

## 4K and 8K: Changing the World of Video



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### 1. Introduction

I recently saw a magazine ad for a marketing course that covered topics including the use of Web 2.0 sites as a means of publishing information. These days, public opinion is often influenced more by social media than by traditional forms of mass communication. Social media engages with the public at a social level by using scalable messaging functions that are open to everyone. In this respect, it is the polar opposite of traditional mass media. Social media services are appearing with an increasingly diverse range of forms and capabilities.

This reflects the beginning of a move away from existing mass media channels to new social media outlets, like the “Our Town” independent video competition (<http://www.sheknowsjournal.com/wagamachicm/top.html>), course materials from universities like MOOC, video programs, and content such as video clips and seminars that support these programs. Our program (“Search of the Future”) was criticized for having incomprehensible opening titles when it started 17 years ago, but things can change beyond all recognition. We have also entered the era of “content marketing”, where individuals, universities and businesses use content (edited information) to communicate with people or consumers.

### 2. The start of the post-HD era

The global market for 4K (3840×2160) televisions is expected to grow quickly to 12.5 million units, and Chinese TV manufacturers have been working hard to meet this demand. As before, their market strategy is based on price competitiveness. In China, TCL and Skyworth launched budget 4K TVs to coincide with the Labor Day national holiday. TCL’s 55-inch E5690 4K TV retails at 9,999 yuan (about 1,600 US dollars, or 164,000 Japanese yen), and Skyworth’s 39-inch 4K TV retails at 3,999 yuan (the same price as their existing 42-inch 1080 HD TV). Both products have a panel resolution of 3840×2160 (Ultra HD, UHD). TCL is a large Chinese manufacturer that releases products in the US under the TCL and RCA brand names. It is expected that its 4K TV will also be marketed in the US at the same price. At \$1,600, this would cost about the same as the 55-inch 1080 HD TVs currently on sale in the US. The E5690 is advertised as a “cloud TV”, and the smart features offered by its quad-core GPU and dual-core CPU running Android 4.2 OS include the ability to scale up video from HD to 4K resolution. It also supports 3D with an active shutter system. The stage is now set for a major battle in the 4K market. 4K systems, live switchers and high-capacity storage systems also featured prominently in manufacturer exhibits at the IBC2013<sup>1</sup>, NAB2013<sup>2</sup> and CES2014<sup>3</sup> trade shows. It is only a matter of time before 4K become widely available in

products with 30-inch or larger displays. This year’s CES featured a Polaroid 50-inch 4K TV for just \$999. SEIKI unveiled a 4K upconverting HDMI cable, and has already started shipping a 50-inch 4K TV priced at \$1,499.

As you know, the 4K video standard has approximately four times the image resolution of HD. So in that sense, 2013 marks the start of the post-HD era. There are actually several different varieties of 4K.

The largest size is 4K16:9 (4096×2304), while standard 4K has a resolution of 4096×2160. There is also 4K2:1 (4096×2048), and 4K Quad Full HD (QFHD, 3840×2160), which is simply four times the size of standard HD (1920×1080). Furthermore, RED (one of the pioneers of 4K cameras) has established its own video sizes, including 4.5K (4480×1920) and 5K full-frame (5120×2700), so the simple designation “4K” can refer to a variety of different sizes.

Super Hi-Vision (SHV) was a hot topic at last year’s International CES in Las Vegas. Even in the consumer world, it has been shown that the next stage in screen resolution will be products centered on 4K TV. Changes are taking place rapidly, and I think it’s safe to say that the transition to 4K is already under way, even without the momentum of e-book readers or 3D television. At this year’s CES, there were even more 4KTV presentations, showing that this trend is growing worldwide. 4K is now available to ordinary consumers, who may be unaware of its history but simply want to upgrade their existing equipment.

### 3. 4K was a standard for movie production

Were you aware that a 4K process was standardized by DCI<sup>4</sup>? When I first saw 4K video about 10 years ago, I was blown away by its picture quality compared with the analog TV of the time. Time passed, and in October 2010 I had the opportunity to talk with specially appointed professor Tomonori Aoyama<sup>5</sup> of Keio University’s Graduate School of Media and Governance about our company’s WEB-TV and NetRushTV (<http://www.netrush.jp/>) services, where Japan’s 4K technology had been adopted by the hybrid video industry as a key technology for the digital switchover. Around that time, even professor Aoyama found it difficult to imagine 4K spreading to the world of TV from the movie industry. The manufacturers had no concrete plans to start offering 4K. Also, the people that developed this technology had apparently thought that it could go no further after being standardized for use in movie theaters. However, my opinion was that 4K technology was more important than ever, and had many other potential applications outside of cinema. In the following year (2011), I therefore produced the show “Samurais of digital

cinema” and had it shown on Television Kanagawa with the aim of handing on this historical perspective and connecting with the future. In this show, I wanted to talk directly to the people behind this technology about the history and future of this technology, and held face-to-face discussions with people in the hybrid movie industry who were using 4K video. 4K technology was born in Japan and is a success story for the researchers at NTT’s laboratories. But it is still just getting started, and I think it will become an important tool in the hybrid movie industry. After a hundred years of 35 mm film, the switch to digital formats is a major change for the movie industry. I was able to experience this for myself when I interviewed people like Wendy Aylsworth (at that time, vice chairman of the Society of Motion Picture and Television Engineers (SMPTE) and currently Senior Vice President of Technology Technical Operations Inc., Warner Bros.) and Garrett J. Smith (Vice President of Production Technology, Paramount Pictures), who had supported 4K’s growing role in Hollywood movies. In the transition from analog to digital, it was clear that efforts would also be made to deliver video content over the Internet. If you take a look at an old story called “Search of the Future — Samurais of Digital Cinema” (available in Japanese: <http://www.netrush.jp/asx/mirai114.asx> and English: [http://www.sheknowsjournal.com/nr\\_engtop.html](http://www.sheknowsjournal.com/nr_engtop.html)), you can see I hope to continue collecting materials on the present and future of cutting-edge technology.

In the road map for the promotion and popularization of 4K and 8K formulated by the Ministry of Internal Affairs and Communications, full-scale 4K broadcasting will start this year (2014), and there will be a growth in demand for 4K TV of sports events such as the Sochi Olympics. 8K broadcasts will start during the Rio Olympics in 2016, and hopefully 4K and 8K technology will be well established by the time the Tokyo Olympics begin in 2020. However, for the success of full-scale 4K or 8K it is important not to forget suitable content. Beautiful ultra-high-definition video pictures can move us emotionally, but how will they change the world of broadcasting? Ultra-high-definition video such as 4K and 8K is expected to be highly suited to programs where artistry is required, such as sports, drama, movies and music, and broadcasting tests have already been performed. On the other hand, video for programs like news reports that require prompt real-time pictures can still use editing and delivery (distribution) methods based on existing Hi-Vision or SD equipment together with archive footage and video captured by smart phones. Instead of focusing on producing TV that is compatible with 4K or 8K displays, it is perhaps more important to produce TV that supports simulcasting. The providers of IPTV and webcast services offer content in multiple formats. Originally, the free world of the Internet led to free competition between streaming and webcast delivery, but as 4K content increases, it seems inevitable that webcast delivery will also increase.

#### 4. Preparing for 4K

While its production companies are of course obliged to support 4K, the BBC has announced that it will use 500 JVC ProHD network camcorders (GY-HM650) in its global news

gathering.

These are professional HD memory card camcorders that support dual HD codecs (MPEG-2 and AVCHD), and can record HD video simultaneously with SD video or proxy files in H.264/MOV format. It uses two SDHC/SDXC memory cards at a time; one for HD files and the other for SD files or low-bit-rate proxy files. With a built-in FTP client and network connectivity, it can send footage to the broadcasting station without using microwave or satellite links. Its features include:

- Compensating for packet losses in IP delivery
- Enabling video transmission without the need for bulky equipment

According to JVC Europe, this camera meets the EBU’s “Tier 2J” recommendations for journalism use, confirming its suitability for broadcast news production. Cameras in the GY-HM600 series also meet the requirements for general long form HD programming (“Tier 2L”) when used with a suitable external recording device capable of 50 MB/s or above. The order from the BBC was based on several factors — compact size, EBU quality compliance, multi-codec support and FTP transfer capabilities. Cloud-based IP video delivery has previously been affected by noise and freezing issues at the receiving end, but it seems that these have now been resolved. For a professional camera, the unit cost of ¥544,000 is very affordable, and its compactness, mobility and reliability make it ideal for electronic news gathering, where Japanese broadcasters still seem to value cameras that can be carried on the shoulder. These days, news reports are mostly gathered with small cameras. On the other hand, the era of 4K cameras has arrived, and I’m finding it hard to choose a camera that matches my budget. Having worked in the business for 20 years without subsidies or sponsorships, replacing the camera system has been one of my biggest headaches. Switching to 4K would increase the cost, and would also mean having to update the editing system. So if I go for a 4K system, I have to buy the equipment before I can start work. It’s no fun, I can tell you. Perhaps the BBC’s camera deal can be taken as an indication that news-gathering will continue to use the same full-HD systems as before, while content creation will use a mixture of full-HD and 4K. Video production technology will always be advancing, but the training of people capable of producing programs is something that never changes.

The “Search of the Future” documentary team will continue to examine social media’s ability to disseminate content, and through our dispatches and summary items, we hope to continue showing you how new video technologies will affect the status and style of media in the future.

- 1 IBC2013: International Broadcasting Convention (Europe’s largest broadcast equipment trade show)
- 2 NAB2013: A global trade show held by the National Association of Broadcasters
- 3 CES2014: Consumer Electronics Show. An international event hosted by the US National Association of Broadcasters.
- 4 DCI: Digital Cinema Initiatives. A digital cinema standards organization consisting of the US’s leading movie distribution companies.
- 5 Dr. Tomonori Aoyama graduated from and is currently an eminent professor at the University of Tokyo. He was previously a researcher at the Nippon Telegraph and Telephone Corporation (NTT).