UHD (8K) Television Coverage of Large Sports Events in Brazil

8K Super Hi-Vision (SHV) and its production in sports events

Shinichi SAKAIDA

NHK
8K Super Hi-Vision (SHV) and its production in sports events

CONTENTS

- Introduction of 8K SHV Technology
- Public Viewing Event of 2014 FIFA World Cup Brazil™
What is 8K Super Hi-Vision (SHV) ?

✓ 8K SHV has been developed as the next-generation television of current HDTV to provide the viewers a superior sensation of reality.
✓ Japan aims to conduct trial broadcasting in 2016 and start a broadcast service in 2018.
8K SHV system

- Ultra-high Definition Video - 33 Megapixels
- 22.2 Multichannel Sound

<SHV> 7680 pixels

Viewing distance: (0.75 x Height of screen)
Viewing angle: 100 degrees

Viewing distance: (3 x Height of screen)
Viewing angle: 30 degrees
Video parameter values of SHV

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spatial resolution</td>
<td>7,680(H) × 4,320(V)</td>
</tr>
<tr>
<td>Frame frequency</td>
<td>120 Hz (max.)</td>
</tr>
<tr>
<td>Bit depth</td>
<td>12 bit (max.)</td>
</tr>
</tbody>
</table>

22.2 multichannel sound system for SHV

24 channels distributed in three layers and its audio channel mapping are standardized in ITU-R Recommendation BS.2051 (2014), and also in SMPTE and ISO/IEC.
Applications of SHV

Ultra-high def. video, 3D audio

Contribute to video and IT industries

Contribute to society, culture

Live public viewings

Publishing/Advertising

3D television

Education

Video Equipment

Receivers

Medical

Art museum exhibits

Contribute to video and IT industries

Digital Cinema

Ultra-high def. video, 3D audio

Live public viewings

Publishing/Advertising

3D television

Education

Video Equipment

Receivers

Medical

Art museum exhibits

Contribute to society, culture

Contribute to video and IT industries
SHV equipment - Cameras

1st generation camera (2002)
8 M pixel x 4-sensor, 80 kg

3rd generation camera (2010)
8 M pixel x 4-sensor, 20 kg

2012
Portable camera
33 M pixel x 1-sensor
5 kg

120 Hz 3-chip full-spec. camera
33 M pixel x 3-sensor, 60 kg

2013
Cube camera
33 M pixel x 1-sensor
2 kg

High sensitive theatre camera
33 M pixel x 3-sensor
48 kg

Full-resolution camera (2010)
33 M pixel x 3-sensor, 65 kg
SHV equipment - Displays

- LCD projector
- Wide color-gamut laser projector
- 85-inch LCD
- 145-inch PDP
SHV equipment - Compression encoder/decoder

AVC/H.264 Encoder

AVC/H.264 Decoder

HEVC/H.265 Encoder
Public Viewing Event of 2014 FIFA World Cup Brazil™
International transmission route

- Venue
  - 3x 8K cameras
  - 4K-8K U/C
  - 8K ENC

- Sofitel Hotel FIFA
- TV Globo & RNP
- 275 inch theater

- CBPF
- Fiber Optic

- 8K 85'

- (Tokyo)
- (Tokushima)
- (Yokohama)
- (Osaka)
- IBC

2x 4K super Slow

8K 85'
Shooting schedule of matches

<table>
<thead>
<tr>
<th>Match</th>
<th>Date</th>
<th>Time</th>
<th>Team 1</th>
<th>vs.</th>
<th>Team 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group Matches</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14 June 22:00</td>
<td>14 June</td>
<td>22:00</td>
<td>CIV</td>
<td>vs.</td>
<td>JPN</td>
</tr>
<tr>
<td>16 June 19:00</td>
<td>16 June</td>
<td>19:00</td>
<td>GHA</td>
<td>vs.</td>
<td>USA</td>
</tr>
<tr>
<td>19 June 19:00</td>
<td>19 June</td>
<td>19:00</td>
<td>JPN</td>
<td>vs.</td>
<td>GRE</td>
</tr>
<tr>
<td>23 June 17:00</td>
<td>23 June</td>
<td>17:00</td>
<td>CMR</td>
<td>vs.</td>
<td>BRA</td>
</tr>
<tr>
<td>Round of 16</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>28 June 13:00</td>
<td>28 June</td>
<td>13:00</td>
<td>BRA</td>
<td>vs.</td>
<td>CHI</td>
</tr>
<tr>
<td>30 June 13:00</td>
<td>30 June</td>
<td>13:00</td>
<td>FRA</td>
<td>vs.</td>
<td>NGR</td>
</tr>
<tr>
<td>Quarter-Final</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5 July 13:00</td>
<td>5 July</td>
<td>13:00</td>
<td>ARG</td>
<td>vs.</td>
<td>BEL</td>
</tr>
<tr>
<td>8 July 17:00</td>
<td>8 July</td>
<td>17:00</td>
<td>BRA</td>
<td>vs.</td>
<td>GER</td>
</tr>
<tr>
<td>Final</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13 July 16:00</td>
<td>13 July</td>
<td>16:00</td>
<td>GER</td>
<td>vs.</td>
<td>ARG</td>
</tr>
</tbody>
</table>

9 matches are shot by 8K in 5 cities.

Transfer route of NHK staff
Total 5,400 km
In venue – camera position

- 3x 8K cameras
  - One in main stand
  - Two in field
- 2x 4K super slow motion cameras
  - In field
Outside broadcast (OB) van
In the OB van

Copyright protection
## 4 PV sites in Japan

<table>
<thead>
<tr>
<th>PV site</th>
<th>Date and matches</th>
<th>8K display</th>
</tr>
</thead>
<tbody>
<tr>
<td>AEON cinema Kohoku new town, Yokohama</td>
<td>14 June ~ 14 July</td>
<td>300 ~ 350 inch Projector</td>
</tr>
<tr>
<td>The Toyosu campus, Shibaura institute of technology, Tokyo</td>
<td>15 June ~ 20 June 3 matches</td>
<td></td>
</tr>
<tr>
<td>Grand Front Osaka, Osaka</td>
<td>15 June ~ 20 June 3 matches</td>
<td></td>
</tr>
<tr>
<td>ASTY Tokushima, Tokushima</td>
<td>14 June ~ 20 June 3 matches</td>
<td></td>
</tr>
</tbody>
</table>
Yokohama site

AEON Cinema Theater No.4
350 inch screen
130 seats
Tokyo site

Auditorium of Shibaura Institute of Technology - Toyosu Campus

330 inch screen
113 seats
Osaka site

Osaka Knowledge Capital
350 inch screen
154 seats
Tokushima site

Auditorium in “Attractive Space in Tokushima Yamashiro”
- 300 inch screen
- 81 seats
### PV Record

<table>
<thead>
<tr>
<th>Site</th>
<th>Audience In Total</th>
<th>Detail (the number of audience and times)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Live viewing</td>
<td>Recording-Playback</td>
</tr>
<tr>
<td>Yokohama</td>
<td>3385</td>
<td>890</td>
<td>2495</td>
</tr>
<tr>
<td>Tokyo</td>
<td>1775</td>
<td>411</td>
<td>1364</td>
</tr>
<tr>
<td>Osaka</td>
<td>2656</td>
<td>385</td>
<td>2271</td>
</tr>
<tr>
<td>Tokushima</td>
<td>1206</td>
<td>232</td>
<td>974</td>
</tr>
<tr>
<td>Total</td>
<td>9022</td>
<td>1918</td>
<td>7104</td>
</tr>
</tbody>
</table>

- Over 9000 people had watched soccer games on PV
- They came to the PV sites overnight
  - Time difference between Brazil and Japan is 12 hours!
- They felt realistic sensation as if they were in the stadium, and immersive sensation
Conclusion

• Toward future 8K broadcasting
  – We are now preparing for the trial broadcasting of 8K SHV in 2016 and the launch of broadcasting service in 2018.

• Public viewing of 2014 FIFA World Cup Brazil™
  – The public viewing was successful providing the viewers a sense of reality and immersive sensation.
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