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March 2014

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# CANCON Champion Celebrates 50 Years in Radio

BY DAVID BRAY

Where does a legend begin? In the case of Dave Charles, currently celebrating 50 years in the radio business, the answer is Belleville in 1964. That is when a young music lover went on air at CJBQ.

In the decades that followed, Dave built a formidable resume and a broad assortment of relationships that have stood the test of time.

His first pay cheque was \$37. Now I know some of you will say that sounds close to what you are getting now. And those are the lucky ones who haven't fallen prey to the whims of corporate consolidation. But I'll leave the grumbling to another day. The bottom line is that, like many of us,

Dave was a true believer in radio and was thrilled to have an opportunity to be part of the magic.

From the outset, he was a champion of CANCON... long before the term had been coined. He is particularly proud of the fact that he played 50% CANCON, playlisting the likes of The Stampeders, The Staccatos (Five Man Electrical Band) and Chad Allan and the Guess Who.

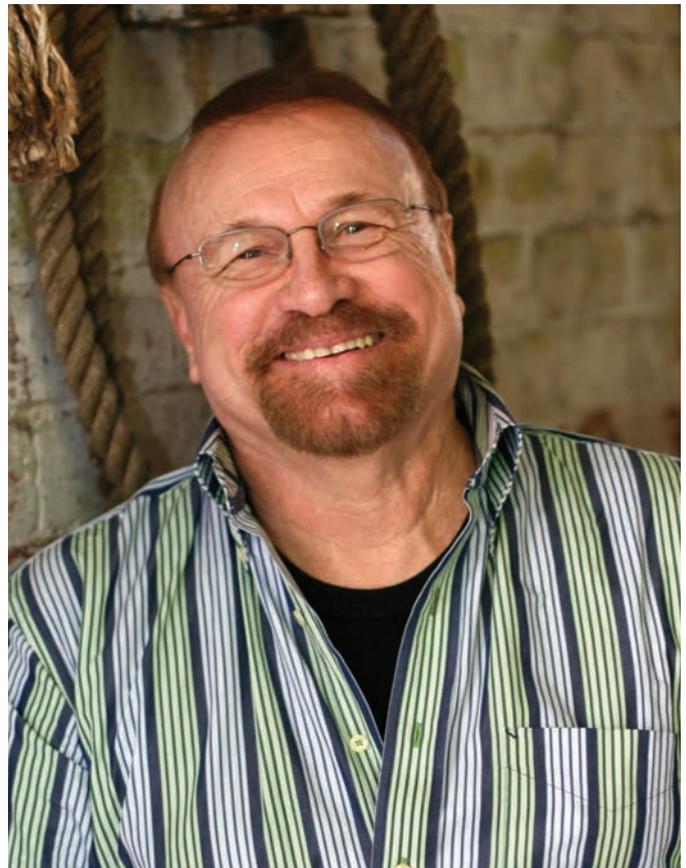
At the same time, he booked bands into the local arena. The likes of David Clayton Thomas and Mandala. In the same month that Dave began testing his chops on air, a fledgling publication called RPM Weekly appeared, the product of Walt Grealis' dream of promoting a vibrant Canadian music industry. Dave would send RPM his weekly Top 40 charts (comprised of 20 International acts and 20 Canadian acts) and Walt would use them to get a handle on breaking music.

Following his stint in Belleville, Dave played the field with stops at CKOC in Hamilton, CHQT in Edmonton, CFGM in Toronto and the legendary CHUM (as MD). In something that would foreshadow his future, he started consulting with various stations like Montreal's CFOX.

In 1977 came a major break. Dave partnered with John Parikhal to apply for a new station, Q107.

With support from Alan Slight and Tony Viner, and against all odds, they won the bid and history was made. The new station featured media greats like Bob Mackowycz and the late Mark Daly.

This success marked the beginning of Joint Communications, one of the most prominent radio consultancy firms ever. The two



**Fifty Years On and Going Strong:** Radio broadcaster, CARAS president, media entrepreneur, industry consultant and more, Dave Charles is still active in the business he loves, fifty years after getting his start on-air.

partners had a fascinating relationship. John was the mercurial futurist and master of the sound bite. Dave was the down to earth programming expert with a wealth of practical experience and a wonderful way with the clients. Within a couple of years they were consulting for prominent stations right across the U.S. and Canada.



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# RADIO BROADCASTING

In 1990, Dave broadened his horizons, taking on the role of President of the Canadian Academy of Recording Arts & Sciences (CARAS), producers of the Juno Awards. He was the first broadcaster ever to assume that position. Here, once again, he continued to champion and foster the development of Canadian music.

In 1994, Dave expanded his boundaries when he received an offer to join the Austereo Radio Group based in Australia. There he helped to develop duopoly radio networks and innovative new programming in cities across that country. Next he formed a super media consultancy with partner Greg Smith called ESP (Entertainment Specialty Programming) which developed commercial radio in Malaysia, Singapore, Europe and South Africa. In all, Dave spent 13 years "Down Under" in what he calls "the most successful move of my life". Since then, he sold Parikhhal his 50% of Joint Communications and Greg Smith has retired.

In 2009, Dave returned home to care for his mother who had taken ill. This also marked the opportunity to re-establish old relationships in his homeland. In fact, every year he and record executive Gary Muth, a long time loyal friend, have hosted an annual get together for radio and music industry veterans. An event I always look forward to.

These days, Dave is busier than ever creating innovative media strategies with his new firm MRI (Media Results International). In addition to consulting on programming and station acquisitions, he has teamed with Greg Nisbet of Mediazoic Inc., a company which helps individuals and corporate clients navigate the minefield of creating their own online radio

stations. Things are equally good on the home front where he has found happiness with partner Rita Cugini (well known broadcast consultant and ex CRTC Commissioner).

For those of us who love radio, these are challenging times as the medium struggles to fine its way toward the future. It has been my honour to count Dave Charles as a friend and colleague over the years.

With Dave as a continuing champion of both radio and Canadian music, I am sure the future is in good hands.



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## Thirty Years of Praising Canadians

It's not always been fashionable to speak proudly of our national achievements; some think it quite impolite – if not foolish.

But, thirty years ago, **Dick Drew** could see from personal experience that Canada was bursting with opportunity, not the least of which was the chance to report on Canadian achievements in the radio, TV and media industry.

He wanted to get that message out, loud and clear, and so he launched a daily radio show, a series of print articles and a book that profiled the achievements of great Canadians.

"I wanted Canada's young people to ignore the nay-sayers; to look at the positive side," Drew recalled. "The program mantra was and still is: *If your mind will conceive it, and your heart will believe it, you will achieve it.*"

Ad agencies thought the idea outlandish at first, Drew recalls. "During one boardroom presentation, an ad guy laughed when I said the series would likely last at least five years. He said quite smugly with a cultured accent, 'You will run out of achievers in 13 weeks'."

That was three decades and over 4,500 Achievers ago and still counting, so Happy 30th Anniversary!

Eventually, Canadian Achievers became a hit in both Official Languages, and it was heard daily on 150 of Canada's top English language radio stations, garnering some 1,200,000 adult impressions weekly according to one report.

That was enough to trigger talk of a book, so Drew developed a mock-up and began calling on Canada's top publishers: none showed any interest.

Cue the feisty little French-Canadian from New Brunswick, **Dick's wife of some 56 years, Aline.**

"You tell radio listeners to never give up," she reminded him. "Well, you should follow your own advice. Publish it yourself!"

Starting from scratch in the publishing business is tough going, but with much hard work on Aline's part, too, Dick did just that, eventually selling some 60,000 copies (it's available online for free down-



Since 1984 Dick Drew has been reporting Canadian Achiever stories on radio, syndicated newspaper columns, best selling books, and in his column for **Broadcaster Magazine**.

load at the author's website, and there is a bi-lingual book, as well).

**Canadian Achievers** also appears regularly in this magazine, still adhering to Dick Drew's original belief that Canada is a land of immense opportunity – and achievement.

Surely, he is one of his own best examples, but Dick is always quick to defer to others, so here is a quote from **Bruce Blackadar's** column in **The Toronto Star** that speaks well of Dick's continuing vision:

*"There is something unnatural about the idea of Canadians actually standing tall and crowing about themselves. We are, after all, a nation of people born to self restraint. When it comes to discussing our accomplishments, an embarrassing aw-shucks modesty allegedly sets the stamp on our style. But Dick Drew doesn't buy any of this."* LR

# TFO: Content Factory for Social and Digital Media

**A**s Groupe Média TFO, the Ontario government agency running the province's French language TV channel, moves further into the digital domain, it has a new location, new studio, new control rooms and edit suites, and a newfound ability to produce some 40 per cent more content in-house, while realizing significant out of pocket (freelance staff) savings.

The company knew it needed a new technology platform to get such productivity gains, and as such it moved to a fully accessible production environment quite different from the traditional workflow of camcorder/ingest/edit suite/deliver and transcode. Shooting had to be on the most appropriate device, from an iPhone to an HD camcorder; editing – at least shaping the program – had to be by the producer or journalist and in the native shooting format; and delivery had to be fast and automated.

To achieve this, the TFO technical team worked with Canadian systems integrator Applied Electronics to develop a core workflow. Central to this was Curator from IPV, which provides the production asset management layer. It manages the flow of content around the system, providing seamless integration with the business systems, and with the desktop editing.

IPV Curator interfaces well with other hardware and software, particularly with Adobe Premiere Pro, so desktop editing could be implemented in a way that required no management overhead.

Now, content can now be shot on virtually any device. TFO has added to its existing P2 camcorders with Canon C300s and iPad shooting kits which allow users to capture video, clip it up and, using a Signiant app, and file it direct into the Curator network ready for further work or for immediate publishing.

Video material shot on any device is available for editing, using a browse resolution proxy, within a few seconds of the ingest starting. A journalist or producer can come in with the story fresh in their minds, sit at any computer, and start putting the package together. At a stroke, TFO moved from three craft edit suites to 50 or more edit workstations.

A render farm, managed by IPV Curator, is attached to the network. So simple packages can be completed at the desktop at browse resolution, then conformed and prepared for delivery fully automatically.

All editing is done at the native resolution of the content. If archive material is being added to something newly shot, Premiere Pro allows mixed formats on any timeline.

Stories, programs and packages can be completed at the desktop, or a shaped piece can be sent to one of the existing craft edit suites for polishing.

"It's simple to pull in the projects that have been started by journalists," described TFO editor Suzanne Nuttall. "They pick shots and create a rough assemble and we finish it. The

*continued on page 8*



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The new Roland VC-1 Series of Video Converters address the demand for high quality video and audio conversion in post production and live environments. The VC-1 Series provides uncompromising picture quality by maintaining the video characteristics of the original signal with no change in color or brightness, rich blacks and super whites, and no interlace artifacts or pixel shifting. The converters support 3G SDI, audio embedding/de-embedding and HDCP content.



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TFO has realized tremendous productivity gains since its installation of new media management, digital production and nonlinear editing tools, including IPV Curator and Adobe Premiere Pro.

journalists are basically doing what they would have done on paper: choosing the shots to tell the story.”

“Everything is much faster now,” producer Alexandre Levert added. “I can log my shots, rename them as necessary, then in Premiere I can do a rough cut or, if it is a simple piece, I can complete it and it will be automatically rendered. The editors do not have to spend time on the structure, so they can be more creative. And I can leave them a lot more flexibility in the way they use B roll, which I hope is more interesting for them and for the viewer.”

TFO also has two studios in its Toronto headquarters, and as part of the project built a new control room. Rather than

a conventional crew, the new platform allows the complete production to be managed by two operators alongside the director and PA.

The production operator calls up any material to be played in using the IPV Curator, and records direct to the server using the same software. Graphics and captions are created in Adobe in response to Curator requests. During breaks in recording the same operator on the same workstation can clip up recordings and assemble edit as the day goes, so a complex show can be completed in virtually the studio time.

Any active content is available to be delivered to any platform. So journalists

and producers are encouraged to put clips and trailers on their personal blogs and to post to social media what they are doing, to promote the work of the broadcaster and to drive further viewing.

Curator manages all the work in progress material on a network cluster of Isilon nodes. Alongside storage, the production and render farm are completely format agnostic.

Producers never need to think about delivery formats. The content is created in a completely standardised workflow, then delivered to whatever platform or platforms are appropriate. The delivery – transcoding, repacking of the metadata and so on – is handled automatically by Curator, according to defined business rules.

When content is to be archived long-term, it is handed from Curator to TFO’s existing Pro Consultant Informatique business system.

TFO’s executive producer Nadine Dupont described the new workflow as “genius. We have access to content virtually instantly, and that impacts on our ability to put stories together. We want to be very much in the here and now: we cannot consider taking three or four weeks to do a piece. Television cannot be done the way it was 30 years ago. Today we will send someone out of the office at 9:30 in the morning with an iPhone, and the finished piece is online by noon. That sort of immediacy – which IPV Curator has given us – has exceeded my expectations.”

## WESTERN ASSOCIATION OF BROADCAST ENGINEERS



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## 'National Legacy' Honoured at Age 65 as Academy Presents Screen Awards for Best in Cinema, Television and Digital Media

The Academy of Canadian Cinema & Television presented the Canadian Screen Awards during a live CBC Broadcast Gala on March 9; it was hosted by comedy legend Martin Short from the prestigious Sony Centre for the Performing Arts in Toronto.

*Gabrielle* won the Best Picture and Best Actress award, but *Enemy*, an English-language thriller by Quebec director Denis Villeneuve, was the big winner with five awards, including best director, best supporting actress, cinematography, score and editing.

On the TV screen, cable comedy *Call Me Fitz* was a big winner, named best comedy with lead actor Jason Priestley taking best comic actor and his co-star Tracy Dawson winning best comic actress.

Three previously announced Academy Special Awards were also presented: to *The Mortal Instruments: City of Bones*, with producer Don Carmody taking home the Cineplex Golden Reel Award; director David Cronenberg was honoured with the Lifetime Achievement Award; and Emanuel



Hoss-Desmarais was given the Claude Jutra Award for Best First Feature Film sponsored by Telefilm Canada.

The Academy also presented Awards in Digital Media, News & Sports, Documentary, Lifestyle, and Reality programming, as part of Canadian Screen Week celebrations and activities.

Complete listings of the 2014 CSA winners can be found online, at [broadcastermagazine.com](http://broadcastermagazine.com); digital media winners are listed at [mediacastermagazine.com](http://mediacastermagazine.com), or visit [www.academy.ca/](http://www.academy.ca/)

"At 65 years young, we're only getting better," noted Helga Stephenson, Academy CEO. "This anniversary marks a celebration of our Canadian screen idols, from Mary Pickford to John Candy to Tatiana Maslany, these world renowned stars have helped to shape a national legacy and continue to create new opportunities for our growing Canadian star system. On behalf of the Academy, I applaud all of (the) outstanding Canadian Screen Awards winners and Academy Special Award recipients."

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# An Introduction to Ultra HDTV and HEVC

By Gregory Cox, Senior Application Engineer, ATEME

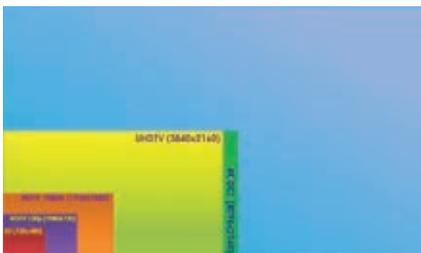
We are yet again at a precipice in technology with the introduction of HEVC and 4K. This is the new standard of video quality that will boast resolutions far beyond HD and catapult television into what we will all come to visualize as Ultra High Definition (UHD) TV.

Will this be another iteration of 3D? Or will this parallel the impact HD had on SD in Markets ranging from broadcast, to cable, to mobile devices and cellular phones. Broadcasters and content/service providers are in a heated race to answer this question. The major challenge/hurdle that everyone is tripping over is the bandwidth that will be required to deliver such media. To make any kind of hypothesis as to how this will pan out, we'll need to dig deeper into what HEVC and 4K actually are. Let's begin by first understanding the differences between HEVC and 4K. While some may use them interchangeably, they are different and should not be confused.

## 4K and UHDTV

The ITU (International Telecom Union) Ultra High Definition standard includes two formats, a "4K" format named UHDTV1 and an "8K" format, UHDTV2. UHDTV1 is a resolution which is 4 times the resolution of HD (1920x1080) for television while True 4K is effectively a standard for digital cinema with 4096x2160 resolution. UHDTV resolutions will be delivered to the home as UHDTV at an astounding 3840x2160 lines (8.3 megapixels). The final iteration of the UHDTV standard (resolution) is UHDTV2. UHDTV2 is 7680 pixels \_ 4320 lines (33.2 megapixels) and is considered for future deliveries.

UDHTV is assumed to have a picture aspect ratio of 16:9 and framerates will range from 23.976 to 120Hz as a progressive scan and will support 4:2:0, 4:2:2, and 4:4:4 chroma sampling. Bit depths will soar to 10-bit, 12-bit and potentially higher levels of color precision with an extended gamut



## HEVC

High Efficiency Video Coding (HEVC) is the newest video coding standard of the ITU-T Video Coding Experts Group and the ISO/IEC Moving Picture Experts Group. The main goal of the HEVC standardization effort is to enable significantly improved compression performance relative to existing standards—in the range of 50% bit-rate reduction for equal perceptual video quality. The HEVC standard is designed to achieve multiple goals, including coding efficiency, ease of transport system integration and data loss resilience, as well as ease of implementation using parallel processing architectures. HEVC is also known as H.265 or MPEG-H part 2 and will be the delivery path for UHDTV.



Here is an example of the progression to the new resolution that UHDTV is expected to bring:

## Increased detail perception



## Industry Challenges

Aside from delivery concerns to the end users, another questionable item that all broadcasters and service providers are struggling with is timing. This timing is specific to when a significant number of

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consumers will actually have a 4K UHDTV viewing monitor or television in the home. While there will be an initial movement by wealthy consumers who can afford the outrageous prices in the first push to market, deliveries are expected to reach all customers if this race is expected to maintain pace with any velocity. Currently there are many offerings as it relates to monitors however the price point begins right around the “4K” mark! Many consumers will wait for prices to drop from the stratosphere before committing to this new HD format and television manufacturers are already looking into strategic ways to bring this cost down.

The difficulty of 4K UHDTV spills over into the home as well, to consumers. Broadcasters will too have to consider other devices that sit in the majority of television viewers’ homes - set top boxes. Set top boxes currently have chipsets that are not capable of processing the new format and the boxes are unable to decode 4K UHDTV material. There’s also the question of the HDD and the ability to store massive amounts of data for DVR purposes. This will be an integral part in how 4K UHDTV is delivered to the home. Along with determining how broadcasters, cable and satellite providers will get 4K UHDTV to the set top box – if there is a set-top-box – interconnectivity within the home is currently an issue. HDMI is the choice cable, in many homes, for delivering a High Quality HD Digital signal to the television. Currently HDMI is limited to **30Hz** under the latest HDMI standard of 1.6. While the 4K standard provides for a range of rates, it is believed that HDMI will be required to deliver **60 Hz** to the television. It is expected that this will be supported with HDMI 2.0 slated for delivery in 2013.

So we’ve identified what 4K UHDTV and HEVC are, and we know that broadcasters have work to do to get the media to end-users. But we’ve forgotten one major point in all of this; how can you send 4 to 8 times the amount of data to the end-user without spending billions in infrastructure make-overs? Many of the older broadcasting plants are SDI, which makes for difficult transportation of high resolution content across the manufacturing plant. Will the promise of new customers

and new revenue streams validate potentially moving existing infrastructure to an all fiber plant? Will plants that are currently fiber have any obvious advantage in positioning themselves for this new technology? These are questions that still remain to be determined and only time will tell.

HEVC can be powerful if leveraged properly. One of the most important points to look at is coding structure. ATEME has developed the most advanced HEVC encoder product in the industry and has been building codecs since 1991 and does not “third party” algorithms. It is a partner of the 4EVER (for Enhanced Video ExpeRIence) Project, a French research consortium that started as a three-year collaboration and multi-million euro research plan. The objectives of the consortium were to research, develop and promote an enhanced quality television experience. As an active contributor to the HEVC standardization process we’ve involved our own experts. For more information about the 4EVER Project visit: <http://www.4ever-project.com/>

### HEVC Coding

Let’s dig into the detailed complexity of HEVC and its coding structure. The HEVC coded is optimized with the Quadtree Coding Structure. A quadtree is a tree data structure in which each internal node has exactly four children. Quadtrees are most often used to partition a two-dimensional space by recursively subdividing it into four quadrants or regions. The regions may be square or rectangular, or may have arbitrary shapes.



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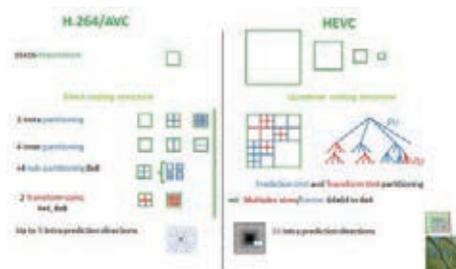
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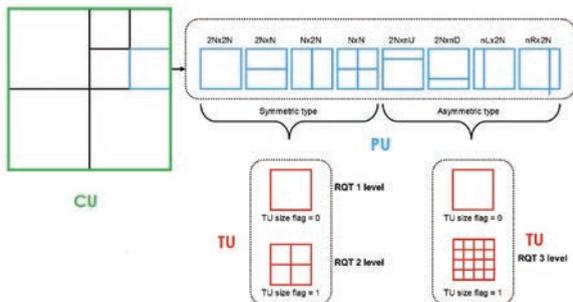


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The macroblocks used in H.264/AVC are replaced by Coding Tree Units in HEVC. The above image shows how an image block is split into the quad tree structure. The Coding Tree Unit (CTU) consists of a Luma Coding Tree Block (CTB) and the corresponding chroma CTBs and syntax elements. The CTU specifies the positions and the sizes of the Luma Coding Block (CB) and chroma CB. One Luma CB and generally two chroma CBs together with syntax, form a Coding Unit (CU). A CTB can have one CU or be split into several CUs. The decision to code an area of image as intra or inter is taken at the CU level. A CU is the root for both Prediction Unit (PU) and Transform Unit (TU). A Prediction Block (PB) can be the size of a CB or be split further into smaller luma and chroma PBs. The supported sizes are 64x64, 32x32, 16x16, 8x8 and 4x4. Details are seen in the image below.

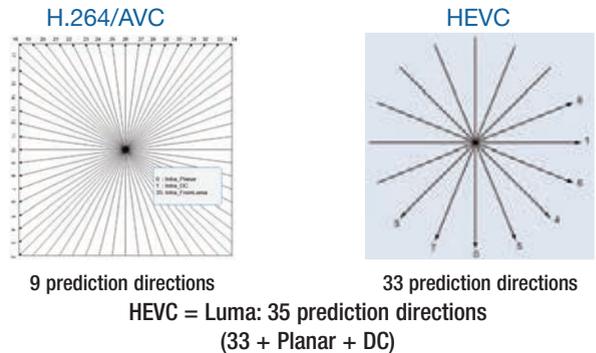


For inter prediction modes, non-square modes are allowed as shown below. An inter frame PB cannot have a size of 4x4.



For intra prediction, HEVC specifies 35 different prediction modes for luma samples. For each PB, any one of the 35

prediction modes can be used to generate a prediction. Both the encoder and decoder always use the row of pixels to the top, and the column of pixels to the left of the current prediction block, to generate the prediction. The prediction mode specifies how the top row or the left column should be used to generate a prediction. In HEVC, there are 33 angular modes, a DC mode and an interpolation mode. The figure below shows the angular modes and the corresponding mode numbers in HEVC.



Depending on the position of the intra prediction block, any number of neighboring samples may not be available. For example, they could be external to the picture, in another slice, or belong to a CU that will be decoded in the future (causality violation). Any samples that are not available are filled in using a well-defined process after which the neighboring arrays are completely full of valid samples. Depending on the block size and intra mode, the neighboring arrays are filtered.

### Rate Distortion Optimized coding decision

To generate a prediction for the current block, the decoder has the pixels to the top and the left pixels. The encoder must also determine the size of the prediction block (PB) to be used. For a coding block, the HEVC encoder must check for all possible prediction modes at all allowed PB sizes and select the best combinations of PB sizes and modes to encode a certain coding unit (CU). This decision is made based on rate distortion optimization (RDO). With no time constraint when encoding content offline, it is possible to try all the possible encoding modes, measure distortion for every mode, and apply the mode



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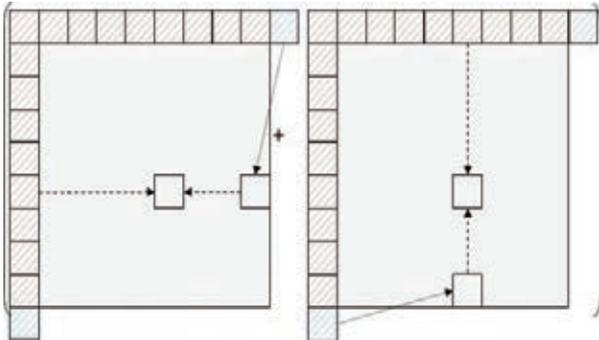
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decision based on these results. But the real-time encoding of live content requires shortcuts and original prediction algorithm to guess those results and make a smart mode decision without running a full encoding process of each possible mode. These original prediction algorithms are the main reason why two "standard" encoders, despite their compliance to the same standard, can produce very different results.

The process of intra prediction mode decision in HEVC involves the encoder measuring the values of distortion and rate for each of the 35 available modes and then selecting the mode that provides the lowest rate-distortion cost.



In the HEVC encoder, the PB size is also determined using rate-distortion optimization. While larger PBs are more efficient, smaller PBs are required in regions of high detail and texture. The encoder should measure the values of distortion and rate for each of the 35 modes at every level of the PU subtree.

ATEME has provided for several technical contributions to the standardization of HEVC such as parallelization tools (wavefront and tiles), intra coding tools, and high-level syntax. We have also offered professional considerations relating to 10/12bit, 4:2:2, and 4:4:4 specifications along with profile considerations. The largest contributions to the HEVC saga offered by ATEME are interlaced support and coding tools. There are two patents pending on this topic.

#### Proposed Solution for Interlaced Content

HEVC is generally not perceived as an efficient coding standard for interlaced content, which recent research has proven to be untrue. Indeed the new codec, pending a proper use of its toolset, can be applied very effectively to interlaced content by applying SAFF (Sequence Adaptive Frame Field) together with efficient field coding techniques and elaborate coding decision for each sequence. SAFF is designed to provide the best of both worlds as it relates to progressive and interlaced content. This is due

to coding modes being switched based on the content. This switching occurs at GOP (Group of Pictures) boundaries to ensure HEVC compliancy. This approach to interlaced content encoding allows coding efficiency results in HEVC to reach practically the same levels as what has been observed to date on progressive content in terms of PSNR (Peak Signal to Noise Ratio). When encoding a mixture of progressive and interlaced content, PSNR results are always better with SAFF when compared to Field only or Frame only coding.

While HEVC was originally designed for progressive video only, encoding interlaced content is possible. Broadcasters are hugely concerned regarding this fact as many house large libraries of legacy interlaced content that will need to be transcoded into the HEVC format.

#### Conclusion

Ultimately the HEVC codec will provide up to 50% bandwidth savings for today and tomorrow's television broadcasting. After contributing significantly to the standardization effort, ATEME will offer one of the most advanced implementations of the standard that broadcasters can deploy in the field to benefit from these bandwidth savings. ATEME will offer its first deliveries of HEVC on the TITAN product line to support OTT platforms for PCs, connected TVs, mobile devices and cellular phones. ATEME will also offer HEVC for UHDTV as

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# Mobile Media? – Try TV on Wheels!

The business model that keeps a company alive and vibrant must continually change. Any company that doesn't keep pace disappears.

That one reason why the 2nd edition of *TV on Wheels*, the definitive book about the Television Production Industry - On Location, was published. Covering what is called Remote TV in the U.S., and Outside Broadcasts in most of the rest of the world, the book looks at the history, planning, logistics, operations and technology that drive this changing industry.

(Broadcaster Magazine covered recent developments in mobile production technology in its December 2013 issue, with

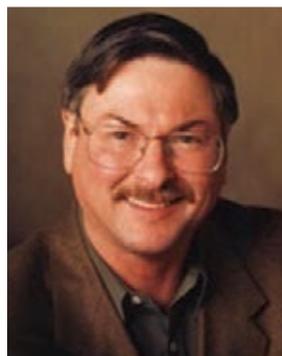
a look at Dome Productions and Videolink MAVIS.)

Change is a real constant in OB: one photo on the book's cover was taken inside Pittsburgh's Mellon Arena, built in 1961 but no longer standing. On the back, a photo shows a number of the trucks were owned and operated by National Mobile Television (NMT), getting ready for the Indy 500. What was once the largest remote production truck vendor at the time is likewise no longer standing.

Between the covers, this book provides a comprehensive collection of information about video and audio production trucks. It covers every aspect from satellite and microwave vans, remote pro audio trucks on up to the newest ten million dollar HD slide-out trailers seen at concerts and Super Bowl games. Costs, technology, how they are

built and designed, accidents and a full history of broadcast trucks are covered.

Written by accomplished industry veterans Jim Boston and George Hoover, this book has over 1000 photos and graphics that provide a detailed tour through a segment of the TV industry that helps points the way to how media will operate in the future.



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*Continued from page 13*

broadcasters prepare to embrace the new format. UHDTV Proof of Concepts and trials are at an all-time high while distributors, aggregators and service providers scramble to deliver the first immersed viewing experience to the home.

**About the Author**

Gregory Cox has over 10 years of engineering experience derived from companies like Ascent Media, Avail-TVN, and Telestream, where he developed his expertise in media workflows, video over IP, networking, post production and video compression. After joining ATEME in 2012, he was able to feed

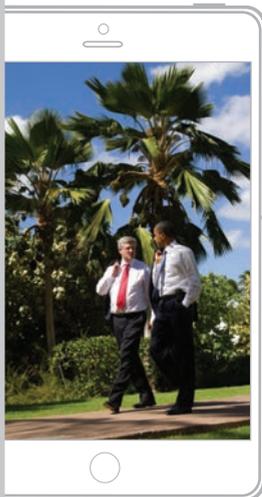
his obsession with new technologies by diving head first into the evolving world of HEVC and 4K/UHDTV. Recently, he was a speaker on 4K/UHDTV and HEVC at this year's WBU-ISOG hosted by Fox and will be speaking at the upcoming SMPTE Symposium 4K/UHD Business Track.



Gregory can be contacted at [g.cox@ateme.com](mailto:g.cox@ateme.com)

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