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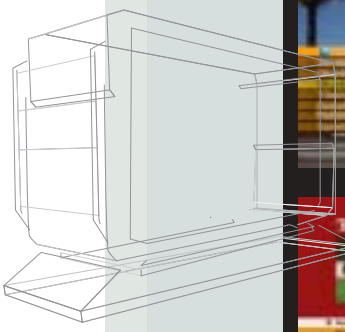
DVB - SCENE

Tune in to Digital Convergence



05

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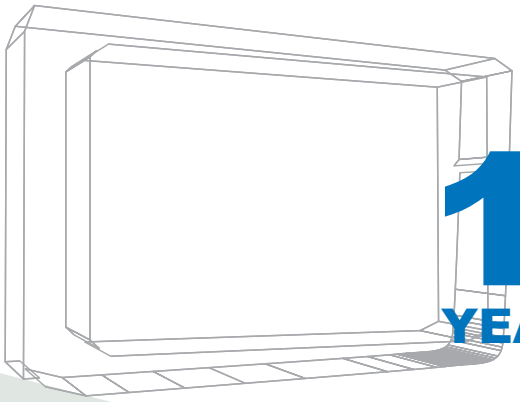

10 YEARS AFTER

Peter MacAvock,
Executive Director

A word from the DVB Project Office

DVB turns 10 in 2003. One often wonders if the Project continues to have relevance in the world of broadcasting, especially since there have been many changes in television. Digital television is a reality, but the harsher realities of the economic situation have meant that interactive television, once thought of as the panacea of the broadcaster and manufacturers, hasn't yet delivered on its promises.

This hasn't stopped DVB preparing for the day when we all "use" our TVs. MHP is the cornerstone of these preparations. It is now well under way, with the specifications maturing, the conformance process in place and delivering conformance test based logos. But what of the other initiatives around the world to develop open middleware systems? Well one of these, CableLabs, announced some time ago that they would adopt MHP and work with DVB to produce a specification essentially permitting MHP to run on their particular environment. The result is the Globally Executable MHP (GEM) specification developed by the MHP Umbrella Group (MUG). You can blame the group's chairman, Bill Foote (Sun) for the name, but it has raised a few eyebrows.

But that's not all. There are other groups working on open middleware systems who are following the GEM process very closely and we hope to be able to make announcements in this area shortly.

Regardless of this activity, MHP offers a unit set of conformance arrangements and a licensing regime which breaks the mould. Designed as a truly open system, it is delivering on its promise. Now the market must decide when and how to implement MHP with new and exciting applications.

DVB-T is often seen as the flagship DVB specification. It has been around for quite a while - since 1995 to be precise. It still continues to be at the leading edge of technology thanks to the latest developments in receiving technologies - evidence of a truly future-proof specification. All DVB-T eyes are on Berlin at the moment as they proceed towards analogue switch-off at an unbelieveable pace. Since the launch there in November 2002, 70,000 receivers have been sold which is a significant number for a small geographic region completely dominated by cable television. In fact, the first major switch-off date comes at the end of February, just as we go to press. Germany is key, because many of the social issues around switch-off will be dealt with some 10 years before the majority of us see analogue switched off.

This issue of DVB SCENE also reports on the developments in the UK where Freeview has taken everyone by surprise, and pleasant surprise at that. Freeview was launched to time with the Christmas season which is all important in Western European countries. The idea was fabulous, especially as the "converter boxes" (the low-end set-top-boxes available in the UK) were freely available at the type of price which made them appropriate Christmas presents. But the shops ran out of stocks of these converter boxes in mid-December.

So 2003 promises to be interesting for DVB. In these tough economic times, standardisation is more important than ever, as organisations can ill afford poorly targeted development investment as they prepare for better times to come. Will DVB be around in another 10 years? Well nobody knows, but you can be sure that DVB-T and MHP certainly will.

NEW MEMBERS

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DVB'S GEM

Bringing MHP's sparkle to the US and beyond

Bill Foote, JavaTV, iTV and Standardization Engineer – Sun Microsystems, L.A. & Chairman MHP Umbrella Group

In January 2002, the DVB technical module created a new working group, called the MHP Umbrella Group, or MUG. Our mission? To build on the worldwide momentum of the Multimedia Home Platform (MHP) by enabling it in other markets. The end goal was no less than the adoption of the core of MHP as a universal, global standard, even in NTSC markets such as the US. One year later, we are well on our way with GEM, a DVB specification that is a "blueprint" for building an MHP-based specification that is tailored to the requirements of another market.

MHP is the DVB specification for building interactivity into digital TV. It specifies all layers of the interactive component of a set-top box or digital TV set. This includes a core Java virtual machine, a number of interfaces used by applications as well as details of screen resolution, signalling, service information and modulation schemes (DVB-T, DVB-S and DVB-C). The MHP specification is backed by a comprehensive conformance test suite that ensures that all MHP compatible equipment works the same way. This enables a horizontal consumer market for receiving equipment. It also provides a common platform for enhanced and interactive television programming.

In markets such as the US and Japan, it's not practical to adopt all details of the MHP specification, because there is a substantial investment in equipment that is not compatible with MHP's requirements. The most obvious example may be video, where the US and Japan have a 30Hz frame rate at a somewhat lower vertical resolution than

"...MHP conformance testing can be applied in other markets."

that required by MHP. The differences go beyond that, however: service information is sent differently, the modulation schemes are different, subtitles are handled differently, and other details differ.

Despite all of this, most of the MHP specification applies perfectly to these other markets. Indeed, the vast majority of the MHP guarantees that impact network-independent broadcast applications can be preserved in other environments. Keeping these guarantees in all markets has a number of important benefits:

• Applications can be authored once, and work in all markets.

• Adoption of MHP's core across markets promotes economies of scale and competition. This hold the promise of driving the price of set-top boxes and digital TV sets down further, faster.

• Enhanced commonality of broadcast infrastructure similarly promotes economies of scale and competition, thus generating cost savings.

• The considerable number of man-years of effort invested in MHP conformance testing can be applied in other markets.

The MUG has made great progress toward achieving its goal. A single, worldwide iTV standard that unifies content, receiver manufacture and conformance testing across Europe, the US and the rest of the world now appears to be within reach.

Shortly after its formation, the MUG began work on a specification called GEM, which stands for Globally Executable MHP. GEM lays out those elements of MHP that must be supported in any iTV specification that is based on MHP. It's sort of a cookbook for creating an iTV specification: It describes the foundation and required technical essentials, such as the base virtual machine and a comprehensive set of application interfaces. It then includes requirements for those elements to be defined in a market-specific way, to adapt to local signalling or other elements of the local environment.

DVB'S LEGAL EAGLE

L-R: Carter Eltzroth and Anthony Dixon

At the November 2002 meeting of the DVB Steering Board, Carter Eltzroth was named as DVB's Legal Director. Although a new position within DVB, Carter comes well prepared. He has acted as the chairman of the Intellectual Property Rights Module since the inception of the DVB ten years ago.

Carter will continue working actively with the IPR Module and its new chairman, Anthony Dixon of Pace Microsystems, and he will see through to completion projects he helped launch over the past years.

"Over the next months I'll help the MHP compliance and licensing regime find its operational cruising speed," Carter told us. "I want to make sure that the regime administered by ETSI and the DVB Project Office is as efficient as possible for distribution of the MHP Test Suite and the MHP Mark. All the while of course the other key objectives are respect for the IPRs of the licensors and interoperability among MHP implementations.

"Also our MHP ambitions extend now to providing the core of the technology, through our GEM process, to sister standards forums in other broadcasting environments. At the Steering Board's November meeting, we adopted an approach to ensure reciprocity with our IPR rules and coordination with the MHP conformance regime."

Carter will also be following the progress on the initial steps in creating an IPR licensing regime for MHP and other recent DVB specifications. Working with Theo Peek, Chairman DVB, and Peter MacAvock, Executive Director, he'll be tackling the full range of other legal questions that a standards forum has to address. He's an Oxford graduate ("a degree in literae humaniores," he tells us, "that's Greek and Latin studies") and a member of the New York bar. He's a dual Belgian/US national.

Carter was one of the initial signers of the DVB's memorandum of understanding in 1993, when he was acting for pay TV operator FilmNet. He has sat on the Steering Board since, until becoming Legal Director. He'll be drawing on this experience, and his years in European broadcasting and new media technologies, as he begins his new work.

It's worth noting that GEM is not a mechanism for subsetting the MHP specification, to make something smaller. Aspects of MHP that are not directly required by GEM usually require that a "functional equivalent" be defined. For example, GEM does not require the exact color map of MHP, but it does require that a functionally equivalent color map, adapted to the local requirements, be defined. Generally speaking, GEM-compliant devices built for other markets will be about the same size as their MHP equivalents.

A specification built on GEM is called a "GEM terminal specification," and two are under development. CableLabs in the US is creating a specification called OCAP (OpenCable Applications Platform), which is the basis of the future iTV plans for cable television in North America. ARIB in Japan is studying the creation of a Japanese standard based on GEM for their terrestrial, satellite and cable markets.

A GEM Application is an application that is written only to the guarantees and interfaces that are present in GEM. The majority of broadcast content that isn't tied to a particular network can be written to just the GEM guarantees. GEM includes support for MHP-style graphics, service selection, tuning, data access, time-based and "do it now" stream events (or "triggers"), remote control interaction, and access to an optional interactive return channel for connection to the Internet. A GEM application will run unaltered on an MHP digital TV in Finland, an OCAP set-top in New York, or any other GEM-compliant device.

In January of 2003, the GEM specification was approved for publishing by the European Telecommunications Standards Institute as ETSI TS 102 819 V1.1.1. Work on the GEM terminal specification from CableLabs is nearing completion, and ARIB's technical work is progressing. We look forward to publication, and to the day when all interactive digital TV sets in the US and the rest of the world have MHP's GEM at their core.

"A GEM application will run unaltered on an MHP digital TV in Finland, an OCAP set-top in New York, or any other GEM-compliant device."

DVB 2.0

Making Progress

In May 2001, a commercial and technical strategy was defined for DVB - known as DVB 2.0 - which set out a path for the current phase of DVBs work. We are rapidly approaching the 10th birthday of DVB - a decade since the first members signed the original DVB MoU. How far have we progressed with the DVB 2.0 strategy over the last 2 years? How accurate have our predictions been?

“DVB’s vision is to build a content environment that combines the stability and interoperability of the world of broadcast with the vigour, innovation and multiplicity of services of the world of the Internet.”

The vision for DVB outlined above remains a valid statement of DVB’s intent. The business climate has become considerably more hostile since it was formulated. However, DVB has made very substantial progress against many of the objectives we set ourselves. Sometimes, it has taken longer than expected to resolve issues and deliver final specifications, processes or documents. In other instances, unexpected opportunities have emerged through DVB that are new and exciting. Many of these have fitted well within the DVB 2.0 strategy and brought additional strength to the overall work programme.

Back in 2001 we identified a number of commercial drivers for the next phase of DVB work.

1. Leveraging DVB’s Proven Processes

Technology has moved forward in a number of areas since the initial DVB specifications were put in place. The DVB-S satellite modulation scheme is a good example. It is now possible to carry significantly higher data rates on a satellite transponder using the latest modulation schemes. The DVB process is being used very effectively to define the DVB-S2 specification. This is an excellent example of the value in DVB’s well proven processes.

2. Convergence

In 2001 a prime convergence path was thought to be DVB broadcast services being delivered over IP networks to PCs. It now appears that PC convergence with TV broadcasting is happening less rapidly. The emerging market for handheld and portable devices is emerging as much more significant. DVB is working on a new specification, known as DVB-X to be delivered later this year; to support PDA devices and advanced mobile phones by delivering a one-way always-on broadband data stream to complement their two-way network connection based on GSM, GPRS or UMTS. The DVB-T terrestrial broadcasting standard is expected to be the basis for this solution.

3. Migration Routes

MHP is a sophisticated, feature rich solution for applications running on DVB receivers. It is very pleasing to see MHP being adopted in a number of markets around the world, including in the US cable TV market through DVB’s relationship with CableLabs. There has also been a constructive approach to defining migration paths to MHP in the German market and in identifying some minor enhancements to the MHP specification that would assist operators wishing to migrate smoothly and economically from MHEG5 to MHP.

4. A Global Approach

The initial DVB specifications are clearly the most widely used specifications for digital TV worldwide - by a substantial margin. However, they have not been adopted in every major market. For MHP to achieve its full potential, we should strive for it to be adopted as the preferred open solution in all major markets. This requires that MHP functionality should be available with all the major digital TV transmission formats. Provided that this approach is implemented in a way that retains DVB’s control of the core MHP specification - now and in the future - and that applications are fully portable between markets then we will have truly achieved our goal.

In conclusion, DVB is continuing to drive through new, valuable and innovative specifications that are well tuned to the need of the industry, in Europe and globally. Although there are many unexpected external challenges that DVB has had to address, it remains a vibrant and effective forum for the industry to collaborate on pre-competitive activities in a commercially focussed way.

Graham Mills, Chairman DVB Commercial Module has made a substantial contribution to the DVB industry group since its formation, setting the international specifications for digital TV and interactive services.

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DVB-X

Acronyms like DVB-S, DVB-C or DVB-T are familiar to most people working in broadcast engineering. However, many may not yet have heard of DVB-X. What is it?

The terrestrial broadcast transmission system (DVB-T) is known to fulfill all known requirements of a broadcast system targeting receivers in homes, offices, cars, etc. DVB-T is perfectly suited for reception by mobile receivers even at high driving-speeds, like for instance 170 km/h. However, if battery operated devices with single antenna reception at high speeds in large single frequency networks are needed then DVB-X steps into the scene. DVB-X is to some extent unkown as hinted by the X. It is based on the current DVB-T standard and is purposed for the new service scenarios where small, pocketable mobile terminals receive broadcast services in various places on the move. These terminals could be small handheld devices that may include integrated mobile phones and provide reception inside buildings, in cars, maybe even in trains.

The origins of DVB-X lie somewhere late in the year 2000 when a small group of interested parties started to study whether there is a need to change anything in DVB-T concerning the emerging new service scenarios. During the spring of 2002 the commercial module of DVB defined the commercial requirements of the possibly new standard for these service scenarios. This later led to the start of the official technical work within the DVB technical module in summer 2002 and the ad-hoc group DVB-X was formed. The first outcome of this group

Dr. Jukka Henriksson chairs the ad-hoc group DVB-X within TM. He holds 14 patents and is a Research Fellow in Nokia Research Center, Helsinki and a Senior Member of IEEE.

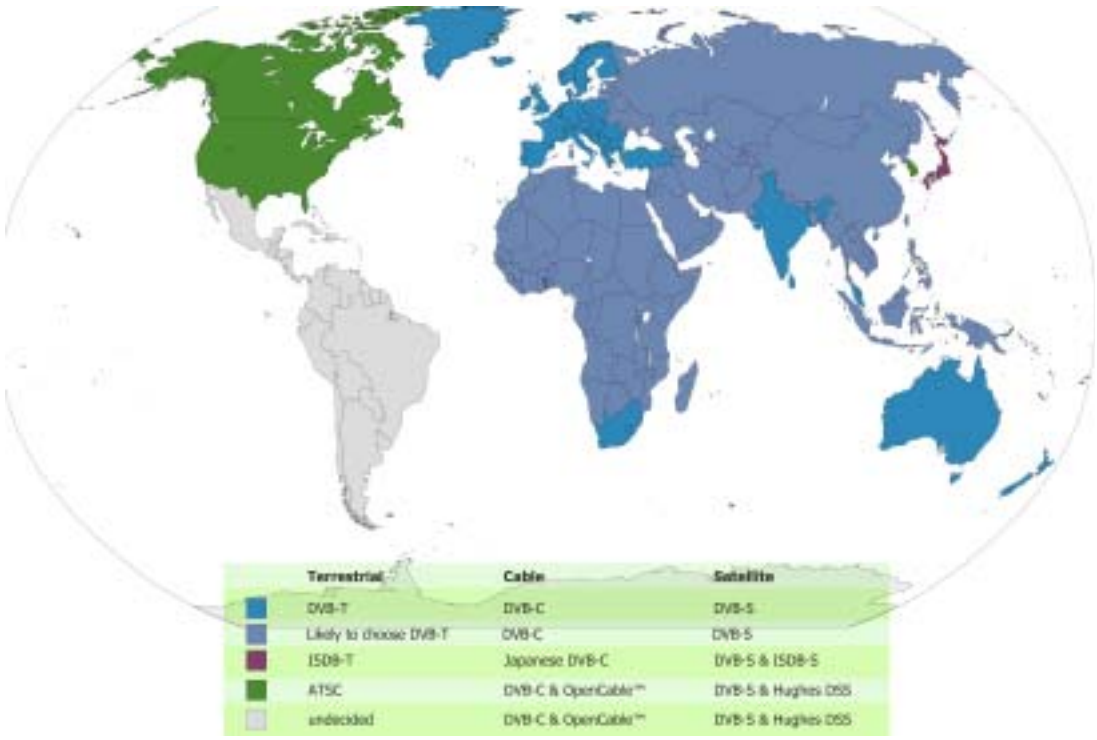
was the evaluation of whether DVB-T could do the job without any modifications. The conclusion was that DVB-T has excellent performance in many aspects and the vast majority of the commercial requirements are directly fulfilled as such. The battery-operated small devices in some network scenarios, however, could not be fully supported. That is why a Call for Technology was released in January 2003 and the inputs will be evaluated during spring 2003. The schedule is to get the first draft of the future standard ready in June 2003.

The new DVB-X standard, while by no way changing the current digital TV business models for fixed reception, could provide new business possibilities for a variety of players from broadcast and cellular operators to chip and equipment manufacturers. For the broadcast operators it would provide a new vehicle to reach their customers while they are on the move, for cellular operators it could provide a cost efficient way to implement data broadcast type of services and so on. For the end user this new standard would mean a more inexpensive and richer content experience in the mobile environment.

This would be very good news for the broadcasters. This would allow them to serve their current customers in a totally new way: service anywhere, anytime. This would even mean the possibility to gain millions of new customers among current mobile phone users. This is also very good news for mobile phone users. Logically, TV service is the main service that is missing from today's mobile

"...this new standard would mean a more inexpensive and richer content experience..."

handsets. In addition to voice, messaging, internet browsing, radio, still and video camera, TV would complement the service offering that digital convergence makes possible. According to field studies people are very keen on being able to receive TV in the device they already carry with them daily.



In My Opinion - Dermot Nolan

GLOBAL DIGITAL BROADCASTING IN 2003: **FROM HYPE TO HARSH REALITIES?**

The past twelve months has been a gloomy period in the TMT sectors created by the collapse of dotcom delusions, economic recession, geopolitical uncertainty and the harsh winds of commercial realism blowing over many digital television ventures around the world. With several spectacular DTT pay-tv collapses, mooted mergers of a number of rival digital satellite platforms around the world, comprehensive smartcard swap-out programmes in many countries due to endemic piracy, and advertising supported television taking a hammering digital broadcasting now must prove its economic worth.

We are seeing the plateauxing of subscribers to pay financed digital cable and satellite platforms around the world suggesting the pay-tv phase of digital television growth may now be peaking. The FT reported Germany's cable networks might not be digitised for many years because new owners do not believe viable business plans can be developed. Ambitious plans to deliver VOD via cable and telecommunications networks have been quietly sidelined by many telecommunications players preferring instead to focus on upgrading dialup customers to highspeed Internet services. And, almost de rigeur, HDTV launched as a technical success in a number of countries has failed to break out from its narrowcast niche.

Interesting future trends are now emerging in the UK, the world's largest digital market but where digital disasters have also hit hardest: ITVDigital folded and the two cable MSOs have needed refinancing to the tune of almost $30 billion after racking up debts in overambitious growth plans. The UK now has 40% digital television penetration, DVD penetration has shot to 25% penetration in three years, it is the largest widescreen market in the world, 80% have GSM phones and broadband connections are now expected to reach 25% within four years.

The Freeview-led renaissance of UK DTT has attracted the greatest attention leading to the record-breaking sale of 300,000 DVB-T adapter boxes priced at £99 in the first two months of service. This spectacular turn around, enabled by the DVB-T system flexibility, has confounded the sceptics with many leading agencies now predicting UK DTT will achieve mass-market penetration within five years. Freeview has around 2.0million TVHH and is the largest DTT service globally. The other digital Cinderella, DAB, has finally come good in the UK with availability of £99 portable digital radios which sold out before Xmas, with predicted sales exceeding 500k units in 2003.

Free-to-air digital TV is also emerging in countries like Germany where a portable and mobile DVB-T service launched to critical and commercial success in October 2002.

Global international DTT standards wars continue but DVB-T's rivals, either implemented or planned, exist largely as laboratory demonstrators/paper concepts or are plagued by severe technical problems, minimal consumer takeup, and abject failure to export these standards across national borders. In uncertain economic times broadcasters, consumers, Governments and regulators worldwide are more likely to endorse a tried and tested DVB-T system leveraging global economies of scale and scope and minimises business risk throughout the broadcasting value chain.

About the author: Dermot Nolan is a Director of Telecommunications and Broadcast services, a strategy consultancy specialising in the media and telecommunications sector with clients worldwide. Contact details: dmenolan@compuserve.com, +44 (0)20 7286 5570

CREATIVE ENVIRONMENTS

CANAL+TECHNOLOGIES has launched its new MEDIAHIGHWAY Development Kit (MHDK), a standard-based development environment for programmers wishing to create compelling interactive television applications for digital TV platforms worldwide.

MHDK is an effective environment for developing applications to be deployed on Java-based digital TV platforms, including those compatible with DVB-MHP 1.0.2 and all MEDIAHIGHWAY middleware profiles.

MHDK enables a developer to create, edit, test and debug an application on a PC, simulating the complete interactive TV technical chain. Thus, developers can easily check how an application will behave from its broadcast at the head-end to the final display on the TV screen.

By reducing equipment costs and accelerating development time, MHDK leads to faster time-to-market implementation for innovative iTV applications.

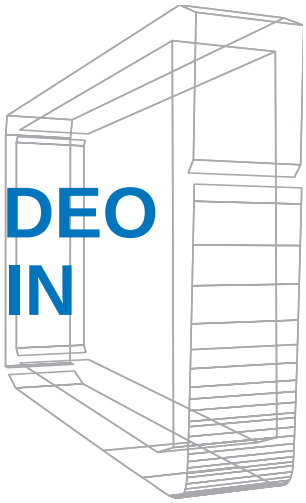
UK'S DIGITAL TERRESTIAL BACK ON TRACK

Over 300,000 digital terrestrial adapters have been sold in the UK in the first two months following the launch of free digital terrestrial television service Freeview. The BBC's news correspondent John Simpson, pictured above, together with a number of British celebrities featured in an televison commercial promoting the new service.

Over the same period, almost two million requests were received for information on Freeview, with approximately 700,000 calls being made to the telephone information line and 1,200,000 unique visits recorded to the website.

Andy Duncan, BBC Director of Marketing & Communications said: "Of course it's still early days for the launch of Freeview, but these figures show that there's undoubtedly a major opportunity out there for the idea of simple, free digital television. "We're delighted that Freeview is making the BBC's digital channels available to many more people and bringing in a new audience who've not considered digital television before."

ADVANCED AUDIO AND VIDEO CODING WITHIN DVB



Ken McCann, ZetaCast - Chairman of TM AHG on Audio-Visual Content (DVB-AVC)

New audio and video compression algorithms are now emerging that challenge the dominance of MPEG-2. These new algorithms offer an improvement in compression efficiency of more than two; in other words it will be possible to obtain comparable video and audio quality with less than half the bit-rate needed for MPEG-2 video and MPEG-2 Layer II audio. The improvement is partially due to a better understanding of compression techniques and partially due to the progressive effect of Moore's Law allowing a level of complexity to be included today that could not have been contemplated in consumer-priced equipment 8 years ago.

DVB does not develop compression algorithms itself, but it does evaluate the performance of candidate algorithms against commercial requirements. DVB then specifies parameters and constraints to give a good trade-off between performance and implementation cost for DVB services. In 1995, DVB published the document that became TR 101 154, the implementation guidelines for the use of MPEG-2 systems, video and audio. Work is now well underway on a similar exercise to include the advanced audio and video algorithms in the DVB suite of standards. This will allow the new H.264/AVC video and MPEG-4 High Efficiency AAC Profile audio to be used for DVB services delivered directly over IP as well for more traditional broadcast services where the audio and video are embedded within an MPEG-2 Transport Stream.

In addition to being more efficient than any previous video compression standard, H.264/AVC also has the distinction of having more names than any previous compression standard! The work began in ITU-T under the working name H.26L. At the same time, ISO/IEC was considering Advanced Video Coding (AVC) within the MPEG-4 standard. The ITU-T and MPEG experts then agreed to form a Joint Video Team, referred to as JVT. Within ITU-T it will be published as H.264, whilst ISO/IEC will publish it as Part 10 of the MPEG-4 specification, 14496-10.

"...also has the distinction of having more names than any previous compression standard!"

H.264/AVC is more of an evolution from MPEG-2 video than a radical change. As with all ITU-T and ISO/IEC algorithms since H.261 and MPEG-1, the architecture is based on a motion-compensated block transform. Like MPEG-1 and MPEG-2, H.264/AVC has intra-coded pictures, predicatively coded pictures and bi-directionally coded pictures (known as I-, P- and B-frames). However, H.264/AVC has smaller, dynamically selected block sizes to allow the encoder to represent both large and small moving objects more efficiently. It also provides multiple reference frames to allow the encoder to find the best match over several frames and it supports greater precision in the representation of motion vectors. The variable-length coding used to compress the picture and motion information is context-adaptive to give greater efficiency.

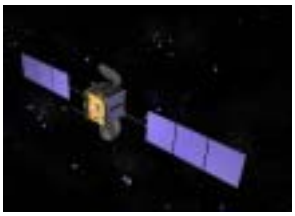
MPEG-2 Advanced Audio Coding (AAC) was first published in 1997 and it offered about twice the coding efficiency of Layer II. However, initial take-up was limited, as at that time the market was not really ready for a new audio compression scheme. MPEG-4 AAC is closely based on MPEG-2 AAC but includes some further enhancements such as perceptual noise substitution to give better performance at low bit-rates. The new MPEG-4 High Efficiency AAC Profile adds spectral bandwidth replication, to allow more efficient representation of high-frequency information by using the lower harmonic as a reference.

Of course, the increased sophistication of the video and audio compression algorithms does not come without requiring increased complexity of the encoder and decoder. In terms of the number of computer cycles required for a software implementation, the new algorithms have been estimated to be around 2 to 3 times more complex than MPEG-2.

So what are the likely early applications of the new algorithms? They are unlikely to replace MPEG-2 in existing services for many years to come, but will probably be used first for totally new services. One possible example is HDTV, where the potential bit-rate saving may significantly alter the viability of the business model. Another possible example would be low-resolution DVB services delivered over IP to mobile receivers.

"...new algorithms offer an improvement in compression efficiency..."

DVB-S2



NEW GENERATION SYSTEM FOR BROADBAND SATELLITE SERVICES

In 1994, DVB introduced the DVB-S standard (EN 300 421) and today the specification is used by satellite operators worldwide for television broadcasting services and data transmissions. It is based on QPSK modulation and convolutional / Reed-Solomon FEC (Forward Error Correction). In 1997, DVB-DSNG standard (EN 301210) was developed for satellite newsgathering and TV contribution services and specified the use of 8-PSK and 16-QAM modulation and a "pragmatic" reuse of DVB-S FEC.

Recently developed coding schemes based on iterative decoding, taken together with higher order modulation, promise more powerful alternatives to the coding and modulation schemes of the current DVB standard.

In Spring 2002 the DVB Commercial Module sub-group on Broadband Satellite Services approved the commercial requirements for a successor to the current DVB-S standard that may be introduced for new services and allow for long-term migration. The primary objective of the new specification is to enable delivery of a significantly higher data rate in a given transponder bandwidth than the current DVB standard.

The new specification will cover three satellite application areas: video and audio broadcasting; interactive services (direct path), such as Internet access, for the consumer market, and professional links (SNG, contribution, Internet Trunking). Furthermore, for broadcasting applications there are plans for two modes to be available: DVB-S2a, a non backwards-compatible mode, and DVB-S2b, a backwards-compatible mode, allowing "old" DVB-S receivers to decode at least part of the transmitted bouquet.

For unicasting applications, the DVB-S2 system will include Adaptive Coding and Modulation techniques (ACM), in order to differentiate the FEC error protection according to the service requirements and the propagation condition experienced by each specific customer.

On the basis of the Commercial

"...seven technical proposals are under investigation..."

Requirements, the Technical Module of DVB set-up the DVB-S2 ad-hoc group in May 2002, with the task to define the technical specification. The milestones of the work plan are the following: the specification for the non-backward compatible broadcast profile should be ready in April, and for Interactive services (including ACM) in June, while the backward-compatible broadcast profile should be defined before the Autumn 2003.

At present, seven technical proposals are under investigation by computer simulation. They are based on four families of codes with recursive decoding: TPC (Turbo Product Codes), SCCC (Serially Concatenated Convolutional Codes), PCCC (Parallel Concatenated Convolutional Codes), LDPC (Low Density Parity Check Codes), with or without a concatenated external block code (BCH or Reed-Solomon).

The first results are very promising. For broadcasting applications a capacity

"...objective of the new specification is to enable delivery of a significantly higher data rate..."

increase of 30-35% versus DVB-S looks feasible, assuming the same transponder characteristics and link-budget. The achieved performance of the best systems are only 1 dB from the Shannon capacity of the modulation, therefore it is expected that the DVB-S2 physical layer will be the state of the art for a very long period. Furthermore, for unicasting applications, the DVB-S2 FEC system combined with ACM technique promise a capacity increase of the satellite system between 100% and 200%, depending on the climatic characteristics of the coverage area: this may open the doors to cost effective fast Internet services by satellite, in direct competition with ADSL and cable terrestrial solutions.

Alberto Morello is director of the Research and Technical Innovation Centre of RAI-Radiotelevisione Italiana.

He was Chairman of the DVB ad-hoc groups which defined the technical specifications for the DVB-S and DVB-DSNG systems, and is now responsible for DVB-S2.

PLAYING GAMES

SkyLife, the Korean satellite broadcaster, will begin its commercial launch in March and is using the Alticast authoring tool, AltiComposer, to deliver MHP interactive services to its subscribers.

SkyLife's interactive services include: TV-Shopping, T-mail, SMS, Polling, News, Games, Quiz, Events and Weather.

VERTICALLY **CHALLENGED** - DIAGONALLY **ANSWERED** - HORIZONTALLY **ACHIEVED**

Anthony Smith-Chaigneau - Director of Marketing & Communication, ADB.

There has been a great deal of consternation about the lack of MHP receivers causing delays in the roll out of MHP. Now that manufacturers have overcome this hurdle, why are we not seeing millions of receivers in stores? What is the problem? Where are the MHP markets? Well as far as DVB member ADB is aware, they are wherever signals are being broadcast on-air (not as a field trial), which to date is Finland, Germany (partially on satellite) and Korea (satellite). This does not however, constitute a mass market, which is a drawback for those with production lines ready to rumble into action.

At ADB we are constantly asked, "When will you have your fantastic MHP boxes in the shops?" Well the answer is simple - if there are no MHP consumer services on-air - there is no set top box market available. The STB horizontal market is only the 'Channel Marketing' model of Factory - Distributor - Retailer - Consumer. There is nothing the STB/iDTV manufacturer can do if the distributors will not buy product that they cannot move on. To have any full commitment from MHP distributors, CE vendors, software houses, applications developers and the likes require MHP on-air commitment. In the meantime, MHP companies are in limbo, waiting, hoping and encouraging the broadcasters and operators to get on with it and switch it on as fast as possible before their enthusiasm, and for some their cash reserve, runs out.

Finland will have an MHP horizontal market because it has gone about it the hard way and has been a pioneer and model of how to digitize and how to launch MHP services. If you have an MHP box you get the added services, if you want 'plain vanilla digital services' you can have them too - off the same networks with different types of boxes available to the consumer. MHP receivers were virtually on the market at the same time as Zapper boxes and the consumer was allowed to make an educated choice. Some made it on price, some on technology, however, TV had to advertise itself on TV - Public Service announcements were a key factor and reduced advertising spots for Distributors and Retailers also helped. Some cable and all terrestrial broadcasts have MHP.

We have to encourage countries, Broadcasters/Operators/Networks to move to digital as soon as they possibly can. They should include MHP Enhanced, and Interactive Services at the same time and allow the customer to choose the type of STB that suits their needs. If the services are compelling enough consumers will pay good money to access them. We will then and only then have a fabulous Zapper/MHP Receiver/iDTV Horizontal Market.

SERVICE REQUIREMENTS FOR DVB-T: THE FINAL REPORT

At DigiTAG (the Digital Terrestrial TV Action Group) we have often been asked by broadcasters or network operators new to Digital Terrestrial TV and who are thinking of starting tests or field trials to advise them on which of the 30+ modes in the DVB-T standard they should choose. Of course our answer 'It all depends what sort of service you want to offer....' doesn't satisfy them, but then we point out that their question is a bit like 'how long is a piece of string?' There are plenty of variables which need to be considered on the service features you want to offer, and a particularly critical question is how much frequency spectrum may be available.

DigiTAG brings together people from all aspects of the broadcasting industry - broadcasters, operators, regulators and manufacturers - so when we set up our Spectrum Matters group in 2001 we were able to call upon experts from many disciplines to tackle the issue in a thorough way. An important part of the study was a survey of service requirements, which sampled the thinking of 34 targeted experts from 21 countries. The questionnaire probed topics such as Type of service (traditional TV, video-on-demand, Internet access, Datacasting, shopping/ banking services, IP-based services etc.), Coverage (the geographical area or population over which the service is to be available including regionality), Capacity, Quality and Reliability, Reception mode (fixed, portable or mobile), Type of Reception Equipment, Interactivity, Transmitter network topology (using an existing TV network, a dense network of low-power sites, or a cellular network for interactive applications), the DVB-T mode, Frequency Planning model (multi-frequency or single-frequency networks) and Convergent technologies- the use of multiple technologies (for example, DVB-T and UMTS) to provide the service. This produced very interesting results with some positive signs of consensus but plenty of variety in the detail.

But we also wanted to look to the all-digital future, for some countries at least ten years from now. To allow people to escape from the constraints imposed by the real world, and the present day, we held a brainstorming workshop where we invented three mythical countries. These countries were broadly representative of three major distinctions between typical situations found today - the countries where terrestrial delivery dominates, where cable delivery dominates or where there is a highly competitive mix of cable, satellite and terrestrial delivery. This resulted in interesting conclusions showing how influential the present market conditions are to the future service requirements and the development of a DTT offer. The typical demand found was for 100-150 Mbit/s total capacity, equivalent to between four and fifteen multiplexes depending on the system variant to be used.

The spectrum planners of the ITU, CEPT and EBU have been looking carefully at the DigiTAG Report as part of their preparations for the marathon series of meetings which will lead to a new Frequency Plan for Europe in 2005 or 2006. The new Plan will replace the now 42 year old Plan fixed at a Regional Radio Conference in 1961 and known by the cognoscenti as 'Stockholm '61'. Preliminary conclusions from their initial study to convert reception requirements and the coverage targets into precise frequency spectrum requirements seem to suggest that they have plenty of work to complete between now and 2006 if the are to squeeze DTT into the available spectrum and simultaneously reach the target population coverage and provide the required number of multiplexes!

The full report can be downloaded from www.digitag.org.

Ed Wilson has worked in the New Technology Division of the EBU in Geneva since 1989, and is presently also Project Manager for DigiTAG and Secretary of the DVB Commercial Module.

COPY PROTECTION
WORK IN THE DVB

By Chris Hibbert, Chairman, DVB-Copy Protection Technologies Group

Digital distribution of video and audio (content) into homes and the advent of affordable consumer digital recording and processing equipment and software is increasing both the ease of copying and re-distribution, and the quality of the resulting copies and re-distributed content. This is causing concern amongst rights owners and their licensees about unauthorised copying and re-distribution and the resulting loss of revenue.

The DVB is working towards producing a specification for an open, interoperable, Copy Protection and Content Management (CPCM) system for use in digital broadcasting, consumer products and in-home networks to provide end-to-end protection for content in all processes from the point of initial distribution to the end-user's point of consumption (viewing and listening).

The DVB CPCM system specification is intended to provide a means to prevent unauthorised copying and re-distribution of content whilst also enabling the widest range of new business models, including new methods for the legitimate distribution of content, brought about by the introduction of new compelling consumer products, such as the personal digital recorder (PDR).

DVB Commercial Approach

In September 1999 the DVB established a new sub-group, DVB-CP (Copy Protection) of its Commercial Module with a mandate to prepare commercial requirements for a CPCM system to provide a common framework for the protection and management of content beyond the traditional boundary points of DVB compliant Conditional Access (CA) systems and for the protection of content delivered by free-to-view broadcasters. In particular, the scope of the required system includes in-home digital networks and PDRs. In common with all DVB standardisation work, the goal of DVB-CPCM is an open, interoperable, flexible, industry consensus and market-led specification.

The Stakeholders

The first step in the requirements capture process undertaken by the DVB-CP group was to identify the key stakeholders and constituencies of interest amongst the DVB members. These comprised:

- rights owners - including representatives of the major movie studios;
- consumer electronics manufacturers;
- broadcasters and platform operators (including both pay and free-to-view services);
- technology providers - including chip manufacturers and CA security technology providers.

Inevitably, viewpoints were initially somewhat polarised between these four industry groups. For example, there was clearly a need to balance the concerns of the rights owners to protect their revenues with the concerns of the consumer electronics industry to protect the investment made by their customers in purchasing equipment. However, despite these differences, requirements captured from the perspective of each constituency showed a great deal of commonality

The DVB CPCM System

Scope

Although the functionality targeted for DVB-CPCM is much less ambitious than that of a full digital rights management (DRM) system, the scope envisaged remains end-to-end protection for content in all processes from the point of initial distribution to the end-user through to the point of consumption. It is also intended that DVB-CPCM shall be applicable to the widest range of equipment and not just restricted to DVB-specified systems: this encompasses in-home digital networks and personal digital recorders as well as all digital delivery systems such as satellite, terrestrial, cable, and the Internet. If widely adopted the system could be extended to protect content distributed on pre-recorded media.

It is recognised that other DRM and copy protection systems already exist in the marketplace and will continue to be used and developed. Hence to the extent possible, without compromising its integrity and security, DVB-CPCM must co-exist with and interoperate with other DRM and copy protection systems.

Functional Model

It was found to be essential to identify a functional model describing how the system would operate - indicating the need for the DVB CPCM system to be self contained and implementable in any equipment to provide "baseline" CPCM functionality but with extensibility, either by future DVB specification or by planned co-existence with proprietary systems.

Recognising that future developments in consumer markets will include home networking and remote access it was decided to design the CPCM system to be "network agnostic" This is to preserve the system functionality over time as it is expected that network technologies will be various and

evolving; i.e. hard wired or radio; based on existing and developing standards and protocols such as 1394, Ethernet and IP.

The Authorised Domain

The DVB-CP recognised that to conform with traditional user experience and expectations based on the portability of pre-recorded content (DVD, CD), whilst maintaining protection against unauthorised redistribution, it is necessary to define an "Authorised Domain" for the use of content in a home networking environment. This requires a means to identify and securely assign devices and networks inside and outside the home uniquely to each other and to a user so that only content legitimately acquired by the user can be consumed within his/her Authorised Domain.

It follows that a means is also necessary to securely bind content to the Authorised Domain if required by the rights owner, or to allow content to be moved "outside" the Authorised Domain if allowed by the rights owner. In cases where content is allowed to be moved outside the Authorised Domain existing copy control rules may still apply.

End-to-end protection

It is expected that DVB-CPCM will be deployed in the context of a home network as well as in standalone devices and it is recognised that some of the devices in such a network may not be fully compliant with DVB-CPCM. However, to preserve the security of the system, trust should only be given to devices which are fully DVB-CPCM compliant and can signal their compliance. Furthermore, wherever possible, trust should only be given to the necessary nodes in the system - the content source and the final rendering device. Other intermediate devices, or entities such as "dumb" storage, should act as a transparent pass-through of encrypted content and USI. This approach increases security by avoiding the necessity of multiple decrypt and re-encrypt processing as would be the case if each entity, device or linkage comprising a home network was to be considered a standalone element.

The Work in DVB-CPT

A call for proposals (cfp) for CPCM technologies was issued in the summer of 2001. Twenty four wide ranging responses were received, some offering a full solution and some offering specific technological approaches for elements of the envisioned system.

In analysing the CfP responses it became clear that further work was needed to develop fully the functional model of the envisaged DVB-CPCM system to provide a coherent framework for analysis.

Rather than attempt to select a solution at the time, as the responses were wide ranging, the CPT group elected to develop Technical Requirements for DVB CPCM to further identify required functionality and against which to assess the available technologies.

A crucial stage has been to fully technically define the characteristics of the Authorised Domain. This is key work as this novel concept is the fulcrum of the DCB-CPCM concept and the CPT group has spent many months deliberating a number of challenging issues which again has exposed significant differences between the constituencies of interest. At the time of writing this difficult stage is nearing completion of the first pass with a growing awareness between the contributing parties that only a consensus based solution will work for the industry as a whole.

The end game?

It is likely to be some time before an agreed specification for a full DRM system emerges, either through formal standardisation processes or through the emergence of a dominant proprietary system. In the meantime there is an urgent need for a basic, open interoperable Content Protection and Content Management (CPCM) System.

Ultimately the success or not of the CPT group will be apparent when the resulting specification is assessed against the original commercial requirements. This process will also inevitably re-introduce some of the contentious, unresolved issues which came out of the initial commercial requirements capture process.

The time scales are therefore difficult to predict but the long term objective is for DVB to be in a position to lodge its CPCM specification with a European standards agency, such as ETSI, so that the industry can benefit from the achievement of the consensus driven open standards approach for which the DVB is known to be successful.

The full length version can be found at www.dvb.org.

Chris Hibbert is Vice President Media Technologies & Standards with Walt Disney Television International.

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