



## The promised 8K industry in Japan (1)

The corporate direction of our company also has many track records of broadcast communication related technology consulting, and was allowed to chance to see the image of 8K from early age. The impression when first time experienced the screen of 8K with the sound of 22.2 channels had some which cannot be rendered to language.

I purchased high quality 4K television promptly from test broadcast, and considered whether it would be worthy for consumers. Although Hi-Vision is also beautiful enough, the picture played back on 4K television is different too. It was so beautiful, and since a vivid detail is discovered occasionally, I could enjoy.

As a television set, not all homes spend and replace with hundreds of thousands yen, and I think that there is little necessity that 4K is set as terrestrial broadcasting. Although 4K is certainly beautiful, possibly not more than the extension of Hi-Vision (2K).

However, image experience of 8K was completely different class. A large thing is large. But, things, such as presence and a feeling of many dimensions, have reached the thing of another level. Although I heard that the visitor estimated it as "new stereoscopic television" at the moment when exhibited 4K in the overseas art museum, I can say that there is an extraordinary reproducible.



On the other hand, I can't stop wonder the question of a new market created via this technology and commercial production. Considering the size, the equipment of an amusement facility class will probably be difficult to introduce for each home. Is it hard to imagine prepare the infrastructure which enable 8K contents service besides a satellite?

I may be wrong, since it is our country which is not stingy about an infrastructure, they may realize 8K as familiar service in 2020 and afterwards. However, in today when technology and a market are globalizing, there is also anxiety whether we fall into the fault which builds the structure accepted only in Japan again. At least, even 4K, the marketability is in the situation where opacity remains.

4K -- worldwide -- deployment --

I have to say 4K television market exceeded past prediction and it is also growing.

4K television had about 980,000 sets (track record) shipped in a world market in 2013. Furthermore, rapid spread is predicted if it will be about 67,330,000 sets in 2018. About the domestic market, there is data which 270,000 sets (track record) is shipped in 2013 and forecast it extended to 5,180,000 sets bout in 2018. At the 2015 stage, it will be 15% of a shipment base with

home television. That is 40% of an amount-of-money base. Also in the screen of that small smart phone, 4K is riding. Future, high-priced device will 4K has become the standard.

The reason is assumed as although the 4K television itself is using the high definition as the catch for sale, it must be a product position as what is called highly flagship range televisions, such as cooperation with a network, and 3D function. Some of the early adopters are already purchased.

But lack of 4K video content is also a still big hurdle. And, unless it becomes a budget-prices belt, the consumers will not feel the money value.

Distribution of the image of 4K is a global motion. Not only in the U.S., South Korea, and EU but countries, such as China and Russia, commercial service is started. However, I am offer which pushes and leads a cable or health broadcast in general, and it is charged added

Fig. 1 International deployment situation of 4K (at end time of 2015)

country	movement	year
U.S.	DirecTV, LG, etc. declaired the manifestation about a UHD alliance at SES	2015
South Korea	KT and SK telecom start IPTV service.	2014
China	DarianTV starts 4K services.	2015
India	TATASKY and STAR start 4K services in 2015.	2015
UK	BSKYB and UT will provide 4K services at 5 pounds from 2015	2015
France	FreeTVFrance starts 4K services.	2015
Vietnam	announce future deployment of 4K8K services supported by Japan.	2016
Spain	Hispasat starts 4K services	2015
Russia	Start TricolorTV starts 4K services	2014

If a big-screen TV does not become a size of more than 80 inches or more, people's cannot understand the difference between 4K and 8K pixels. It is difficult to look for the space into which 80-inch television goes in a normal housing environment of Japan.

In addition, the Olympic Games in 2020 is touted as the image delivery is made in the 8K, that it is also planning a commercial service of the net communication also, will people many think of waiting to replacement of the TV.

First of all, a young generation has a high tendency which stops purchasing the television itself, even if until next Olympic Games coming by introduction of new service.

The old thesis from the color television ages that of evocation of a product replacement demand will be out of date. We may be unable to expect the replacement demand of the television by 8K. Probably, an "unnecessary 8K " theory also has high validity, supposing it is the purpose to evoke a replacement demand.



*Then, what kind of meaning and opportunity can be find out from the promotion of 8K in future broadcast communication industry ? Moreover, What kind of a new market being created in the name of broadcast and communication technology integration?*

*It is the theme of this report to consider from the viewpoint of management consulting.*

## 2. 8K unnecessary Theory?

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Broadcasting technology history leads to 8K.

First, it will be necessary to go back, when calling it the start of full digitization of terrestrial broadcasting. First of all, although the stop of an analog spectrum has ordered to the prevention from interference and the increase in efficiency of digitization of radio wave band regional use. We may conclude that there was an another aim called highly-resolution-izing and internationalization-izing further as overlooked well. And unquestionable the latter aim was a more important matter for domestic industries.

We are easily understand that the highly resolution enable to playback clear picture in the huge size screen. It leads to purchase of heavy price huge screen size TV set. Furthermore, that it is assumed that the internationalization can develop a transmitter and a receiver in pre-advancement by the adoption country (in this case, ISDB family adoption country) accepted on the same platform without doubt.

In fact, 8K-zation of our country also starts research of the "overly highly minute visual system" which will exceed Hi-Vision from around 1995 by NHK Science & Technical Research Laboratories, and having started research of the overly highly minute visual system of "the 4000 scanning line class (4K)" in 2000.

This will have been started before the 2003 when digitization of broadcasting was started in the metropolis. On August 23, 2012, NHK announced that the system became an international standard of television by ITU-R recommendation. Digitization and IP-zation by connection with Internet and fix television, the advanced broadcasting infrastructure which can use high definition super-Hi-Vision and interactive services was making up the way to develop. I conclude after all that the origin of 4K/8K or more than further 16K was set destination from that time 20 years before at planning digitization.

In fact, 8K does not have a formal name. Although it came to call unawares since the present HD have the number of screen pixels of (Hi-Vision) are about 2 million pixels (2K), probably, 4 times multiplied one called "4K" and 16 times "8K" no matter many people may feel uncomfortable. Although NHK had advocated 4K/8K as Super Hi-Vision at the beginning, the formal name by ITU-R nominated as Ultra-High Definition Television. 4K and 8K things differ so much, they called - the present -the same bundling. It seems that we have to attach the character of 8 to 8 K Ultra-high-definition television, 8K Ultra HDTV, 8K UHD, 8K UHD, the head in order that 8K may distinguish from 4K.

## 3. 8K stimulates wide industry Theory

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Highly definition technology of 4K/8K does not limit adopt in the high-definition contents in communication and broadcast, but can also expect a spread to a digital cinema, digital signage, a tablet, etc., and also it has a possibility of leading also to export of contents work know-how associated new equipment.

As our country said to have a strong point in highly broadcasting technology, by putting concrete service in practical use and spreading it at an early stage, promote the technical capabilities of a

contents correlative industry, and global competitiveness, and tying to export of technology, products, also Japanese culture, etc.is expected.

It seems that positive competition is following the broadcast of the next generation which utilized higher definition imaging technique is going among the foreign countries, such as South Korea and the West. It is said that South Korea constructing a new platform directing power towards 4K broadcast at the Winter Olympics in 2018, also European DVB camp cooperate set standard of Internet connected 4K function television and which are called "HBBTV" as a next-generation communication base.

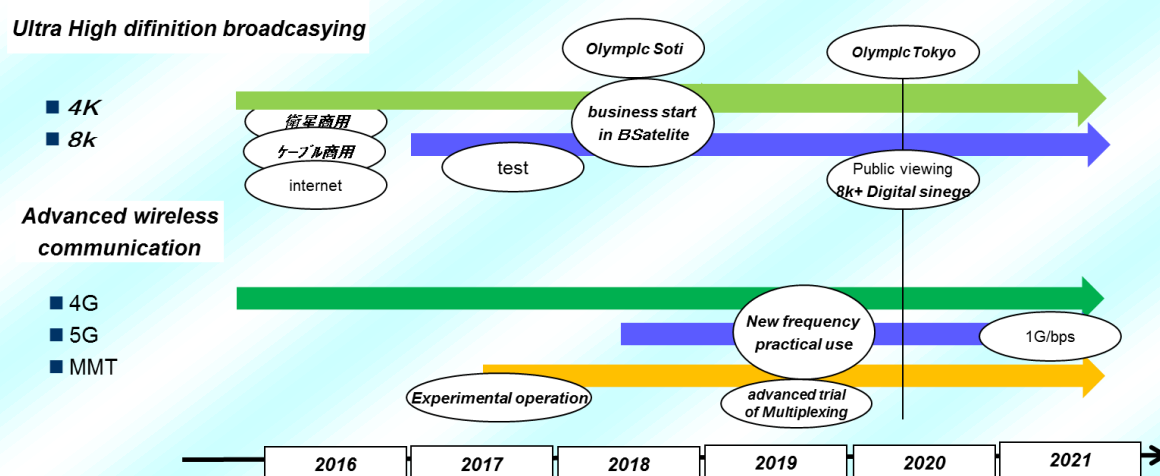
It is no wonder for the broadcast industry of Japan which has NHK to be government-company aliened to advance for the purpose of attaining competition strengthening of basic technology capability and also contents work power. NHK aims at expansion of service of the "hybrid cast" which realize television and the Internet connect mutually, going to research and development towards the test broadcast start in 2016 development promotion of 8K Ultra HDTV.

By 2020 Tokyo Olympic Games

The Ministry of Internal Affairs and Communications has realized the purpose and meaning of 4K/8K (super Hi-Vision) to be an international competition. The ministry has advanced examination in "the committee about the advancement of broadcast service -ICT growth strategy meeting " about the policy towards the early spread of the advanced broadcast services of the next generation, such as 4K/8K and smart television. It is aiming at market cultivation which secured predominance by utilizing as a showcase by making the Olympic Games as a good trigger.

In addition to 4K, in the RIO Olympic Games in ISDB-T introduction country Brazil in 2016, it has planned the live streaming show of 8K. Tokyo Olympic Games in 2020 as an industry showcase it aim to utilize the opportunity that international appeal.

Fig. 2 Highly advanced plan of broadcast and communication of our country (source: Ministry of Internal Affairs and Communications)

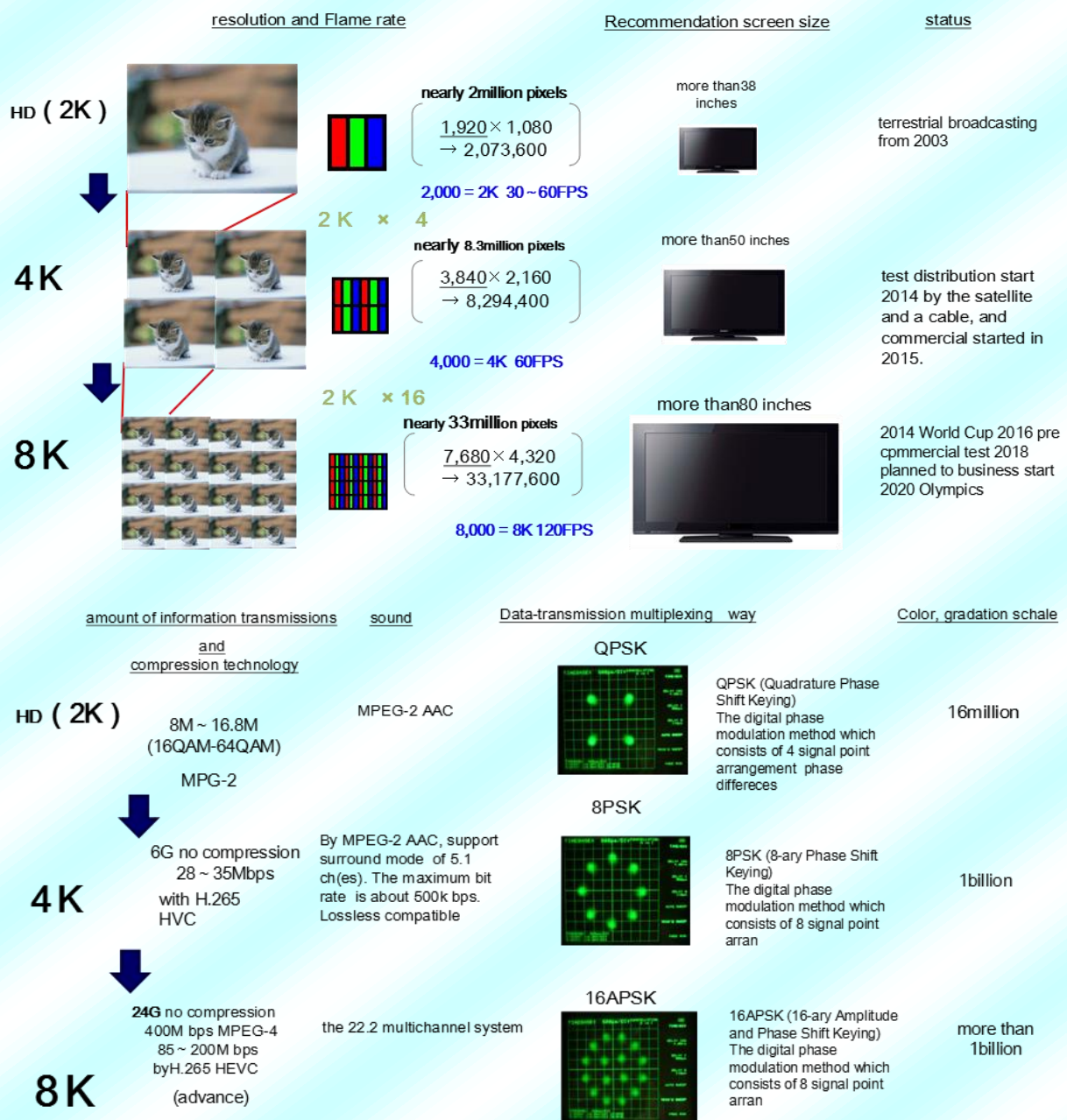


Broadcast of "4K" and "8K" will spread completely in 2018, and will presuppose that I aim that viewing and listening becomes possible on commercial television services.

The feature of -8K which is not only at big screen-zation

I would like to introduce the feature about 8K here as compared with HD (2K) and 4K. Fundamentally there is increase of the number of pixels -level 7,680p -- perpendicular 4,320 . The present high-definition TV broadcast (HDTV) 2K. 4K is 4 times 2K, and, similarly 8K is one 16 times the number of pixels of this by the super-high-definition television broadcast (UHDTV) corresponding to 4K/8K format. It becomes highly exact.

Fig. 3 HD (2K), difference between 4K and 8K



In addition, for reducing a "move and grumble" of the motion picture at big screen subject which was enable it moves quickly, 8K use 120 per second in the number of frames, and performing frame rate extension whose motion could be reality. In 8K, further, also expanded the color gradation scale tone to 60 or more times, and it aims at more beautiful image reappearance.



## Change name "8K" to "intelligent super reality television"

Simultaneously with the high definition, by making display possible to close to natural colors to the ultimate, it aims to reflect more reality. It is expected utilization in various fields by this feature. The technology is called HDR (High Dynamic Range). This, HDR is, to expand the representation width of brightness by making it possible to display close to natural colors to the ultimate, aims to reflect more reality. Previously, contrast scenery captured by the camera is not appear in the video image, HDR technology makes possible to apply their contrast to the improvement of the expression of high realism as it is.

There is a "high sense of realism" as a basic concept of 8K. My TV manufacturers friend is equivalent is a technology referred to as a "picture making", but so far the band and the amount of information, was not realistic in the more or less limited resources in the performance of the receiver as "trying to reproduce." However, in the large-capacity information in the 8K that can send a single Blu-ray disc that per second 24 giga in the non-compressed state, can be expected to become so finally send he wanted a picture of the creator.

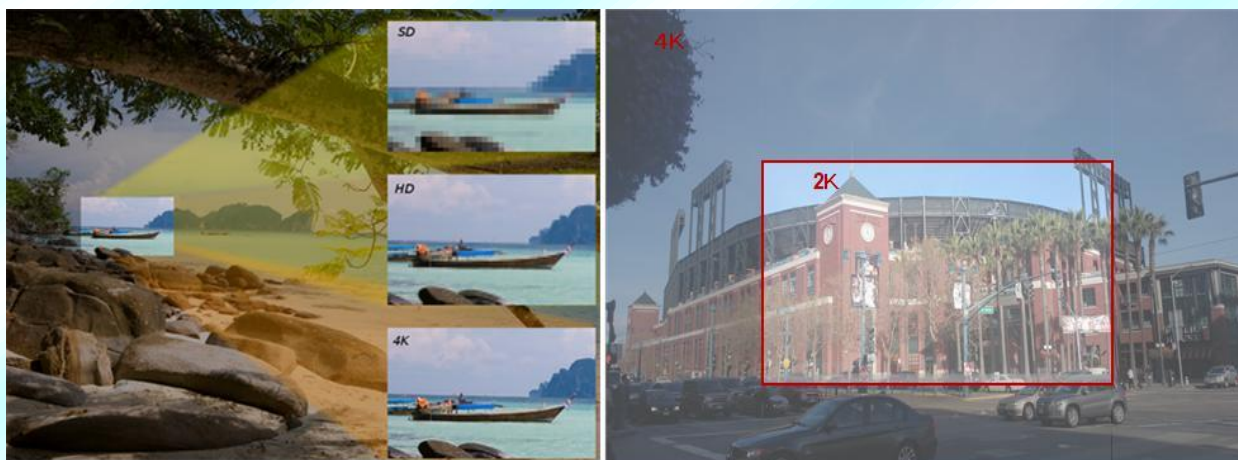
There is "high presence" as a fundamental concept of 8K. Although the technology which television maker's friend calls "the reproduction of a picture" had realized, in the resources restricted to some extent by a volume of information, considering the CPU performance of the receiver until now. However, it is expectable to get used for the mass information on 8K which can transmit one Blu-ray Disc of 24 giga bit/bps by a non-compression rate, so that a creator's satisfactory picture can be sent at last.

The image recorded on 8K can be upgrade to 16K or down rate to 2K and 4K by post production process. Since a super high definition video is maintained even if it carry out trimming by taking a motion picture by wide angle zooming at the edit process, and it is remain highly clear pixel material. There is also an advantage its dramatic reduction of the cost of personnel expenses of the camera work.

Fig. 4 Advantage of 4K8K material

Remain highly clear pixel After zooming..

HD quality picture after trimming..



8k has a high-quality sound of a maximum 22.2ch as a function of increasing the sense of realism. It has introduced the MPEG-4 AAC (AAC: Advanced Audio Coding) for this. In addition, lossless for (no

deterioration from the original sound) high-quality services, has introduced the MPEG-4 ALS (ALS: Audio Lossless Coding). 22.2 The channel sound system is Multi-Speaker mechanism for, nine channels in the upper layer, 10 channels in the intermediate layer, and the speakers arranged in three layers of three channels in the lower layer, three-dimensional reproduction of the sound field in the two-channel LFE (low frequency effect). For the usage for home, it has been considered a virtual system to reproduce 3.1-channel or 8.1 channels.

Moreover, in CTEC in 2015, exhibition of 16K playback equipment was introduced as for which four every direction connected 8K panel. Of course, the same issue of cost as consumer product 8K television will become a problem, but it is likely to be solved technically day by day. Looking the acceleration situation heading to highly-definition movement, evolution in 8K will not stop.

Thus, there is already feature of 8K no less than big screen-zation. Only for a big screen, although an unnecessary theory will probably also be appropriate, it has functions in which I can say "intelligent functions", such as time synchronous cooperation with a interactive function and a network connect, especially. I can also already be said to "The intelligent super reality television". The timing is also coming when we should not call it simply "8K."

Corporate direction

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