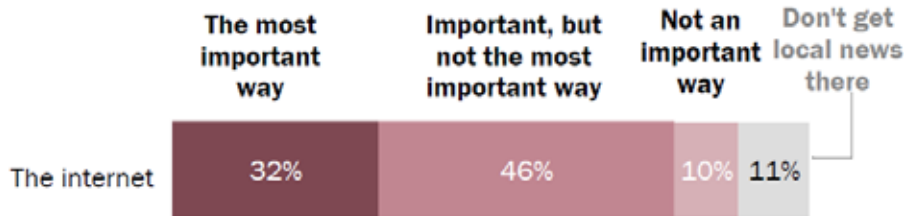
65 and older watch local news, and 47% of people 50 to 64 years old. However, only 18% of 18-29s and 28% of 30-49s watch local TV news.

Meanwhile, global video brands continue to build their audience, particularly among the young. According to Piper Jaffray, a third of teens now watch YouTube every day, up from 21% in 2015. 38% of teens watch Netflix every day. What's more, Netflix and YouTube combined account for over 70% of the time teens spend watching video. This data suggests that US local broadcasters have just as big a problem reaching young people as their peers in Denmark.

US local broadcasters beginning to recognize the online ad-supported

Online's share of total TV viewing time in Sweden and Denmark

Sweden: 13% (2014), 45% (2018)
Denmark: 14% (2014), 35% (2018)

Source: Mediavision, 2019
■ 2014 ■ 2018

About a third say the internet is the most important way they get local news

	The most important way	Important, but not the most important way	Not an important way	Don't get local news there
The internet	32%	46%	10%	11%

Note: Respondents who did not give an answer are not shown.
Source: Survey conducted Oct. 15-Nov. 8, 2018.
"For Local News, Americans Embrace Digital but Still Want Strong Community Connection"

PEW RESEARCH CENTER

opportunity

The signs are that local broadcasters in the U.S. are beginning to understand the problems with their audience. It also looks as though some are moving to act along the lines that Ms. Nilsson is suggesting for Denmark. In an interview with nScreenMedia, Bob Sullivan, Head of Programming, Tegna, had this to say about reaching the audience:

"Our job isn't just to push out a daily newscast on our broadcast linear stations, but also to go find that audience and provide quality content to them on all their platforms."

Tegna is doing just that. It has launched a free ad-supported daily news magazine show called the Daily Blast Live and distributes local news on social platforms like Facebook.

Sinclair Broadcasting is starting down the same road. It launched the free ad-supported mobile-oriented STIRR app early in 2019. The app leverages content from the 190 Sinclair-owned local TV stations to give app users a uniquely local "channel" within the experience. According to Adam Ware, GM of STIRR at Sinclair Broadcast Group, helping local broadcasters connect with online viewers is what STIRR is all about:

"There's a channel right at the first channel position. It's called the STIRR City channel. It is a direct-to-local OTT channel that features local programming 24/7. It is live local news from our sister station in the market. The STIRR City channel is a local TV station's second streaming channel."

As people, particularly the young, spend increasing time watching online, the opportunity for advertising content expands. The results from Sweden suggest it is an excellent opportunity for local broadcasters around the world to remain relevant to an increasingly online television audience.

Why it matters

Though streaming services came to Sweden and Denmark at the same time, far more TV time is spent online in Sweden than in Denmark.

The much wider availability of ad-supported online TV content in Sweden, bolstered by local TV broadcasters, could be a significant factor.

AVOD could be an excellent opportunity for US local TV, and providers are beginning to embrace it. □

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Reducing Bandwidth Cost with OTT Video Optimization

By: Raymond Westwater

Can I just say it? Bandwidth costs are too high!

Justification of Video Optimization

During the first Golden Age of Television and even in the Age of Cable bandwidth costs didn't matter. A single station could reach millions over just one 6 MHz channel and a single copper loop might deliver 600MHz of bandwidth to hundreds of subscribers.

Content providers thought that the advent of Compressed Video would enable them to extend their reach without additional cost. Instead, OTT (Over-The-Top) Connectivity created an exponential demand for bandwidth such that the aggregate cost of individual TCP connections has dramatically outstripped even the rapidly falling costs of commodity Internet hardware.

As users greedily demand better video quality, reduced buffering, and ever-higher resolutions, bandwidth costs continue to swell. For the OTT business model, these costs consume a typical 6% to 10% of each gross dollar, dwarfing profit margins. Bandwidth cost reduction has become critical to the enterprise.

The most obvious path forward, sadly, is also the most expensive: upgrading the compression standard in use. We most commonly use H.264 now, as we have for roughly the last ten years. Our options to move forward are essentially the standards-based compression standards H.265 and AV-1.

H.265 offers a minor incremental improvement over H.264 for HD video resolutions, but a stunning 50% reduction for UHD resolution video. H.265 players are already implemented on many consumer platforms, so the pain of upgrade is substantially eased, but not erased! Additionally, the license terms for H.265 are onerous, and at times unclearly defined. There are three separate licensing bodies competing for H.265 patents, and those of us who are content providers are required to arrive at satisfactory licensing terms with all three, one of which has failed to even publish standard terms. Between the marginal improvement at HD resolutions and the uncertainty surrounding licensing issues,

H.265 deployment has substantially lagged projections.

AV-1 claims a 30% improvement over H.265, and it is a license-free open-source project, eliminating the single greatest objection one might have against its use. Unfortunately, several factors work against its early adoption. AV-1 has virtually no acceptance at the consumer appliance level, in part due to its recent ratification, and in part due to its dramatically higher computational requirements as compared to either H.264 or H.265. It may well be another five to ten years before AV-1 decoding has reached a critical mass of users where its adoption might be relatively seamless, and its adoption might not risk substantial subscriber flight.

Yes, we can save bandwidth costs through adoption of advanced standards-based technology. But we're still paying too much! The last step remaining is to use "Video Optimization" techniques to reduce our bandwidth utilization without degrading the user experience.

Overview of Video Optimization for OTT Ladder Use

Optimizing videos for modern broadcast platforms requires insight into how OTT broadcasting compression decisions are

As a thought leader in area of video compression, Dr. Westwater has worked with and lead teams at AT&T Labs, Microsoft, Intel, IBM and others. He currently is working as Lead Scientist at ZPEG, developing a video compression "supercharger" compatible with existing compression workflows. When he's not actively solving the world's compression problems, you'll find him jamming out on his guitar and enjoying the Austin music scene.

made today.

OTT introduces a varying-bandwidth ladder method of video transmission, often referred to as Adaptive Bit Rate (ABR), that adds flexibility to standards-based encoding technologies. The OTT ladder solves the problem of delivering optimal quality video over a point-to-point link to a customer, where the capacity of the link may vary over time. The customer's playback client originates OTT requests for short video segments (typically around 2 seconds in duration) at the bandwidth the client believes it can receive data. This drives the need for an encoding ladder of the video bitrates (and resolutions) that is to be prepared by the broadcaster and

Figure 1: The OTT ladder enables the OTT client to adapt to channel conditions.

OTT Ladder

Broadcasting Server

UHD resolution, 16 Mbs

HD resolution, 4 Mbs

SD resolution, 1 Mbs

Manifest describing rungs of OTT ladder (bandwidth, segment length, frame rate, resolution)

Read video segment

OTT Client

Actual Per-Asset encoding image, courtesy of BEAMR.

made available to the customer's player. An additional requirement is that each rung of the ladder be nearly constant, so as to allow the client's choice be stable over time (too much variation in bandwidth causes client-specific errors in rung choice, resulting in offensive buffering errors).

Typical broadcast best practices dictate we survey many (perhaps hundreds) of videos and determine the acceptable lowest bandwidth for each video resolution, or for each bandwidth-quality tradeoff. This research gives us a minimum-cost series of fixed-bandwidth rungs to the encoding ladder that we can provide to the OTT client for playback. Additional higher-quality rungs may be added to appeal to videophiles, where the minimum subjective quality is increased to satisfy marketing demands. In any event, the ladder is carefully constructed with an eye to minimizing cost while providing "minimally acceptable" quality at each rung. Once an encoder technology is chosen, and best encoding practices have been defined, where else can we look for cost savings (even the differences amongst commercially-available encoder technologies is typically no more than a percentage point or so)? There are two opportunities for Video Optimization, "Per-Asset Encoding" (or "Content-Aware Encoding") and Video Pre-Processing. Per-Asset encoding individually assesses each asset for its relative compressibility. Some files are more compressible than others, meaning that if we individually tune the compression parameters on a per-asset basis, we can produce a custom OTT ladder for that asset.

Automated per-asset encoding may be accomplished by performing an analysis of the video and determining a fixed bandwidth

for each rung of the ladder that results in an equal quality to that of the worst-case bandwidth quality that had been selected. Attempts to solve this difficult human engineering problem are being made by several vendors and use a machine-based quality measure to reduce the compressed bandwidth as far as possible to reach a specified minimal quality.

Video Pre-Processing prepares video for subsequent compression by improving its compressibility without a reduction in quality. The point of Video Pre-Processing, at least in principle, is to remove imperceptible visual redundancy that standards-based motion estimation compressors cannot extract (and must therefore encode).

The Video Pre-Processing process is in many ways the functional partner of Per-Asset encoding in that Video Pre-Processing adds compression headroom allowing Per-Asset Encoding to even more aggressively reduce bandwidth.

Machine-Based Video Quality

Measurement and Per-Asset Video Optimization

Machine-Based Quality Measurement is as old as compressed video, and as new as the latest PhD thesis. The effort to fully replicate the human visual subjective experience has been a long and painful process, and while tremendous progress has recently been made, no end appears in sight.
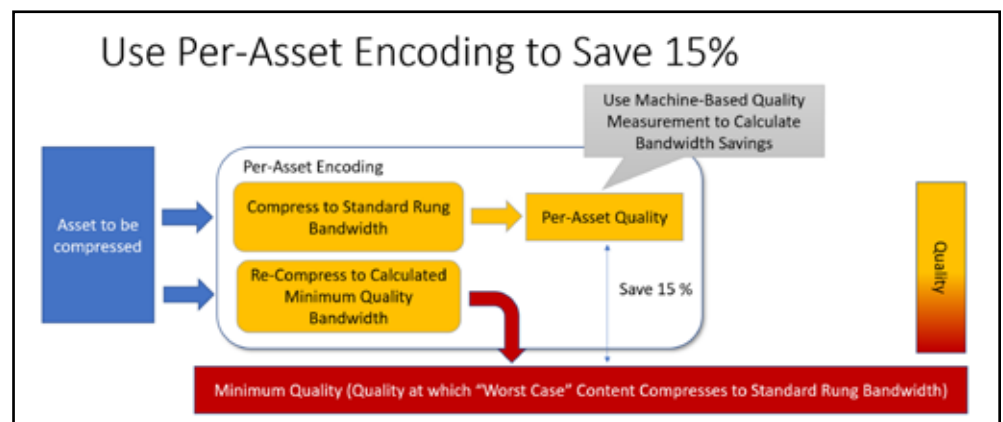
The first (and still-used) metric is PSNR (Peak Signal to Noise Ratio), a measure of the relative error between the original image and the encoded image. When comparing apples-to-apples systems of compression, the PSNR results can track the human experience moderately well. But artifacts such as edge (blocking) artifacts, which are extremely visually disturbing, do not contribute much to the PSNR metric, leading to a visual quality disconnect. The PSNR metric is typically produced as a side-output of the compression process.

Another family of metrics is based on the similarities between a video asset and its compressed bitstream (after reconstruction). Perhaps the best-known metric of this type is the Structural Similarity Index (SSIM).

The newest contributions to the field of visual metrics are primarily in the area of machine learning. Netflix is performing pioneering work in this area with their Video Multi-Method Assessment Fusion (VMAF) metric. The VMAF metric also applies to reconstructed video sequences.

Practical Implementations of Machine-Based Quality Measurement

The standard compression "CRF" setting (constant rate factor) implements a variable bit rate compression algorithm that is a function of the measured complexity of each frame, and even the complexity of the motion estimation pattern between frames. The result of compression to a fixed CRF is the bandwidth produced, where lower CRF values produce higher bandwidth streams on the same content. A measure of the relative quality of the produced stream may be the

Actual quality improvement resulting from pre-processing operation at a fixed bandwidth.

compressed bandwidth may then be reduced to produce the pre-decided "minimum quality" SSIM value for that particular ladder. The IETF publication "Video Codec Testing and Quality Measurement"[1] asserts that the SSIM measure may be related to bandwidth savings, which would allow a simple two-pass encoding (I am not familiar with the accuracy of this projection).
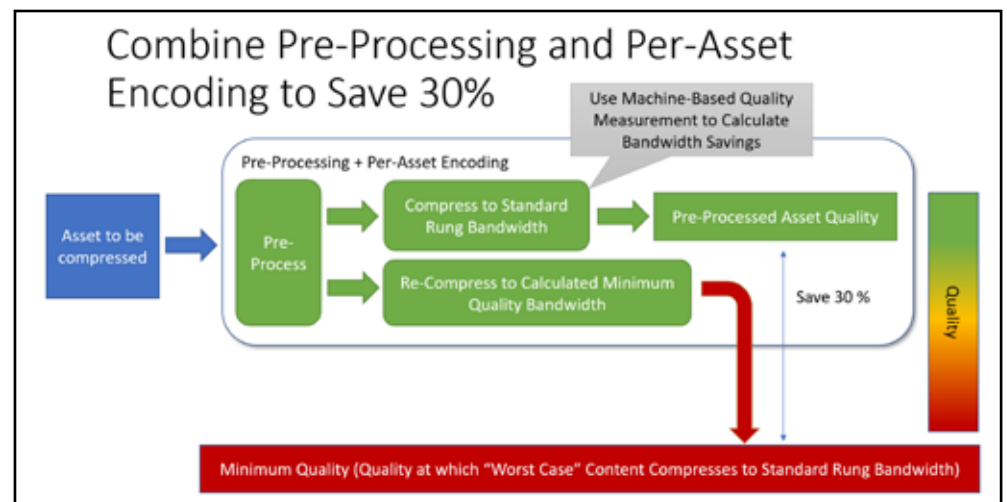
VMAF may be used as a benchmark to calculate the equivalent-quality bandwidth of an asset to be optimized. However, to my knowledge, no simple means of predicting VMAF from bandwidth exists (notwithstanding the assertions made in the IETF publication "Video Codec Testing and Quality Measurement"). It may be necessary to perform multiple encodings at different bandwidths to converge on the optimal bandwidth for a newly coded asset.

Pre-Processing Video Optimization

The area of video pre-processing has also undergone substantial evolution over time. The visual technology has evolved from noise removal to human visual-driven optimization, and the underlying implementation has evolved from simple digital filtering to pure transform-domain processing.

One of the most compelling qualities of a pre-processing solution is its independence from the compression technology. Some Machine-Based Quality Measurements artificially bias toward certain compressor technology. In contrast, the pre-processing solution delivers processed uncompressed video to the compressor, making it agnostic in most cases to the specific technology or its implementation (vendor).

The earliest digital filters were simple low-pass filters that removed high frequency components. This noise removal process does quite effectively increase compression efficiency, but at the cost of lower resolution.

PSNR difference to the original content. Machine learning-based metrics are provided by multiple vendors. Netflix has released its metric, VMAF, for use by the public. You, as its user, may train the metric using your own assets, and then use the resulting model to determine the quality of an asset to be compressed. The LightFlow service, provided by Epic Labs, determines the ideal ladder for your asset and performs the compression. Bitmovin offers a comparable service. Beamr's H.265 compressor incorporates its own human visual model to perform more aggressive compression than would be available with a "standard" compressor.

SSIM-Based or VMAF-Based Best Practices

A compression may be made to the established "standard" bandwidth, and the quality assessed by generating the SSIM metric comparing the original file to the reconstituted compressed result. The

More advanced filters attempt to better model human perception within the limited digital filter paradigm, but the efficiency of a digital filter cannot match the performance of a fully-decorrelated transform-domain implementation. This type of filter is now routinely integrated into virtually all video compression engines.

The current state of the noise-removal art may be seen in wavelet-based transform domain. Waveletbeam provides a noise removal system that, being based on wavelet transform-domain technology, does a very good job of isolating any-size disturbance to the visual field (noise) without affecting overall quality.

The newest candidate offering pre-processing for video compression purposes is ZPEG. We have pioneered the implementation of a human-visual model in the three-dimensional decorrelated DCT transform domain, enabling optimal removal of imperceptible artifacts of all kinds (spatial as well as temporal) before introducing the video into the compressor. However, the computation requirements for ZPEG pre-processing are well in excess of the other methods described here.

Combining Pre-Processing and Per-Asset Encoding Techniques

As pre-processing increases visual quality while per-asset encoding decreases visual quality to the minimum acceptable level, it is reasonable to suppose the two techniques could be combined. And, with few caveats, they absolutely may be.

In the case of per-asset encoding, the synergy between the two techniques is, simply, additive. As pre-processing reduces the visual complexity at a fixed bandwidth and the per-asset encoding technique decreases bandwidth until the desired pre-defined minimum measured quality is reached, the two techniques are exactly complementary and may be used together.

"More advanced" human visual models, certainly those generated through machine learning, may not understand or account for the complexity reduction introduced by visual pre-processing. Caution is advised in the naïve use of these techniques, as they may result in unexpected outcomes.
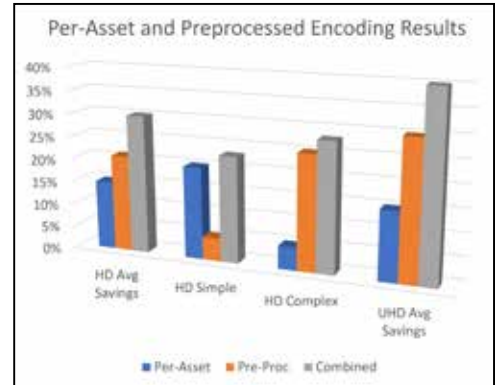
Conclusion

Bandwidth cost savings though per-asset encoding can be realized, but it requires care and experience. The process of optimizing assets can be implemented through automated means. Excellent solutions may be implemented on-premises, and cloud-based solutions are becoming available. Cost savings over Machine-Based Quality Measurement per-asset techniques can be doubled though proper choice of pre-processing technology. □

References:

1.   https://tools.ietf.org/id/draft-ietf-netvc-testing-08.html

Per-Asset and Preprocessed Encoding Results

Overview of Video Optimization Implementations

	Per-Asset Encoding	Pre-Processing	Pre-Processing + Per-Asset Encoding
Works Best With	Low-Complexity Scenes	High-Complexity Scenes	All Content
Average Improvement for HD Content	15%	21%	30%
Average Improvement for UHD Content	15%	30%	40%
Compatibility with Encoders	May require custom integration	Works with ANY technology	May require custom integration
Complexity	Requires 2-pass encoding*	Requires 2-pass encoding*	Requires 2-pass encoding*

*First pass may be a statistical sample instead of a complete rendering

OTT Executive Summit
2019 Wrap Up

By: Kurt Michel

This year's OTT Executive Summit, held at the Marriott Marquis in Times Square, NYC, was an information-filled day of panels, keynotes, and roundtable discussions. If you missed it, I have provided the brief summary below.

In our post-event surveys, Summit attendees identified **speaker quality** as the most compelling element of the event, followed closely by the Summit's **networking potential** and the **informative content** that was provided.

The panels and keynotes were designed to open discussion across a broad swath of OTT industry issues.

• The *Serving the Viewer* Panel was kicked off by Chris Knight, CEO of Gusto TV. This panel discussed a wide range of topics around the user experience. Fantastic insights were provided by the panelists, including Dave Zimmer, VP Content Programming for Amazon FireTV.

• In one of our more unique sessions, *The Viewers Speak* panel, our group of everyday viewers (aka Trenders) provided real-world opinions on the state of OTT services today, and some of their wishes for the future.

• Andrew Hare of Magid presented *OTT Consumer Trends* – his latest research on OTT viewing habits.
-You can watch the video at https://vimeo.com/343360670. Andrew's presentation can be downloaded here: http://bit.ly/OTTSummit19-ConsumerTrends

• **Piper Rosenshein, A+E Networks** GM for D2C, **Marty Roberts** CEO of **Wicket Labs**, **Erik Trusler** of **Equifax**, and the other panelists shared their experiences in the *Understanding the Viewer* panel, in which they discussed some of the "aha" moments they have experienced when reviewing their viewer analytics data.

• A majority of our attendees identified the *Building the Business* panel discussion as the day's best. It kicked off with a case study by The Weather Channel's President, Tom O'Brien, followed by a spirited discussion with panelists from **Google**, **Hearst**, **Roku**, **SheerID**, and **Viacom**.
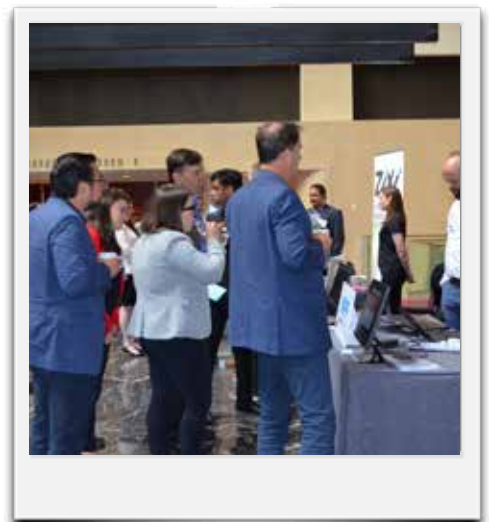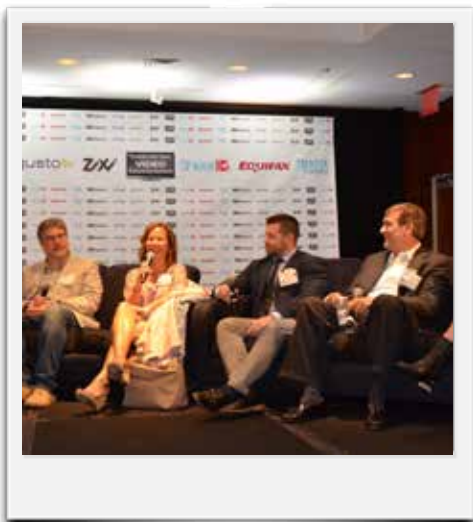-You can view this session here: https://vimeo.com/346946229

• Brian Mahony hosted the *"Live" in the Era of OTT* "fireside chat" with **fuboTV's Hannah Brown**, **Newsy's Blake Sabatinelli**, and **PlutoTV's Harold Morgenstern**, covering the latest trends and issues in the live/linear OTT video space.

• I moderated the *Delivering the Content* panel session, the most technically-oriented session of the day. It was kicked off with a case study by Zixi's Eric Bolten, and covered a variety of aspects around today's delivery technologies, including CDNs and the emerging ATSC 3.0 broadcast standard. Chris Wagner shared his extensive technical knowledge developed while in the industry, including as co-founder of NeuLion.

• **Tubi's Andrea Clarke** kicked off the *Creating/Curating the Content* panel discussion with a case study, followed by the panel discussion moderated by **Michael Smith**, who has a great deal of experience from his time at Scripps. This panel addressed some of today's most pressing issues in content development

• The **Executive Choice VIP Round-Table**, moderated by Brian Mahony, discussed the top-of-mind issues in the OTT community, based on a pre-event survey. Key topics discussed included the blurring lines between movie and TV

"OTT Genius"	"OTT Hero"	"OTT Guru"

Chris Wagner
Managing Director
OTT ADVISORS

Hannah Brown
Chief Strategy Officer
fuboTV

Erik Trusler
Business Dev. Leader
EQUIFAX

content, trends in D2C service models, and the impacts of new OTT entrants like Disney+ and Apple+. The panelists for this session – including **Erick Opeka** of **Cinedigm**, **Prem Parameswaran** of **Eros Now**, **Deepakjit Singh** of **Amagi**, and **Dave Zimmer** of **Amazon FireTV** provided their unique perspectives on the topics from a variety of different angles.

Another unique element of our Summit is the **product speedcase.** During this event, our sponsors presented their solutions to our attendees, and the attendees voted for the winners.

    Best of Show: **Zixi**
    Best ROI: **SheerID**
    Best Innovation: **MPP Global**

Our attendees also selected three event participants for their solid contributions to the day's events.

OTT Genius: **Chris Wagner, OTT Advisors**
OTT Hero: **Hannah Brown, fuboTV**
OTT Guru: **Erik Trusler, Equifax**

We also presented Trender Research's annual OTT Accolades (OTTA) awards for Executive, Service, and Company of the Year, which you can read about on page 34. And many attendees enjoyed a post-session reception in what is arguably the best venue in Times Square, with a fantastic "top-down" view of the heart of Broadway. Attendees seemed happy with the food too!

I'd like to thank our sponsors for their tremendous support of the OTT Executive Summit. Without them, this unique event would not have been possible.

Gold Sponsors:
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As I spoke with attendees throughout the day, it was gratifying to hear that this event continues to stand out within our industry as something different and unique – a collegial atmosphere where thought leaders can meet and exchange ideas. Clearly, there was not enough time to go as deep as we (and you) would like on each subject, but we consider the Summit just a part of a continuous engagement with the OTT Executive Community that we seek to nurture throughout the year – not only through the Summit, but through our magazine, whitepapers, webinars, social media conversations, surveys, and anything else the community finds helpful.

We hope to see you at our next event! □

Best of Show

Best ROI

Best Innovation

A Special Thank You to Our Sponsors and Speakers

Is a Unified Video Solution the Answer to Challenges in Content Delivery & Monetization for OTT?

By: Vineet Dhawan

Over-the-top (OTT) video has become more than a passing trend. The emergence of internet-enabled devices and smart TVs has made the 'cord cutting' phenomenon persistent. The number of active OTT video subscribers in the US will be 197 million by 2022 (eMarketer), while the OTT industry in its entirety is projected to surpass $40 billion by 2020 (TDG Research Study).

The OTT space is converging with the world of core telecom services and exhibiting exponential growth. Be it simple access to engaging premium quality content or the availability of expert service providers that offer high-quality content, these aspects appeal to more consumers, thus unlocking opportunities for niche OTT services.

Despite these opportunities, and the potential of the OTT segment, several challenges remain. Video can be a complex environment with its own set of unique hurdles. Companies hoping to establish a powerful online video presence are often daunted by the technology requirements.: Here are some of the common challenges that content owners are facing:

1. Complexity and cost of infrastructure for building the platform

Based on our experience, building an OTT infrastructure takes approximately 6 to 10+ months – a slow, complicated and expensive process. It requires purchase of Aspera or Signiant licenses, servers and hardware encoders for initial onboarding, which are then idled between weekly or monthly content updates. Multiple encryption schemes, key servers and client integrations are needed to enable Digital Rights Management (DRM). A single video must be transcoded and stored as multiple renditions to reach all consumer devices.

Content Delivery Network (CDN) partners must be onboarded and integrated with encoding workflows, along with optimization of OTT caching and video delivery. Online Video Platform (OVP) partners have to be engaged along with plug-ins and personalization to build custom workflows and define metadata schemas. Third-party vendors must then be sourced for integrating APIs with OVP partners and apps, and for assimilating workflows with monetization, content management and user management partners. Development teams are required to aggregate viewing logs from multiple sources and formats to write custom reports. To make matters more complex, a separate workflow is created for clip selection, encoding and syndication.

Vineet Dhawan, CEO of Digital Convergence Technologies has led extensive success stories on both live and on demand video streaming services. In his 20+ years of technical and executive management he has been the navigator of several accomplishments in IT Products, Services, and Consulting.

2. Maximizing revenue and boosting the value of video assets

With the extensive availability of internet, the increase in OTT subscriptions and viewership is creating unprecedented opportunities, forcing content providers to strategize outside the box for sustainable ways of monetizing their OTT content. OTT providers are delving into various revenue models to achieve profitability.

As consumers move away from traditional cable boxes, ad budgets from both digital and linear are sure to follow. As a result, OTT providers need to incorporate multiple monetization options like advertising, subscriptions and freemium options to obtain bigger shares of the revenue pie.

3. Reaching a global target market with a low churn rate

With the OTT Market expanding across the globe - including into developing markets - many service providers have decided to develop and reach these global audiences. And along with this growth and maturity, online streaming platforms are now in hard-pressed combat to secure digital audiences.

According to an analysis by PYMNTS.com, top reasons customers choose to abandon streaming services include: too many ads (27%), service cost (25%), the lack of good content (20%) and technical problems (17%). Churn management is imperative because after spending significant capital on developing platforms and strategies to acquire subscribers, retention is required for the financial payoff. In addition to customer acquisition, content owners must develop effective customer retention strategies if they want to survive.

Expanding into international markets is expedient, but content owners must plan for the cost of retention in addition to the acquisition and infrastructure costs.

4. Providing multi-device viewing

OTT platforms have increased in popularity because they provide not only on-demand access but also cater to a personalized viewing experience. Video content has gone beyond televisions, with ever-increasing availability across multiple screens, including mobile devices, laptops and Smart TVs. Building multi-screen OTT video platforms can be demanding, involving a huge investment in app development and video delivery.

Today's successful video content offering requires a multi-platform framework; supporting VOD across a variety of OTT devices, personalization, continuous service evolution, a premium CDN for high-quality delivery, and video analytics to monitor performance and support real-time decision-making.

In short, when in control of their video platform, a service provider begins to own the market, the loyalty of audience and the data. Lacking that control can limit the opportunity to build revenue. In the current OTT ecosystem, service providers are seemingly left with no other option than to rope in different vendors for various functions like content management, app development and integration of the app with the content, etc.

In order to overcome these challenges, content owners need a unified video solution that simplifies the tools and brings together best in class video capabilities under one canopy. The benefits of this kind of comprehensive solution include:

• **360 Degree Streaming Solution Development** with a short turn-around time for building the OTT video streaming platform incurring low initial capital investment, followed by payment tied to service use.

• **Front End Video Streaming Solution** with a clean interface and optimized for digital devices, as well as CMS agnostic - versatile, accessible & accommodating.

• **Single Vendor** managing the entire video workflow, to avoid finger-pointing and simplify vendor relationships.

• **Content management system** for metadata management and user management integrated seamlessly with encoding workflows.

• **Multi Device support** (Web, Android, iOS, Roku, Fire, Android TV, Apple TV)

• **Video Capabilities** such as lightning fast CDN & Data Storage, Digital Rights Management, Transfer, Encoding and Multiple Monetization Options (SVOD, AVOD & TVOD)

• **Live Event Management** with multiple room and camera options, supporting custom and real time server-side ad insertion for live events.

• **Advanced Analytics** for analyzing fine-grained performance numbers in real time, with extensive configurable reporting to provide a holistic view onto customer behavior and KPIs.

As the OTT business continues to grow and evolve, so too must the platforms that support it. Multi-vendor, DIY platforms are not the best solutions for a large number of content providers. Leveraging an agnostic video workflow that includes everything OTT video providers need to launch their own streaming service - all controlled from a single Content Management System (CMS) - gives them the freedom to build, transform and grow their businesses and audiences. At DCT we took on the challenge of building a solution to meet these needs and provide these benefits. We believe our D'Café solution does just that. It is a unified solution that is highly customizable according to the needs of the particular OTT platform, and is continuously evolving to meet the needs of today's emerging OTT video service provider. ☐

The State of OTT Advertising & The Challenges Ahead

Interview by Kurt Michel with Tim Armstrong, General Manager, Ad Technology at Switch Media

Tim Armstrong, the General Manager, Ad Technology at Switch Media recently talked with Kurt Michel, Trender Research about the challenges that lie ahead for advertising and the OTT industry.

Kurt: Hello Tim. Thanks for taking the time to speak with us. Can you tell me a bit about Switch Media, and more specifically, about your area of focus – Digital Video Advertising Solutions.

Tim: Hi Kurt, my pleasure! Nice to meet you. Switch Media is a global online video company with offices in Australia, Sweden, South Africa and India. We have delivered complex online streaming solutions for major world-wide events such as the Olympics, Commonwealth Games and Game of Thrones over the past 10 years. With strong roots in software development and broadcast engineering, we can deeply integrate with our client's systems and workflows, making video effortless. We've been working with pay TV provider Foxtel for 7 years to reach around 30% of Australians, so we've got a lot of experience delivering OTT at scale.

As mentioned, my area of focus is in Digital Video Advertising solutions– specifically AdEase, our Server-side ad insertion (SSAI) solution. The vision is to help media owners deliver a great ad experience for end users while elevating the advertiser's value. It's a clever product that delivers a consistent viewing experience to users across any connected device. We've architected the product in a way for media owners to best utilize advertising technology to generate the maximum revenue.

Kurt: Thanks Tim. Nice summary. It seems that even as the SVOD wars heat up, more attention is being given to ad-supported offerings for viewers. At our OTT Executive Summit this year, there was a great deal of discussion around Ad-based VOD and Ad-supported live/linear services, because these services are "free" to consumers. Are you seeing market indications that the demand for ad-based OTT solutions and services is accelerating?

Tim: With an increasing amount of Live content now delivered via OTT, we can turn the focus from SVOD and AVOD towards supplemented advertising. My observations across the OTT industry are of increasing challenges and media owners pivoting to hybrid-based models, capturing more user preferences with a blend of available options[1]. A recent article referenced testing of this in Europe, with strong recommendations towards broadcasters needing an ad free subscription option. There is always attractiveness in free services, however success is founded on the variety
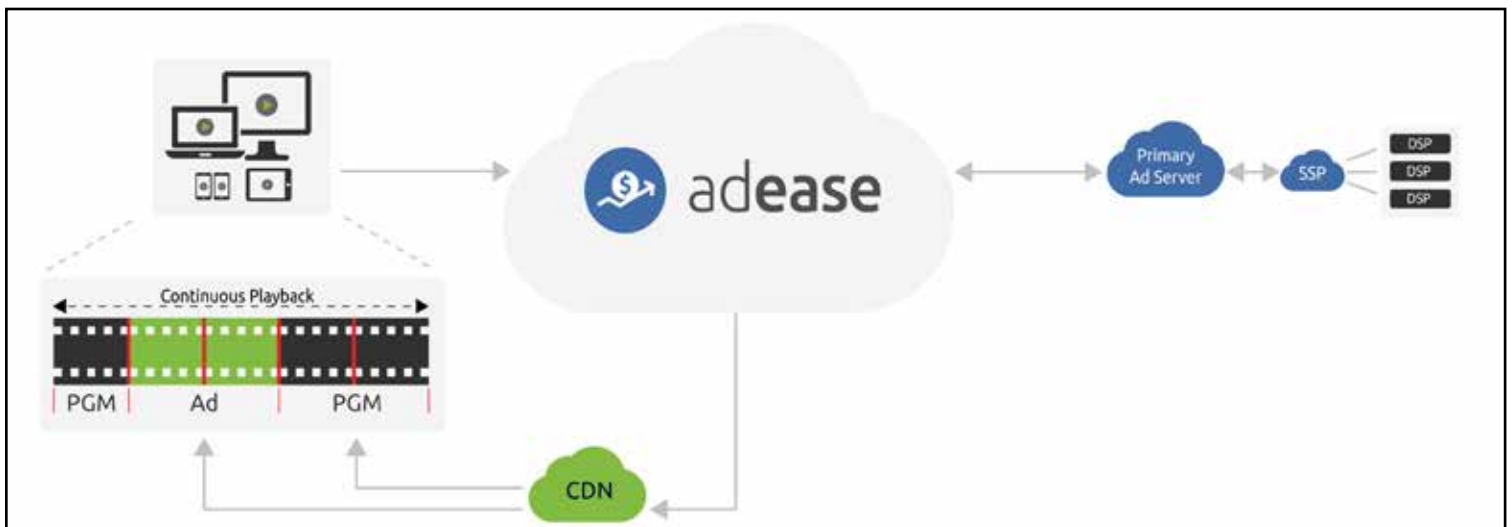
Tim Armstrong is the General Manager, AdEase at Switch Media. He is an expert in video monetisation, leads the server-side advertising product (AdEase), as well as acting as a subject matter expert in the media advertising space. Tim is responsible for ensuring the ongoing development of the product, market adoption and strategy for AdEase globally within the Switch Media business. Tim's approach, experience and expertise positions him as a trusted advisor in digital monetisation.

and selection of content.

Traditional public broadcasting businesses can be sustained with an OTT advertising funded model, while others are ever reliant on advertising sales generated for traditional linear broadcast channels. We will reach a tipping point; but we need to keep in mind that with inventories being more accessible for OTT, greater accountability around curation and management of the audience data is an increasing focus.

The demand for addressable advertising, whether at the individual or household level, is growing quickly. With some of the enhancements in technology for OTT, we see a greater ability to connect advertisers with users. We are now moving from a model where each unique session is supported

by user data at the point of ad request to a focus around the effective management and curation of user data. When it comes to programmatic, which is primarily driven through data and inventory matching, being able to effectively categorize a user is crucial, even while simultaneously meeting data collection regulatory requirements.

For businesses working towards an advertising funded model, making the right ad tech investment to begin with is going to mitigate costly challenges moving forward. Like anything, a solid underlying foundation creates the ideal platform for innovation, growth and added value. Building these foundations or platforms is something we have been doing successfully for over a decade.

Kurt: Server-Side Ad Insertion (SSAI) is positioned as an improvement over "traditional" ways of delivering ads to OTT viewers. Could you compare/contrast how the systems are functionally different?

Tim: Traditional online video advertising has until recently been delivered using client-side ad serving. That means the ads are delivered to the viewer's end device as a separate stream from the primary content, and the device switches between the primary content and the ad content. The experience is controlled within the viewer's device.

Although previously an acceptable form of ad delivery, today's users expect a higher quality online video experience. Client-side advertising is often clunky, with buffering caused by switching between software players for program content and ads within the viewer device. Users are exposed to black screens and spinning wheels while waiting for ad playback starts and when returning to the program content after the ad break. . Due to these issues, Client-side ad serving over time has led to increased consumer frustration.

Also, as the ads are called by the client, ad blockers can detect calls to an ad server and block them, meaning lost revenue for the media owner

Server-side ad insertion is a significant improvement over the client-side experience. In this method, servers in the network are responsible for providing the device player with the information it needs to pull the video stream. There is only one player, and it is unaware of what parts of that stream are primary content and advertising.

We've gathered market feedback and seen an increasing shift to server-side ad insertion as a standard practice. It was not only inevitable but highly beneficial.

Kurt: What are the benefits of SSAI compared to the traditional systems?

Tim: Put simply, it comes down to optimal viewer experience and increased ad revenue over client-side advertising.

There are several elements to this; such as transcoding of video advertising creative to match the quality of the content being consumed. Not only is it quality-matched, but the advertising is stitched into the video stream manifest (the "script" given to the player that tells it where to pull video streams from) to support a seamless content-to-advertising transition. That delivers a consistent TV-like viewing experience and mitigates the efficacy of ad blockers. For advertisers and consumers, an additional benefit of SSAI is that advertising can be called prior to the ad break and held for the user in a personalized advertising playlist, driven by user-based data.

The media owner benefits from SSAI through an increase in customer sentiment and a reduction in consumer churn. Revenue is also improved, as SSAI is not susceptible to ad blockers, and increased CPMs are achieved via improved targeting capabilities.

For the viewer, more relevant advertising delivery can be delivered through the creation of individual sessions and a personalized manifest for each unique playback, whether for on-demand or live content.

From a functional perspective, the viewer data available for each of those unique playback sessions passes to the advertising demand-side platform (DSP) through a standards-based Video Ad Service Template (VAST) conversation; which, in turn, sources appropriate ad videos to fill the required opportunities. Once the ad video file is returned, the SSAI engine transcodes each unique advertising creative, aligning encodings with the profiles the media owner is supporting from a playback perspective. Those transcoded advertising creatives are then stitched into the video manifest and

accompanied by a package to handle the relative tracking and measurement beacons. This is all done in advance of actual playback. From the player software's perspective, there is no clear distinction between content and advertising. Ad-blocking software struggles to identify the presence of an ad when it is stitched into the manifest by the network.

Kurt: Much has been said about OTT's ability to individually target viewers with ads that are relevant to them, but deployments still seem to be "in the future." What are the blockers to scalability of this capability to millions of viewers? Where are the bottlenecks? Are the challenges technical, business process, or a combination? Have you seen any implementations that can do that at practical scale?

Tim: This is a great question! You will get widely varying responses depending who you talk to on this. To target individuals and households, deep integration into the media owner's data management platform or identity management platform is required. We've built features and capabilities of our product to make this as effective as possible. SSAI is middleware connecting between video delivery and advertising monetization technology, handling the targeting data as effectively as possible to increase the value of each ad impression. Many of the solutions in market have been developed from a technology perspective, with limited experience of the inner mechanics of advertising monetization and their underlying technologies; we've been driving the AdEase roadmap with a primary focus on what's important to advertisers.

Individual viewer targeting works and effective implementations exist; however, there is a misunderstanding that because each viewer is delivered a personalized manifest, they won't get the same advertising as

others. The data system that feeds advertising personalization must support it. Finding the balance between privacy and personalization continues to be a fundamental challenge for the industry.

Kurt: Is the goal to deliver a TV-like experience on all our devices? Or are there ways to leverage some of the unique aspects of our various devices to deliver advertising in new and innovative ways?

Tim: The difference in ad opportunities between Traditional broadcast and digital OTT are worlds apart. With traditional broadcast the level of flexibility and options as an advertiser are restrictive, making this channel more applicable to those seeking mass audiences and reach. Advertising placements are sold by time of day, day of week, and content ratings – there's less complexity around where to invest, making it easier for buyers. But the lack of measurement encumbered the ability to effectively measure and return on investment. As audiences' transition to digital OTT platforms, the options and flexibility for advertisers have grown exponentially. For clarity, let's not ignore that many characteristics of traditional broadcast advertising continue to exist in this new world. With the ability to execute data-driven campaigns in an environment that supports measurement, advertisers can think very differently about engaging their target audiences. A more fluid and dynamic environment presents measurable paths a viewer/consumer can pursue in response to your advertising; continuing industry focus will be on closing the attribution loop.

As digital OTT captures a greater proportion of audiences then the rigid ad break structures of traditional television will change in accordance, advertisers will gain additional choice around length of ads, duration of ad break and of course the choice of audiences to target.

As OTT usage increases, platforms for innovation continue to evolve. In terms of formats and approaches from an advertising perspective, the Interactive Advertising Board (IAB) recently released a draft of their new Secure Interactive Media Interface Definition (SIMID). The IAB are doing great work as they help drive standardization; we saw massive growth and utilization in Video Player Ad Interface Definition (VPAID) and there is no doubt we are going to see similar interactive advertising and functionality through VAST4.1.

Kurt: Do you envision a day any time soon when an advertiser can identify their target audience in detail, enter that information in the Demand-Side Platform (DSP) and not only reach the desired audiences, but get real-time attribution?

Tim: That's the light at the end of the tunnel, right? Technically this is achievable today. The catch is with the regulation of data, meaning we end up with legal roadblocks to the "great detail" as you say. As an industry, greater transactable data and patience is required. Regularly we have communicated risks around how user data is utilized. If the ecosystem is closed and effectively controlled, it makes the possibility more real. Advertisers in general want all the data they can get hold of. Attribution will always be a tough one based on the number of channels a consumer can be targeted via daily. But one day the attribution loop will be closed at scale, and then the next challenge will be what advertising drove the conversion. In the short term there is no lack of important challenges to solve, like cross screen measurement for OTT.

Kurt: What new developments in Ad-based OTT distribution have you excited? Is there anything on the horizon that will dramatically propel the industry and consumer experience forward?

Tim: You cannot overstate the opportunities associated with live events and ad replacement. I mentioned earlier it's critical that OTT experience meets that of big screen TV linear broadcast. We see an increased focus on reducing online video delivery latency to that typical of cable, terrestrial or satellite- typically 3 – 10 seconds from live. To that end, our R&D folk are working with the Common Media Application Format (CMAF), low latency HLS and the like, creating new options for live monetization. In August last year we saw global powerhouse Amazon struggle with live streaming the US Open to the UK, with many users calling for the rights to be handed to the likes of Sky. We are keeping events like that in mind as we architect our solutions for scale.

With increased scale and reduced latency of live event streaming, ad demand platforms have less and less time to prepare advertising creative to fill an ad break. With less time to make ad decisions, technology needs to be built in a way that reduces processing loads and the resulting latency. Methods such as distribution of ad calling and pre-fetching are key features that are available, and we take advantage of those in AdEase. We also work actively with governing bodies. For example, the IAB plays a vital role, as well as the VAST4 specification that outlines the usage of a universal Ad ID for easier identification of unique advertising content.

A challenge in live stream monetization is aligning consumption patterns with buyers' strategies. Traditionally the advertisers buying online inventory have worked to evenly distribute budgets and buying strategies that are not dynamic – they don't move with the consumers. We are working with our clients and partners symbiotically to capitalize on traffic peaks, delivering greater fill rates and efficiency. It's going to be a very interesting couple of years!

Kurt: Tim, it sounds like we are just at the tip of the OTT advertising iceberg. While the technology keeps improving, perhaps the toughest challenges are social – what data can/cannot be used in serving ads to consumers. I cannot agree with you more that the next few years will be very interesting!

Thanks for chatting with us and giving us your insight into the ever-changing world of advertising as it relates to OTT. □

Just brushing the tip of the iceberg with OTT advertising.

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How Can Broadcasters Best Use ATSC 3.0?

By: Fred Ramsey

While ATSC 3.0 has been discussed since 2016, in the last few months it has gained a great deal of attention, particularly after this year's National Association of Broadcasters (NAB) Show where a coalition of broadcast television station groups and public broadcasters, including NBC and Fox, announced that ATSC 3.0 will be rolled out in 40 U.S. markets by the end of 2020. Despite currently only being in the testing phase, industry insiders expect ATSC 3.0 to gain real momentum next year, before becoming the commonplace standard in 2023. While the initial switch to this new standard may present some challenges, such as losing companion channels, broadcasters that make the move to ATSC 3.0 stand to see substantial benefits. But what exactly are these benefits and how can broadcasters take full advantage of them?

New revenue streams

According to research by PwC[1], cord-cutting is continuing at pace, with total pay-TV subscriptions in the US declining from 73% in 2017 to 67% in 2018. As a result, broadcasters are looking for ways to stay viable and bolster their revenue. ATSC 3.0 could be just the ticket to help them do this, with the new standard making it possible to create new revenue streams or more attractive packages to retain subscribers.

For instance, the new standard will allow broadcasters to branch out and create new sub-channels, which could be used for local news or special interest programming. As such, viewers will have a greater choice of channels, and with more niche programs on offer, it could be possible for broadcasters to attract a wide range of viewers. According to a recent study[2] by Edgeware and YouGov, 89% of adults across the USA, UK, Hong Kong, Mexico and Spain would be interested in content that is aimed at their personal interests when watching traditional TV channels. Furthermore, 68% would be interested in content aimed at their local area. By taking full advantage of this capability and developing a wider variety of channels and content, broadcasters will be able to create a more competitive and attractive proposition that appeals to a larger audience.

Personalized viewing experiences

In addition to this, ATSC 3.0 will enable broadcasters to create targeted content as the IP-based standard allows for a two-way signal, something that hasn't been possible with digital transmission. With the current ATSC 1.0 standard, broadcasters are reliant on third parties, such as Nielsen, to find out who is watching what, which then informs how broadcasters schedule programs and provides insights into ways to increase revenue. ATSC 3.0 will cut out the middleman and allow broadcasters to gather information about viewers themselves, enabling them to access details such as the location and age of viewers, as well as what they are watching and when they are watching it. This means if viewers are connected to an internet connection, broadcasters will be able to tailor ads to the individual, which could substantially increase revenues. For broadcasters, it is vital that they make use of the data they will have at their disposal, particularly as research from Paywizard[3] found that most US broadcasters are currently failing to use data to drive customer engagement. As ATSC 3.0 will give broadcasters easier access to information on their customers, it may be possible for them to overcome this obstacle and use data to both engage new and existing customers, create a better customer experience and benefit from

Fred Ramsey is the Sales Director North America at ATEME. With a background in television engineering, operations and production, Fred optimizes technical solutions for major broadcast groups, NOCs and Channel Partners. Fred has been the Sales Director North America at ATEME since June 2018, before which he worked at Harmonic and Harris Corporation in the Broadcast Communications Division.

greater ad revenue.

In terms of quality, broadcasters will also benefit from higher frame rates and be able to offer more immersive experiences that provide viewers with the opportunity to customize their viewing experience. For example, ATSC 3.0 will allow broadcasters to use its support for object-based audio to give viewers the ability to choose and control audio channels. So, if a viewer is watching the Super Bowl, for instance, they could select to hear the audio solely from the field and adjust other audio channels to reduce crowd or background noise.

An enhanced experience

ATSC 3.0 will also allow broadcasters

to offer better quality viewing experiences thanks to its use of 4K UHD, HDR, wide color gamut and frame rates up to 120 frames per second. As a result, viewers will gain a clearer and crisper image. Plus, as it also uses the H.265 codec, higher resolution signals can be broadcast without an increase in bandwidth. This means broadcasters will be able to produce programs that appear in better quality, but without concerns about having to increase bandwidth and the cost that would traditionally entail.

If broadcasters choose to adopt ATSC 3.0, they could also find themselves playing a hugely important role in times of crisis. With ATSC 3.0, emergency signals will be able to switch on televisions remotely and enable natural disaster warnings and evacuation routes to be much more effective. This will be particularly helpful for people during a blackout or evacuation because emergency signals can be sent directly to phones.

At a pivotal time when viewers are turning their backs on traditional television, the introduction of ATSC 3.0 could revolutionize the broadcast industry afresh. However, broadcasters can't expect to sit back and let the new standard do all the work. In order to best use ATSC 3.0, broadcasters must take advantage of the insights and data it will provide on their audience and use this to develop more personalized experiences and improved packages. This will help them gain a more solid standing in a competitive market, with the potential to develop new business models and stem the tide of cord-cutting.

Behind the scenes (for the Geniuses)

ATSC 3.0 represents a definite game-changer for video Over-the-Air (OTA). In order to enable the convergence between broadcast and broadband, ATSC 3.0 features a scalable encoding standard named SHVC (Scalable HEVC).

Overall, compression is about exploiting redundancies to transmit less data than originally required. In video compression, redundancies are areas that are similar to what has been previously coded. Those

similar areas, called reference areas, may be in previously sent pictures (temporal redundancies) or be areas already coded in the same picture (spatial redundancies). A compression scheme is said to be scalable or layered if those redundancies are in an already compressed stream of the same content. In such a case, the stream that is already compressed is called a base layer of a scalable stream. Once a scalable encoder finds a similar area in a base layer, it computes the difference between this reference and the corresponding area in the picture to be encoded. This difference is simplified and sent to the receiver as a part of an enhancement layer of the scalable stream. To decode this enhancement layer, the receiver needs to first decode the base layer which can therefore be used as a reference. Then a decoding device will be able to decode the enhancement layer.
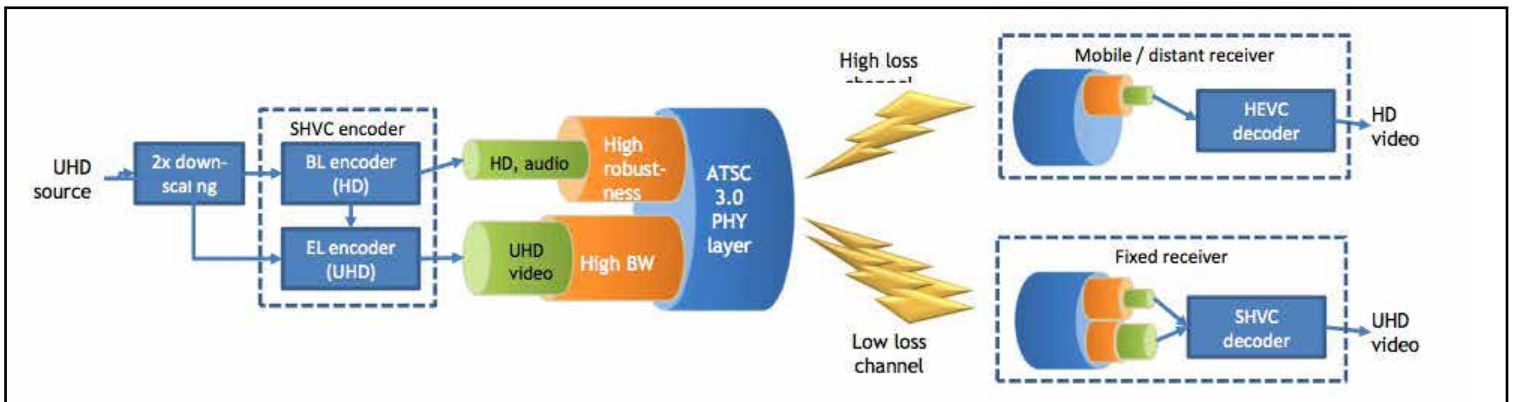
This base/enhanced layer approach is at the heart of ATSC 3.0 video processing: the base layers are broadcasted OTA, while enhancement layers are streamed over the internet. Standard digital television receivers can decode the base layer, offering a standard viewer experience. Hybrid receivers, on the

other hand, receive and decode at all the layers: base layers broadcasted OTA and the enhancement layer over IP. Doing so, they offer the best possible video experience. One can envision for instance HD as the base layer while the enhancement layer provides access to UHD.

This model provides wide content coverage using the traditional OTA infrastructure, while broadband delivery will offer the best viewing experience to enabled users. Therefore, those broadcasters that adopt the ATSC 3.0 standard will have a greater ability to stand out from the crowd and create a more attractive proposition to not only retain customers, but potentially also attract new ones. □

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Talkshow broadcast.

OTT Accolades 2019 Award Winners

Review by: Kurt Michel

Andre Swanston accepts his OTTA.

OTTA Executive of the Year: **Andre Swanston, CEO Tru-Optik**

Andre Swanston has led Tru Optik to become a driving force for OTT monetization by providing the subscriber analytics data and audience intelligence that fulfils the promise of addressable online video advertising. By building partnerships with leading companies such as Oracle, Pluto TV, SpotX, TransUnion, and TiVo, Andre has established himself and Tru Optik as a clear leader and consistent OTT industry voice, especially now as ad-driven monetization models become an increasingly important element in the OTT industry. Tru Optik is not only helping the service providers, but as a founding member of OptOut.TV, they are providing consumers the choice to participate in—or opt out of—targeted OTT advertising.

Bernarda Duarte accepts the Roku Channel's OTTA.

OTTA Service of the Year: **The Roku Channel**

Roku is doing something that few companies have been able to accomplish successfully. They are pivoting from their origins with a hardware-based business model built on selling internet video players to an ad-based business model built on OTT services. They are re-inventing their core DNA on-the-fly. With **the Roku Channel**, they have emerged as a leader in providing free, ad-supported content. But they are also offering viewers the ability to add premium subscriptions and other app-based channels, all through the Roku UI. Through partnerships with television manufacturers like TCL, Sharp, HiSense, and Element, and their powerful, value-priced players, they have made it easy for consumers to adopt the Roku interface as their primary door to OTT streamed content. And when we look at some of the key trends in the OTT business – content aggregation with centralized voice-enabled search, ad-driven monetization models, access to niche content – Roku is there. For icing on the cake, in the last year they added the ability to stream the Roku Channel content to browsers and via iOS and Android apps, a clear signal that they have moved beyond hardware.

Alesandra Madurowicz accepts Zype's OTTA.

OTTA Company of the Year: **Zype**

As testimony to what Zype is doing in our industry, I point to something one of our OTT Executive Summit attendees said: "I always wanted to be a broadcaster, but the cost of entry was far beyond my means. Zype removed that obstacle".

Since 2014, Ed Laczynski has focused Zype on simplifying the task of OTT video delivery and distribution, and all the elements that go with serving the companies that drive their businesses with video. As testimony to Zype's success, within the past year they were named in the top 20% of the most recent **Inc. 5000** list of privately held companies, granted a customer service excellence award by **The International Business Awards**, and won an **NAB product of the year** award. From a technology perspective, they continue to add capabilities like Server-Side Ad Insertion (SSAI), Linear "channel" creation through playout of VOD assets, and rich analytics APIs to allow their customers to easily take advantage of the information the Zype platform provides. While OTT always had the potential to reach niche audiences, complexity and cost continued to be a challenge. In addressing those challenges, Zype has become a great nichecaster's platform, truly unleashing the power of OTT.

OTT and Generation X

By: Nichole Janowsky

When I started working at Trender Research over three years ago, I had no idea what OTT (Over The Top) meant. Of course, I knew what it was, but had never heard that terminology before; nor did I realize what a large and growing industry OTT had become.

Not typically an adopter of new technologies, I had an older version of Apple TV, which I only used to play my iTunes play list on my stereo (which just happened to be connected to my television set). We were/ are a traditional cable watching family. We pay monthly for our movie channels, sports packages, etc. As my knowledge of OTT and its many offerings increased, I began to ask myself: why haven't I "cut the cord?" What is holding me back? Is it just me or is it my entire generation? My generation (Gen X), those of us in our 40s to mid-50s, remember when there were no cell phones, iPads, even computers! We are more likely to visit brick-and-mortar, subscribe to magazines and newspapers, and put down our phones to chat during dinner. Is this why I'm late to the OTT party?

So, in the spirit of writing this article, I posted a very unscientific poll on Facebook (again, another sign I'm a Gen Xer). What I found is that I'm not alone: 64% of my peers still subscribe to traditional cable TV; while only 5% of my Gen X peers have completely cut the cord. Despite the large number of cable subscribers, most of those same people also partake in some form of OTT services. The two most popular services indicated by my respondents were Netflix (the original movie streaming service) with 76%, followed closely by Amazon Prime with 74% (which is included when anyone subscribes to Amazon's Prime online shopping membership-which is most of us, haha). Hulu came in next with 33% subscribing, with "other" (HBO GO, Starz, CBS, etc.) at roughly 33%. Interestingly, only 4% of those surveyed subscribed to any niche services. Nearly all of my Gen X peers who still subscribe to traditional cable said they want to or wish they could cut the cord.

What is holding us Gen Xers back from cutting the cord? What is holding me back? With my increased knowledge of OTT and its growing services surrounding this booming industry, why am I still paying a large monthly cable bill? My initial excuse of lack of knowledge is now null and void, as is

my other excuse…it takes too much time to figure out what services I should subscribe to. With companies like Cobblecord, where their main objective is to help one get more from streaming and drop cable, I cannot claim it takes too much time to find these services.
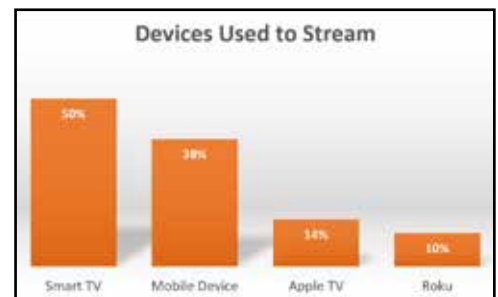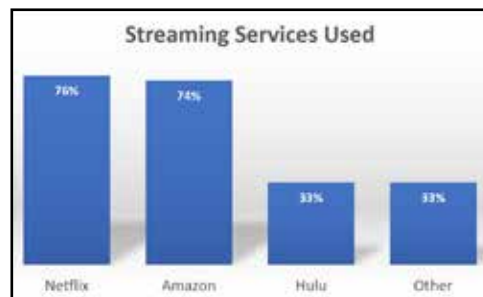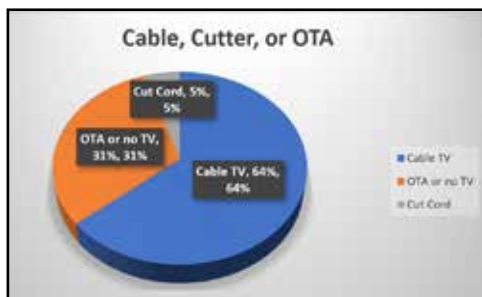
When I really gave it a lot of thought, my biggest issue is that we don't watch that much TV (I don't have time to watch TV), so I'm not sure what services I would even utilize. My two kids (tweens) typically watch videos on YouTube (free) on their devices and rarely watch anything on the family room television set (especially if it's with their parents!). And

Nichole Janowsky is the Editor for the OTT Executive Magazine. Nichole has worked in the publishing field for over twenty years. She began her career in media advertising. She lives in Massachusetts with her two children, husband and dog, Buster.

by the time I finishing driving said kids to the myriad of practices, games, etc. (they are on ten teams year-round between the two of them); then make dinner and walk the dog; I have about 45 minutes before I crash. I'm lucky to get through an hour show I've recorded on my DVR.

In my head, I reason that if I am paying for cable and get a giant bundle of channels and only watch a few of them, then at least I'm watching some of what I'm paying for. If I subscribe to a bunch of niche channels and then don't end up watching them month after month, then I feel like I'm paying for services that I'm not using (I'm not sure why I don't feel the same way about my gym membership!). So, in a strange way, keeping traditional cable is my hope that one day I'll get a bunch of niche channels and be able to sit around, relax and watch whatever I want!

So, what is stopping my Gen X peers? Are they as crazy busy as me, or is something else holding them back? I'm not sure, but their many comments suggest they want to cut the cord sooner rather than later…so let's see what the future of OTT will be for me and my Gen X peers. □

Spinning a Well-Known Brand Into Something New

Interview by Brian Mahony with Dave Longaker, SVP and GM Americas, Synamedia

*B*rian Mahony, Founder of Trender *Research, sat down to chat with Dave Longaker, SVP and GM Americas at Synamedia.*

Brian: Hi Dave, Thanks for taking the time to speak with me today. Could you give us a little personal background to get started?

David: Yes sure. I joined Synamedia right as the company was being carved out of Cisco last October and prior to that I'd held a variety of positions in sales and executive leadership in the pay TV industry. This includes a couple of years running global sales for Rovi and then TiVo during the time that Rovi acquired and integrated them. Before that I was with Alcatel-Lucent during their acquisition of Velocix, and before that with Nortel back in the early 2000s. I cut my teeth coming into the pay TV industry when America Online acquired Time Warner way back when.

Brian: Oh, that's funny. I was actually with Nortel switching briefly after business school at Research Triangle Park. So we have that in common.

Can you give us an update on Synamedia? Has your strategy evolved since launch, and what specific markets are you targeting?

David: Sure. I think the company has really

done a good job standing up independently in filling out critical roles for our teams, defining our global centers of excellence, and consolidating our engineering and development teams into those facilities; and we've even launched a product and brought on a new investor in the short time that we've been outside of Cisco. So I think the company is well on its way to achieving the things that we need to in our first year of operation.

We finish up our fiscal year at the end of June and I think before the end of it we'll have brought on a number of new customers, and we'll have launched a new service on a few different platforms and taken it into trial with an initial set of customers. I'll talk a bit more on that later.

So high level, the company is doing really well. As always we're laser-focused on being the leading video technology vendor to the to the pay TV industry and that spans both traditional service providers, newer over-the-top providers, as well as media and broadcast companies. Geographically, our focus is truly global. And I think we have customers on every continent except Antarctica, at the moment.

Brian: How has it been transitioning customers from Cisco to Synamedia?

David: We've been true to our priorities

David Longaker is the SVP and General Manager, Americas at Synamedia. He leads Synamedia's customer-facing organization and activities in the Americas region, including sales, marketing, partners and delivery. He is responsible for driving customer intimacy and success, developing partners, and the growth of Synamedia's business in the Americas. An accomplished executive with over 20 years experience in the pay TV industry, Dave has repeatedly led organizations through periods of high growth and transformation. As CRO for TiVo and Rovi, Dave was responsible for the global sales organization as the companies integrated their operations and launched new offerings in content discovery and advertising analytics. Prior to that, he held leadership roles in both Alcatel-Lucent and Nortel, where he helped both companies build and scale their pay TV businesses in the Americas.

— helping our customer base embrace IP as a technology in their transition to - or use of - that technology, and being able to deliver high broadcast quality video over IP networks in IP delivered services. We are helping our customers protect their existing revenue and content while evolving our very successful traditional conditional access business into newer technologies that are useful in the online streaming video world. And lastly we are helping our customers generate new lines of revenue through things like targeted advertising.

Brian: I'd love to hear a bit more about new product areas.

David: We've launched a product for the targeted advertising application that we co-developed with Sky, and we're expecting to build on that. Another example is our credential sharing insights product which launched just before the end of 2018. That's designed to help operators both identify fraud and theft of credentials but also to identify opportunities to upsell where credential sharing is occurring; perhaps encourage a credential-sharing friend or family member to become a paying subscriber. So those remain our areas of priority.

In terms of underlying technology we

really focus on four areas.

1. We've got our traditional security business that's evolving from conditional access into multi-DRM, rapid water-marking, streaming piracy disruption, and credential sharing insights.

2. We've got our cloud-based Infinite Platform, an end-to-end solution for customers to deliver connected or hybrid services over satellite, cable, telco, or pure IP infrastructures like the Internet. Infinite Platform addresses the needs of the traditional satellite, telco and cable TV operators as well as newer over-the-top, direct-to-consumer providers. Our cloud DVR component of the Infinite platform has been very successful in the US. Two major pay TV operators in the US have launched our cloud DVR solution since we became Synamedia, and we expect another two to launch in the next several months, and possibly three more before the end of the year. So that's a component of the Infinite Platform that is getting quite a lot of attention in the market.

3. Third is our video processing portfolio. This includes our encoder, transcoder ,CDN and Professional IR&D portfolio. And this is an area where our market share here can take a significant uptick with the increased attention and focus we can provide now that we are narrowly focused on the video space and on partners that really understand video technology. We've got some great product to sell. We're emphasizing our very low latency ABR pipeline and also helping broadcasters prepare for the transition to ATSC 3.0.

4. And finally, targeted advertising is an area of focus, as I mentioned. We did launch a product with Sky. This is an area of our portfolio where you can expect to see quite a bit of investment moving forward. And this will become I think a broader portfolio of solutions for our service provider community. So there's the strategic focus and technology focus. That's a long answer to your question but hopefully I've covered where we're focusing.

Brian: Yes. So that's a lot going on - very helpful. Do you consider Synamedia to provide an end-to-end platform, and exactly what you mean by that?

David: Yes I do. Our strategy is to be able to deliver end-to-end solutions to our customers. But that doesn't always mean that we're developing every component of the solution ourselves. Oftentimes we'll work with partners for different elements that are not core competency for us, which allows us

to help our customers put together just about everything they need to launch a new service or to evolve their existing services.

Now depending on the type of customer we're talking about- whether it's a customer that prefers to develop a lot of things themselves, which we happen to have quite a few up here in the Americas- for those we will deliver the piece parts that they need to build that solution themselves. And we think we've got core technology that will help build-versus-buy decisions for the components that we decide to offer to come our way. But we also want to put them together in a way that operators who don't have the wherewithal or the desire to do everything themselves will have an end-to-end solution that they can quickly stand up and get running.

And so when we say end-to-end, I mean being able to deliver everything that you need, pretty much to take formatted content to deliver to any type of device, whether that's a legacy set top or an IP device, in a hybrid or pure IP or over the top setting; and whether you're a service provider or a direct to consumer media company, having the components from the cloud platform to the video processing to the user interface.

Brian: Okay good. Let's switch more to the industry and trends. If you look at traditional incumbent pay TV companies - broadcast and cable companies – they are now expanding into more over the top business models and distribution strategies. What would you say are the top three things that are holding that industry back from really being true replacements for what we used to call traditional pay TV from the consumers' perspective? And how is Synamedia addressing those challenges to make it more of a seamless and enjoyable experience for the viewer?

David: I think first is being able to find the content that you need and want. And so with the sort of fragmenting of the market into specific content being available via only specific applications or providers it becomes hard to find the content that you want, without a way to do aggregated search or unified search. And so to us that's a key problem we're going to help the industry solve; to be able to pull a variety of different applications together into a single user interface, a single experience, and a simple way to be able to log into the underlying applications that might deliver that content. So unified search or aggregated search and unified user experience that pulls together all these fragmented applications that are that are arising is, I think, critical for the industry to maximize its possibilities and it's an area where we're focusing a lot of energy on.

Second thing is the video quality has got to be high. The video and audio quality. People are going to want to be able to link streams coming into their devices to their TV sets, to their sound systems; and they're going to expect a high quality end-to-end experience that's not always available over managed IP networks today. And so we're really focused on the underlying technologies to be able to deliver high quality - broadcast quality – video over IP networks. And as I mentioned before we have a lot of the pieces of the puzzle to make that happen, from the player, to the CDN, to the adaptive bitrate and smart rate encoding that makes really good use of the available bandwidth on the network and can adapt to congestion and changes and maintain constant quality - to the cloud platforms themselves and even the storage of cloud video. So that's a second area that we think is really important.

And the last area is with the proliferation

of streaming video, piracy has never been higher. I think I saw an article that said within minutes after Game of Thrones being launched there were something like 55 million pirated versions out there - something like that. We've seen sports leagues having trouble renewing their buy-ins from certain networks where there's not a good enough job being done of protecting the content. We've seen quite a few customers who are suffering from basically pirate service providers that to the average consumer might even look like a legitimate service where they get a box and they pay a subscription fee and they can get thousands of channels of content. Some consumers might not even realize that they're buying a pirated service - they can buy it at an average retail store in their mall. And so for the industry to truly do well, obviously, the financials, the economics of being in the business, have to have to work . And it's hard for that to happen if piracy continues to rise as it has been. So we're doubling down on our strong DNA in security and in operational security services to help deliver a set of tools to the industry and really an end-to-end solution for combating piracy. We think that's critical for the industry to be a profitable one.

Brian: Our last question will be the crystal ball one. Three years from now - specifically around the OTT industry - where do you think things are headed? There have been a lot of new service launches. Some analysts are pointing to consumer fatigue with all the options they have, and a somewhat fragmented experience. And still others are pointing to the overall viability of the economics of the industry, where folks like Netflix continue to borrow money and lose money. Where do you see things in three years and how is Synamedia going to adapt and evolve to get to that future vision?

David: I think over the next few years the industry will continue to refine how to really tailor packages to individuals. So I think that while there'll be an increasing number of choices in how to get different kinds of content, I think the industry will sort out what kind of packages really make sense for different kinds of subscribers; which ones line up with different profiles or market segments that they're targeting. And as they do that, I think the need to have an easy way to access content across packages from a number of different providers is going to be increasingly important. So the service providers or the application providers or the over-the-top providers that figure that out and find a way to be an effective aggregator for their own content and popular third party apps and content - as we're beginning to see

in the industry today - that I think will become even more pronounced as people get better at defining different packages and services that people want. I think that the need for that unified interface becomes super important. I think it will take shape, and I think the notion of having several different services that you subscribe to for several different types of content that you like to access will continue. And I think especially as long as there is such a broadened investment in original content production I think it's all about the quality of the content - content people want to see - and as long as there is this wave of investment from a broader set of companies in producing original content, there'll be a demand in the market and there'll be a need to make it easy to get to it.

Brian: So what you're saying is we'll still have this cornucopia of content options but the industry will figure out ways to make it a more seamless experience for content discovery and the overall viewing experience.

David: Yes, I believe so. Exactly.

Brian: Well that's a great vision. I think that's a great way to end our conversation. Thanks for spending this time with me and sharing your insights with our community. Good luck to you and Synamedia! □

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FIFA Women's World Cup 2019 Reveals Clear Trends in Consumer Viewing Preferences

By: Yogen Patel

The United States and the Netherlands were not the only ones fighting for victory during the final FIFA Women's World Cup match this summer. Over the course of June and July, cable and streaming service providers also waged a battle to win viewers' hearts and eyes for the final game.

Before the matches kicked off, Amdocs surveyed over 1,000 U.S. consumers[1] to get a sense for their sports viewing habits and how they anticipated watching the 2019 Women's World Cup. The following includes a few key takeaways stemming from the survey results, but overall, what's clear is that the future of how fans watch and engage with their favorite sports teams is changing.

eSports viewing continues to skyrocket

Ticket sales for this year's World Cup in France were lower than in year's past[2], as we're seeing an increase in consumers turning to streaming channels to enjoy the games from the comfort of their couches. As the official coverage provider of the tournament, FOX Sports reaped the benefits of this shift, averaging over 1 million viewers[3], which is 16% higher than indicated by the 2015 stats.

This year's FIFA Women's World Cup ratings skyrocketed compared to years past. For example, when the tournament kicked off in early June, ratings soared by 11% compared to 2015[4]. The France vs. South Korea matchup, in particular, saw heightened numbers, with streaming ratings up a staggering 375% compared to the 2015 opener[5].

For those who would rather stream a game at home, however, they are leveraging TV and streaming services to do so. According to our research, cable is still king when it comes to viewing the games. When asked how consumers planned to watch the tournament, 26% responded that live cable and paid television options were their top choice. However, another 13% said they're using streaming platforms as their own personal preference, showing a closing gap.

When it comes to digital fanatics' top motivations for selecting streaming services, our research found that the three most important factors in purchase are cost (40%), viewing experience (18%) and having access to a broad content selection (11%). Noting cost as the most important factor when choosing a provider, respondents stated that they were willing to pay more for a package if they were guaranteed a better experience. With that, 29% of respondents are willing to pay $10 in order to upgrade their current plans to access all of their favorite games and content.

The streaming competition heats up

The number of streaming options for fans continues to grow, with FOX Sports (both live and streamed), Telemundo Deportes, fuboTV, Sling Blue, Hulu Live and PlayStation Vue all serving as key providers for this year's FIFA Women's World Cup. And don't forget about social media. While cable and streaming have been key for fans to watch the tournament, social media has also seen major spikes this year over 2015, with content video views up 310%[6] since the 2015 opening game. In fact, our research found that social media ranked as the third most popular streaming method for sports (23%), behind watching games on television (63%) and mobile devices (56%).

Though not as popular as viewing on

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traditional television and new streaming services, we've seen consumers flock to social media not only as an easy way to watch their favorite games, but more importantly as a way to share these experiences with their family and friends. This popularity is even stronger across a younger demographic (ages 18-24), as 44% use social media as a way to share in the experience with others. For fans who are not watching the games together with family or friends, a large portion of

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survey respondents (31%) are actively using social media as their primary digital platform to engage with.

Younger fans are leading the way in sports streaming

The younger generations are making their presence known with their innovative viewing habits, and this means big business for OTT providers who seek to win the streaming battle. Our data found that younger consumers – primarily aged 18-24 and 25-34 – are more receptive to, and excited for, a new sports viewing experience. This means that they are adopting emerging technologies like 5G and AR/VR at a higher rate than other generations, paving the way for the future of media consumption, particularly when it comes to sports.

With that, we found that these younger, more tech-savvy fans are interested in futuristic developments, with 27% seeking VR/AR offerings and 31% craving 360-degree live game video. Luckily for the younger fans, our previous research with Ovum[7] also found that major sporting events like the FIFA Women's World Cup are influencing 70% of service providers 5G rollout timelines, meaning the future of sports is already in the works.

The final battle of the Women's World Cup might be over, but the fight for the streaming future is still on the clock. Whether it ends in penalty kicks or a blowout, the providers who embrace innovative technologies, such as 5G, software-defined, open cloud networks, and listen to fans will come out on top. □

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Making Streaming a Primary Strategy for Media Companies

By: Sanjeev Goyal

The media industry is witnessing a radical transformation at the hands of emerging technologies. The advent of the digital era and the emergence of new niche players are just a couple of factors driving incumbent companies to reinvent their businesses so that they can effectively reach customers and continually enhance the engagement experience. Media and entertainment companies realize that Digital Reimagination of the entire ecosystem and their operating business models is crucial to sustained profitability.

In the past, the media industry primarily focused on creating content, relying on distributors and aggregators for delivery to viewers. Industry debate continues regarding whether content - or the consumer - is king. Original content is undeniably the driving force of creative industries; however, ensuring easy content access while understanding audience behavior and preferences are vital to delivering the superior customer experience required for success in the digital age.

Companies like Netflix and Amazon began on the other side of the value-chain. They started their journey as content aggregators and distributors – the consumer-centric side of the business - and have now established themselves in content creation. This shift has fundamentally transformed the fabric of the media industry, with disruption impacting the entire established ecosystem. To survive this changing reality, today's media companies are forced to redesign their business strategies and supporting operating models, in order to influence the entire content value chain – from creation to consumption.

Major media houses and content companies have been continually assessing their direct to consumer strategy; however, risk of cannibalization, change of business model, and lack of familiarity with the new consumer paradigm are just a few of the issues that they must address before jumping into an increasingly crowded and diverse marketplace. To thrive in this environment, content companies must develop a digital streaming business with innovative content strategies, realign their business models and make continuous investments in platform and marketing strategies to both attract and retain a subscriber-base. Here are some key areas where these companies need to increase their focus:
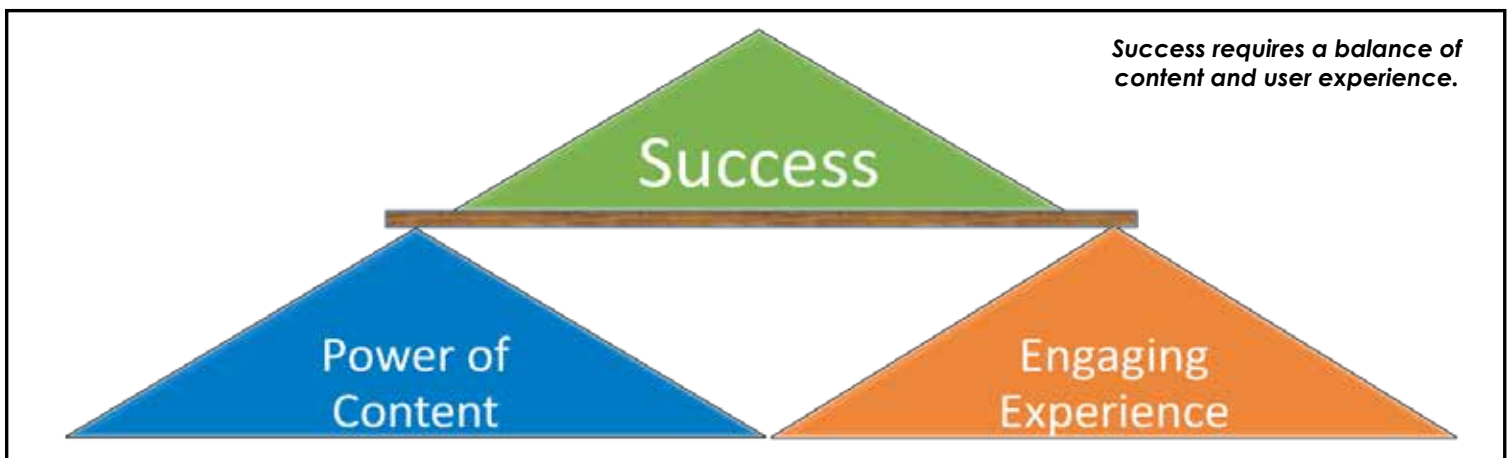
• **Scalability to grow with the audience.** The streaming business model must be built to scale up with the subscriber base. In direct to consumer (D2C) streaming, the responsibility of scaling and differentiating lies with the media companies themselves. They must invest in building the audience and scaling with it – while synchronizing a combination of factors. Here are just a few:

• How the new streaming business content strategy impacts any existing content supply-chain model

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In his previous roles, he has been engaged with media companies on their digital supply chain initiatives, has patents on video technologies and authored papers around digital asset management eco-system and media companies' journey through digital transformation.

• What the business model and pricing strategy will be, by market

• How global reach impacts their current licensed based business model

• How to build enhanced consumer data through 1st and 3rd party data sources in support of their targeted content strategy.

• **Content is still the dominant force:** Media companies must ensure that viewers are interested in their content: this requires a mix of deep libraries and original content. They need to:
• Build deep libraries - either through acquisition or licensing;

Success requires a balance of content and user experience.

• Build deep genre depth to address varied consumer interest;

• Be prepared to accept reductions in their existing content licensing business to build the brand;

• Assess their content library to differentiate long-tail sustainable content [such as sequels, children's content, episodic content] to maximize the penetration for every age-group;

• Create "Originals" in order to build critical stickiness for the services;

• Plan their content strategy to differentiate their 3 core distribution channels – Theatrical, TV and Streaming (D2C). These distribution channels will co-exist for a certain period of time, but they need to continually calibrate their content investment strategy across these channels;

• **User experience improvements and service reliability:** The digital streaming businesses lies at the intersection of creativity and technology. Media companies will need to set the new standards of usability for their streaming services. Ease of use, service reliability, and greater loyalty are important to establish their brand perception through combination of creativity and technology leadership. Companies must augment their talents with those from related industries – such as retail, consumer-based companies that have built audience-base businesses. Exploring content creation for newer devices and experiences [such as AR/VR] would be an interesting differentiating factor for their services.

• **Personalization and Context Awareness:** While content recommendation is important, companies need to establish more "intent-based" discovery services. This is becoming extremely important for companies with deep libraries who seek to provide targeted and relevant content at scale. This is a perfect application for AI/ML technologies These services may require deep understanding of content-narratives and deep tagging to improve the discoverability and recommendations. The benefit? Improved viewer engagement and retention.

• **Owning and driving the consumer relationship.** Thus far media companies are mostly relying on 3rd party data for their content strategy. A new platform that can collect usable subscriber data is important for driving marketing and content strategy – even beyond streaming services. The granular level of data obtained could become the new currency for these companies to build their comprehensive content strategy in the converged, yet highly fragmented market landscape that exists today. Facilitating conversations (e.g. social media channels) around their content can help build a loyal consumer base. For instance, Netflix's original programming success rate is almost twice that of the traditional media players because of their ability to map their audience insights into their original content development.

• **Evolve business models based on content mix and market**. It is essential for media companies to establish customer-centric business models and pricing strategies that are driven by the competition for viewers' free time and content demand. Existing pricing models and strategies of most content companies are predefined and flat, and lack the mechanisms to predict and forecast demand patterns. Analysis of market demand can play a vital role in helping media companies to dynamically adjust their pricing strategies and modify business models. Companies have to develop multi-prong approaches to establish themselves in the crowded market-place:

• Prepare initial strategy, price points and market entry plans.

• Devise a "plan" or "hook" which will help to retain the subscriber's base; for instance, using cross-product offerings like bundling a sports package with an entertainment package.

• Making the choices between advertising and subscription base models.

For media companies, the need for a streaming model is no longer optional. Media companies must devise strategies to establish themselves in the marketplace for the long term. Rapid, continuous innovation is their best bet to capitalize on the combined power of content and the consumer in the emerging digital world. □

On the Edge of a Revolution:
How OTT Can Change Live Sports and Beyond

By: Michael Jones

The first live streaming of sports occurred more than 80 years ago at the 1936 Olympics. Booths were set up allowing viewers to watch black and white, low resolution live streams of events. Contemporary reports stated that video quality was so low that most events were unwatchable. But this represented a milestone.

Over the intervening decades, the user experience improved for live sports – colorization, video quality and resolution were the most obvious ways. Also, cable and satellite TV allowed access to many different events and enabled new features. For instance, picture in picture (PIP) allowed the simultaneous viewing of two streams and broadcast technology advanced to allow replays, on-screen graphics, close ups and the like.

The advent of OTT video brought two-way data to the live sports experience. Now, information for users and analytics allowing service providers to target their programming and advertising while better monitoring quality of service (QoS) is available.

However, OTT also brought drawbacks

to the live sports experience: latency (delay from real-time image capture to the screen) and QoS issues like rebuffering, dropped frames and channel switching delays. Latency is generally considered the biggest issue – given the ubiquity of messaging and instant information, a 60-second delay is unacceptable to many viewers, especially on premium services.

Latency has improved over time. For example at NAB 2019, Red Bee Media, Anevia and VisualOn demonstrated glass-to-glass (camera to screen) latency of approximately 3.5 seconds in real-world intercontinental conditions; the encoding occurred in Europe, while viewing was in the United States. However, this result requires very tight coordination and optimization across the entire signal chain, along with close monitoring of network conditions and very accurate bitrate adaptation.

Low latency has also uncovered new issues. For example, open-source HTML5 players such as Shaka and DASH.js have inaccurate throughput measurement. This is not a serious issue for normal playback. But, when using fetch download in low latency

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situations, re-buffering, bitrate adaptation oscillation and other QoS issues occur due to the throughput rule being too aggressive and the buffering rule being too conservative. While these issues will likely be addressed by the open-source community, it serves as a reminder of the challenges of making "OTT as good as linear" for live streaming.

Mind-blowing OTT live video functionality

One key question, then, is how can we move OTT ahead of the curve? Can technology be used to radically alter the live sports viewing experience from the traditional linear experience of one stream and one camera angle for the viewer at a given point of time? Can we enable viewers to interrupt coverage for replays rather than when broadcasters choose?

The answer, of course, is yes. One key strength of OTT is the flexibility to deliver a virtually unlimited number of streams to many different devices and screens. This can allow the viewer to select camera angles and replays, even allowing multiple streams on one screen or shared between several. For example, a television can be split into four windows, each showing a different game or different camera angle. A smartphone can simultaneously be used to select instant replays or a breakdown and analysis of a play.

This promises to revolutionize the viewer experience in a very fundamental way. However, the technical challenges are significant and can only be accomplished through tight coordination and partnership through the entire ecosystem - hardware and

VisualOn

software, from the broadcast booth to the client.

One of the most difficult challenges is synchronization of streams. If watching multiple games, the viewer does not want one to display a score or replay from another game before the main stream has broadcast that event. Imagine a Red Sox fan watching a game against their rival Yankees, the bases are loaded and the pitcher is getting ready to start his windup. Another stream cuts away to the replay of a grand slam in Boston. That user experience is terrible.

Switching between camera angles in the same game requires even tighter synchronization between streams. The challenge is that the coordinated universal time or UTC clock on client devices is not always accurate and does now allow for the level of precision required. Coordination between the chipset manufacturers and the player providers can ensure that this feature can be properly implemented.

Live features beyond sports

While live sports viewing is the primary target for these technologies, other live events can benefit too. Imagine a concert where a user could change camera angles to focus on individual musicians without the music being out-of-synch.

In addition to OTT being able to provide new experiences for live events, equally important is the opportunity to reach new viewers. According to the International Telecommunication Union (ITU), in 2018, 85.3% of households in developed nations had internet access, compared to only 48.3% of those in developing nations. The "next billion" internet users will mostly come from developing nations and smartphones will be the gateway for most of them.

Addressing these new viewers brings additional challenges: poor network infrastructure, low-end devices with limited capabilities, and new business models that reflect local economies. But the demand is there. According to The Economist, mobile subscribers in India use an average of 8.8GB per month, nearly triple the data used by Americans, and video is the overwhelming data consumption type.

Addressing these viewers, again, requires partnerships and collaboration among the entire ecosystem. In this case, the challenges include minimizing bitrates to save bandwidth on a given network, and financial constraints. Meanwhile, techniques like post-processing can be used to enhance video quality for the screens and viewing conditions of users.

We, as an industry, have a chance to revolutionize the viewing experience of live streaming while providing access to billions of people, many of whom have never had the opportunity to experience live entertainment. Technology advances, new services and, most of all, cooperation between the entire signal chain is necessary to deliver on these promises. □

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Engaging OTT's Global Village: An Asian Initiative

By: Chris Lo

Today, after more than a century of electric technology, we have extended our central nervous system itself in a global embrace, abolishing both space and time as far as our planet is concerned. —Marshall McLuhan, **Understanding Media**, 1964

Canadian-born media visionary Marshall McLuhan coined the term "global village" in the early 1960s, decades before the advent of the consumer Internet. His prescience is manifest today in the form of the two teens, for example, who regularly share videos from opposite ends of the planet via various digital platforms.

And the content, as well as the culture, generated by the creative community in the United States permeates the world. According to Vulture magazine, ABC's "Scandal" is among the most popular TV shows in South Korea; BET's "Second Generation Wayans," in South Africa; CBS's "CSI: New York," in Romania; CW's "The Flash," in Spain; NBC's "The Blacklist," in Brazil; and HBO's "Game of Thrones" is "as popular in Russia as it is in the United States."

The Global Village as first envisioned by McLuhan – a true *genius*, in keeping with the theme of this issue -- has opened enormous opportunities for providers of video, film and other multimedia content.

The American content community is embracing the Global Village and understands that opportunities lie in Asia.

The mobile Internet, for example, presents content owners virtually unlimited global distribution channels, yet unprecedented challenges. On this point especially I'll cite one company that has capitalized on the Asian marketplace.

Vobile, founded in 2005 and headquartered in Santa Clara, California, helps content owners and distributors to not only maximize video distribution, and thus revenue potential, but also to minimize piracy-induced revenue loss. Its AI-powered platform, VDNA® Content Identification, enables video and audio tracking for content protection and monetization.

In a few short years, Vobile has earned a position as a worldwide leader in the online video content protection market; its customers include the top seven global film studios and online video distribution sites, and its content protection technology was recognized as a winner at the 69th annual Technology and Engineering Emmy Awards by the National Academy of Television Arts and Science.

Vobile recognized that the Asian markets were a key to its growth, with Vobile's CEO Yangbin Wang citing the rapid development in the Guangdong-Hong Kong-Macao Greater Bay Area, the high-speed rail connecting Hong Kong with Shenzhen and Guangzhou, and the region's deep talent pool. These elements all pointed to Hong Kong being the beach-head for their Asian initiatives. It was truly, as Mr. Wang stated, "a unique place for us to accelerate in the region."

After listing on the Hong Kong Stock Exchange in January 2018, Vobile set about establishing additional offices and R&D centers not only in Hong Kong but elsewhere in Asia.

Companies like Vobile have inspired deeper interest in Asia from the global video industry, and the Hong Kong Trade Development Council (HKTDC) is available to them for assistance. HKTDC is a statutory body established in 1966 to promote, assist and develop Hong Kong's trade. With 50 offices globally, including 13 in Mainland China, HKTDC helps global businesses easily enter the Asian marketplace.

Recognizing the potential OTT business opportunity, the Hong Kong Trade Development Council (HKTDC) made the rapid emergence of OTT platforms the hot topic at their 2019 Hong Kong International Film & TV Market event, FILMART[1], and on September 20, HKTDC will host a full day symposium, Think Asia, Think Hong Kong, at the JW Marriott in downtown Los Angeles, for companies that are interested in the opportunities that Asia holds. The symposium will include topics addressing the growing role of digital entertainment in Asia, and will feature executives and experts in the areas of mobile content and eSports. It will address the good, the bad…. and the unknown… of the explosion in new-media technologies impacting content creation and distribution, and it will also

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focus on the alphabet soup of emerging media technologies – data analytics (DA), augmented reality (AR), virtual reality (VR), and even "virtual anchor" (VI) technology and trends.

Like the global media industry itself, Hong Kong has evolved in profound ways. It is a key gateway – arguably the key gateway - for western industry to enter Asia, offering companies and investors a wealth of highly educated talent and consumers. Of course, with this opportunity comes risk, and the September Symposium will foster an important dialogue about both.

The opportunity in Asia is a reality. The risks are a reality. And the solutions and associated benefits - as exemplified by companies like Vobile - will increasingly be realized. Through more constructive idea exchange, including through events like the above-mentioned symposium, companies in the OTT marketplace can reach beyond their borders to make the global village – and the global economy— a win-win ecosystem. □

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