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THE NEW IMMERGING TECHNOLOGY 4K UHD TV

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Abstract: This paper proposed a A detail idea about how the 4K ULTRA HD TV Technology is used now a days. The Consumer Electronic Association announced on October 17, 2012, that "Ultra High Definition", or "Ultra HD", would be used for displays that have an aspect ratio of at least 16:9 and at least one digital input capable of carrying and presenting native video at a minimum resolution of 3840×2160 pixels[1]. This offers a customer a great viewing experience. Recently ISRO launches its communication satellite GSAT-16 on 6 Dec 2014 from Guiana along with that DIRECTV from US which is a DTH provider has also launched its satellite name DIRECTV-14 which will provide a user a 4K UHD technology at their doorstep.

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1

INTRODUCTION

4K Ultra HDTV is the next step in the logical progression that has seen television pictures go from black and white to color; color standard definition to high definition and now high definition to 4K Ultra HD. It offers dazzling, pristine images and an immersive viewing experience. Because 4K Ultra HD offers four times the resolution of HDTV you can see so much more detail, such as the mosaics on the wall in a castle or the tiny dots on a fish in the aquarium. In pixel terms, that's 8.3 million pixels vs. HDTV's maximum 2.2 million.

Early HD TV broadcasting used analog technology but today used a digital technology with compression techniques.

The limited standardization of analog HDTV in the 1990s did not lead to global HDTV adoption as technical and economic constraints at the time did not permit HDTV to use bandwidths greater than normal television.
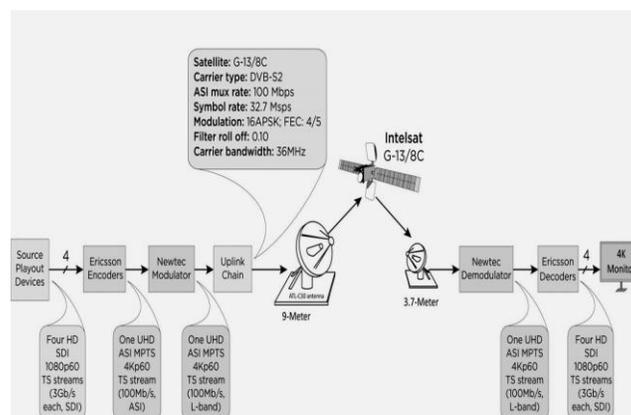
UHD diagram

Early HDTV commercial experiments such as NHK's MUSE required over four times the bandwidth of a standard-definition broadcast, and HD-MAC was not much better. Despite efforts made to reduce analog HDTV to about 2× the bandwidth of SDTV these television formats were still distributable only by satellite.

In addition, recording and reproducing an HDTV signal was a significant technical challenge in the early years of HDTV (Sony HDVS). Japan remained the only country with successful public broadcasting of analog HDTV, with seven broadcasters sharing a single channel.

DVB (Digital video broadcasting) created first the standard for DVB-S digital satellite TV, DVB-C digital cable TV and DVB- digital terrestrial TV. These broadcasting systems can be used for

both SDTV and HDTV. In the US the Grand Alliance proposed ATSC as the new standard for SDTV and HDTV. Both ATSC and DVB were based on the MPEG-2 standard, although DVB systems may also be used to transmit video using the newer and more efficient H.264/MPEG-4AVC compression standards. Common for all DVB standards is the use of highly efficient modulation techniques for further reducing bandwidth, and foremost for reducing receiver-hardware and antenna requirements.

Initially the existing 5:3 aspect ratio had been the main candidate but, due to the influence of widescreen cinema, the aspect ratio 16:9 (1.78) eventually emerged as being a reasonable compromise between 5:3 (1.67) and the common 1.85 widescreen cinema format. An aspect ratio of 16:9 was duly agreed upon at the first meeting of the IWP11/6 working party at the BBC's Research and Development establishment in Kings wood Warren. The resulting ITU-R Recommendation ITU-R BT.709-2 ("Rec. 709") includes the 16:9 aspect ratio, a specified colorimetric, and the scan modes 1080i (1,080 actively interlaced lines of resolution) and 1080p (1,080 progressively scanned lines). The British Freeview HD trials used MBAFF, which contains both progressive and interlaced content in the same encoding.

2. SCHEME DESIGN

Broadcom's BCM7445 is the world's first Ultra High Definition Television (UltraHD TV) video decoder solution on the market. The BCM7445 is the first step to delivering UltraHD TV into the home with the performance and picture quality needed for the evolution in multi-screen connected home entertainment. Broadcom's 28 nanometer (nm) ARM-based BCM7445 UltraHD video decoder solution, serving as the primary gateway to the home, delivers more transcoding, CPU processing performance and home networking throughput to support a greater range of applications such as video-on-demand (VoD), gaming, social media and web store applications.

UltraHD TV technology, formerly known as 4K, marks a major innovation in HD resolution. UltraHD TV screens display four times the resolution of today's 1080p60 displays. The delivery of UltraHD TV requires a more efficient compression codec made possible by the use of the

new High Efficiency Video Coding (HEVC) standard. HEVC speeds Internet video downloads giving operators and users the ability to download content such as movies in half the time and with higher quality video at 50 percent of the bit rate previously required.

Company LOGO

Multi-standard video decoding support for:

• MPEG-2 MP@ML

• MPEG-2 MP@HL

• AVC HP@L3.0 for 480i

• AVC HP@L3.2 720p

• AVC HP@L4 1080i

• AVC HP@L4.1 1080i for Blu-Ray and HD DVD

• **Multi-standard audio decoding**

• MPEG2 AAC-LC- Stereo and 5.1

• MPEG4 AAC HE (High Quality)-Stereo (level 2) and

5.1 (level 4)

• MP3 (MPEG1 layer 3)

• Dolby® Digital Plus

• Dolby Digital Plus to Dolby Digital transcode

• **Dual-stream decoding with independent program clock reference (PCR) clock recovery**

• Two video output interfaces

• HD_DVI Interface for connection to BCM7038

• HD or SD, with interlaced or progressive scanning

• **Video post-processing with scaling, 3:2 pull-down, clipping, and padding**

• H.264/MPEG-4 part 10 decoder

• MPEG-2 decoder

• Programmable audio decoder

• Transport demultiplexer

• HD-compatible digital video output

• Multi-host control/status interface

• DDR SDRAM controller

 Digital cable, satellite, terrestrial, IP, and **DSL set-tops**

• HD DVD players

• DVR (playback)

• Portable multimedia players

GPIO/SPI Program I/O DRAM Controller PCI Interface

AVC**G2 SD/HD**

The master processor in the SoC is the Brahma15, a quad-core Cortex A15 configuration running at up to 1.5 GHz to provide 21000 DMIP performances. The configuration has TrustZone, NEON and virtualization support. Plenty of performance is needed to run Broadcom's Nexus and Trellis multi-framework software interfaces which allow different client technologies to operate in a seamless manner.

Broadcom refused to divulge power consumption details (a very important aspect since set top boxes happen to be one of the worst offenders when it comes to home energy consumption), but did indicate that their platform supports on-chip power management to power down unused blocks in the chip as applicable.

We asked Broadcom whether the appearance of the Cortex A15 in a STB SoC marked the beginning of the end for MIPS in the STB space. They were quick to point out that they continue to be solidly behind MIPS for multiple segments of the STB market and indicated that it was one of their MIPS-based STB platforms (BCM7356 in the Samsung SMT E-5015) that had obtained official Android 4.0 certification recently.

• H.264/MPEG-4 part 10 decoder

• MPEG-2 decoder

• Programmable audio decoder

• Transport demultiplexer

• HD-compatible digital video output ports

• Multi-host control/status interface

• DDR SDRAM controller

FEA TURES

Applications

• Digital cable, satellite, terrestrial, IP, and DSL set-tops

• HD DVD players

• DVR (playback)

• Portable multimedia players

The BCM7411 introduces the advantages of the H.264 video compression Algorithm to today's advanced consumer and broadcast applications. The BCM7411 is a dual-channel AVC/MPEG-2 decoder chip capable of full HD real time Decoding.

Broadcom's H.264 Compression Advantage™ architecture provides three times the compression power of MPEG-2. Systems incorporating the BCM7411 have superior image quality, improved system performance, and larger storage capacity with the reduced bit rates of Functional Components H.264—also known as MPEG-4 Advanced Video Coding (AVC). The BCM7411 fully supports the MPEG-2 standard, so that compatibility with existing media can be maintained.

The BCM7411 supports the following decoding operations:

• 1 HD (MPEG-2 or H.264) in real-time

• 2 SD streams (MPEG-2 or H.264) in real-time

Video decoder block diagram The H.264 Advantage The H.264 coding standard incorporates innovations and techniques developed over decades of worldwide research into video compression. The algorithm Produces results far superior to the preceding MPEG standards. H.264 derives much of its performance gain from complex motion estimation techniques, Integration of an in-loop deblocking filter, and brand-new spatial prediction operations.

H.264 Support

• Complies with the ISO/IEC 14496-10 specification

• Decoder support for AVC High Profile streams up to level 4.1 with a 30 Mbps maximum encoded bit rate restriction

• I, B, and P slices

• CABAC and CAVLC entropy decoding

• Field/frame and picture adaptive decoding

• Macroblock adaptive field/frame decoding

• All intrablock and interblock sizes

• Resolutions supported: QCIF up to 1920 × 1088

Transport/Program Stream Demultiplexer

The BCM7411 accepts transport or program streams depending on the preferred application, and parses the incoming video, audio, and private data for decoding.

The BCM7411 monitors PCR information in the transport stream to adjust the frequency of an external VCXO oscillator.

Digital Video Output Ports

The BCM7411 provides configurable digital video output ports for a glue less interface to the BCM7038 or to a variety of video DACs. The outputs may be configured for BT656 and HD-DVI.

System Control/Status Interface

The BCM7411 is intended for use as a peripheral system and requires a controlling agent to configure and monitor its operation. The following interfaces are supported:

• PCI 32-bit interface

• Generic 16-bit host interface

• SPI serial and GPIO interfaces

BCM 7411 Specification

In 4K technology, the TV / video industry has come up with something worthy of a consumer's serious consideration. With its 4Kp60 HEVC decoding capabilities, Broadcom's BCM7445 fills a very important gap in the video delivery pipeline for the acceleration of 4K adoption.

UHD used in smart phones

Future Technologies

The Curved UHD TV is designed after the curvature of human eyes. However, the curvature was calculated more carefully than just borrowing the concept.

According to the consumer research conducted by Samsung, the average living room size in North America and Europe is about 16 x 16 ft. (4.87 x 4.87m). That is, the actual watching distance is around 3 to 4 meters and it was discovered that the figure of 4200 radius can deliver the best immersion to the audience. Therefore, the curved screen has the curvature '4200R'.

Ultimately, this curvature lessens the distortion that occurs from the difference of the viewing angle between the viewer's eyes and the existing flat screen, which results in the ultimate immersive viewing experience.

According to Taeheon Kim, Designer, Visual Display at Samsung Electronics, this design concept is not only applied to the screen but also to most of the major parts, such as the stand, sound bezel and the back.

The frame that covers the screen is made up of metallic materials. Metal is a material that is pure and solid enough to express premium value. It is being used widely in Samsung's premium TV line-up. Depending on how the detailed texture of the metal is expressed, the product's quality can be very different.

To maximize this metallic texture, this model uses a 'brushed hairline technique'. A hand-etched hairline pattern is designed to give a more natural feel to the metal texture, which can be seen on the metallic surface of the stand. And the stand and its hairline pattern are also curved with the same curvature of 4200R.

With all these combined considerations, the curved UHD TV is definitely an 'all-rounder' in terms of design. Everything was designed carefully and scientifically, but with the viewer in mind. The curvature and the design of the Curved UHD TV is not for its premium look, although it is quite fascinating just to look at. The priority of its design is 'people'.

CONCLUSION

As per the data collected and graph shows the UHD TV is a new technology which is widely appreciated and accepted. Their increases the demand for UHD worldwide

Worldwide LCD monitor Vs UHD demand

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