DVBSCENE

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The open internet including CDNs, Cable, Fiber, xDSL, mobile access networks, WiFi, etc.

CES Attention Grabbers — 15

Marking 25 Years
A Word From DVB

2018 is a special year for DVB as it marks its 25th anniversary. Over the 25 years DVB has revolutionized how we watch television. In Europe, but also in many other parts of the world, analog TV has been successfully replaced by DVB technologies. In almost every country at least one DVB standard is used. In 1993, DVB started on the necessary specifications for satellite, cable and terrestrial transmission with a clear focus on standard definition TV programs. Ten years later DVB provided the technology for high definition with its second generation transmission standards. Recently UHD resolution, in combination with the advanced HDR feature set, wider color gamut, HFR and Next Generation Audio (NGA) were added to the list of DVB specifications. This was a major milestone for broadcast technology, in that the end-user Quality of Experience (QoE) now comes close to the capabilities of the human eye. Even if initially the first implementations of the technologies do not utilize the full range of these new features they will eventually see their way into the consumer marketplace.

This is a significant milestone to look back on, but what will the future bring? DVB's Chairman, Peter MacAvock, has clearly stated where this journey will take us: "to strengthen broadcasting and specify the transition to seamless hybrid broadcast-broadband services and delivery". In line with this statement there is a wide range of DVB activities in the area of hybrid delivery and services. After having introduced UHD resolution and advanced features to the DVB MPEG DASH specification the Technical Module is now working on ABR (adaptive bit-rate) Multicast which will bring improved scalability to OTT delivery of live broadcast services. Furthermore, the Commercial Module has started work on two new interesting activities. One is the new commercial group for Targeted Advertising (TA) which will provide the necessary framework to fully enable TA. This work will be done in close cooperation with HbbTV. Another important new activity is DVB-I. The initial focus of this work item will be to provide a user perception of a linear TV channel that can be discovered and consumed over the open internet and by regular TV equipment and user interfaces. There is great interest in this new work as it will add internet as another delivery scheme alongside satellite, cable and terrestrial.

These are exciting new developments which show the relevance of DVB in a changing media technology.

Peter Siebert
Executive Director

New Members

ITV plc is an integrated producer broadcaster, which creates, owns and distributes high-quality content on multiple platforms. **www.itvplc.com**

Kratos is a global provider of enterprise-grade ground segment solutions. It's range of capabilities include delivering turnkey ground stations to RF systems to a complete suite of satellite fleet, RF and network management products to support our customers. **www.kratoscomms.com**

PROGIRA is an independent solution and software provider with expertise in Network Coverage, Infrastructure Investment Optimization, Digital Dividend Possibilities, Frequency Planning and Digital Cartography. **www.progira.com**

Qarva is a global provider of innovative and dynamic software solutions for end-to-end IPTV, OTT offerings for their partners and customers worldwide. **www.qarva.com**

New Standards

TS 103 205 Ver. 1.3.1: Extensions to the CI Plus Specification (CI Plus 1.4) (Dec - '17)

Expanding the Digital Opportunity
12–14 March, Warsaw

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Future Forward

Meeting the Demands of Today's Media Landscape

Peter MacAvock, Chairman, DVB

Peter MacAvock is Chairman of DVB. He was DVB Executive Director for 14 years before taking his current position of Head of Distribution, Platforms and Services at EBU Technology & Innovation. One of his first tasks as Chairman was to undertake a review to determine how DVB will adapt to meet the new challenges the TV industry is currently facing.

2017 was a good year wasn't it? In DVB, we finalized the specification for UHD-HDR, and indeed have just published the final building blocks for UHD services: the important area of bitmapped subtitles. But we continue to struggle in finalizing specifications quickly, and DVB reflects a number of the problems facing the industry at the moment.

But the key question everyone is asking is whether the global OTT players will ultimately replace linear broadcast TV. A more delicate question is what impact their success will have on the TV industry stakeholders active in DVB. As a representative from the broadcaster community, I can point to the relatively stable consumption figures for linear TV despite rising OTT viewing. The explanation? People are watching more content on more devices for longer. But beware; there is no room for complacency. The broadcast industry has an opportunity to leverage its linear popularity in the OTT space, but that window will close quickly.

DVB's role has to be to combine linear and on-demand seamlessly so that the TV viewer is unaware of the delivery channel used for his media. In a handheld device it could be WiFi or 4G; in a TV set it could be broadband or broadcast. The user doesn't care, the technology increasingly facilitates it, so why should they see a difference?

We have seen the successful transition of BBC three online, where there are claims that the move has more than doubled the brand's reach[1]. We see similar trends in other markets, where broadcasters are increasingly attracted by the flexibility afforded by online only distribution. But the BBC's experience has taught us that a simple transition is not viable; you must have a fundamentally different user experience expected of an online experience.

Whether one subscribes to a view of the near future where linear and on-demand is combined into a single experience or not,

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…to apply the DVB rigors to ensure that we maximize interoperability and facilitate efficient deployment…

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few can argue that a broadband TV experience should at last be able to resemble a linear one. This is DVB's next big challenge.

Whereas in the past, DVB could do this alone, it would now be impossible without the help of other bodies like HbbTV, which is an organization successfully filling the gap left by the fading away of DVB's MHP

interactive television proposition. Not by chance, there is much in common between DVB and HbbTV: same companies involved, same procedures, same legal structures.

There are other organizations upon which DVB will need to draw. The key will be to apply the DVB rigors to ensure that we maximize interoperability and facilitate efficient deployment of OTT as a de-facto element in the broadcaster portfolio. So far, it's clear that linear TV provides the revenue that allows broadcasters to play the OTT game. Pretty soon, OTT will have to pay its own way as it seeks to become the mainstream delivery mechanism expected by so many observers.

DVB itself must adapt to address the technical challenges its stakeholders face. Some standards organizations have developed parallel speedy processes where their members and, in some cases, non-members can work on a specific free of some of the constraints normally placed on standards development. ETSI's ISG process is an example, but it comes with a heavy price: if you wish to pursue the standardization of a technology, would you submit it to a time-consuming, specialized group-based process, or a speedier closed-group process? DVB is lucky in that it has a number of the characteristics of a standards development organization, but it is not one. Additionally, DVB's processes allow for a speedier workflow. I have spent some time endeavoring to enforce the rigor required to speed up DVB; ultimately making it more attractive to stakeholders who recognize the problems, but might not have the appetite for a lengthy process to develop solutions.

Despite all these challenges, 2018 promises to be an exciting year for DVB.

[1]http://advanced-television.com/2017/09/07/bbc-three-chief-hails-online-success/

Candidate Technology
Investigating WiB Networks

Peter Barnett, Chair, DVB CM-WIB

WiB, which stands for Wideband Re-use 1, is a candidate technology under consideration for becoming the next generation DVB technology for DTT networks. The concept of WiB was described in a little more detail by Chris Nokes in the September 2017 edition of DVB-Scene.

Following the IBC paper presented by Erik Stare and co-authors in September 2016, DVB established in early 2017 two Study Mission Groups, one (TM-WIB SMG) to explore the technical potential of WiB technology, and the other (CM-WIB SMG) to investigate commercial aspects, such as how the introduction of WiB technology might fit with broadcasters' business plans, and how transitions from existing networks to WiB-based networks might be achieved.

> Tools such as these may be necessary to allow terrestrial platforms to continue to develop in the longer term.

One of the main advantages that WiB technology brings directly is a massive reduction in power consumption of the transmitter network, perhaps to around 10% of the power of conventional high power high tower networks providing similar coverage. DVB-T2 networks could in principle also be designed with reuse-1 to allow such power reduction, and operate with existing DVB-T2 receivers, often with existing receiving antennas. However, a number of substantial advantages can be gained from moving to a non-backwards compatible wideband system, greatly increasing the capacity and flexibility of the system. Ideas under consideration include super multiplexes that are hundreds of Megabit/s wide, which would allow quasi-ideal statistical multiplexing even of UHD services; interference cancellation techniques; use of several superimposed signals in the same spectrum (LDM); and using both polarizations simultaneously (MIMO). In addition, introducing a new physical-layer standard enables the introduction of the latest generation video coding. Tools such as these may be necessary to allow terrestrial platforms to continue to develop in the longer term.

Choosing to go with a non-backwards compatible system would however mean consumers having to be equipped with new receivers. Depending on the selected technology, performance point and receiver location, they may also need to be equipped with new receiving antennas. In a horizontal market, consumer purchases of new equipment need to be driven by attractive new features and services; replacement of obsolescent or broken receivers could be an unacceptably long process. Either way, there has to be a transition period where both networks coexist and the ability of WiB to enable such coexistence in a migration phase is an important aspect.

The introduction of WiB networks could also involve costs for other users of the broadcast bands, such as Program Making and Special Events, and TV White Space devices, both of which use the interleaved spectrum in existing networks, on a coordinated basis. With the introduction of WiB networks, much or all of the capacity for such services would disappear, resulting in costs of re-equipping to make use of alternative frequency bands.

With the help of TM-WIB Study Mission Group, CM-WIB Study Mission Group is studying the costs, benefits and migration paths for transitions from conventional networks to WiB-based networks, and talking to broadcasters and network operators to see whether, in their view, such costs would be justified by the benefits that transition would bring. However, the term 'WiB-based network' can mean many different things, given all the possible technology options and use cases.

Technical and commercial aspects of WiB are on the agenda for DVB World in Warsaw in March 2018. In May, both TM-WIB Study Mission Group and CM-WIB Study Mission Group are scheduled to produce their reports, which are intended to help DVB decide how it should proceed with this exciting technology.

Peter Barnett has been a regular supporter of the DVB Technical Module and was a member of the Steering Board for approaching 20 years. He is a Vice-Chair of the Commercial Module and chaired the group that developed the Commercial Requirements for DVB-S2. He is currently chairing the Study Mission Group looking into commercial aspects of WiB.

> WiB enables the introduction of a range of technologies that could greatly increase the capacity of DTT networks, but what works commercially?

MIMO

Layer Division Multiplex

etc.

WiB

Latest video coding

SuperMux
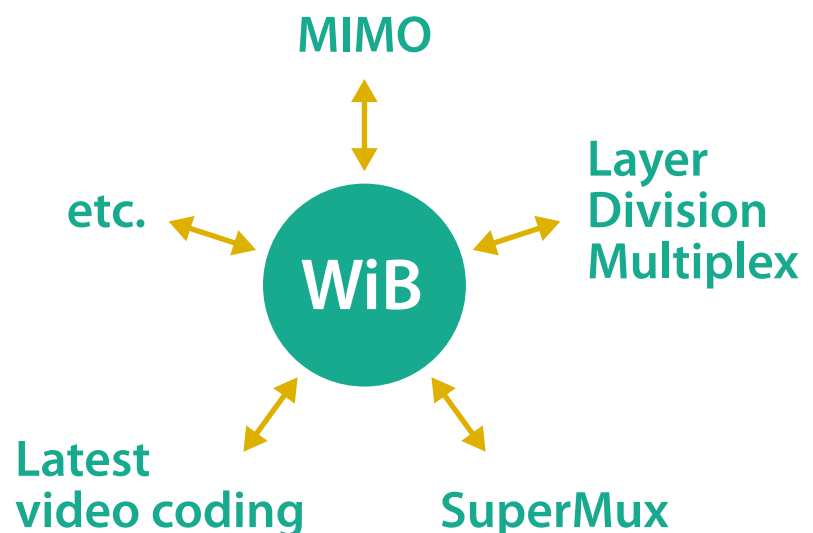
Enhancing the Portfolio
Kicking Off DVB Internet TV Services

Thomas Stockhammer, Chair, DVB CM-I

Thomas Stochammer is Director Technical Standards at Qualcomm. He is active in and has leadership and rapporteur positions in 3GPP, DVB, MPEG, IETF, ATSC, CTA, ETSI, VR Industry Forum and the DASH-Industry Forum in the area of multimedia communication, TV distribution, content delivery protocols, immersive media and adaptive streaming.

At the DVB Commercial Module (CM) meeting in October 2017 it was agreed that a new CM group, DVB CM-I, be set up to look into commercial requirements for standalone TV services over IP, referred to as DVB-I services. A DVB-I service is defined as a DVB service providing, at a minimum, a similar user experience to a broadcast DVB service that can be discovered and consumed by devices with basic internet connectivity, i.e., via principally a non-managed broadband connection and HTTP access, with options and opportunities to exploit additional functionalities provided by the nature of bidirectional connectivity. It is anticipated that this activity may become an important new work item for DVB to enable a linear TV channel experience over the open internet with the same quality of experience as DVB-S/C/T or IPTV, adding a new asset to complement the DVB portfolio and to be used by stakeholders along with traditional standards. Moreover, by embracing this activity, DVB will ensure that these new features are developed in a harmonized way in the context of the DVB ecosystem, instead of passively acknowledging the adoption of uncoordinated mechanisms defined by external bodies.

Initially, the group is charged with developing commercial requirements for DVB-I services, which are expected to include among others:

- Definition of DVB-I services
- Use Cases around DVB-I services
- Functionality regarding the definition, offering and discovery of DVB-I services
- Functionality that enables interoperable deployment and smooth integration of DVB-I services on TV devices and non-TV devices
- Functionality that enables the harmonizing of DVB services across different access networks, including DVB services on devices with multiple connections
- Procedures to enable the offering and operation of DVB-I services
- Considerations on commercially successful deployments of DVB-I services.

One may ask why there is still any effort being made in enabling and enhancing linear TV services? For example, an Ofcom study conducted in summer 2017 reveals that in 2016, linear TV services still accounted for 80% of AV viewing in UK. It is also observed that on-demand content is quite often 'linearized' by continuing on-demand assets based on recommendations (just think Netflix and YouTube). The lean-back experience is an important consumption model, especially on TVs with restricted user interfaces.

At the same time, internet connectivity in Europe is steadily growing and it is expected that by the time the specifications are ready, it should permit broadcast TV services to be supported in scale using internet distribution systems. According to Akamai's state of the internet report , throughout Europe more than two-thirds of the broadband internet connections exceed 4 Mbit/s and more than half of them exceed 10 Mbit/s, even if the coverage is not yet homogeneous. Also noteworthy in that report is that in several regions in Europe, such as Scandinavia and Benelux, more than two-thirds of the households have internet access exceeding 10 Mbit/s. These trends will likely motivate consumers to access richer services through nontraditional TV distribution means as well as viewing them on non-classical TV displays. There is an emerging opportunity for DVB in this context to develop consistent frameworks for the benefit of broadcasters, TV/CE manufacturers and, most importantly the consumers.

The Commercial Module group addressing this activity primarily takes the perspective of the two ends of the DVB distribution chain, namely the content provider/broadcaster and the consumer. In the context of this work, some use cases were generated with the simplest and straightforward one formulated as follows: (i) A consumer buys a TV set in the retail store and connects it to Ethernet/WiFi; (ii) finds a configuration option on whether a broadband TV channel lineup should be created (DVB-I services); (iii) selects this option and the TV set adds appropriate Broadband channels into the channel lineup as regular TV services; and (iv) when consuming the service, the consumer does not differentiate between whether the channel comes through broadband or other DVB distribution means, and will use the well-known and simple remote control to control the service. In particular, the consumer observes the same quality in terms of latency and channel access time.

> ...developing visions and strategies that enable business opportunities in the context of internet-based distribution of TV services beyond the initial obvious use cases.

DVB has a couple of completed specifications and additional ongoing activities that provide components and enablers for such an end-to-end experience. These include the DVB DASH specification in ETSI TS 103 285, recently updated to address the full set of DVB UHD-1 phase 2 including UHD, High Dynamic Range (HDR), High Frame Rate (HFR) and Next Generation Audio (NGA). Complementary to the DASH specification, the DVB codec and TTML subtitle specifications are internet TV capable. In a separate effort, DVB is in the process of developing a specification to enable DVB DASH end-to-end latencies and random access times that match the performance of conventional MPEG-2 Transport Stream (TS) based

DVB systems such as DVB-T or DVB-S. These specifications permit not only the consumption of such services on regular TV sets, but also on non-TV devices such as mobile phones, tablets, laptops, PCs and other devices.

Beyond the quality enhancements and the need to carry subtitles and audio description, additional missing pieces for such a simple service over the internet include consistent service announcement and discovery, as well as all the information that is carried with conventional TV services, such as program information, logical channel numbers, content protection and other rights management issues. This service information is expected to include features that today are part of DVB Service Information as defined in EN 300 468, but which is currently limited to MPEG-2 TS based broadcast distribution. What is expected for a modern service discovery and description capability fit for internet use is one that (i) takes into account the advances in modern web architectures such as web-centric architectures, dynamic network configurations, virtualization and cloud-based media offerings; (ii) can be easily and transparently integrated in TV sets and set-top boxes (i.e., devices equipped with a traditional "DVB" tuner), offering a consistent user experience (e.g., service selection by means of the traditional remote control) across all the available delivery networks; (iii) can easily be accessed and integrated in non-TV devices, for example consumed by apps and browsers; (iv) provides proper procedural processes for service authorization, e.g., by facilitating the discovery of legitimate or regulated DVB-I services at national level; (v) is available broadly and possibly natively in TV sets and devices to avoid unnecessary processing and access delays when services are launched and changed; and finally (vi) supports services that are able to become more dynamic over time, supporting regional variations, and personalization for consumers, etc.

While the initial simple use case is primarily towards replication of linear TV services, internet TV services are expected to provide opportunities for enhancing conventional linear TV experiences. A service provider may offer more and additional services such as long-tail and special content, as well as much more experimental types of services that can be tested for user acceptance. Another relevant aspect for broadcasters and service providers is the ability to target and personalize content and advertising, and to the extent permitted by law and via user consent, to collect operational data to enable continuous service improvement. In short, greater service variety and better quality is expected to be enabled. Aspects for better services include personalization, higher audio-visual quality, interactivity, lower latency, richer content accessibility, and enhanced control and management mechanisms. Additionally, such services are expected to be more easily accessible on different device types including non-TV devices as mentioned above.

At the first face-to-face meeting in January 2018, DVB Members including BBC, EBU, RAI, Media Broadcast, Samsung, BT, Qualcomm and TP Vision provided input on envisaged use cases for DVB internet TV services. Based on these inputs, it was decided to develop use cases that will support the development of Commercial Requirements. In the course of the work, the use cases now are differentiated across five categories, each backed by companies in the respective domains:

- Broadcaster centric view: primarily addressing the key use case of delivering linear TV services with the same user experience as traditional broadcast offering, e.g., agile activation of additional niche or temporary services not available on broadcast channels;
- TV centric view taking the perspective of a TV manufacturer by adding such services for consumption in TV sets and other consumer end devices, leveraging global standards and according to a horizontal model;
- Network Operator/ISP centric view by taking into account the aspects of offering existing DVB services on an IP infrastructure;
- OTT provider view: Migration of a proprietary OTT service to DVB compliant service to gain access to DVB-I functionalities and the integration into the familiar DVB user experience;
- Mobile/Portable/Non-TV device centric view that takes into account the consumption of DVB-I services on mobile/portable devices over heterogeneous broadband networks, e.g., 5G, WiFi, etc.

The work in DVB will progress with the ambition to develop and agree on an initial set of Commercial Requirements by June 2018 to initiate technical work for completion of a specification in the first quarter of 2019 at the latest.

It is expected that DVB-I will be the home of additional internet TV centric commercial and technical discussions with additional use cases, commercial requirements and technical specifications. One of the key aspects for DVB is the enhancement of DVB services across different access networks, including DVB services on devices with multiple connections, by using DVB-I technologies. Coordination with other relevant ongoing activities in DVB (e.g., ABR Multicast, in-home network distribution, etc.) as well as external organizations such as HbbTV, regional TV receiver specifications bodies, W3C and 3GPP are envisaged to create a horizontal and more ubiquitous framework for TV services that addresses the needs and customs of the generation of the millennials, but also simplifying access to new services for traditional TV consumers.

In the long term, the group is also charged with developing visions and strategies that enable business opportunities in the context of internet-based distribution of TV services beyond the initial obvious use cases. DVB Members and other interested parties are invited to actively support this endeavor into the next generation of TV services.

TV services over the open internet
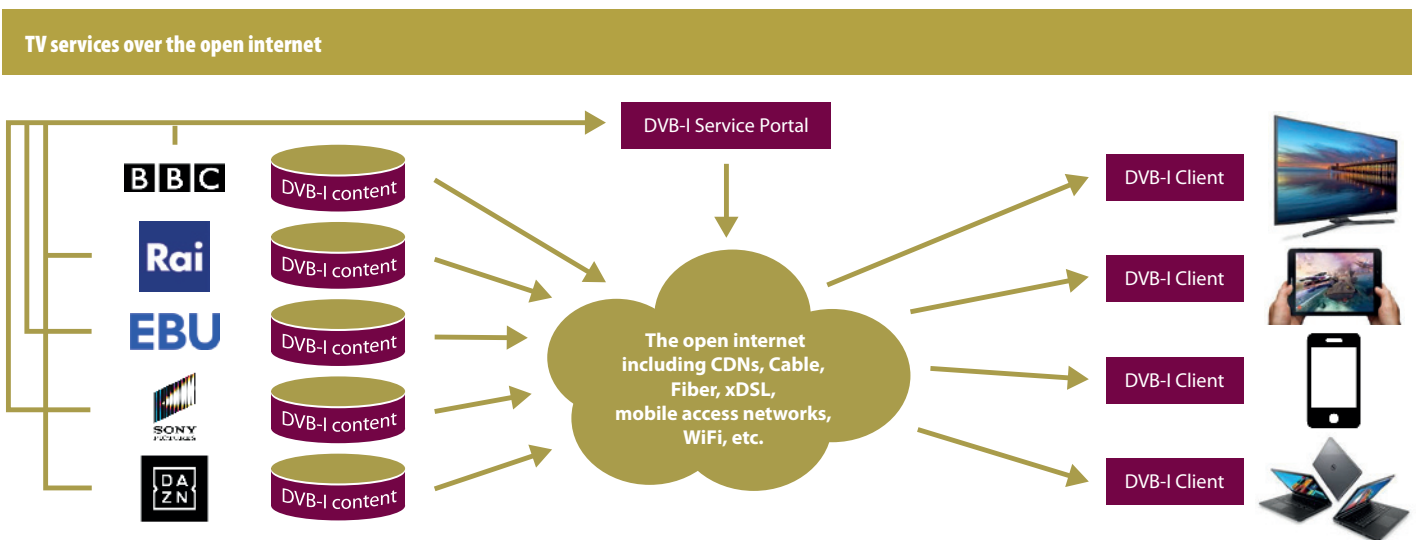
Time for Collaboration
Reaching the consumer

Henry Rivero & Peter Doe, clypd

Henry Rivero is General Manager for Europe at clypd. He is responsible for clypd's European and international strategy and market expansion.

Peter Doe is Chief Research Officer at clypd where his main responsibility is the integrity of data and algorithms in the clypd platform.

Television has been a large part of people's lives for decades, and advertisers have always found value in the medium because of how well it connects with people. As technology and data have progressed and TV has begun to move beyond the passive box in the corner of the room, there are new opportunities to connect more closely with consumers through Targeted Advertising (TA) and move beyond age and gender audience buying.

Targeted Advertising's goal is to enable marketers to efficiently reach their intended consumers with improved resolution and scale. The mechanisms to reach intended consumers include addressable (1-to-1) and broadcast (1-to-many) models. Both models require a combination of workflow automation and data-driven decisioning to ensure advertising campaigns are planned, executed and analyzed with precision and efficiency.

TV audience data used to be available only via research, designed specifically for the purpose. Measurement technologies from companies such as Nielsen, Kantar, IPSOS and GfK evolved from recall studies such as viewing diaries, to the current state of the art - electronic measurement of devices and persons using people meters. This technology is expensive and sample sizes are therefore relatively small (e.g., the UK BARB panel has 5,100 homes). However, this approach solves the problems of representativeness as TV measurement panels are designed to represent all TV homes and provide measurement of all devices and people viewing within the home. Furthermore, these measurements are typically audited and accredited for use (whether via MRC in the U.S. or Joint Industry Committees in Europe and elsewhere). Most buying and selling of TV advertising employs broad demographic groups that have been used for decades. Innovations to introduce more precision and efficiency, i.e., targeted linear advertising, with panel data, include consumer data overlaid onto panel data for planning and sales research.

In the last two decades other data have become available as a direct output of TV technology. Return Path Data from set-top boxes, Automatic Content Recognition, OTT and IPTV, while largely closed or proprietary, all offer large volumes of data – in some cases from millions of devices. When these data are combined with consumer data, targeted addressable advertising opportunities are enabled, propelling TV into a similar space as digital advertising. However, there are questions of transparency and representativeness when contrasted with panel data. Industry initiatives such as HbbTV and ATSC 3.0 offer a compelling potential for a standards-driven, open and horizontal approach.

The current TV market remains primarily a demo-based market. In 2016, just 0.1% of linear TV adspend used advanced targeting methods, but this is growing and in 2020 is projected to be 10% of the US national linear TV market (projected to reach $75 billion in 2020). Other markets, such as Europe, are in the early phases of experimentation.

TV advertising is a multibillion dollar business and switching budgets to a completely new model won't happen overnight. At present there are many experiments with targeted TV advertising and some of these experiments are becoming repeat business as advertisers become more confident in going beyond age and gender buys. As the TV advertising industry begins to invest further in TA, there are also challenges it must overcome. Challenges include: technology silos, privacy/legal considerations, data accuracy and coverage.

Work is happening behind the scenes with technology and industry collaboration to make targeted TV advertising more standardized and transparent, moving it away from the Innovation Lab and into the mainstream. One example of this work is the Advanced Targets Standards Group (www.atsg.tv), founded by clypd and a group of US media owners in 2016 that has fostered collaboration among competing broadcast and cable networks and agency partners to lay down guidelines for advanced audience deals, and data standards for these deals. A key element here is collaboration by competitors – the industry's openness to this will be a key determinant of the adoption and success of Targeted Advertising for TV.

A single platform powering multiple Targeted Advertising models

Curate multiple networks into an aggregated pool of premium television inventory for advanced audience and demo guaranteed sales.

Streamlined buyer and media owner workflow, allowing transactional opportunities that scale with the needs of clients.

Direct transactions between a media owner and buying organizations, through a network-branded environment.

Advanced target optimization and age-gender optimized linear TV deals across a portfolio of networks.

Enterprise scale and automation through system-level integrations and file interfaces.

Advanced audience targeting on national network inventory across multiple media owners, available through streamlined access for non-traditional and digital buyers.

Advanced audience targeting on national network inventory across multiple media owners through a buyer portal or api.
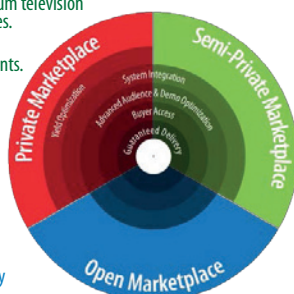
Targeted Advertising spend will take an increasing share of total TV Ad spend

■ Opportunity Cost — Total Adspend (A/G + Targeted) ···· Tradional Adspend (A/G)
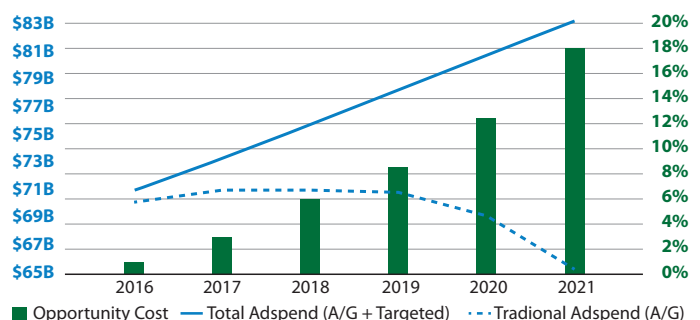
Targeted Advertising Update

DVB takes action to enable TA in the TV Space

Vincent Grivet & Angelo Pettazzi, Co-Chairs, DVB CM-TA

Vincent Grivet is in charge of Broadcast Development and Innovation for the TDF Group. He also serves as a Board Member for the French television channel distribution service, Molotov TV, which offers a new way of accessing programs and channels.

Angelo Pettazzi is Senior Strategic Marketing Manager at RTI S.p.A., part of the Mediaset Group. He is a member of the HD Forum Italia Technical Committee, a member of the HbbTV Association Steering Group and chairman of the HbbTV Marketing & Education Working Group.

In 2017, DVB established a dedicated Study Mission Group (SMG) to review the opportunities and challenges associated with the introduction of Targeted Advertising (TA) in the TV ecosystem, and especially in the classical broadcast world. TA is also sometimes referred to as addressable advertising.

...enable broadcasters and service operators to easily introduce targeted advertising into their programs...

This was felt to be a rather important and urgent matter, as the advertising market is generally shifting towards addressable or targeted models, which have 'built-in' capabilities in the digital environment. TV players run the risk of being at a disadvantage if they are unable to offer a targeted or addressable option. The SMG Report was delivered in September 2017, and approved by the DVB Steering Board in November. The report has been made public and can be downloaded on the DVB website*.

The key findings and conclusions of the report were the following:

- Targeted Advertising is very likely to become of considerable commercial importance in the context of broadcast TV, and it is a high priority to enable broadcasters to offer such models to their advertising customers;
- no satisfactory, complete, open technology framework enabling TA in the context of horizontal broadcast TV is currently available, though HbbTV appeared as a robust starting base;
- given the combination of the high commercial importance and the lack of a suitable enabling technical framework, it was advised that DVB should generate a dedicated DVB-TA specification (or technology framework) to fully enable TA, focusing on horizontal broadcast business models as a minimum;
- this DVB-TA framework should be generated in close cooperation with HbbTV, with a view to re-use all relevant existing (or future) HbbTV assets.

DVB has now formed CM-TA, a new commercial group dedicated to Targeted Advertising. The group's main objective will be to quickly generate Commercial Requirements for a new Technical Specification, which will enable broadcasters and service operators to easily introduce Targeted Advertising into their programs, e.g., the dynamic substitution of a broadcasted advertisement inserted in a linear TV program.

DVB and its sister organization HbbTV have agreed to a tight liaison on this matter, including where HbbTV will advise DVB on how to take advantage of existing or future HbbTV technologies to achieve the CM-TA goals.

CM-TA started its work process in the early days of 2018, and it has already attracted substantial interest with around 20 DVB Members participating. These are a well balanced mix of broadcasters, including the largest commercial companies with combined advertising revenues exceeding 5 billion Euros, as well as service providers, equipment manufacturers and broadcast network operators. Interestingly, some high visibility companies, which were not DVB Members, have knocked on the door to either become Members (again as the case may be), or offer their expert contribution to the CM-TA work process.

CM-TA will aim to deliver approved Commercial Requirements by mid 2018, with a view to having a DVB-TA specification published during the course of 2019. First field implementations are anticipated for 2020.

* https://www.dvb.org/resources/public/whitepapers/sb2462_targeted-advertisement-sm-report_public_nov_2017.pdf

An Explosion In Audio

Next Generation Audio as Standard for UHD

Next Generation Audio (NGA) has seen strong growth and development in the 12 months that have passed since the last in-depth article on the topic in DVB-Scene.

The intervening year has seen an explosion in NGA and immersive audio, with NGA live on-air across Europe, the Americas, and Asia, and immersive audio being included as standard on discrete media, cinema releases, live sports, drama, and entertainment programming.

It was also a year where NGA-enabled TVs, STBs and mobile phones started to appear in retail locations globally. In the past 12 months, OTT and streaming media added immersive audio to its standard offering.

Yet again it is DVB operators, broadcasters, and country specifications who are global leaders in including and deploying Next Generating Audio. DVB Members are the pioneers ensuring immersive, personalized, accessible, and adaptive audio is an integral part of UHD, and a key technology for improving the efficiency and quality of A/V delivery.

An important driver for the adoption of object based audio over the past year is the ability to add height information to audio content. A proliferation of consumer technologies such as sound bars, and simpler, lower cost systems are now available in the market, to enable more consumer-friendly access to immersive audio. Given the global success of Dolby Atmos and DTS:X, there is now a widely-recognized consumer expectation to deliver high-quality content with a rich, immersive sound experience.

From an operator and broadcaster perspective, personalization of sound for individual viewers is untapped. The NGA technologies specified by DVB will provide stable solutions for broadcasters to address the needs of their audience and improve the experience for all, including visual and hearing-impaired consumers.

With 2018 now well under way, in this article we discover what's coming in Next Generation Audio from two of its leading proponents. The first of which is DTS, whose UHD codec is now an ETSI specification that is progressing towards inclusion into the next revision of the DVB specification, followed by Dolby, whose AC-4 technology was the first to be added to the DVB toolbox and is a standard feature in many DVB countries and operator specifications.

DTS:X

Ted Laverty, DTS

Ted Laverty is a Senior Director of Corporate Development and Strategy based in Xperi's Northern Ireland R&D laboratory. He has been involved with the DVB for over 16 years representing DTS' audio technologies.

DTS, a wholly owned subsidiary of Xperi Corporation, develops audio technologies that support the build of content ecosystems, from content creation to distribution to consumption. DTS:X was launched three years ago and has had great success penetrating the home AVR, Blu-ray and digital cinema markets through its expansive and continually growing catalog of titles. Today, the majority of smart TVs support DTS technologies and virtually all immersive AVRs and soundbars on the market support DTS:X.

DTS:X is the branded, consumer-facing NGA experience from DTS, while DTS-UHD is the technical name of the object-based codec, standardized in ETSI (ETSI TS 103 491), that carries the DTS:X experience to consumers over broadcast and online streaming networks.

On the content creation side, tools based on the Multi-Dimensional Audio (MDA) standard are available for creating content for broadcast delivery, episodic post-production, and major studio immersive theatrical productions. MDA is an open specification for object-based audio production and program exchange. MDA and Audio Definition

Dolby AC-4

Elfed Howells, Dolby

Elfed Howells is a Business Group Director at Dolby, based at their European Headquarters in London. He is currently responsible for Dolby's multiscreen audio strategy across worldwide broadcast and OTT markets. He is a member of the DVB Steering Board and a DVB sub-group chair.

There is always a landmark year in the development of any technology, and 2017 was such a year for both UHD TV specifications and for Dolby AC-4.

Not only has AC-4 been on-air throughout the year via DVB networks in several countries around Europe, and on ATSC systems in the US, it has now also made its way into a huge number of consumers' televisions and STBs worldwide.

The year began with AC-4 being included in both the DVB and ATSC specifications, and chosen as the only recommended NGA system for ATSC 3.0 in North America.

Throughout spring and summer, major events around Europe were broadcast in AC-4, both via terrestrial and satellite TV. These included the French Open in Paris, the changing of the Royal Guard in Spain, and local trials in Poland, the US and across Europe via satellite. The broadcasts this year became more ambitious too, with both immersive Dolby Atmos sound, and multiple language presentations being broadcast in AC-4 for the first time.

Model (ITU-R BS.2076) are used as program exchange and as NGA input production formats to the DTS-UHD delivery chain as part of the wider broadcast and streaming workflow.

With the support of audio objects, the DTS-UHD system can offer a completely personalized experience, allowing customization of the sound mix to an individual preference, including improved dialog intelligibility through dialog object control. As long as the content creator allows the enablement of such user control, consumers can personalize many aspects of their sonic experience that was previously never possible.

This individual control over a complete object-based mix is perhaps the biggest benefit clearly identified by a recent research study on the benefits of object-based audio for the hearing-impaired, conducted by DTS and the University of Salford (see AES publication: "Personalized Object-Based Audio for Hearing Impaired TV Viewers," J. Audio Eng. Soc., Vol. 65, No. 4, April 2017). The study found that everyone's impairments are truly individual, hence the personalized settings were all different. No single mix can satisfy everyone, making an object-based approach to broadcast television a worthy goal to meet. Furthermore, an object-based workflow allows for a more efficient method to deliver accessibility services to consumers. Audio Description tracks for the visually impaired can now be efficiently delivered as a single audio object along with the mix.

While personalization is a key feature of DTS:X technology, consumers today best know DTS:X for its ability to deliver a more natural immersive sound experience.

Unique to DTS-UHD is its ability to enable NGA features without unnecessarily burdening infrastructure workflows, by increasing bandwidth or forcing top-end silicon platforms to enable the solution client-side. An example is how DTS-UHD's support for scene-based audio used in the DTS VR audio format allows for an enhanced VR audio experience, yet only uses the same small footprint used by first-order ambisonics. This philosophy continues with processing footprint requirements on the more sensitive decoder side of the chain, critically important to mobile applications. This efficient design enables DTS:X to have a large device footprint, permitting operators to widen the reach of addressable devices that can realize the benefits of NGA.

While new video technologies such as HDR are receiving a lot of attention, it's clear to many in the industry that NGA is a key component of the next-generation UHDTV service experience. As production workflows continue to adapt and change, the potential to deliver a fully personalized audio experience will soon become a reality.

These signals were in turn received by real consumers on a wide range of new televisions which arrived in spring 2017 from both Samsung and LG, with AC-4 support built-in.

Meanwhile immersive audio in the form of Dolby Atmos was also being debuted by vertical operators, with both Sky and BT in the UK, Orange and Canal+ in France, Maxdome in Germany, and Netflix in many other countries, delivering the experience, via existing Dolby codecs. AC-4 enabled STBs from major operators also started shipping mid-year, in preparation for a more efficient, immersive delivery in future.

December brought another landmark with the HD Forum Italia in Italy's publication of the "Ultra HD Book 1.0 – Unified Volume" specification, including Dolby AC-4 as its NGA solution, for both DVB terrestrial and satellite television. The specification is a great template for countries considering the addition of full UHD features to their receivers and services, and marks the start of AC-4 as a standard feature in country specifications.

In 2018, we expect to see the momentum growing even further with the addition AC-4 to the HbbTV specification, and growing adoption on mobile devices and applications for OTT and catch-up services. There will be more TVs too, with many more of the leading manufacturers adding AC-4 and Dolby Atmos capabilities to their products.

So, what is fueling this momentum and the move to NGA? For some, the delivery of immersive audio for premium sport, drama and movies is the driver, whilst for others it's the efficiency, and for many, built-in accessibility and dialog enhancement are the key features which they are keen to deploy. For others, the ability to experiment with delivering personalized audio and multiple presentations is the attraction.

What is sure is that NGA and AC-4 has made a big impact and is here to stay. As new use cases and new devices continue to launch, we expect another exciting year ahead for AC-4 and for audio.

NGA in action - AC-4 and Dolby Atmos delivering live sports.

An object-based workflow enabled by DTS-UHD, showing the benefits of DTS:X personalization for accessibility services.

Getting Beyond the Hype

A Use Case Approach

Ludovic Noblet, Chair, DVB CM-VR

You may have noticed the news coming from the last Sundance Film Festival : 'VR financing and distribution venture CityLights buys rights for the three part VR series Spheres'. It was reported to be a seven figure deal. Seems like very little? Perhaps. Also at Sundance, you may have noticed the news about the launch of Atlas-V, an immersive entertainment studio, led by a team of very talented pioneers especially when it comes to storytelling. If you have been lucky, you may have experienced content from some recent Virtual Reality (VR) productions such as 'Alteration', 'Battlescar' or 'Alice'.

Without a doubt, the VR entertainment market is developing and continues to mature from different perspectives: storytelling, technology, business models. VR location-based entertainment is an example of a VR market segment evolving at a fast pace.

Whilst I am not talking about DVB's business, but looking at the VR market from a holistic standpoint is probably relevant. In many discussions I have had about VR (we should probably say 'xR'), I am often surprised by the confusion which is made between broadcasters as a business and broadcast as a delivery mechanism. I often hear that VR is not something for broadcast. I don't want to give any opinion about this because I don't want to enter into a technical discussion, but that confusion is absolutely not being created by broadcasters. The European cultural TV channel, Arte, for instance, is one of those broadcasters at the forefront of VR content exploration, producing high quality content from a narrative, purpose standpoint (drama, documentaries, music concerts), with an impressive range of durations. This is all available on their web portal (https://www.arte.tv/en/).

Broadcasters have offered multiscreen services for a while now, combining linear broadcast distribution with OTT for on-demand, replay and a broad range of other services.

As chair of the CM-VR, I believe the real question here is if there is anything that broadcasters can do with VR. DVB is offering a broad range of delivery mechanisms and even has recently launched a CM-I group for IP delivery. That answer of 'purpose' won't come from inside DVB. It has to come from DVB Members and especially broadcasters and content service providers who may want to deliver services that contain VR content and thus may want to benefit from DVB's work on that topic. If there is something to do, then the task for DVB will be to work on making things happen. We conducted a survey in order to evaluate the level of commercial demand for

VR. But it is always the same when something gets hyped. Over the past months, we have worked on a 'use case' centric approach in order to ensure that, beyond the hype, we would be able to document several aspects of what may help broadcasters and service providers build a value proposition for VR. It's not an exhaustive list of use cases. These have been structured into three levels: service, experience and distribution. Before investing more time working on the Commercial Requirements, the CM-VR launched a survey in February focusing on use cases, timescales for deploying commercial services and any related conditions, as well as priority over other investments, such as UHDTV. The results will be shared during DVB World 2018 in March.

> ...the real question here is if there is anything broadcasters can do with VR.

In terms of use cases, this survey is going beyond the usual VR streaming as we considered how VR could, for instance, complement linear broadcast, for example having VR content distributed over OTT in a synchronized way with a linear TV program distributed over a broadcast channel. For instance, imagine a VR replay available with live sports.

During the process of gathering use cases, we also identified what may have to be developed in terms of Commercial Requirements. Meeting the June 2018 milestone for proposing Commercial Requirements for approval will definitely depend on the results we obtain from the survey.

Ludovic Noblet,
Director of Hypermedia at b<>com

Other Realities

Virtual Reality, DVB, and the Scarecrow

David Wood, EBU

When the smartphone was first introduced, looking beyond providing simple spoken communications, Apple said they would have to 'see how people used it, to understand what it would really become'. The rest, the flowering of the smartphone, as they say, is history.

Today the media world asks whether or not history will repeat itself for Virtual Reality (VR) and Augmented Reality (AR) - tools that evolving technology is making possible. As the man in the movie said - if we build, will they come? What will the young want? We wait for insights into what VR and AR could really become.

The objective of VR is to create an immersive viewing experience, where the user, usually wearing a headset, is transported to another place. The objective of AR is to provide a viewing experience that is a combination of a scene with multimedia additions.

The DVB exists to serve its Members with media delivery specifications that can be made commercially successful. Today DVB is journeying through VR and may soon be starting the road to AR.

The story of DVB and VR began in 2015 with the establishment of the CM-VR Study Mission. They were asked to analyze whether there is a role for DVB to play. Enthusiasm for VR had mounted over the preceding decade, and huge investments were made. Who could doubt then that the media future would lie with VR?

The DVB group drew about 40 companies together. They delineated the basic division between the systems. The simpler one, three degrees of freedom or 3DoF, allowed the user to move his head (roll, pitch, and yaw) but not his body. The more complex one, six degrees of freedom or 6DoF, allowed the viewer to move his body in the virtual space as well (x,y, and z).

The simpler system could be provided by a smartphone and container glasses. The more complex needed new purpose-built headsets plus a connection to a computer or games machine. The group's report analyzed not only image but also audio aspects, and finally made an initial examination of the business factors that would make one or other a commercial success.

The group concluded in late summer 2016 that DVB should usefully prepare Commercial Requirements and a specification for a 3DoF system, as this was the approach with the highest probability of commercial success in the immediate future. In early 2017, the DVB CM-VR group was set up to prepare the requirements, led by Ludovic Noblet and Ralf Schaefer. The group is currently assembling case studies for VR usage, and a questionnaire for DVB Members.

Outside DVB, although a bonanza of different groups and committees are staking their place in VR, the march forward is arguably being led by the industry body, the Virtual Reality Industry Forum (VRIF). The group has worldwide participants. Their soon-to-be-finalized text on Guidelines for VR is a tour de force, providing guidelines for content production, compression technology, storage, delivery, and security.

Joe Public needs content that they want enough to be willing to pay for. They will not pay for receiving technology alone, so understanding what content could be available is essential.

The VRIF production guidelines spell out the production grammar elements that are major limitations in VR content. There are many that affect viewing comfort, not the least of which is content duration. This report, and DVB's earlier report, points out that VR content duration should be 20 minutes or less if the content is not too challenging, and that content with significant action should be shorter. If stereoscopic content is being used, our old friend from 3DTV, the convergence/accommodation conflict can also come into play. The fundamental equation is that as the level of immersion increases so the potential problems of orientation increase. There are many rules for ensuring the experience is comfortable.

In terms of a technical specification for VR, the major development is the specification produced in the ISO/IEC JTC1 MPEG OMAF (Omnidirectional Media Application Format) group, for which a final draft was agreed in October 2017. This specification is cited in the VRIF Guidelines. The DVB work may also result in a specification that draws on the OMAF specification.

DVB is not yet in full gear regarding Augmented Reality, but watch this space later in 2018 for a questionnaire. Probably the standards body doing most in AR today is the IEEE.

So where does that leave us in our search for insights into whether VR will be successful? What about insights from the younger generations? I did ask my daughter. Her reply was that if there were to be a VR App offering a 3D scarecrow, to be commercially successful, it would need to be outstanding in its field. Probably true?

David Wood is Consultant, Technology and Innovation for the European Broadcasting Union, and has previously chaired the ITU-R groups that prepared the Recommendation for UHDTV, ITU-R BT 2020. David led the DVB's Study Mission Group on Virtual Reality.

One way to assess VR systems: Electrode testing emotional reactions

Au Revoir

It is time to say good bye to DVB-CSA1?

Bertrand Wendling & Philippe Stransky-Heilkron, Nagra

Bertrand Wendling is Senior Director for Standards and Regulatory Affairs at Nagra. He is also a member of the DVB Steering Board.

Philippe Stransky-Heilkron is Senior Vice-President and Chief Architect at Nagra.

History of CSA

The DVB-CSA (Common Scrambling Algorithm) was developed by DVB in 1994, allowing digital pay-TV services to be deployed in an interoperable way. Its usage is specified in ETSI ETR 289. The DVB-CSA specification is not public and is only accessible to licensed organizations that have been approved by the CSA licensors (who own the patents of the CSA technology) as legitimate implementers not involved in piracy.

DVB-CSA licensing terms imposes that all actors from the chipset manufacturers to the operator are licensed. ETSI is the Custodian in charge of all formalities to become a CSA licensee.

Versions and performances

There are currently three versions of the CSA algorithm:
- DVB-CSA, as designed in 1994, is a single algorithm currently used in two modes, differentiated solely by the length of the scrambling keys. For convenience, we use the terminology CSA1 for 48 bits keys and CSA2 for 64 bits keys.
- In 2006, DVB specified CSA3, which is a successor based on state of the art cryptography, using 128 bits key length.

Risks

The publication 'Breaking DVB-CSA', released by the Technische Universität Darmstadt in 2011, describes an implementation of an attack against DVB-CSA1. This paper reveals that with a very reasonable investment, DVB-CSA1 (48-bit key size) could be reversed. This attack would require about 7.9 TB of storage, and allow an attacker with a GPU (powerful CPU used for image processing) to recover the scrambling key in about seven seconds with 96.8% certainty. However, the attack was only effective with specific Transport Stream packets containing large padding blocks of zeros. Without a large padding of zeros, the attack cannot be performed.

Field experience has shown that the attack has been effectively used, but it has been rendered useless for real-time pirating by shortening crypto-periods (frequent change of the scrambling key) and by replacing padding blocks of zeros (or other constant repeated values) by random data.

Are all CAS impacted?

Any CAS using DVB-CSA1 will be potentially exposed to content piracy using brute force attack sooner or later. However, applying the measures described above prevents even today a real-time brute force attack on CSA1. CSA2 with 64 bits keys will remain safe for several years. There is no known method to brute force CSA2 within a reasonable time.

What about DVB-CSA3?

DVB-CSA3 uses 128 bits content keys and is based on state of the art cryptographic technologies. It will remain robust against attacks for many years. Therefore, pay-TV providers should ask their set-top box (STB) vendors that they implement support for DVB-CSA3 alongside DVB-CSA2.

What is recommended?

The first measure is to upgrade the scrambler in the head-end to properly handle the padding/stuffing bytes. They need to be random data; any known pattern would reduce the scrambling entropy and ease an attack. The second measure is to switch to DVB-CSA2 using the full 64 bits key length. In some cases, this might require the swapping of some very old set-top-boxes that could have hard-coded the 48 bits key length. However, these very early devices should have by now nearly all disappeared from most if not all pay-TV networks. The third measure is to consider adding support for DVB-CSA3 in all new STBs alongside CSA2, allowing for a smooth switching to CSA3 in the future.

Conclusion

The technological means available to illegitimate service providers are constantly increasing as the power and cost of computing decreases. Pirates systematically search for the weakest link of a content protection system. It is paramount to regularly review all the components of a pay-TV system in conjunction with the evolution of the threat landscape. The scrambling algorithm used for the protection of content can become a potential weak link. To avoid being taken by surprise, it is necessary to:
- Verify that all equipment and STB providers have a DVB-CSA license.
- Verify with the equipment provider that they implement the latest methods for properly performing the padding in their scramblers.
- Activate DVB-CSA2, i.e., use 64 bits scrambling keys or control words.
- Request the support of the DVB-CSA3 with 128 bits scrambling keys from your STB supplier, so that you are ready to activate CSA3 when it is needed.

Attention Grabbers

More Realistic TV Viewing Experiences Quiet Star of CES

Myra Moore, DTC Reports

Most reviews of the super-sized annual Consumer Electronics Show (CES) focus on futuristic gadgets as the essence of 'new.' Evolutionary improvements don't get as much attention but most have a greater long-term impact on the electronics business than their flashier siblings.

No matter the futuristic visions laid out on the exhibition spaces at CES 2018, there are basic principles that never seem to change (at least for the 30-plus years I've been attending): 1) Technology that delivers more realistic viewing experiences and greater audio and video fidelity matter just as much as they always have; 2) Products that look consumer 'unfriendly' or like publicity-seeking prototypes usually are; and 3) Most technical advancements are incremental improvements.

A parade of new displays, TVs and companion technologies (many not shown in exhibit halls) including a market-ready 8K TV, new and improved emissive displays, and Artificial Intelligence (AI) flourishes, fell in line with the 'more realistic viewing experiences' principle.

The newly formed Sharp, under the management of Jon Hai Precision/Foxconn Electronics, selectively unveiled its big bet on 8K Super Hi-Vision (SHV) TV, which included the demonstration of a TV set that is now available in the Japanese market and was described by executives as a 'true shipping unit'.

Japanese broadcaster NHK is preparing for the 2020 Olympics with a satellite-delivered 8K SVH service to showcase the new system. Sharp executives say they plan to make the set available in Europe in March.

Samsung is also prepping for a higher-fidelity future as it showed a giant MicroLED TV display. MicroLED, which is based on technology Samsung developed for commercial applications, is described by Samsung as "a self-emitting TV with micrometer scale LEDs, which are smaller than current LEDs, and serve as their own source of light". The upside, according to Samsung, is brighter, sharper pictures and the ability to build modular devices/systems.

Hisense displayed a new twist on current Texas Instrument (TI) projection DLP technology by featuring a 100-inch set dubbed 'Laser TV' that uses a laser rather than a lamp for illumination which promises even wider color gamut rendering. The TV is available now for $10K.

Displays were not trotted out as lone improvements. Machine learning, or Artificial Intelligence (AI), was coupled with high-end displays not only to improve the user interface (such as incorporating 'virtual voice assistant' technology from heavy hitters like Amazon, Google, and Samsung), but also to do the heavy 'upscale' lifting. Samsung said it will incorporate an algorithm in a new QLED TV that will enable the TV to upscale content to an 8K resolution.

This was a mix of actual new products and concepts with supposed product availability before the end of 2018. All sent the same message. Since adding the critical High Dynamic Range (HDR) and other enhancement to 4K TV, TV makers are betting consumers will open their wallets for even better Ultra High Definition (UHD) home-viewing experiences and the TV service providers will provide the programming to go with it.

Although CES is not devoted to programming, it is the beating heart that animates these technologies.

Myra Moore is President of DTC, a boutique market intelligence firm that analyzes the worldwide consumer digital TV market and aids TV providers in transitioning to next-generation technologies.

Upscaling may improve resolution but it is not a wholesale substitute for content that is properly captured and prepared to take full advantage of the capabilities of these TVs and other devices. Select broadcasters, such as Sky Deutschland, DirecTV, BT and KBS, offer UHD services over their broadcast networks, but broadcasted UHD content has been slow in coming. The rest comes from streaming services (when bandwidth is adequate) and UHD Blu-ray programming.

Of course there were many other consumer technology products/systems on display – some with promise, like the latest iterations of home networks. Others have promise but aren't ready for wide-market status such as the still be-goggled virtual reality (VR) systems that must be tethered to high-end personal computers or high-end smartphones. Recent theme park-like VR installations signal that VR hasn't found a hook into the broader consumer market. And, then there were others, like quasi-anthropomorphized machines (aka robots) billed as human companions that, to my eye, fell way short of their billing, but generated lots of publicity.

The TV/video ecosystem and the corresponding displays might not have gotten as much publicity as those robots, but they are still the heart of the consumer-electronics business even if they can't shake hands like Sony's latest robot dog.
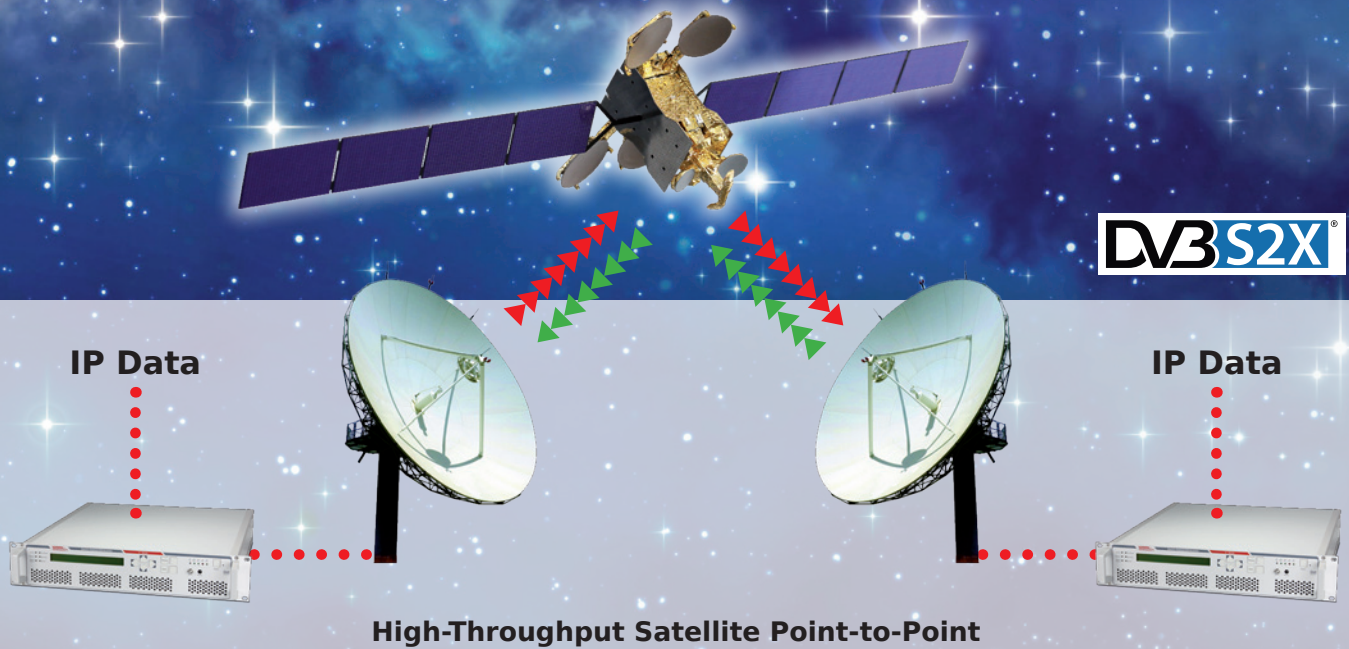
CES 'Hype Beast' – Sony's Aibo