

**8K**  
SUPER HI-VISION

**BMSB2015**

# Countdown to the ultimate television



Kenichi Murayama



Science and Technology Research Laboratories

June 19, 2015

- The Past, Present and Future of Digital Broadcasting
- 8K Broadcasting will start soon!
- NHK STRL OPEN HOUSE 2015
  - ✓ 8K satellite test broadcasting experiment
  - ✓ Technologies for terrestrial broadcasting
- Others



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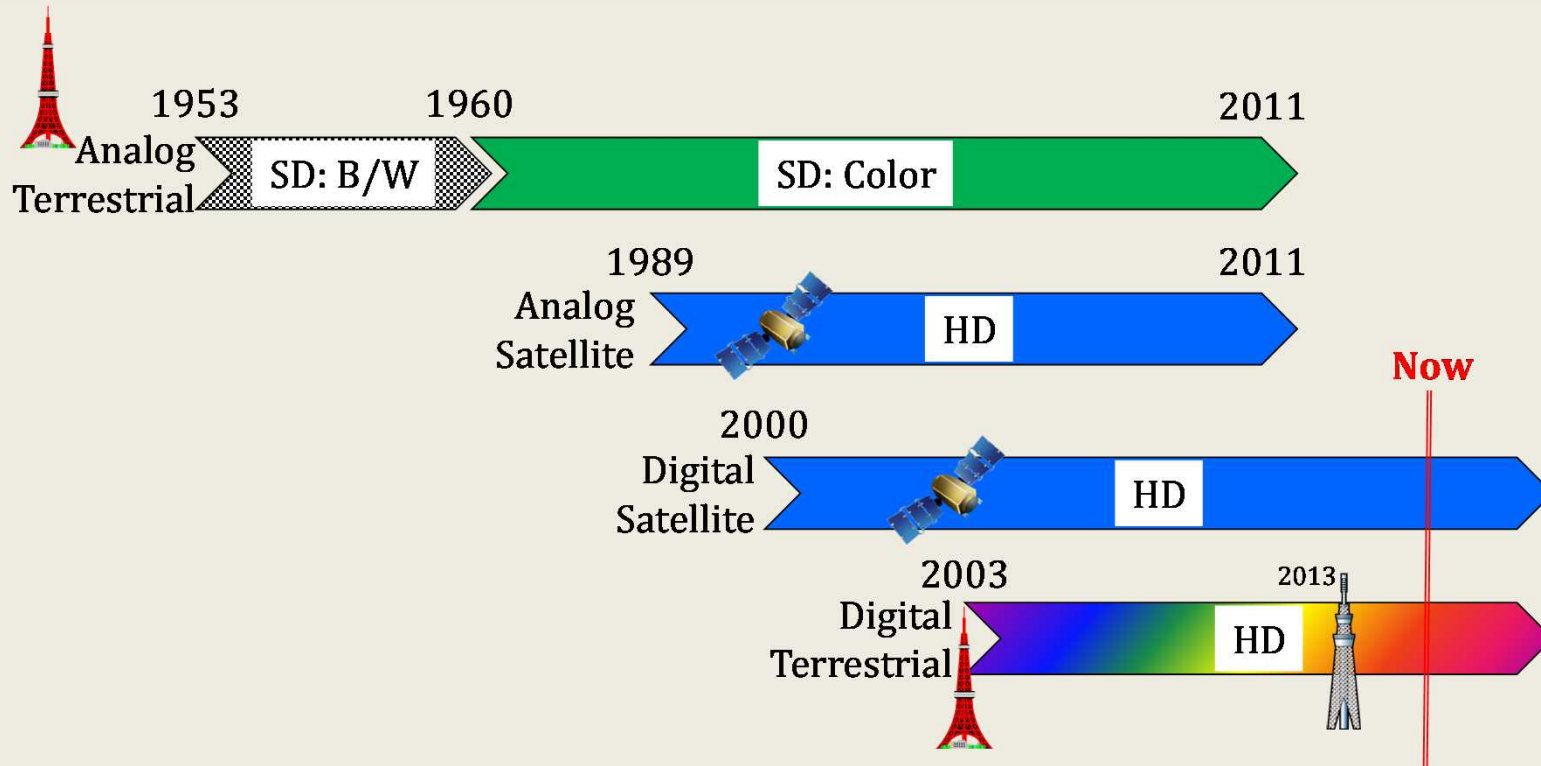
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# The Past, Present and Future of Digital Broadcasting



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The Past

# Diversification of the viewing environment

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Mobile phone



Tablet



Smartphone



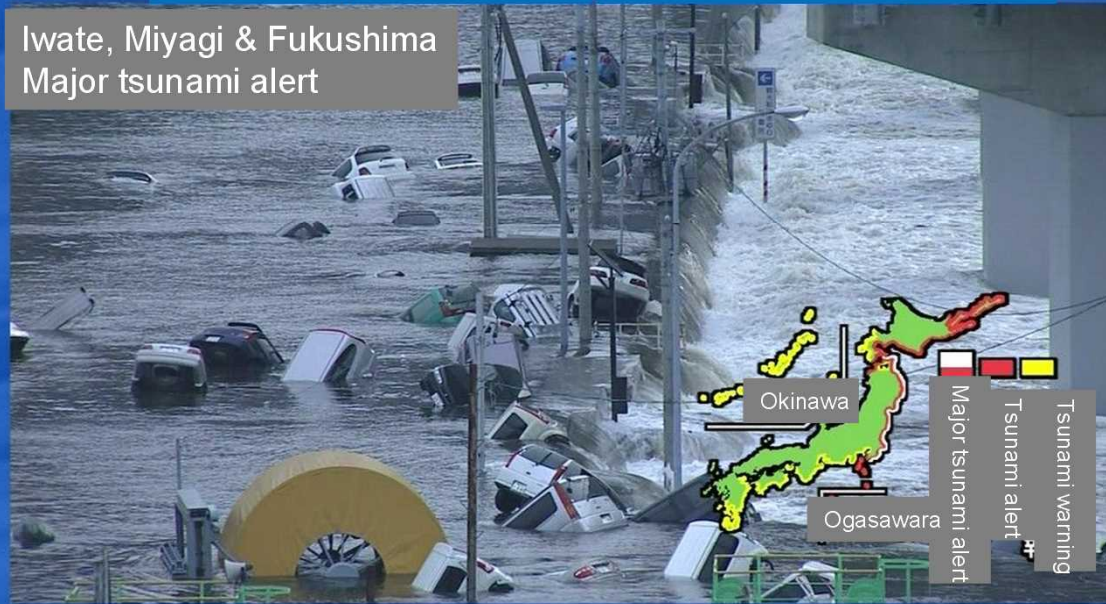
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Major tsunami alert Miyagi Prefecture

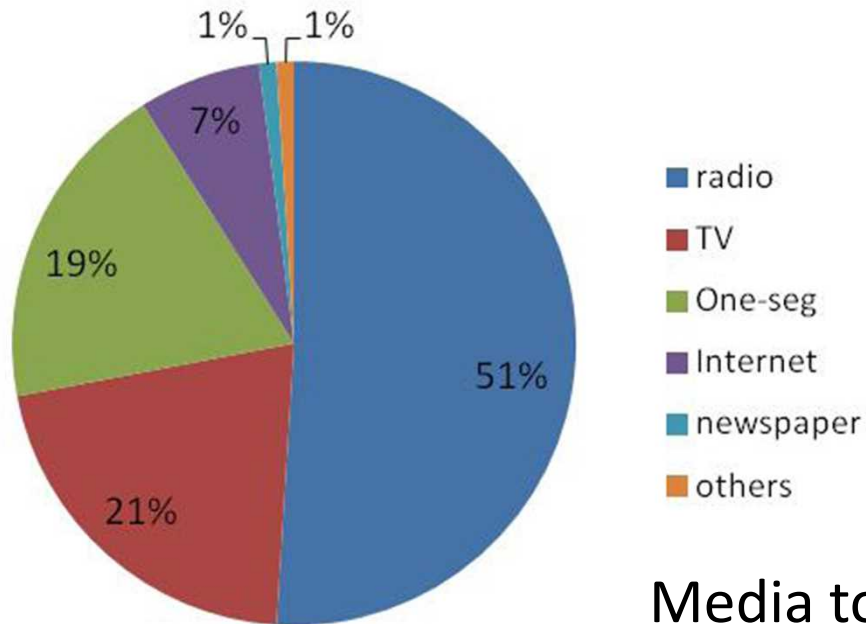
Tsunami impact confirmed Waves of >10 m expected

Iwate, Miyagi & Fukushima  
Major tsunami alert



15:18





Media to which people first connected after the Great East Japan Earthquake



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The Past

# Coping with disaster

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The Present

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# Hybridcast has launched

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## Technical changes

High speed broadband, Smartphones, Tablets, TV receivers with high performance CPUs

## Social changes

Spread of SNS, Literacy, Privacy protection, Diversification of viewer preferences



Converged Broadcast/Broadband Service

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- **March 11, 2011: Great East Japan Earthquake**
  - Experienced simultaneous retransmission of TV on the Internet as an emergency measure.
  - People were able to access information in real time not only from Japan but also from overseas.
- **Broadcast law amendment**
  - Following an amendment to Japan's broadcast law, we are investigating a framework that will allow IP delivery to be used not only for “**previously broadcast content**”, but also for “**simultaneous live broadcasts**” and “**the delivery of scheduled broadcast programs**”.

\*However, the constant simultaneous delivery of TV broadcasts is still impossible.



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The Future

# UHDTV Broadcasting

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# 8K broadcasting will start soon!

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8K Super Hi-Vision broadcasting  
will start soon.



**2020** Full-fledged broadcasting  
will start.

**2018**  
Practical broadcasting



**2016**  
Test broadcasting will start.

**2014** Super Hi-Vision was used for public viewing events of the FIFA World Cup.

**2012** Super Hi-Vision was recommended by the ITU-R as an international TV standard.

**2002** First ultra high-definition video was shown at NHK Science & Technology Research Laboratories.

**1995** Research began at NHK

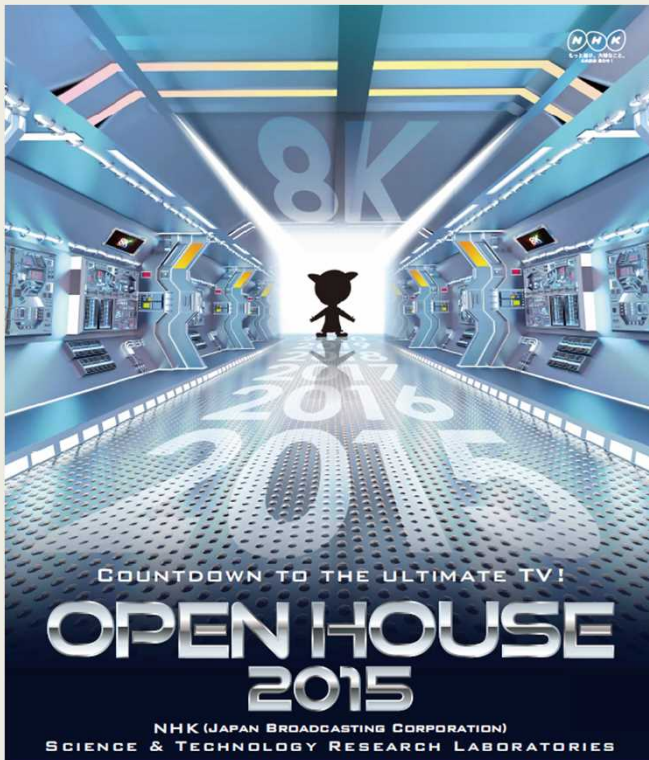
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# OPEN HOUSE 2015

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was held from 28<sup>th</sup> May to 31<sup>st</sup>.

<http://www.nhk.or.jp/str1/open2015/en/>



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# What is 8K Satellite Broadcasting Experiment

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- Toward realization of 8K Super Hi-vision Satellite Broadcasting
  - Production Equipment
  - Video and Audio Encoder/Decoder
  - Multiplexing Equipment
  - Transmission and Reception equipmentAccelerating development of key equipment
- Accelerate the preparations for 8K Satellite Broadcasting in accordance with Roadmap
- Conducting **8K Satellite Broadcasting Experiment** via the actual broadcast satellite that include all equipment like camera, switcher, recorder, encoder/decoder, multiplex, transmitter/receiver and display was showcaserd.



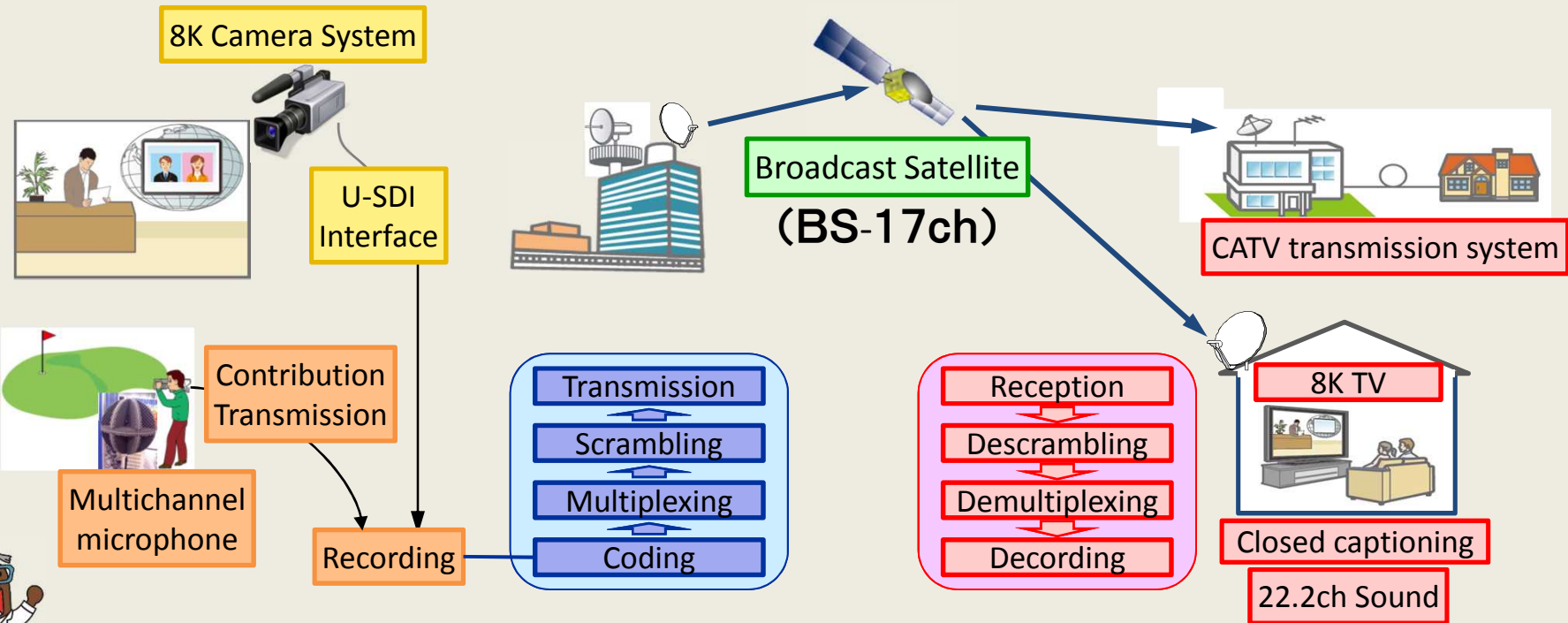
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# Overview of 8K satellite broadcasting experiment

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# Production Equipment

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Recorded 8K CG



Live Camera 1  
Tokyo Bay Area



Live Camera 2  
inside  
the exhibition venue

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# HEVC Encoder and CAS

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## Specification of Video/Audio Encoder

Video ENCODER	MPEG-H HEVC/H.265
	7,680 x 4,320/59.95P
	4:2:0 / 10bit
Audio Encoding	3G-SDI x 17
	MPEG-4 AAC
	48kHz/24bit
Multiplexing	MADI (AES10)
	MPEG-H MMT
	RJ-45 x 1



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# Satellite transmission system

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## Transmission Parameters of 8K satellite broadcasting experiment

Modulation Scheme	16APSK
Symbol Rate	33.7561 Mboud
Roll Off Factor	0.03
FEC	LDPC(7/9)+BCH
Bit Rate	100.4898 Mbps
Multiplexing	MMT/TLV



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# Display and receiving equipment

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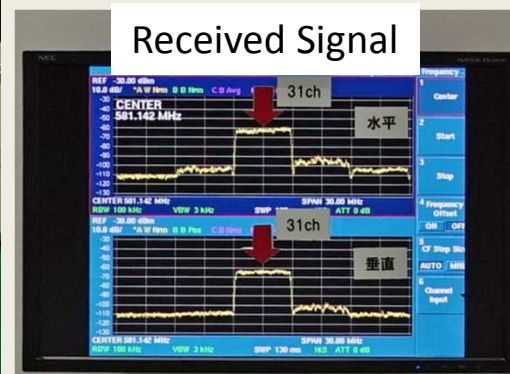
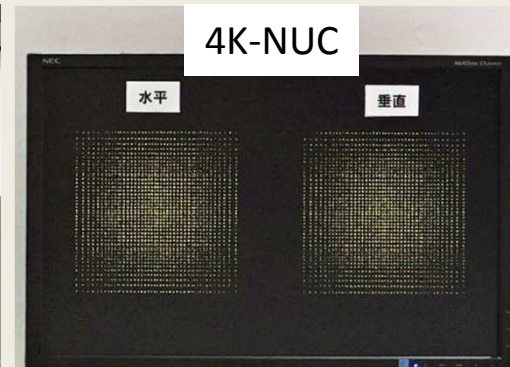
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# Terrestrial Broadcasting

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# Terrestrial Broadcasting

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Transmission Antenna @NHK STRL



Reception Antenna @NHK Broadcasting Center



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# Industrial Applications



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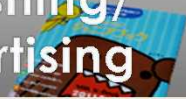
# Applications for 8K Super Hi-Vision

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Digital cinema



Publishing/  
Advertising



Live public viewings



3D television



Education



## 8K Super Hi-Vision

Video  
equipment



Receivers



Medical



Art  
museum  
exhibits



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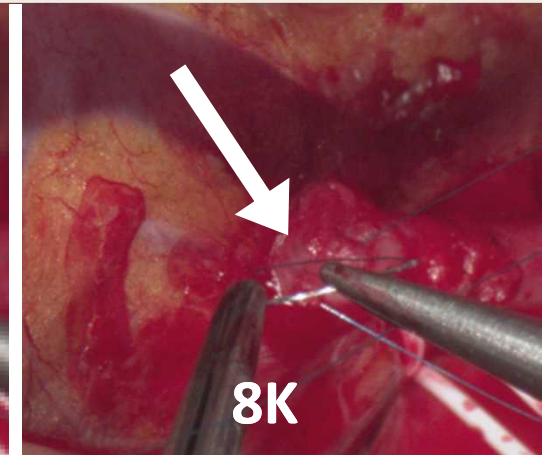
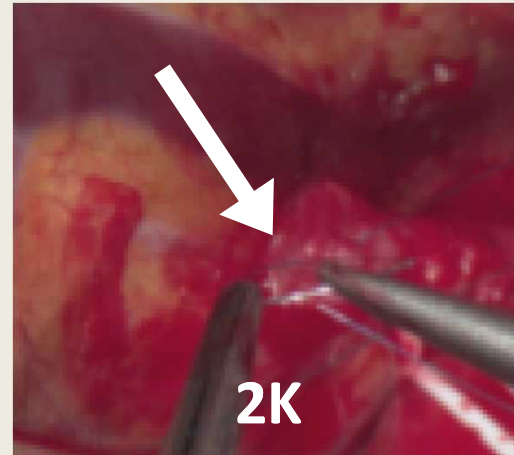


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# Medical Applications

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- 8K filming with an endoscope
- Remote surgery, robot surgery
- Remote medical treatment support



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**Thank you for your attention**

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