DVBSCENE

DVB Digital Video Broadcasting

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DVB over IP — IP over DVB

A Word From DVB

Peter Siebert
Executive Director

Prompted by the decision of the ATSC to opt for an IP-based transport layer, DVB has discussed these concepts intensively. This led to the "Technologies beyond the Transport Stream" workshop, jointly organized by the DVB with IRT which brought together experts from companies and organizations to discuss the pros and cons of various technologies.

DVB working on IP is not a recent activity. More than ten years ago the DVB IPI group began working on the delivery of DVB services over managed IP networks and created an impressive suite of IPTV specifications. DVB over IP was complemented by the DVB Profile of MPEG-DASH which defines how to deliver DVB video services in an OTT environment.

In addition, all second generation DVB transmission standards support Generic Encapsulation Streaming (GSE), which enables the transport of IP packets directly above the modulation layer which is IP over DVB.

I think it is fair to say that DVB has already come a long way when it comes to embracing IP. Nevertheless, we live in a world where there are many routes to your screens and the delivery of video content via broadband is constantly growing. TVs are connected to the internet and video content is consumed on devices such as tablets or smartphones, which most probably will not be equipped with broadcast receivers. In this rapidly changing environment we have to constantly assess our specifications to ascertain whether they are fit for the future. Indeed, a number of the articles in this issue address this matter.

DVB will continue to carefully assess upcoming IP related requirements and use cases. To this end, the Steering Board will examine the outcome and prepare the next steps. I am convinced that there are areas where DVB can bring value by providing new specifications. However, whatever we do, we will not abandon the Transport Stream. When looking at different regions worldwide, the availability and performance of broadband differs significantly. Therefore, for some countries, pure broadcast delivery will be the predominant course. For these environments the Transport Stream is and will be the best solution. With its technology deployed worldwide, DVB has the responsibility for providing technical solutions which fit the more developed as well as the less developed markets.

At IBC, DVB will be showcasing its standardization work in the areas of MPEG-DASH and Second Screen Technology. We will have demonstrations highlighting the capability and efficiency of DVB over IP and IP over DVB. We hope you can join us on Stand 1.D81.

New Standards

TS 101 154 Ver. 2.1.1: Specification for the use of Video and Audio Coding in Broadcasting Applications based on the MPEG-2 Transport Stream (Mar - 2015)
TS 103 285 Ver. 1.1.1: MPEG-DASH Profile for Transport of ISO BMFF Based DVB Services over IP Based Networks (May - 2015)
TS 103 286-1 Ver. 1.1.1: Companion Screens and Streams; Part 1: Concepts, roles and overall architecture (May - 2015)
TS 103 286-2 Ver. 1.1.1: Companion Screens and Streams; Part 2: Content Identification and Media Synchronization (May - 2015)
TS 103 286-3 Ver. 1.1.1: Companion Screens and Streams; Part 3: Discovery (May - 2015)
TS 103 320 Ver. 1.1.1: GEM Companion Screen Service Framework (May - 2015)
TS 103 320 Ver. 1.1.2: GEM Companion Screen Service Framework (May - 2015)
TS 102 006 Ver. 1.4.1: Specification for System Software Update in DVB Systems (Jun - 2015)
TS 101 547-4 Ver. 1.1.1: Plano-stereoscopic 3DTV; Part 4: Service frame compatible Plano-stereoscopic 3DTV for HEVC coded services (Jun - 2015)
TS 101 154 Ver. 2.2.1: Specification for the use of Video and Audio Coding in Broadcasting Applications based on the MPEG-2 Transport Stream (June - 2015)
EN 302 307-2 Ver. 1.1.1: Second generation framing structure, channel coding and modulation systems for Broadcasting, Interactive Services, News Gathering and other broadband satellite applications; Part 2: DVB-S2 Extensions (DVB-S2X) (Jul - 2015)

New Members

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Partnership Models

Advancing collaborative paradigms, enabling and delivering innovation

Ludovic Noblet, b<>com

Ludovic Noblet joined b<>com in 2014, where he is in charge of developing innovation strategies and intellectual property management. Prior to b<>com, he held senior positions at Dolby Labs, Orange Labs and Thomson Electronics Research Labs. Throughout his career, he has developed a strong experience with world class R&D team management, standardization and intellectual property.

Over the past twenty years, the media industry has gone through profound changes: not only with technologies, but also business models. The acceleration happened over the past five to ten years leading to more transformative innovation, as the media industry was getting closer and closer to a quasi-completion of its migration to digital. New services have emerged leading to intense competition not just between new entrants and incumbents but also significantly disintermediating parts of the media value chain. The media industry entered a 'beyond digital' era: the challenge is no longer just about designing new technologies and implementing them into legacy services; but more importantly about designing new usages and experiences, new business models, probably at a scale and pace that has never been seen before.

Going beyond digital

As an example, even if it's difficult to predict how these technologies will really be embraced, we can already see that virtual, augmented and mixed reality offer a strong potential for value creation from both content and experience perspectives, going beyond gaming. After 'cloud' and 'big data' a few years ago, 'IoT' and 'fog computing' are some of today's buzzwords. '5G' is on the way, from research to market, offering new content distribution paradigms with software defined network capabilities and virtualization including hybrid broadband-broadcast.

From a business standpoint, we can hear new buzzwords from the mouths of a significant number of companies asking themselves how not to be 'kodak-ized', 'uber-ized', 'airbnb-ized', 'netflix-ized', how to create 'unicorn businesses', etc. Major market consolidations are ongoing throughout the whole value chain, money spent on mergers and acquisitions is at incredibly high levels creating not just giants but sometimes titans. The size of some intellectual property portfolios is raising questions: 'fair, reasonable and non-discriminatory', does it still really mean something?

> ...Europe is sitting on a gold mine of technologies with a value yet to be enabled, and yet to be transferred.

Innovation imperatives

All those points are going to significantly impact the media industry. In 2011, the core creative media industries represented revenues of almost 560 billion euros in Europe, 4.4% of total European GDP, 8.3 million jobs. In this context, while the pace of startup creation is increasing with reasonable failure rates and while ecosystems and value chains are getting more and more complex, significant barriers are raised every day for small and medium-sized enterprises with regard to expanding market penetration, innovation and growth, impacting employment and competitiveness. One of the difficulties for such organizations is being fully ambidextrous with regard to innovation, both on the exploitation side (everyday business) and the exploration side (tomorrow's business). At the same time, Europe is sitting on a gold mine of technologies with a value yet to be enabled, and yet to be transferred. This reinforces the need for more and more attention to be paid to both business model innovation and collaborative models.

Partnering has never been so important

For these reasons, from a critical mass perspective (investment, resources, talents, skillsets and knowledge), there is no doubt that partnering/collaboration between universities/academia including business schools, SMEs and large companies makes more than sense in order to foster innovation. One condition though is that collaborative models for innovation are revisited in order to focus more on leveraging the benefits of a collaborative approach with regard to business incubation and enablement, technology transfer and not just technology development. Colocated teams working together on a daily basis independently of the organization they come from, lean innovation management with iterative and agile design, focus on customer feedback and conditions of commercial viability, business model innovation are among the best practices. That's basically how b<>com operates as a Technology Research Institute.

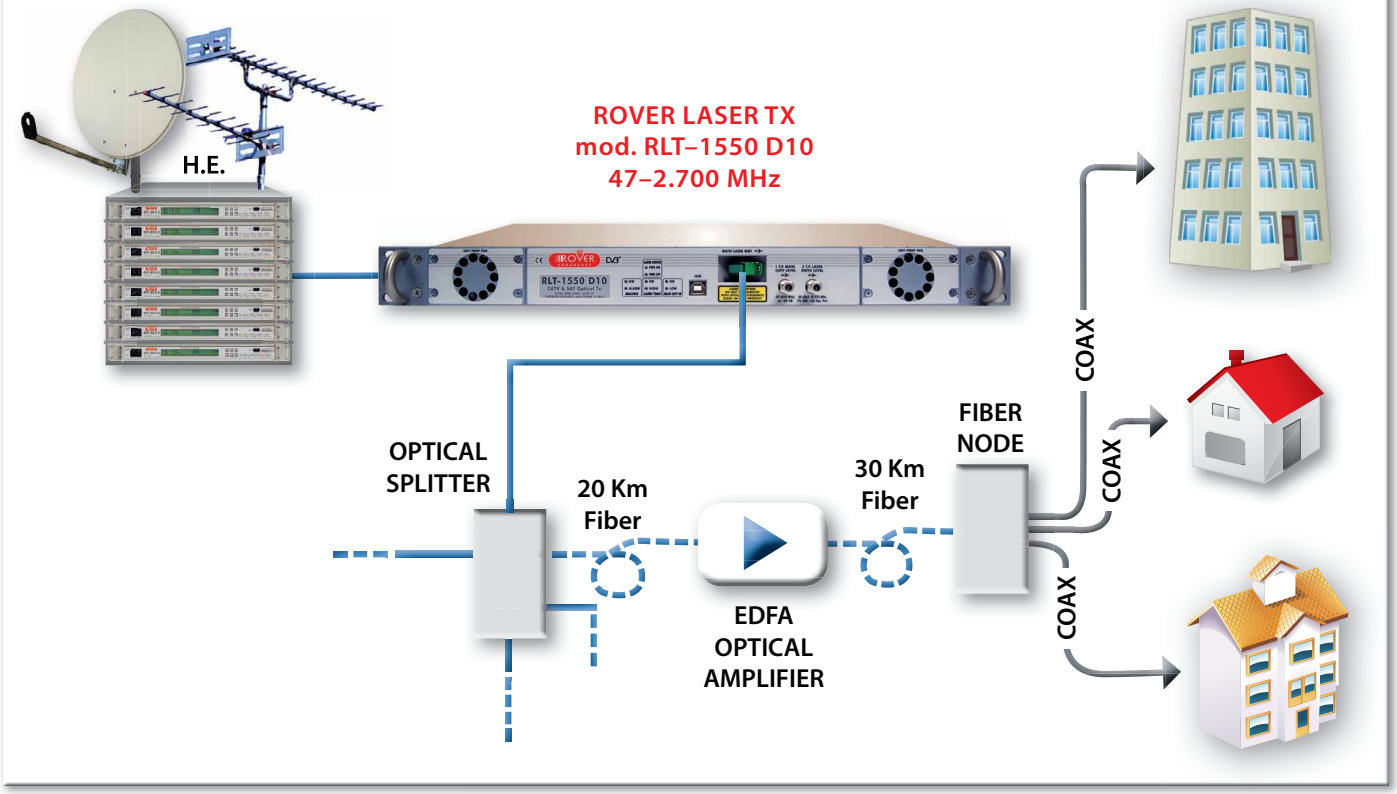
It is crucial that national and European stakeholders continue to support such initiatives while pan-European collaboration is also essential.

b<>com headquarters

Switch to Fiber

CATV & SAT LASER TRANSMITTER

47 – 2.700 MHz OPTICAL DISTRIBUTION EXAMPLE



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Symmetry of Strengths

7 Roads Less Travelled

Will Law, Akamai

Will Law is Chief Architect within the Media Engineering group at Akamai and a leading media delivery technologist. He has been involved with streaming media on the internet for the last fifteen years. He is currently focusing on MPEG-DASH and HTTP streaming, technology evaluation, 4K distribution, WebRTC, mobile media, cloud transcoding, connected devices and multi-bitrate switching.

Many in the broadcast space view the internet as an immature mechanism for content distribution. Broadcast, resting solidly upon ninety years of continual technological improvement, looks upon the internet with the benevolent fondness one reserves for a vigorous but naive youth. Surely a solution built by CERN[1] in 1989 for sharing academic papers cannot be considered as the future of video distribution? Yet it is and it's thriving. My company was founded in the late nineties to make websites faster. It quickly found that the dominant challenge was not the movement of text or images, but the movement of video. The resultant growth rate has been dramatic. Ten years ago, the total traffic across our network was 86 Gbps. Today, that number is closer to 27 TBps. What is remarkable is that during this time the fundamental underlying architecture of the internet has not changed – the same HTTP/TCP protocols have remained in place while accommodating 31,000% growth in traffic volume! What did change? Faster switches, faster fiber, cheaper and denser storage, faster and more powerful servers and client devices which today are as powerful as the servers of ten years ago. If we project forward the same linear growth over the next decade, we come to the seemingly improbable estimate that just Akamai's traffic alone should be approximately 8.3 Pbps by 2025. This is equivalent to sending an 8.3 Mbps stream to 1 billion people simultaneously.

In Denmark, where this year's DVB World conference was held, average internet throughout is now approximately 12.7 Mbps , more than sufficient to deliver 1080p30 content at 6 Mbps. This growth rate mirrors much of northern Europe and North America and in fact lags the hotspots of South Korea and Japan. What changes need to be made for an IP-based network to deliver 8.3 Pbps? For a start, there needs to be a movement away from the unicast distribution that constitutes the vast bulk of IP distribution today. A unique session between a server and every viewer is wonderful for delivering the long tail, but is terribly inefficient when many consumers are viewing the same content synchronously, as they like to do for sporting events, news and live events. There is an interesting symmetry of strengths between broadcast and broadband. The weakness of broadcast (serving different content to every viewer) is the strength of OTT, while the weakness of OTT (serving the same content to many concurrent viewers) is the strength of broadcast. It does not take a clairvoyant engineer to realize that the optimum IP delivery solution should involve both broadcast and broadband.

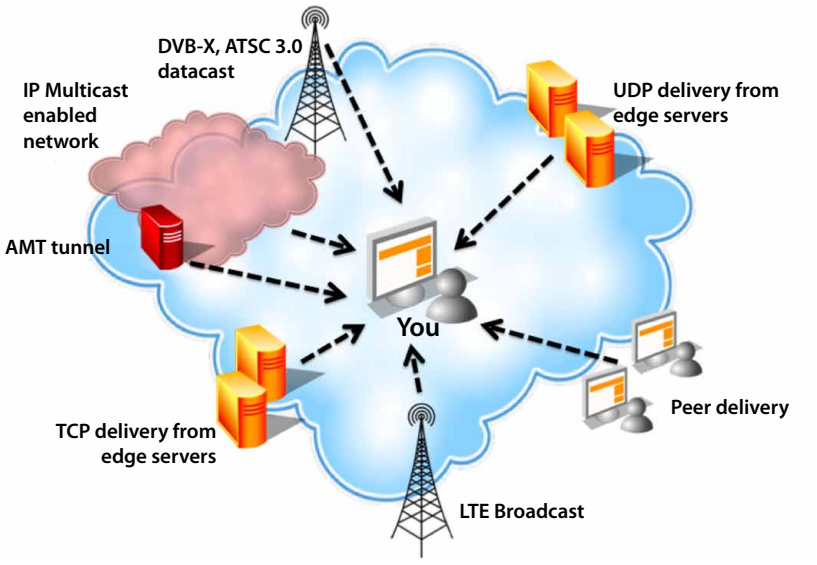
Today a client (set-top box, HDMI dongle, television, phone or tablet) typically receives its data from a fixed source. It might be a STB receiving DVB-T2, or an iOS phone receiving HLS over LTE or a television receiving MPEG-DASH over a DSL connection. Imagine however if this client were smart and that each piece of content might be available through multiple concurrent distribution paths? A device might receive its next video segment from:

- An edge server via TCP (the norm today)
- An edge server via UDP
- An IP multicast connection
- An Automatic Multicast Tunnel (AMT) connection
- A peer via a peer-to-peer network
- An eMBMS (LTE Broadcast) cellular connection
- An ATSC 3.0/DVB-X broadcast file download.

The smart client could then choose the optimum source for the next segment of video, based on throughput, file type, geolocation, device and network characteristics, leading to improved quality experience for the end-user.

It is an exciting time in the content distribution world. With HTTP2 being rolled out this year at scale, finally the internet itself is getting an upgrade. 4K size is raising bitrates, UHD and its dimensions of High Dynamic Range, expanded color space and deeper color depth are bringing a sense of realism to video, creating compelling offerings for consumers. After being static for much of the latter half of the twentieth century, TV is changing. Finally, we will move beyond eponymously associating the delivery mechanism (TV) with the content (TV) and with the playback device (TV). You will watch more "TV" than ever in the twenty first century, but the content will take many roads to get to that big screen on your wall.

Multi-sourced content distribution



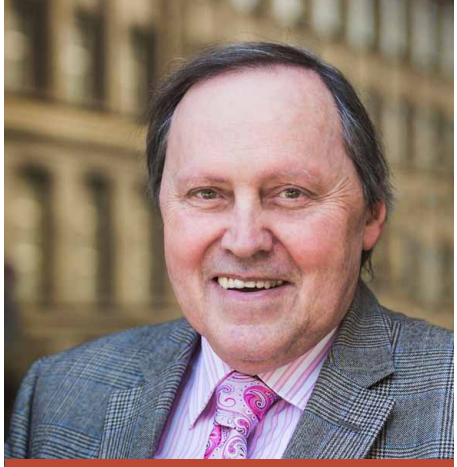
[1] Curious about the first ever web page made? It has been preserved and you can see it here http://info.cern.ch/hypertext/WWW/TheProject.html

[2] Akamai State of the Internet Report - https://www.akamai.com/us/en/our-thinking/state-of-the-internet-report/index.jsp

Dynamic Progress

Towards the Next Phase of DVB UHDTV

David Wood, Chair CM-UHDTV



David Wood

It is indeed an exciting time for UHDTV and DVB!

Following the ITU-R 2012 agreement on the main parameter values for the 'family' of UHDTV formats, ITU-R BT.2020, the DVB set out to agree appropriate formats for UHDTV broadcasting for the lower 8 Megapixel level, UHD-1. ITU-R provides formats for program production and exchange, and usually they are the resource from which parameter values for delivery systems are chosen by alliances such as DVB.

Broadcast parameter values need to take into account those of program making itself, but also constraints such as the timescales needed for services, decoder availability, and costs limitations associated with domestic receivers. The initial DVB broadcast format was termed 'DVB UHD-1 Phase 1', and it responded to the request by DVB Members for a UHD-1 system that could be on-air in 2015/16. Some initial services have already begun.

Phase 1 uses the 3840 x 2160p format from BT.2020 UHD-1, together with frame rates up to 60Hz. The receiver is capable of decoding bitstreams with either the UHDTV color primaries from BT.2020 or those of HDTV (termed BT.709), because these were expected to be found in UHD -1 displays for some time yet. Equipment makers were recommended to include the capability to map BT.2020 color primaries for such BT.709 displays. There was also provision for coping with incoming signals which provided a higher frame rate by 'top-up', using 'temporal scalability' if this were to be used in subsequent delivery formats.

In the original DVB thinking, there was to be a second format, DVB UHD-1 Phase 2, intended for service in 2017/18, which included more of the features of BT.2020. Phase 2 is currently under intense discussion.

BT.2020 envisages an improved type of dynamic range curve – assuming that everyone can agree the specific curve(s) to be used. This is termed 'Extended Image Dynamic Range for Television', or more simply HDR (High Dynamic Range). The benefit of the new range and curve will be striking for images on future television sets that allow higher 'peak brightness', said to be a firm trend in TV sets. The possible range between blackest black and whitest white can be much wider in future, and exploiting this will enhance the 'realness' of the image. An image with HDR is said to have more 'sparkle'. This is seen as critically important for UHD-1 formats beyond Phase 1.

We do not yet have standards for EIDRTV/HDR, but options for it are now being evaluated in both the ITU-R and the MPEG/ITU-T groups. The options fall into two categories, which are often termed: 'PQ' (Perceptual Quantizer), and 'Log-Gamma'. Proponents of each type claim advantages in areas such as image quality, production convenience, and compatibility with existing practice.

Although we cannot be sure of the timescale, ITU-R, ITU-T and MPEG hope for agreement before mid 2016. Largely the same companies participate in the three bodies, so we imagine that their conclusions will be aligned. DVB will draw on the conclusions of these bodies for its DVB UHD-1 Phase 2 specifications.

Another issue for DVB Phase 2 concerns the possible addition of Higher Frame Rates. BT.2020 allows frame rates in program making and exchange up to 120Hz. Although this feature would improve the sharpness of moving objects in broadcast UHD-1 images, its use would call for more complex domestic decoders. Decoder chips would be needed with 'memory bandwidths' twice those of decoders that only handle up to 60Hz, so this has to be factored into the decision making process.

> ...the new range and curve will be striking for images on future television sets that allow higher 'peak brightness'

We should also not forget the sound systems that may be used with UHD-1. Great progress has been made in parallel in the ITU-R and MPEG groups on systems sometimes called ASS (Advanced Sound System) or NGA (Next Generation Audio). This system would mean delivering a series of 'sound elements' along with the images. These sound elements could provide a whole new world of sound for viewers. It could supply 'immersive audio', which will place the viewer in a 'three dimensional sound field', and it could also offer a whole range of other features that will 'personalize' the sound the viewer hears, including adjusting the sound to suit a particular room configuration, and providing accessibility services. It is easy to get excited about this new age of sound that awaits us.

You may also ask about the potential impact of the plans announced in Japan and Korea to provide UHD-2 services (the 32 Mpixel image system) by 2020. How will this influence the delivery of UHDTV? If you have an idea, I will be waiting at the bar in the IBC lounge to hear it.

Defining the New

The New Infrastructure Required for the Next Generation of Television — UHDTV

Frank Heineberg, Cologne Broadcasting Center GmbH

While the current technical discussions around UHDTV mainly focus on Higher Frame Rate (HFR), High Dynamic Range (HDR) and backwards compatible distribution, we should be aware that the next generation of television has a huge impact on the current technical infrastructure of broadcasters as well as production companies and their products.

The good news is that while a number of existing gaps in the production chain have been closed with regards to UHD Phase 1, key elements like cameras, mixers, editing, playout servers and encoders are now available and have been successfully used in test transmissions on a low-performance base.

Looking at the additional requirements for complex live and nonlinear workflows, the current issues are bandwidth, studio interconnects, the integration of codecs and the definition of new HFR and HDR standards. It also has to be taken into account that broadcast technology is migrating slowly from audio/video baseband to network technology. What is the best solution of these challenges?

Currently the production standard of most broadcasters is still 1.5 Gbit/s for HD. The processing of uncompressed baseband UHDTV requires 12 Gbit/s for Phase 1 and 48 Gbit/s for Phase 2 with HDR and HFR. Referring to a nonlinear workflow, we have to consider seven times more data when switching from XDCAM HD to a UHDTV XAVC production codec, and even much more for uncompressed data. Basic requirements to cope with this are:

- Improvement of network performance, storage and render engines
- Definition of future proof UHDTV studio interconnects.

Transporting UHDTV baseband is currently done via four 3G SDI cables, a solution that is not suitable for larger installations and which also rapidly exceeds the SDI router's capacities.

Standardization approaches for a needed one wire UHDTV interface have not led to a new industry standard until now. The lifetime of classic point to point solutions would likely be limited, because manufacturers are already moving forward towards an open Layer3 IP standard like SPMTE 2022.

After having being used in national and international broadcast contribution networks for nearly ten years, the industry is working on Layer 3 network technology as a future-proof concept for HD and UHDTV production infrastructure as well. It is scalable, based on standard IT components and is able to transport a variety of required services in large WAN and LAN networks.

Much effort has already been made to adopt best-effort network technology to UHDTV live broadcast demands. To manage the bandwidth, frame accurate routing and seamless synchronization of streams, SDN (software defined networks) and performant Layer 3 control and monitoring systems are being developed. The bandwidth limit of common and affordable 10 Gbit technologies could be compensated by light-weight, low-delay compression algorithms (mezzanine compression) without any impact on visual quality. However, additional standards are still required to ensure the interoperability of devices from various manufacturers.

Once the next step towards the bandwidth demands of a 100 Gbit/s network with fiber infrastructure is taken, this will allow the transmission of uncompressed data rates, including UHDTV Phase 2 with HFR, as well as additional streams.

As these IP-based broadcast infrastructure solutions are still in the development stage, decisions on the level of integration always depend on the availability of technology. Typical tradeoffs are buying expensive converters to connect legacy SDI streams versus waiting on the latest generation device.

Owing to the variety of different HDR solutions there is still a lack of specification for signal and file formats for the new Phase 2 features, HDR and WCG (Wider Color Gamut). Internal production standards have to be redefined for upcoming HFR, HDR and WCG. HDR mapping, color grading and controlling sharpness, just to mention a few issues, will be major challenges for post production/graphic workflows and quality check. As broadcasters will continue to simulcast SD and HD content in SDR (Standard Dynamic Range) and SFR (Standard Frame Rate) on various distribution platforms, there will be a huge demand for high quality signal conversion. Also, we need to take into account future immersive, object based audio demands that are based on additional audio tracks and metadata.

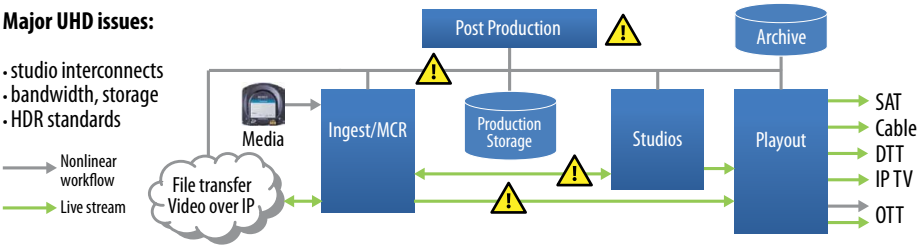
Conclusion

The key challenge for UHDTV within the TV industry over the next five years is to move to IP Layer 3 and to include future HFR, HDR and compression standards. Technologies to integrate legacy SDI and audio streams have to be implemented for at least the next ten years.

An example of a next generation 100GbE switch: HP FlexFabric 12900

Frank Heineberg is Senior Manager Program Distribution at CBC (Cologne Broadcasting Center GmbH). Working on new technologies, Frank has a 25 year background in broadcast system engineering at CBC and before that at RTL Television .

Major UHD issues in a current broadcast center infrastructure



Coexisting Together

Compatibility is Key for UHD IP and Broadcast Delivery

Theirry Fautier, Harmonic

Thierry Fautier is vice president of video strategy at Harmonic where he is in charge of defining and driving the execution of the long-term strategy of Harmonic's video business. He has recently been appointed President of the Ultra HD Forum, aimed at providing guidelines for Ultra HD deployments.

Ultra HD (UHD) video content is no longer a futuristic fantasy. OTT service providers such as Netflix and Amazon are already delivering UHD content, and additional UHD services are expected to be launched by other providers later this year. As the industry gears up for mass adoption of UHD, a lot of work is being done in the background to standardize the next generation video format.

As we know, the DVB has already standardized Phase 1 of UHD delivery to broadcast networks for DTT, cable, DTH and IPTV operators. Now the DVB is working on Phase 2, which will include new technologies such as High Dynamic Range (HDR), Higher Frame Rate (HFR), Wide Color Gamut (WCG) and Next Generation Audio (NGA). Phase 2 is expected to take longer to finish, since it requires developing a complete ecosystem that can cope with the evolving new technologies. IP delivery of UHD content with adaptive streaming technology is more agile as content can be encoded for a wide range of devices, and the profile is chosen according to device capability.

However, Harmonic estimates that by 2017, there will only be a very small amount of HDR UHD capable television sets. Therefore, a backwards compatibility scheme for Phase 2 is highly recommended for the installed base of UHD Phase 1 TV sets. There are several strategies to achieve backwards compatibility, and this article will outline the various methods.

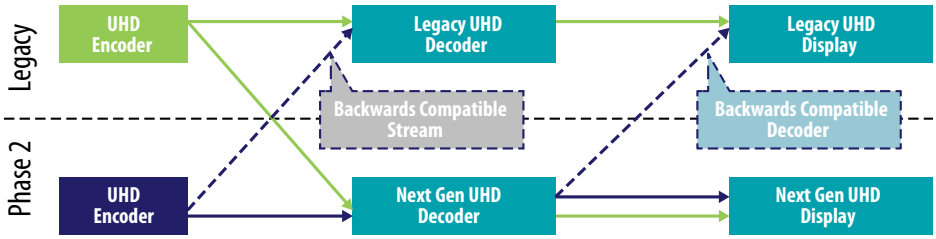
Stream Backwards Compatibility

This approach relies on multiple tools. On the encoding side, it uses SHVC, MPEG layered Scalable Video Coding and HEVC for the Phase 1 base layer and a non-backward compatible additional layer. This approach can be used for both HDR and HFR. For HDR, the stream backwards compatibility approach utilizes an HDR scheme that can be displayed on BT.709 displays, similar to what has been proposed by the BBC.

Decoder Backwards Compatibility

Another scheme, called decoder backwards compatibility, offers a solution where the Phase 2 decoder produces a decoded signal that can then be displayed on Phase 1 TVs. This method supports a single layer HDR scheme, similar to what has been proposed by several HDR proponents, including Technicolor and Dolby. The same approach applies to HFR, where a Phase 2 decoder down converts a 100/120 fps signal to a 50/60 fps signal (see Figure 1 and Table 1).

Figure 1. The broadcast backward compatibility scheme



Backwards Compatibility for IP

On the IP side, with adaptive streaming technologies such as MPEG-DASH, it is possible to create an adaptation set for each type of service, as described in Table 2.

Compared to a single Phase 1 manifest, this approach results in several "adaptation sets" (four in the example above), which requires more encoding, CDN and storage resources. On the other hand, this method enables a gradual introduction of new services without any backward compatibility constraints as each device picks its own adaptation set. Note that some profiles could be shared between the different adaptation sets. This method is currently being investigated.

Unlike for the broadcast case, an IP decoder does not need to convert to a Phase 1 TV, as a Phase 1 profile is always available. With IP unicast delivery, the diversity of HDR (in case no single standard emerges) can be coped with by adding additional HDR adaptation sets, which makes the network more complex but simplifies the client implementation and leads to a faster time to market.

Conclusion

Broadcast and unicast delivery mechanisms will coexist, and it is important to have one DVB specification that can support both since broadcast receivers will also need to have IP connectivity.

Table 1. Different broadcast Phase 2 combinations

Profile	Encoding Profiles	MPEG Level	HDR	HFR	Phase 1 Compatibility	Estimated Tme Frame*
Phase 1	2160p60	5.1	No	No	Yes	2015
HDR Only Profile	2160p60	5.1	Yes	No	No	2016
					Stream	2016
					Decoder	2017
1080 & 1440 p120	1440p120	5.1	Yes	Yes	No	2018
					Decoder	2018
Full Specification	2160p120	5.2	Yes	Yes	Stream	2018
					No/Decoder	2019

Table 2. Various adaptation sets for UHD IP delivery

Adaptation Set	Encoding Profiles	MPEG Level	HDR	HFR	Estimated Time Frame*
Phase 1	2160p60 and below	5.1	No	No	2015
HDR Only Profile	2160p60 and below	5.1	Yes	No	2016
1080 & 1440p120	1440p120 and below	5.1	Yes	Yes	2018
Full Specification	2160p120 and below	5.2	Yes	Yes	2019

** Based on current specifications and technology availability estimates*

There is Something in the Air: Germany Gears up for DVB-T2/HEVC Rollout

Holger Meinzer, Media Broadcast GmbH

The European Football Championship 2016 will make history from a technical perspective, with the first sporting event that German TV households can watch in high definition via terrestrial TV. True Full HD quality, a wide range of channels, as well as ease-of-use are three key elements of the DVB-T2 platform to be rolled out in Germany.

Following pilot operations in urban areas from May 2016, extensive deployment and switchover will commence in Q1/2017 - first in urban and followed by rural areas. Transition to DVB-T2 is to be completed in mid 2019. This will free up the 700 MHz frequency spectrum recently auctioned to mobile network operators planning to use the second digital dividend to provide mobile internet access in rural regions.

This is the world's first nationwide DVB-T2 deployment with the HEVC compression standard that will enable 40 to 50 HD/SD services, which doubles the 24 SD channels carried over today's DVB-T network. Most HD transmissions will use 1080p50 resolution, making DVB-T2 the only German platform offering Full HD resolution.

German transmitter network operator Media Broadcast was selected by the state media authorities to operate the three DVB-T2 multiplexes carrying commercial TV channels. They will complement the three multiplexes used by public broadcasters ARD and ZDF for unencrypted free-to-air transmission. A key aspect for the two largest commercial TV broadcasting groups RTL and ProSiebenSat.1 will be the ability to transmit encrypted services enabling them to expand their HD business model from cable, satellite and IPTV to DTT. Viewers will be charged a small monthly reception fee to access these commercial HD channels.

Media Broadcast will handle subscriber management services, marking the B2B company's entry into the consumer market. A cardless encryption solution provided by Irdeto will also facilitate access on mobile devices.

In addition, the hybrid platform will contain internet-based services such as catch-up TV and VOD as well as Media Broadcast's HbbTV portal called Multithek.

Information for consumers will be handled by an initiative formed by industry stakeholders and associations. The jointly created DVB-T2 HD logo (as seen above) will indicate future-proofed reception devices' compliance with German DVB-T2/HEVC specifications.

A Milestone for Digital Television

Christoph Dosch, Institut für Rundfunktechnik GmbH

17 June 2015 – "A milestone for Digital Terrestrial Television" - at ITU Headquarters in Geneva. Phil Laven, Chairman DVB Steering Board; Christoph Dosch, Chairman, ITU-R Study Group 6 participating in the first session.

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On 16 June 2006, the ITU concluded the Geneva-06 Agreement (GE-06), which replaced the Stockholm 61 Broadcasting Plan. GE-06 outlined the new frequency plan for digital television (and sound) broadcasting in ITU Region 1 (except Mongolia) and Iran. 17 June 2015 was determined as the due date for the transition from analog to digital television in the UHF band with the exception of a few countries in the VHF band, for which the date for the Digital Switchover was extended to 2020. The agreement was signed by 109 countries. GE-06 triggered the worldwide digital switchover.

The recent ITU International Symposium on the Digital Switchover held on 17 June, marking the due date determined by GE-06, provided information on the status of the digital switchover and on the future for digital television with the introduction of new TV systems such as HDTV and UHDTV as well as the "digital dividend".

The Symposium commenced with an introductory video by the ITU (moderated by David Wood, EBU) on the digitization process. Representatives from around the world underlined the advantages of digital TV with some pointing out the opportunities for mobile services in the UHF band.

The first session dealt with the objectives of the transition to digital TV and the technical and regulatory frameworks of GE-06. In session two, broadcast organizations from some thirteen territories including Australia, Asia, Africa, Europe and the Americas reported their experiences in converting to digital. A map of the actual status is available on the ITU website[1].

Various talks, a roundtable discussion and impressive system demonstrations looked at the future of digital television including UHDTV, extended image dynamic range, wide color gamut, higher frame-rates, immersive audio as well as integrated broadcast/broadband (IBB) systems such as HbbTV or Hybridcast.

The final session focused on the building of a sustainable ecosystem for digital TV. Simon Fell (EBU), Mark S. Ritcher (ATSC), Vincent Grivet (TDF), David Barrett (ITU), Jochen Mezger (IRT) and other experts discussed the efficient use of spectrum and the potential growth for TV broadcasting in light of the new technologies as well as the potential convergence of terrestrial broadcasting and mobile services.

The Symposium culminated with an awards ceremony recognizing outstanding experts of GE-06.

All contributions and videos are available via the ITU website[2].

[1] http://www.itu.int/en/ITU-D/Spectrum-Broadcasting/Pages/DSO/Default.aspx
[2] http://www.itu.int/en/ITU-R/GE06-Symposium-2015/Pages/default.aspx

Shared Access

DTT on In-Home Networks

Erik Stare, Teracom

In most countries DTT has traditionally been used for TV viewing with TV sets connected to a roof-top antenna, however addressing portable indoor TV reception is challenging for link-budget reasons. In addition, direct DTT reception on other types of devices, such as PCs, smartphones and tablets, is typically not possible because of a lack of DVB receiver support on such devices. However, both these issues can be addressed by providing DTT on in-home networks using WiFi retransmission.

In a similar way as the total broadband connection is divided into a fixed part to the home and a WiFi part within the home, the same could be done with broadcast by separating the broadcast connection to the TV antenna outlet and the (WiFi) in-home distribution. The first device that is connected to the TV antenna outlet, such as a set-top box or TV set, would demodulate (parts of) the received DVB signal and retransmit selected content over IP to connected devices, which may also include (other) set-top boxes or TV sets. These could be freely positioned, within WiFi coverage, without any need to be connected to a portable in-door antenna.

Any such device could then request a selected live TV service to be sent over the in-home network and be consumed in a similar way as with internet streaming, but without involving the broadband connection. Since the DTT reception is normally very stable and allows high service data rates, the resulting Quality of Service for the consumer can be expected to be very high in most cases (high stable quality, low latency).

It is important to note that the experienced "portable/mobile indoor coverage", when such WiFi retransmission functionality is in place, would be identical to the roof-top coverage, which in many countries is extremely high (Sweden has >99.8% population coverage). It is equally important to note that basically no network changes would be required – this concept could be implemented as an add-on to the existing DTT offer. The only required key component is a WiFi retransmission functionality implemented in some home device, which is likely to be a TV set or set-top box. Some TV sets and PVRs with basic retransmission functionality already exist. It should be noted that an additional tuner is required to allow simultaneous TV viewing and retransmission of content from different muxes.

> ...it could allow the user virtually unlimited access of streamed and VOD content.

The concept has, so far, only been described for a live TV reception (streaming) use case. However, it can be expanded to include storage for local caching of content. Such storage could be built into the device, connected directly to the device (e.g., USB hard disk) or NAS (Network Attached Storage), potentially available for all devices and positioned anywhere in the network. In a similar way as with traditional PVRs, the broadcast content could then be stored for later access, allowing well-known functionalities like catch-up, pausing and even a kind of local VOD.

In an advanced version, the combination of local caching of broadcast content in the in-home network and the availability of a broadband connection could allow the user virtually unlimited access of streamed and VOD content. The "fat tail" content would transparently be supplied via the broadcast and caching mechanism, with full broadcast QoS, whenever possible.

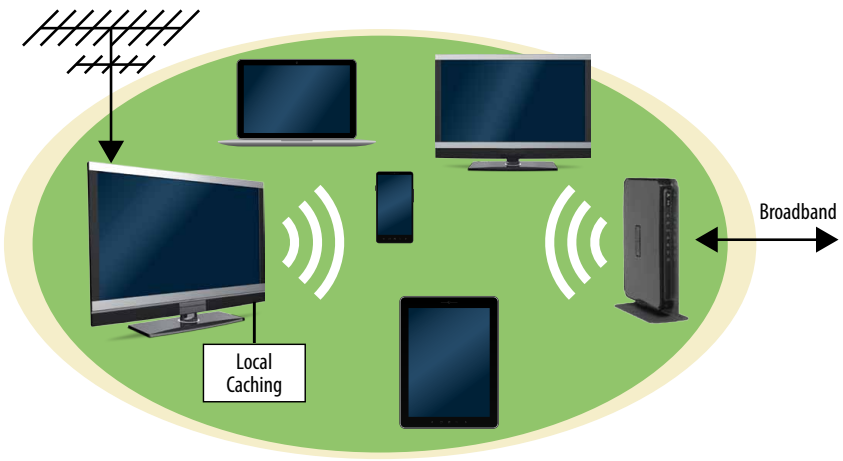
While the in-home WiFi network is probably the main use case envisaged for the described concept it may also be applied in other contexts such as in indoor and outdoor public areas, public transportation and private cars.

In DVB, the terrestrial sub-group of the Commercial Module (CM-T) has identified "DTT on in-home networks" as a potentially important item for DVB to consider further. It is recognized that some niche products already provide some of the functionalities described in this article using, for instance, SAT-IP and DLNA. Interoperability, ease of use, ability to find and access content are probably the keys to making such systems attractive to consumers and to allow for a mass deployment. To reach this goal, further standardization may be required. This is something that DVB is expected to look further into in the near future.

What has been said in this article about DTT on in-home networks would of course equally apply to other delivery methods, such as satellite and cable.

Erik Stare is a Senior R&D Engineer, Business Development, at Teracom. Erik is a member of DVB TM, TM-T (vice chairman) and CM-T and has for many years been deeply involved in the development of DTT in Sweden and internationally.

In-Home Network (WiFi)



In My Opinion

What is at Stake in Terms of Satellite Broadcasting Spectrum at WRC15?

David Hartshorn, GVF & Satellite Spectrum Initiative

Every layer of the broadcasting ecosystem that depends on the satellite spectrum being considered at WRC-15 would be negatively impacted by the introduction of IMT into the bands. Broadcasters' and cable operators' returns on investments would be affected; SNG operators' services would face commercial disruption; and their hundreds of millions of customers, the end-users, would suffer losses that would be incalculable.

Accordingly, for the past two years, the broadcasters and satellite industry have been on the defense of extended C-band and standard C-band (WRC Agenda Item 1.1) and, increasingly, Ka-band (Agenda Item 10). The latter of these satellite bands has been proposed by wireless interests to be included on the WRC-19 agenda as a potential band for IMT.

In the short term the stakes are most evident at extended and standard C-band. As some administrations have been permitting IMT (fixed WiMAX) services at extended C-band since 2006, we know too well that sharing is unworkable. The in-band and out-of-band interference caused by fixed WiMAX has either compelled regulators to withdraw WiMAX licenses (e.g., Tanzania, Indonesia, Malaysia) or, absent such measures, it has often required incumbent satellite service providers to either relocate their services to standard C-band, or invest heavily in filters, screens and other capital-intensive mitigation measures, which rarely resolve the problem.

The disruptions that have been caused are tremendous: Faced with degraded services for millions of customers, groups of broadcasters and cable operators have banded together to approach their local governments for relief (most recently in the Philippines). And broadcasters are not alone: Oil companies with multinational networks have commissioned services only to find severe interference. Civil aviation authorities from Latin America and the Caribbean to Africa have had to retrofit their earth stations to prevent disruption to delivery of safety-of-life services (e.g., ICAO and ASECNA). And so on.

> ...user groups are increasingly concerned about the wireless industry's intentions

This state of affairs is becoming apparent to these and other user groups who are increasingly concerned about the wireless industry's intentions and who are mobilizing to oppose their efforts… thus, the "No Change" positions established by broadcasting organizations such as, the World Broadcasting Unions and the International Satellite Operations Group, in concert with civil aviation, meteorological, humanitarian, maritime and other organizations.

Longer term, the prospect of "sharing" in any of the above noted bands is worse. The IMT systems planned for introduction in the satellite bands would be mobile, not fixed, making it that much more difficult to coordinate. The practical result would be to drive satellite communications customers to other alternatives.

Broadcasters and the satellite industry, coordinated globally by GVF, are standing together against the wireless industry's attempt to take extended and standard C-band spectrum.

The global campaign is being coordinated through GVF's Satellite Spectrum Initiative (SSI). The SSI campaign, which has been underway for more than two years, will continue to run from now until the end of WRC-15 this November. The main focus of the work – and the areas where broadcasters and SSI are concentrating their efforts – is on activities related to WRC-15 agenda items 1.1 and 10 where the wireless industry is pursuing satellite spectrum for terrestrial IMT.

Conclusion

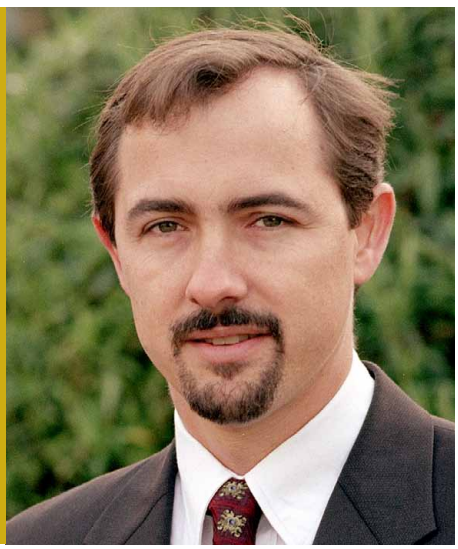
The broadcasting and satellite industries' collaboration proved invaluable at WRC-07, and we are building upon that joint effort to wage an even more successful outcome for WRC-15. We call upon everyone in the broadcasting sector for their support.

David Hartshorn is Secretary General of the GVF, the London-based non-profit international association of the satellite industry. GVF consists of member organizations from every major region of the world and from every sector of the industry, including mobile and fixed satellite operators, manufacturers, system integrators, and other service providers.

Supported by 15 affiliate offices, two regional offices and seven working groups, Mr. Hartshorn leads the Forum's global efforts to facilitate the provision of satellite-based communications solutions throughout all nations of the world.

Mr. Hartshorn works closely to support national-, regional- and global-level policy makers as they formulate state-of-the-art satellite regulatory, policy and spectrum-management frameworks. He is also responsible for creating greater awareness of the commercial, economic, political and technological advantages that satellite-based communications provide. GVF's training, product quality assurance, network validation, and other programs are an important means by which these aims are achieved.

For more information, visit www.satellite-spectrum-initiative.com.



Ready to Roll

DVB-S2X: Silicon chips are coming

Thomas Wrede, SES

The DVB-S2X standard was published as ETSI EN 302 307 part 2 in October 2014. It offers improved flexibility and features for the core applications of DVB-S2, including Direct-To-Home (DTH), contribution, VSAT and DSNG. A comprehensive Implementation Guidelines document has recently been published by the DVB as BlueBook A83-2 and an overview of the features and advantages of DVB-S2X by Vittoria Mignone of RAI can be found in DVB Scene issue 45.

The availability of respective silicon chips is a key element for the market success of DVB-S2X in new Ultra HD DTH flat screen TVs, set-top boxes and in satellite internet modems. In recent months DVB Members Broadcom, Silicon Labs and ST Microelectronics have announced the implementation of DVB-S2X on their satellite DTH and Broadband system-on-chip (SoC) devices. DVB Member Maxlinear confirmed that they are developing DVB-S2X silicon and that all of their next generation Full-Spectrum Capture satellite front-end products will support the DVB-S2X standard.

Broadcom's BCM453xx series of chips integrates dual Full Band Capture (FBC) technology A/D converters and up to eight DVB-S/S2 and S2X demodulators in a single chip. The FBC technology allows operators to digitize the entire 250-2350 MHz intermediate frequency spectrum and provide flexible bandwidth utilization and tuning function in the digital domain. Broadcom's BCM453xx series, including the 8 front-end version BCM45308, is currently sampling.

Silicon Labs' Si216x and new Si218x single digital TV demodulator product families as well as their Si216x2/8x2 dual digital TV demodulator chips include the broadcast services profile of DVB-S2X functionality and are now in production.

The DVB-S2X functionality comprises Variable Coding and Modulation (VCM), QPSK/8-PSK and 8/16/32 APSK demodulation schemes with roll-off factors from 0.05 to 0.35 and channel bonding. The chips also feature the necessary control functions for LNBs and multi-switches, two independent transport stream interfaces and an equalizer to compensate for group delay that, e.g., is introduced by a satellite transponder or by distribution components.

The dual demodulator chips come in an 8 x 8 mm QFN-68 package while the single demodulator chips are in a 7 x 7 mm QFN-48 package.

The STMicroelectronics STiD135 chip focusses on satellite broadband applications. The chip, with the code name Oxford, features dual, high symbol rate demodulators with a maximum baud rate of 500 MSymbols/s (up to two slices each) and has been designed as part of the French Space Agency (CNES) THD-SAT program.

The STiD135 is compliant with DVB-S2, DVB-S2X and DVB-S2 Annex-M and also supports channel bonding. The STiD135 may be used in standard broadcast environments as an 8-channel DVB-S2/S2X receiver enabling multichannel distribution and/or fast channel change scenarios. The chip was demonstrated during the SES Industry Days in May 2015 in Luxembourg and is currently sampling.

With these first DVB-S2X compliant chip sets, manufacturers can design and produce future-ready satellite Ultra HD iDTVs, set-top boxes and High Throughput Satellite (HTS) compatible broadband modems.

The combination of the latest FBC technology with up to 8 demodulators on a single chip and the DVB-S2X extensions, especially with channel bonding, will enable operators to better utilize their available satellite bandwidth and deliver a plethora of Ultra HD services to subscribers, including in a multi-room environment.

The fact that several leading chip vendors are offering DVB-S2X compatible silicon is a clear indication that the DVB-S2X standard has been adopted by the industry and the first STBs and iDTVs with DVB-S2X capability can be expected to be launched during 2016.

Thomas Wrede is the Vice President, Reception Systems at the satellite operator SES, where he and his team are responsible for developing and implementing satellite reception products and solutions. Thomas represents SES in the DVB Commercial Module as chair of the CM-S subgroup.

Companies committed to offering DVB-S2X chips

BROADCOM

MAXLINEAR

SILICON LABS

life.augmented

MARKET WATCH

www.rohde-schwarz.com

The new R&S VENICE ingest and production server from Rohde & Schwarz offers major advantages to broadcasters, particularly in studio, multi-camera and editing environments. It manages classical video server tasks such as HD-SDI ingest and studio playout coupled with intelligent file-based features like file ingest, transcoding, and media transfer operations for distribution. The 4K server combines the sophisticated requirements of high-end 4K studio production workflows with the ease and efficiency of HD production.

www.syes.eu

The recently launched Syes SL5 transmitter series offers the perfect trade-off in terms of delivered RF power versus electrical efficiency and size. The air cooled transmitter line is of rugged design for greater reliability, easy operation and maintenance. As with all the company's transmitters, the series is capable of handling all analog and digital terrestrial TV standards. Amongst its capabilities is the simultaneous handling of T2-Base and T2-Lite frames.

www.advantechwireless.com

Designed for broadcasting applications, the second generation C-band GaN SapphireBlu SSPA/SSPB from Advantech Wireless offers very high linearity in a compact single package. The increased linearity comes at the same time with no additional increase in size, weight and energy consumption. These units are designed for very high linearity as imposed by the heavy Ultra HD traffic, and at the same time to be ready to operate under the high density modulation schemes that are now part of the DVB-S2X standard.

www.roverinstruments.com

Meeting the needs of modern installers, ROVER has equipped all their HD Meter series with a built-in web server. With the HD Remote Monitoring "APP", users can manage, monitor and record all measurements remotely, using any browser or device (PC, Mac, smartphone, tablet, etc.).

www.newtec.eu

The Newtec MCX7000 Multi-Carrier Satellite Gateway is a new dense DVB-S2X multi-carrier satellite gateway for efficient distribution and contribution broadcast applications. It offers significant OPEX and CAPEX savings thanks to its multi-carrier processing capabilities and increases bandwidth efficiency by up to 51%. The versatile platform supports multi-stream, as well as the company's Clean Channel technology and linear and nonlinear pre-distortion technology, Equalink 3. The system is compatible with the company's Dialog multiservice broadcast platform.

www.enensys.com

ENENSYS' AdsEdge provides an innovative approach to local video content management for DTT networks, creating the opportunity for effective content monetization. Broadcasters can generate additional revenue from existing output, inserting local content - such as adverts, news and weather forecasts - at the final stage of DTT delivery (at the transmitter site). A deterministic approach allows it to comply with the vital transmission accuracy requirements of SFN networks to avoid interference.

MARKET WATCH

www.teamcast.com

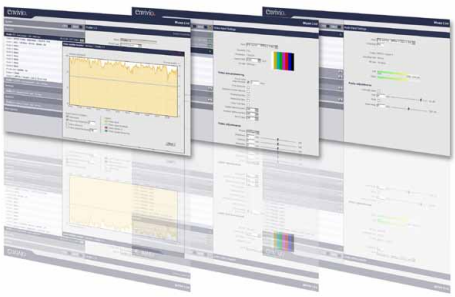
TeamCast's TWISTER-4000 system comes as a complete self-managed and auto-negotiated exciter solution, ready to drive DVB-T/T2 transmitters in Dual Drive operating mode. It consists of two exciters operating simultaneously and combined with a RF switch unit. The solution meets broadcasters' demands for upgrading, recycling or renewing existing transmitters efficiently and easily. More than a technical value-added solution, the innovative system enables lower CAPEX investment cost as well as reduced OPEX cost.

www.work-microwave.de

WORK Microwave's new DVB-S2X Wideband Modulator is designed for wideband transponder applications, in particular those operating in the Ka-band, single carrier mode. Based on DVB-S2 multistream technology, it supports advanced features such as wideband time slicing, allowing economic design of receiver chips. New S2X features, such as low roll-off and super frames, are also supported. Broadcast and broadband applications can exist in parallel on the same transponder by merging transport streams and IP streams with GSE encapsulation into one multiplex.

www.envivio.com

Envivio Muse Ultra HD can encode up to 4K video resolution at 60 frames per second and in larger color range with the new BT.2020 standard. It also supports HDR video and is compliant with DVB standards for audio, video and subtitles. It supports HEVC (H.265) compression in 10 bits, Dolby AC-4 encoding and pass-thru. The all-software architecture enables operators to continuously enhance their UHD services, therefore future proofing operations.




More information at:
MEDIA BROADCAST, hall 1 stand 1.B79
THERE'S SOMETHING IN THE AIR.
DVB-T2: the future of terrestrial television.
In early 2016 Germany will be switching from DVB-T to the new DVB-T2 standard, making digital terrestrial television available in Full HD 1080p for the first time. DVB-T2 is already up and running in pilot projects in Berlin and the Cologne/Bonn region, with nationwide coverage in Germany set to be complete by 2019.
'There's something in the air' – this is the slogan for the DVB-T2 range of services MEDIA BROADCAST is already advertising to customers. In addition to the wide range of public and private broadcasters on offer, the services provided will also be supplemented with further content from the HbbTV multithek service.
MEDIA BROADCAST