Current Status and Prospect of K-UHD with New Media Services

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October 19, 2016
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History of Broadcasting in Korea
- Korea saw its first black and white in the 1960s, color in the 1980s, and the transition to digital HD in 2012

1960s
- B&W TV (1st gen.)
  - Monochrome video
  - NTSC

1980s
- Color TV (2nd gen.)
  - Color video
  - NTSC

2000s
- HD TV (3rd gen.)
  - HD video
  - ATSC 1.0

So what's next? UHD
**Current Status of K-UHD : Paid UHD**

- Paid UHD services were launched in Apr. 2014, June 2014, and Oct. 2015.
- ~1.3 million subscribers (Mar. 2016)

<table>
<thead>
<tr>
<th>Service</th>
<th>No. of Subscribers ('Mar. 2016)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cable</td>
<td>10 thousands</td>
</tr>
<tr>
<td>Satellite</td>
<td>130 thousands</td>
</tr>
<tr>
<td>IPTV</td>
<td>1.17 millions</td>
</tr>
</tbody>
</table>

- Cable: UMAX ULTRA Reality ('14.4)
- Satellite: sky UHD1 ('14.6), sky UHD2 ('15.6), UXN ('15.6)
- IPTV: UMAX ULTRA Reality ('15.10)
Current Status of K-UHD : Terrestrial

- **Experiment**
  - Korea has tested broadcasting of terrestrial 4K UHD from 2012

- **Frequency Band**
  - allocated 30MHz bandwidth (5 Channels) in the 700 MHz band at July 2015

- **Technical Standard**
  - various standards have been compared and field-tested
  - Technical standard based on **ATSC 3.0** is finalized for terrestrial UHDTV in July 2016 and rulemaking is in progress
    - Including HEVC (Main 10 profile), MPEG-H 3D Audio (LC profile), DASH-ROUTE / MMT
**Current Status of K-UHD: Terrestrial**

**Service Plan**
- Starts in Seoul metropolitan area by the 1Q of 2017, then expand to major cities by the end of 2017
- Nationwide service by 2021

- 4K UHD broadcast at PyeongChang Winter Olympic Game (Feb. 2018)
New Media Services over K-UHD
- K-UHD supports encapsulation of IP packets
- new style or type of services can be easily implemented for broadcast and/or broadband environments with hybrid delivery

New Media Services : IP Data Packet

- Fixed/Mobile Reception
  - Fixed, Mobile Receiver

- Multi-View
  - Orchestrated-VView
  - Screen Segment (Multi-Angle & Etc), Ultra Wide Vision, VR

- Personalization
  - Viewer Matching Service (e.g. Targeted Advertising)

- Interactivity
  - Connecting Service, NRT (Non-RealTime) Service

- Emergency Alert
  - Emergency Broadcasting (Typhoon, Earthquake & Etc)
New Media Services : VR

VR streaming services demonstrated
- Real-time VR streaming for professional baseball game by kt (April 2016)
- VoD VR for music portal by genie (June 2016)

Requirements from Industry
- VR sickness: high resolution (>8K), less delay, consider brain effect, etc.
- fast stitching and effective 3D modeling from multiple camera inputs
- Object extraction and identifying
- Fast data delivery without delay or half-frame delay
New Media Services : UWV

**Ultra Wide Vision**
- High quality (12Kx2K@60p) panoramic video + multichannel audio
  - Service trial in PyeongChang Winter Olympic Game (Feb. 2018)
- Live broadcasting with 4K UHD devices
  - Multi-camera Rig, Live Stitching, HEVC Encoding/Decoding, Multi-projection

![Diagram](image)

**UWV over K-UHD**
- Hybrid broadcasting: Center (Broadcasting), Left/Right (Broadband)
- Orchestrated media service with additional displays or HMD
- *Demonstrated at “MMT Developer’s Day Event” (Collaboration between ETRI and Samsung)*
New Media Services : Teramedia

- **Teramedia for the next generation**
  - Media for “Ultra Realistic” services to improve the Quality of Life
    - "Ultra Realistic" : More realistic than real
  - Media requiring monstrous amounts of data (more than Tbps)

- **Category & Example of Teramedia**
  - Single Teramedia
    - Digital hologram : ~ 5 Tbps for 5” digital hologram presentation
    - Light-field : ~ 10 Tbps for 700x700 FHD view point presentation
    - Free-view
  - Collaborative Teramedia
    - COMP (Collaborative, Mosaic, Panoramic)
      - Billions of cameras installed in CCTVs, terrestrial or air vehicles, drones, etc.
      - To provide top down and organized information derived from big data analysis
      - Media orchestration for playout and delivery
    - Orchestrated Media with thousands of videos : ~ 10 Tbps input HD videos
New Media Services: Teramedia System

Teramedia Contents
- Full 3D Light Field Video
- High Resolution Digital Hologram
- Orchestrate Media

Teramedia Coding
- AV Coding for Teramedia

Teramedia Representation
- Orchestration of Media
- Hologram
- LF Media

Teramedia Data Format
- Unified Teramedia Data Format

Orchestrated Reconstruction
- Full 3D LF Video
- Hologram Visual Object
- Connected Media Background Video
Conclusions

• Technical Standard for Terrestrial UHD of Korea was finalized in July 2016
  – Based on ATSC 3.0 and MPEG Standards

• Supporting IP data packets provides flexible environment for implementing or testing the new style of service

• The term Teramedia is suggested to represent new media for the near future
  – New immersive media service: VR, Light Field, UWV, Hologram
  – Orchestration between media
  – etc.
Thank You !