

The Introduction of UHD TV

China

IEC TC100 Discussion



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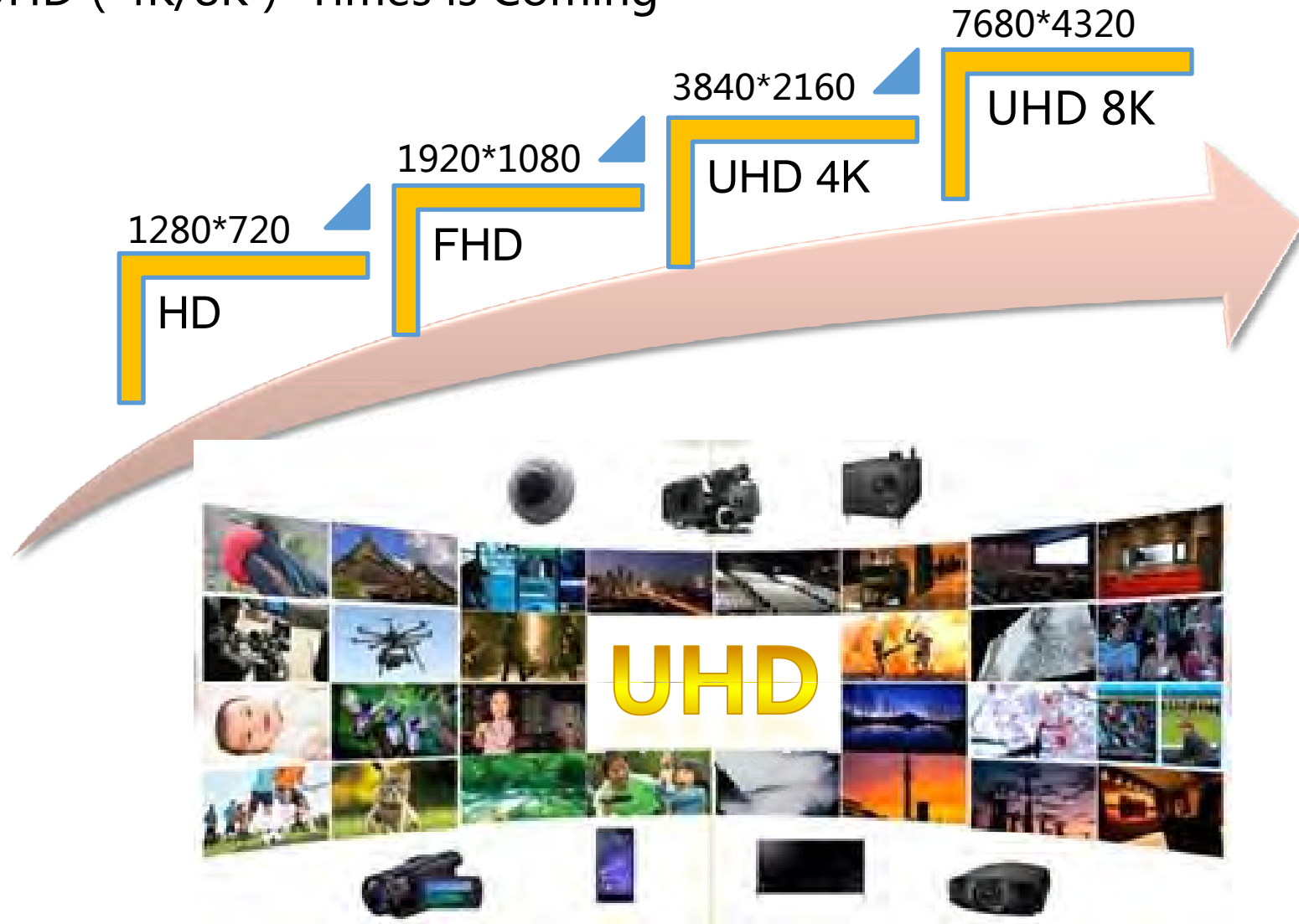
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1. The Industry of UHD TV

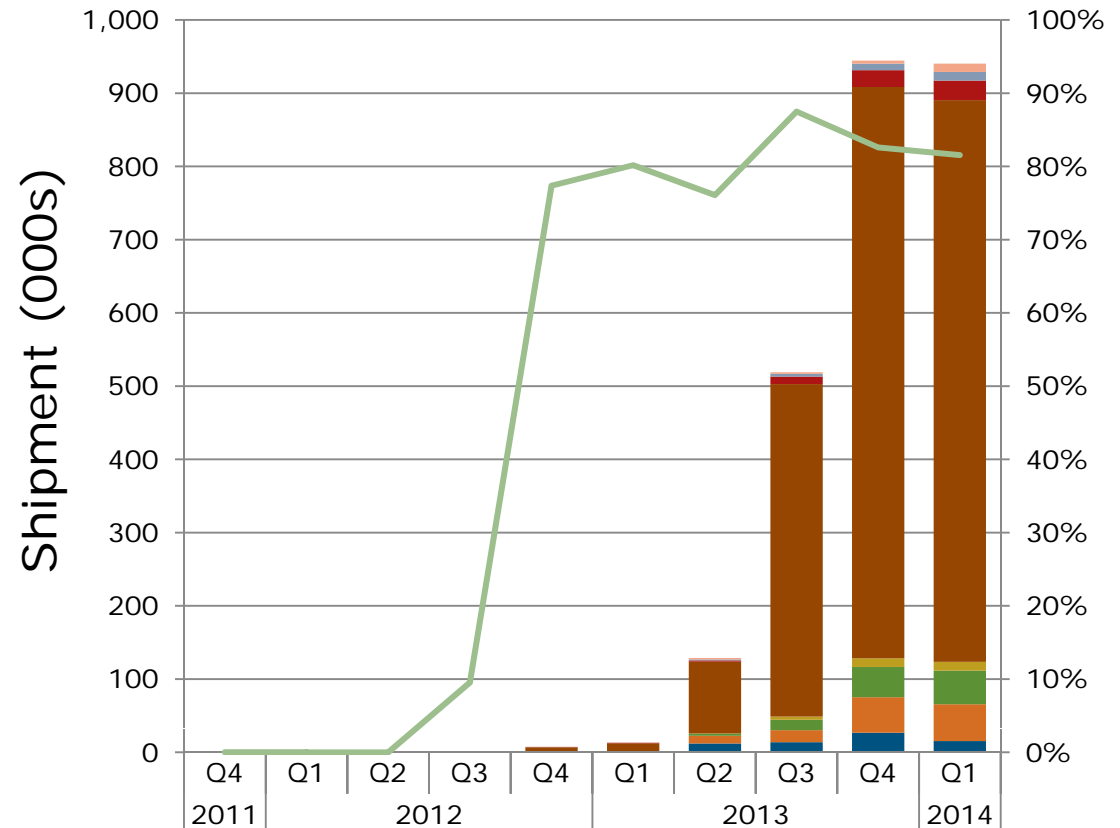
UHD (4K/8K) Times is Coming



1. The Industry of UHD TV

UHD Shipment History

According to the report released by Display search in July, 2014, the total shipment of 4K products are more than 939.4 thousands units in 2014 Q1, of which china accounted for 82% of global 4K shipments.

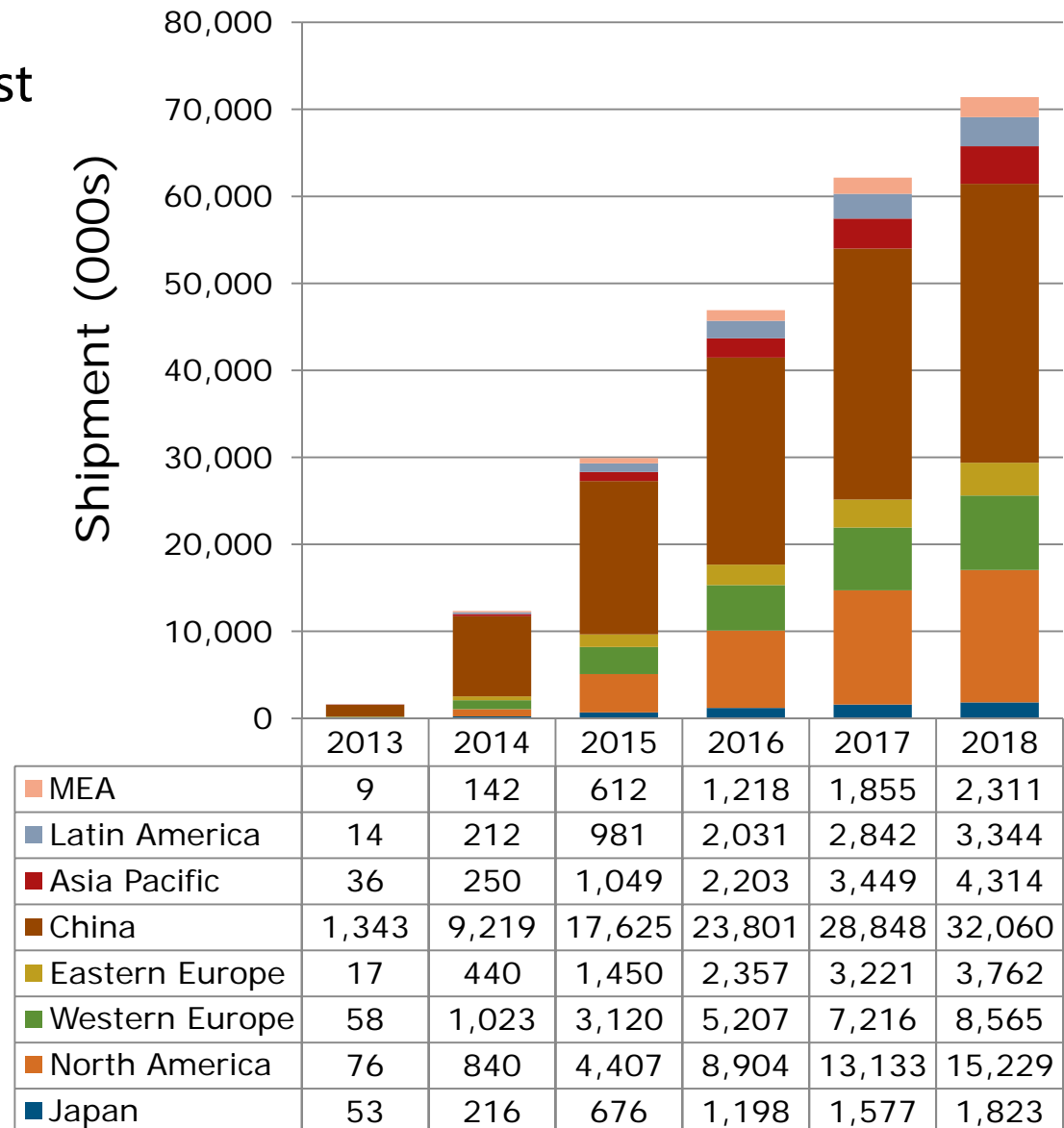


	Q4 2011	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1
	2011			2012			2013			2014
Middle East and Africa					0.4	0.4	2.1	2.2	4.0	11.4
Latin America					0.1	0.2	1.1	3.5	9.1	11.7
Asia Pacific				0.2	0.3	0.6	1.9	10.4	22.8	26.7
China				0.0	6.0	10.9	98.1	454.	780.	766.
Eastern Europe				0.0	0.2	0.3	0.6	4.3	11.8	12.0
Western Europe	0.1	0.2	0.3	0.1	0.2	0.4	2.5	14.2	41.3	46.0
North America					0.2	0.3	10.5	16.3	48.7	50.2
Japan	0.1	0.2	0.8	0.1	0.3	0.4	12.1	14.0	26.7	15.4
China %	0%	0%	0%	10%	77%	80%	76%	87%	83%	82%

1. The Industry of UHD TV

UHD TV Shipment Forecast

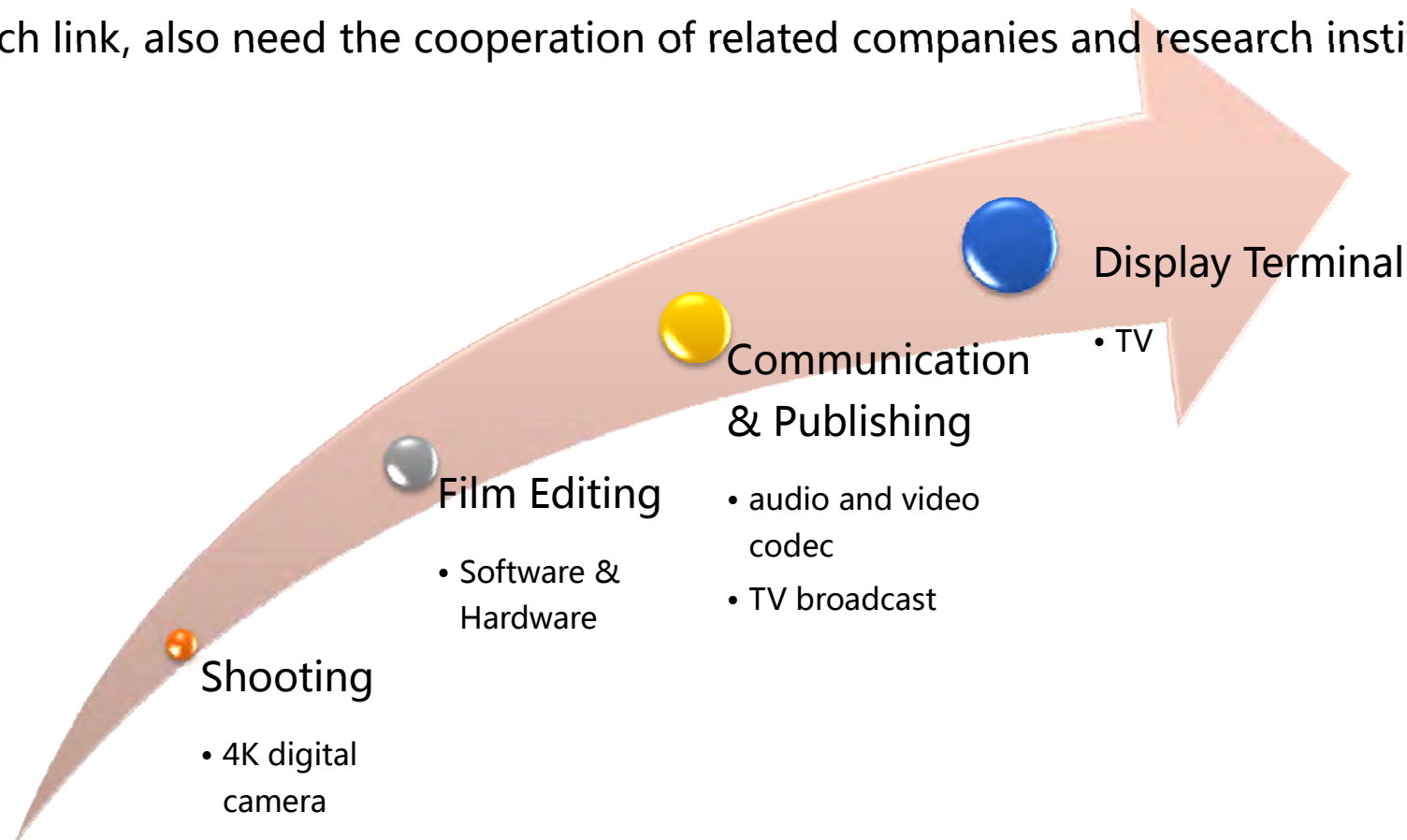
According to the forecast report released by Display search in July, 2014, the total shipment of 4K products are expected to 71.4 million units in 2018, compared with 1.6 million units in 2013. During the five years from 2013 to 2018, china always be the biggest part of global 4K shipments.



1. The Industry of UHD TV

The Whole Industry Chain of UHD TV

Same as the SD or HD television industry chain, The UHD TV is also divided into "shooting", "film editing", "communication & publishing" and "display terminal" four links. The development of UHD TV industry, need the mutual improvement of each link, also need the cooperation of related companies and research institutes.



1. The Industry of UHD TV



Government business

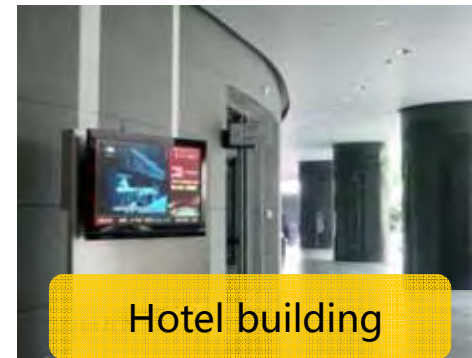


Financial communications

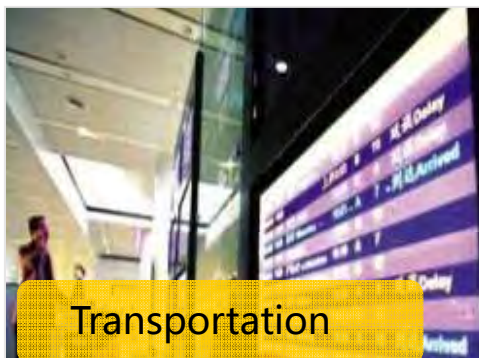


Chain enterprise

THE APPLICATION OF LARGE SIZE UHD TV



Hotel building



Transportation

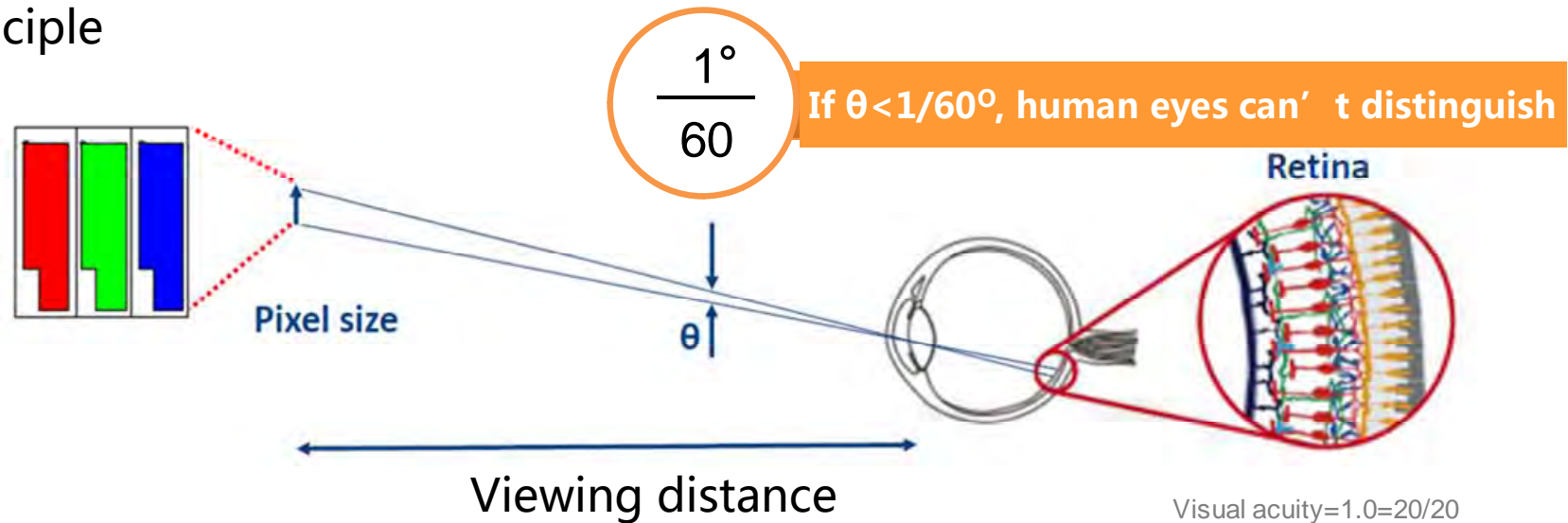


Education & Medical

2. The Characteristic of UHD TV

The Distinguish Limits of Human Eyes

Principle

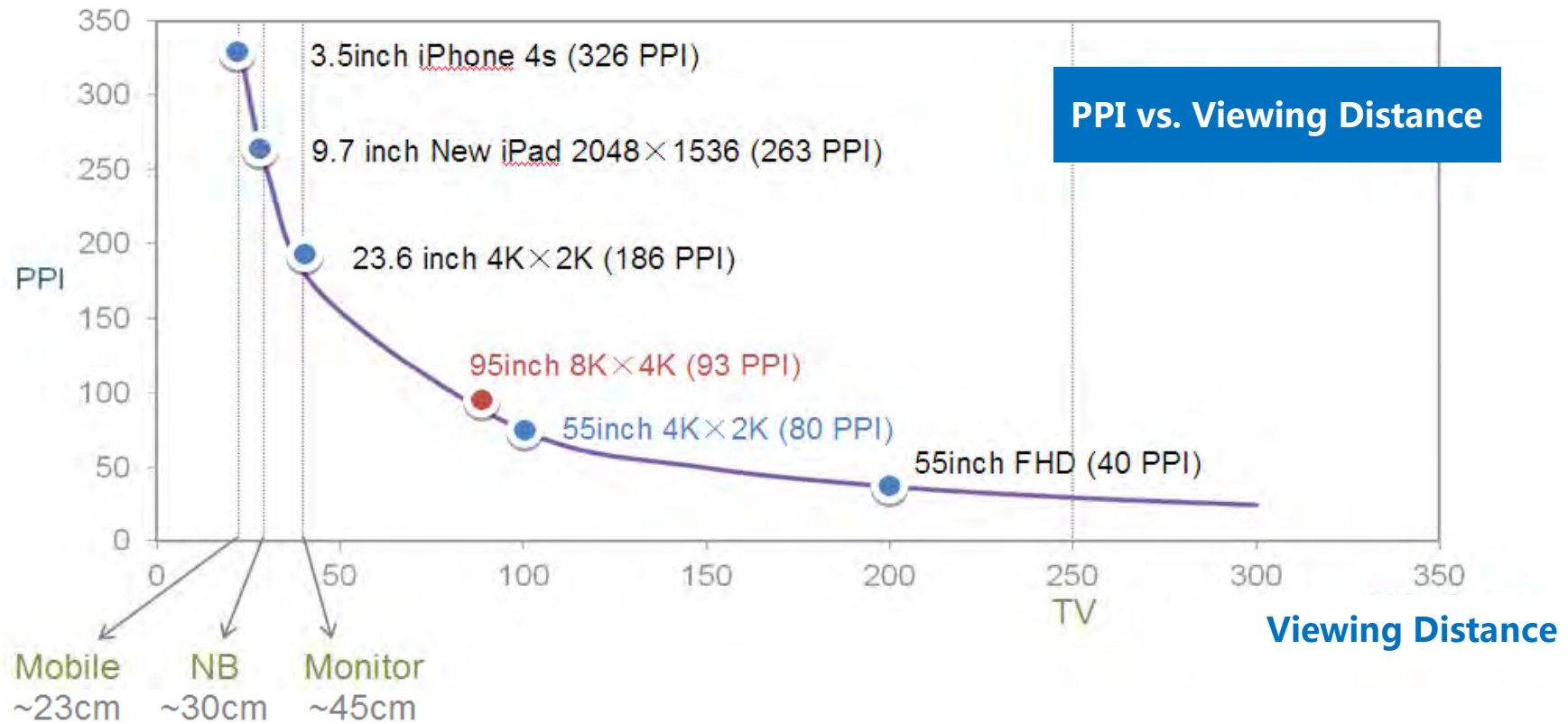


Retina Display Definition :

- When the pixel size is smaller than the human eye distinguish limits, the screen is defined as a retina display ;
- Viewing distance is the key factor, it determines the Retina screen pixel size, and determines the PPI (how many pixels per inch) ;

2. The Characteristic of UHD TV

The Distinguish Limits of Human Eyes

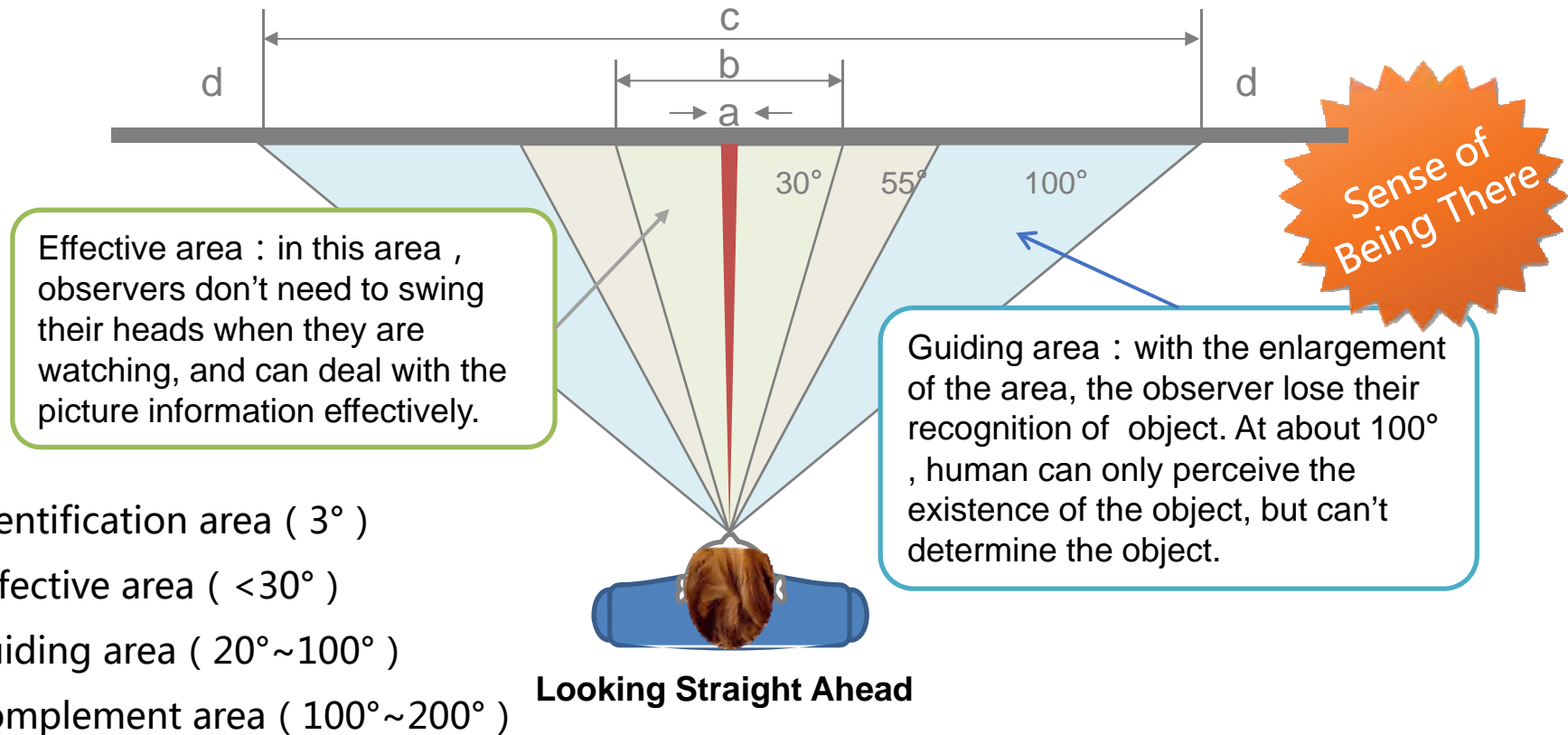


Viewing Distance

- Blue Curve in the picture means the relationship between the viewing distance and PPI for retina display ;
- 55inch FHD TV is already the retina display

2. The Characteristic of UHD TV

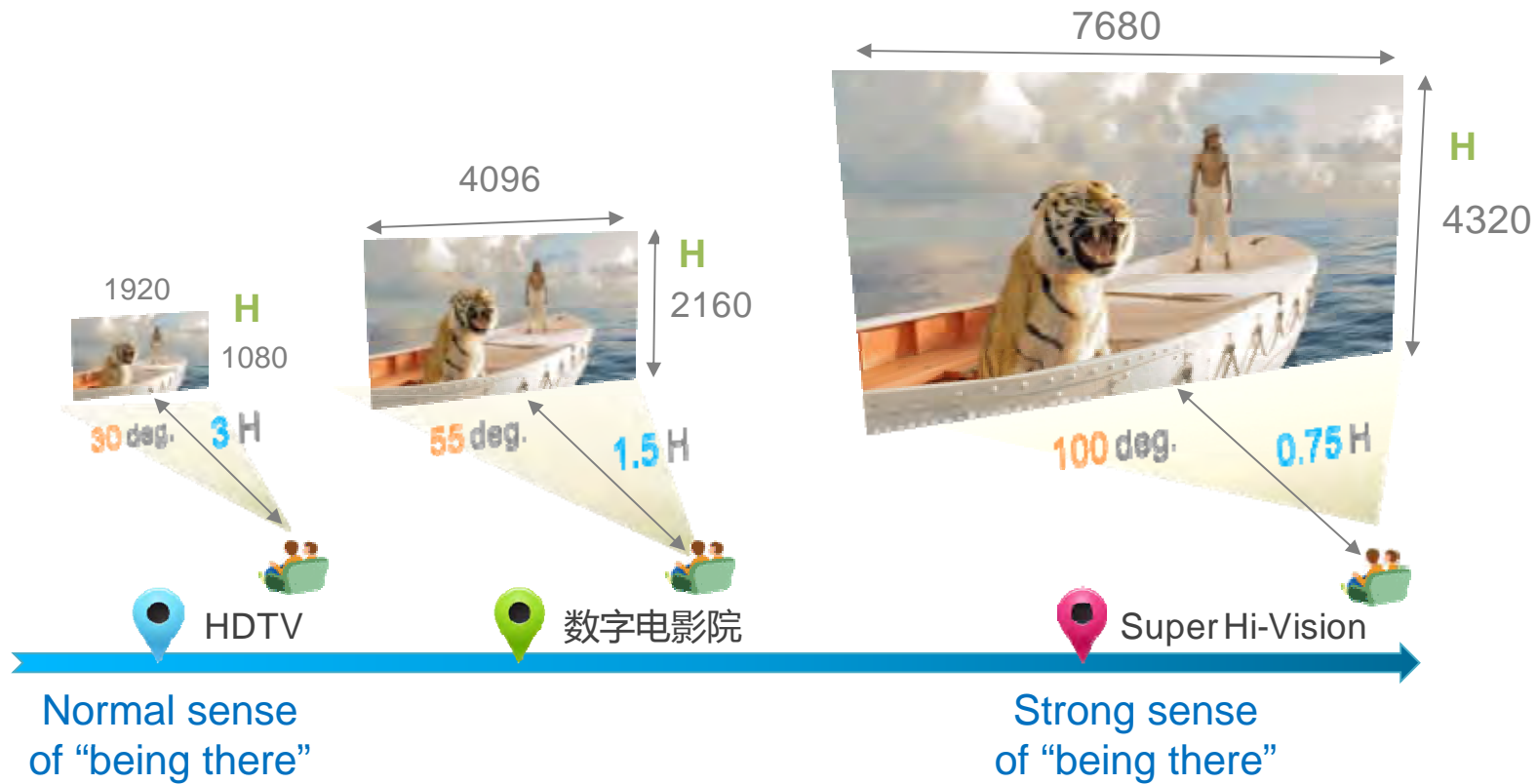
 The basic rules of human visual system — field of vision



- The principle of UHD TV can bring people a better watching effect

2. The Characteristic of UHD TV

Better Visual Experience of UHD TV

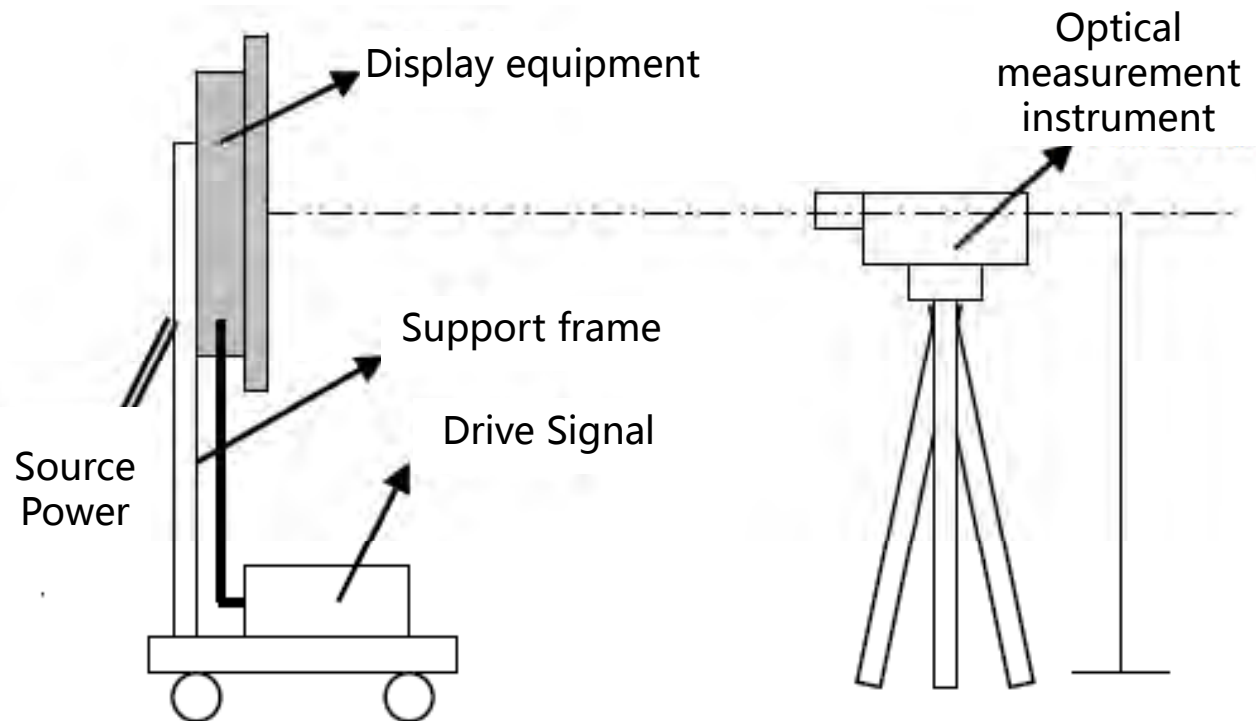


- UHD TV can provide a better visual experience, its main method is to cover most area of the human eyes by larger display area.

3. The Test Item & Method of UHD TV

Traditional Optic Test Item

- Definition
- Reproduction rate
- Horizontal color viewing angle
- Horizontal brightness viewing angle
- Brightness
- Contrast ratio
- Luminance uniformity
- Color gamut
-



- Traditional test items can not reflect UHD (4K/ 8K) TV features, need to add new test items

3. The Test Item & Method of UHD TV

New Test Item & Method



3. The Test Item & Method of UHD TV

 **Example1: Horizontal Color Viewing Angle** u', v' is chromatic definition

- The color of the image will change according to the viewing angle. Horizontal color viewing angle is just the viewing angle when the center point's $\Delta u'v' = 0.020$

Measuring Step :

- a) Show the 1st color signal of table-1 , use colorimeter measure the chromatic value of the center point (u'_{01} , v'_{01}) ;
- b) Horizontal moving the position of the colorimeter , test each angle' s chromatic value (u'_{i1} , v'_{i1}) ;
- c) Show other color' s signal of table-1 , test color coordinate (u'_{02} , v'_{02}) ~ (u'_{09} , v'_{09}) ;
- d) Repeat b) ~ c) , test (u'_{i2} , v'_{i2}) ~ (u'_{i9} , v'_{i9}) ,Use formula (1) to test ;

$$\Delta u'_{ik} v'_{ik} = \sqrt{(u'_{ik} - u'_{0k})^2 + (v'_{ik} - v'_{0k})^2} \dots\dots\dots(1)$$

I — positive integer , represent different horizontal Angle ;

k — 1 ~ 9 , represent nine different color signal ;

e) Calculate the average color deviation value of the nine color, draw the curve

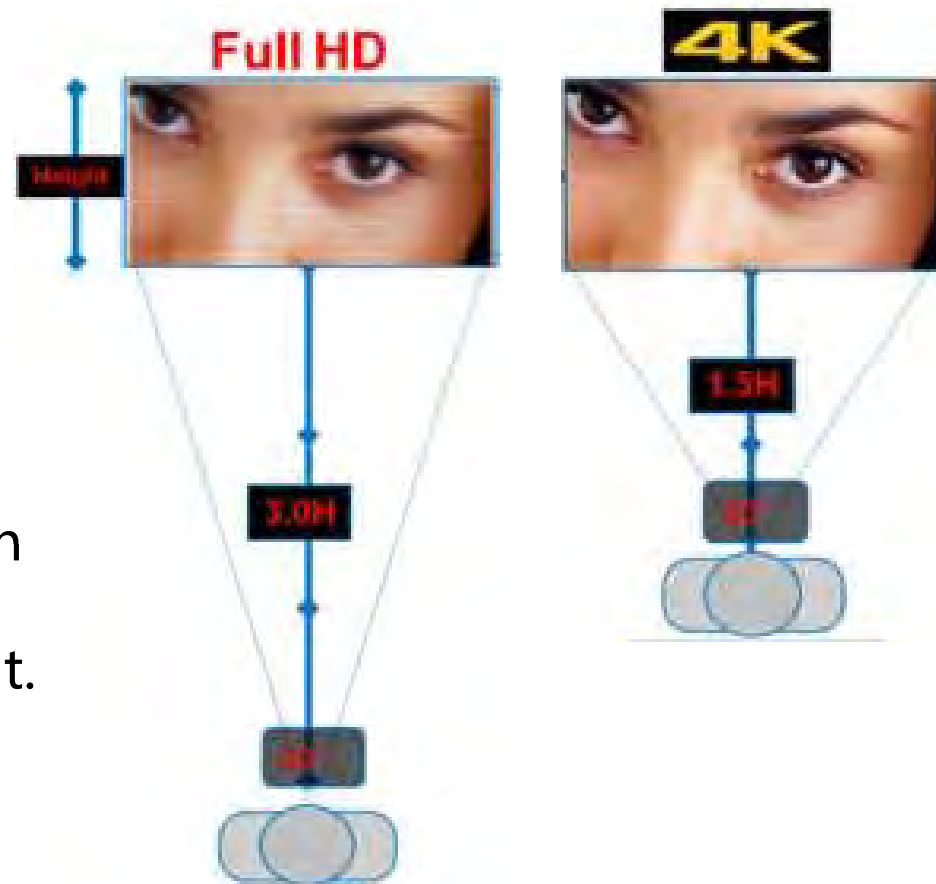
f) Find the left and right angle of the average color deviation = 0.020, the sum of the left and right angle is the horizontal color viewing angle.

Color Sample
Dark Skin
Light Skin
Blue
Green
Red
Yellow
Magenta
Cyan
Grey

3. The Test Item & Method of UHD TV

Example2: The difference of Test Distance

- FHD : 3.0H of TV
- UHD : 1.5H of TV or ...



The test distance between
UHD TV & FHD TV is different.

3. The Test Item & Method of UHD TV

New Test Items :

More Image Quality test method for UHD is being discuss:

- Color accuracy ;
- Gama viewing angle ;
- Curved Display test ;
- Color brightness ;
- Vision resolution ;
- Capacity for 4K video decoding ;
- 2K-4K Image Quality ;
-

4. The Standard of UHD TV

International Standards

- 2006-6 , The international telecommunication union wireless communications department (ITU-R) released 《ITU-R BT.1769 Parameter values for an expanded hierarchy of LSDI image formats for production and international programme exchange》 , raised the “3840×2160” & “7680×4320” two picture format for the first time.
- 2012-5 , The international telecommunication union R6C working group passed the new generation of UHDTV standards , that is the resolution of UHDTV including 4K×2K (3840×2160) & 8K×4K (7680×4320) two specifications。 This is the first time defines the resolution of the UHD TV specification by standard.
- 2012-8 , The international telecommunication union wireless communications department (ITU-R) released 《ITUR BT.2020 Parameter values for ultra-high definition television systems for production and international programme exchange 》 , Specifies the UHD TV used for the parameters of the international programme production and exchange

4. The Standard of UHD TV

The Definition of UHD TV by International Standard

ITU-R BT.2020:

	8K	4K
Pixel count Horizontal × vertical	7 680 × 4 320	3 840 × 2 160

- Refer to this, the 4K UHD means the sub-pixel number = 11520 x 2160 or 24.9M
- Both Traditional RGB or improved RGBW are two different technology, both of them meet the standard



16:9
21:9

- In addition to 16:9 format , 21:9 format also getting more and more popular which is better for film mode ;
- As a result, the following two resolution can also be seen as UHD :
 - 1) 5K UHD TV (5120*2160)
 - 2) 10K UHD TV (10240*4320)

END

THANKS