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

Electronics and Telecommunications Research Institute
Broadcasting · Media Research Laboratory

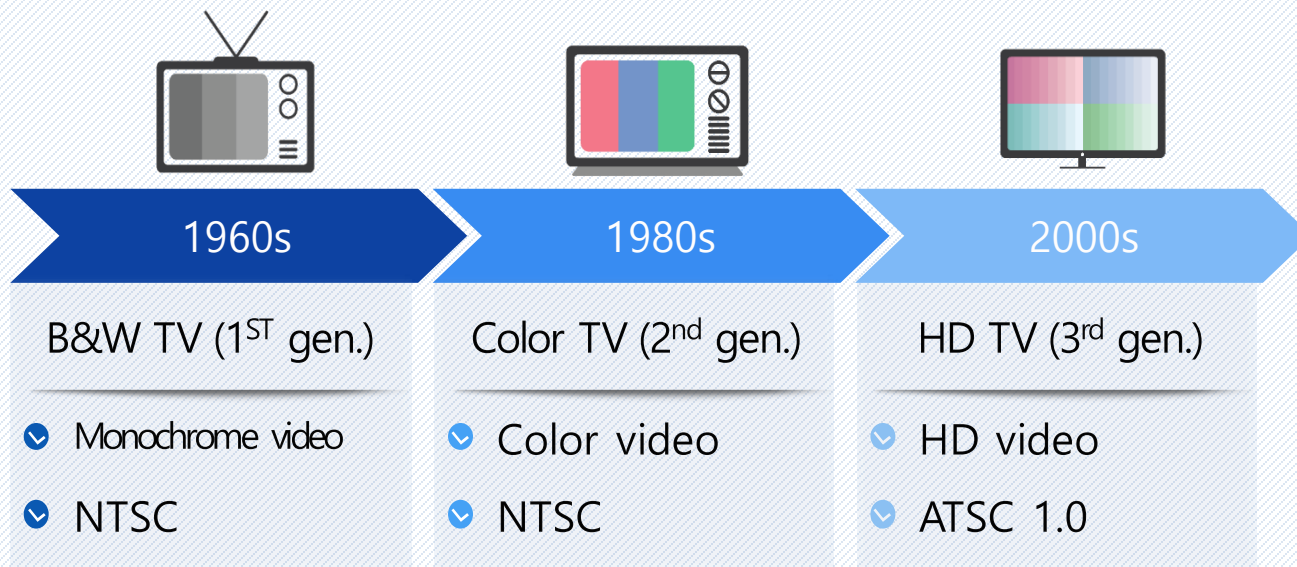Senior Vice President, **Chieteuk Ahn**

October 19, 2016

Contents

History of K-TV Broadcasting

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	1980s	2000s
B&W TV (1ST gen.)	Color TV (2nd gen.)	HD TV (3rd gen.)
⌄ Monochrome video	⌄ Color video	⌄ HD video
⌄ NTSC	⌄ NTSC	⌄ ATSC 1.0

So WHAT'S NEXT?

UHD

4K UHD

HD

Current Status of K-UHD : Paid UHD

Paid UHD services were launched
- a cable TV in Apr. 2014, a satellite in June 2014, and an IPTV in Oct. 2015.

~ 1.3 million subscribers (Mar. 2016)

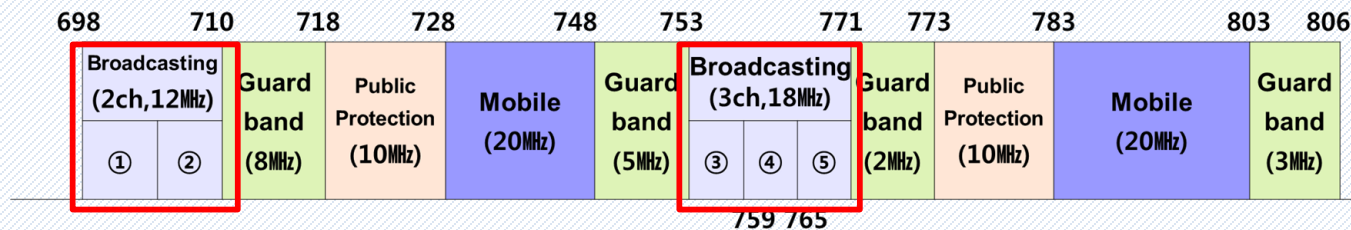| Cable	Satellite	IPTV
UMAX ULTRA Reality	sky ÜHD1 드라마·오락 sky ÜHD2 네이처·다큐 UXN ULTRA EXTRAORDINARY NETWORK	UMAX ULTRA Reality
('14.4)	('14.6) ('15.6) ('15.6)	('15.10)
10 thousands	**130** thousands	**1.17 millions**

No. of subscribers('Mar. 2016)

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

| 698 | 710 | 718 | 728 | 748 | 753 | 771 | 773 | 783 | 803 | 806 |

| Broadcasting (2ch,12MHz) ① ② | Guard band (8MHz) | Public Protection (10MHz) | Mobile (20MHz) | Guard band (5MHz) | Broadcasting (3ch,18MHz) ③ ④ ⑤ | Guard band (2MHz) | Public Protection (10MHz) | Mobile (20MHz) | Guard band (3MHz) |

759 765

**Technical Standard**

- various standards have been compared and field-tested

- Technical standard based on **<u>ATSC 3.0</u>** 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

KOREA UHD ON AIR

Service Plan

- starts in Seoul metropolitan area by the 1Q of 2017, then expand to major cities by the end of 2017
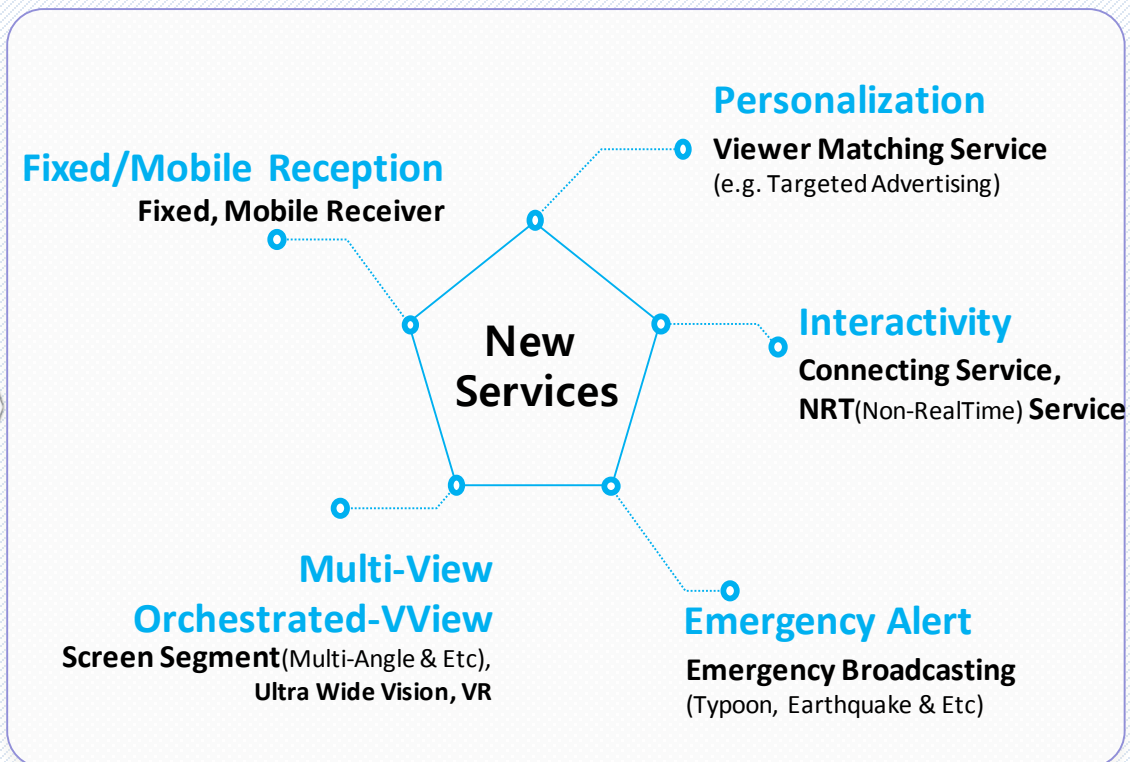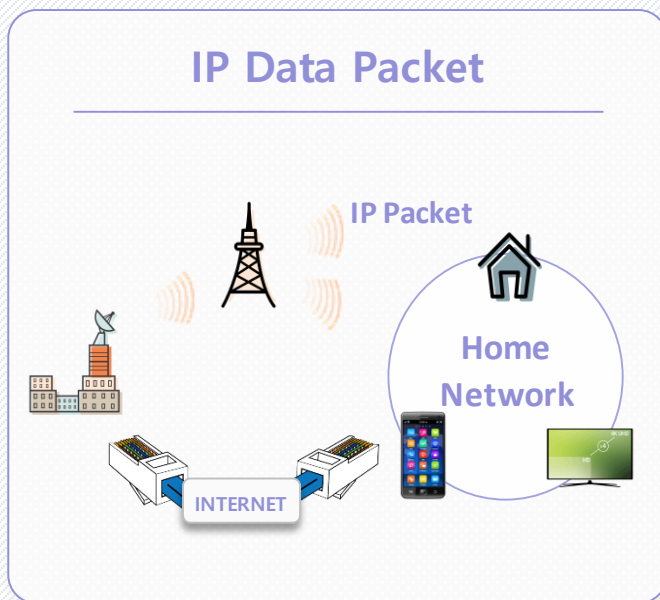- nationwide service by 2021

Stage 1 — Seoul — 1Q of 2017

Stage 2 — End of 2017

Stage 3 — ~ 2021
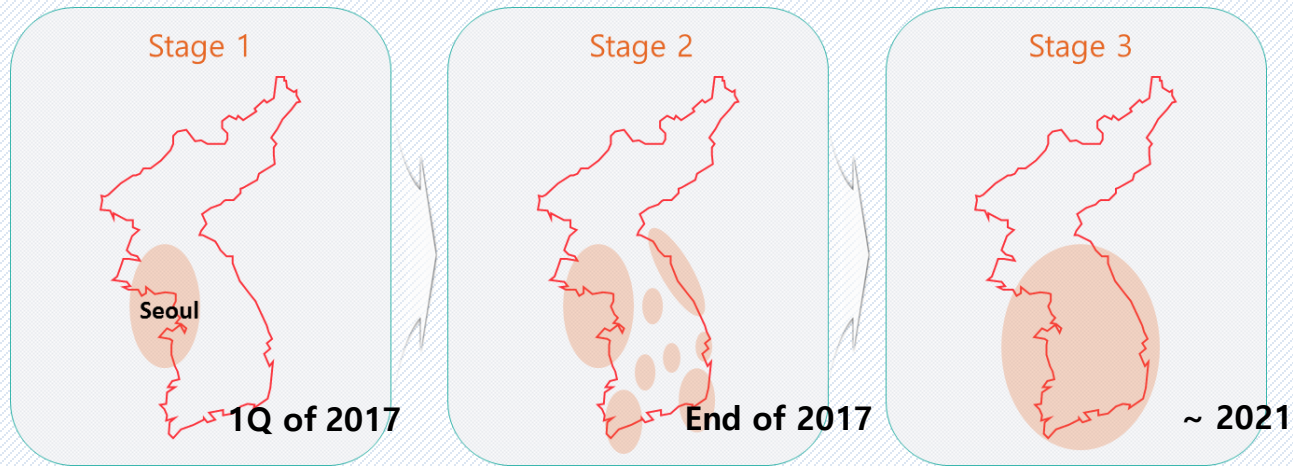
- 4K UHD broadcast at PyeongChang Winter Olympic Game (Feb. 2018)

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New Media Services : IP Data Packet

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

IP Data Packet

IP Packet

Home Network

INTERNET

New Services

Fixed/Mobile Reception
Fixed, Mobile Receiver

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

Interactivity
Connecting Service,
NRT(Non-RealTime) Service

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

Emergency Alert
Emergency Broadcasting
(Typoon, 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)

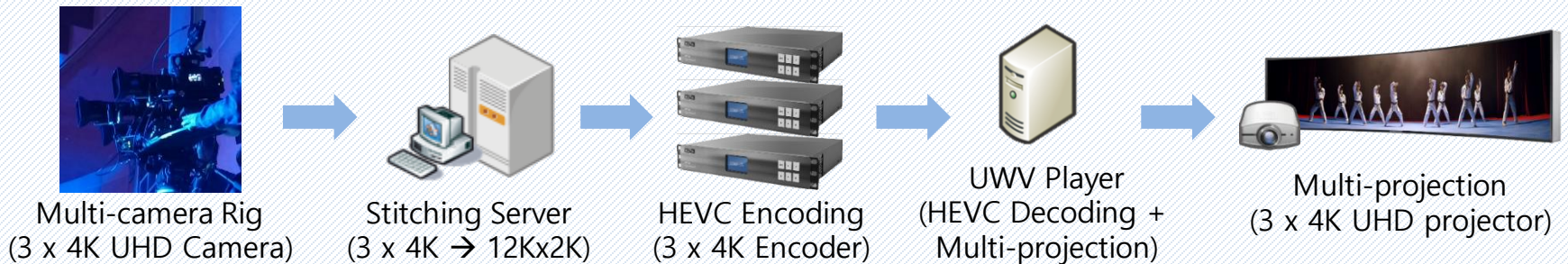
Requirements from Industry
- VR sickness: high resolution (>8K), less delay, consider brain effect, etc.
- fast stitching and effective 3D modeling from multiple camera inputs
- Object extraction and identifying
- Fast data delivery without delay or half-frame delay

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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*

Multi-camera Rig
(3 x 4K UHD Camera) → Stitching Server
(3 x 4K → 12Kx2K) → HEVC Encoding
(3 x 4K Encoder) → UWV Player
(HEVC Decoding +
Multi-projection) → Multi-projection
(3 x 4K UHD projector)

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)*


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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, Panorammic)
    - ✓ 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
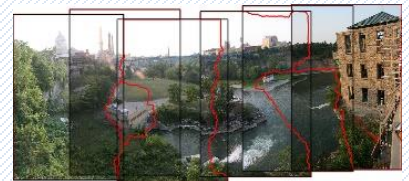
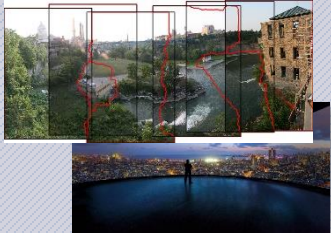# New Media Services : Teramedia System

Teramedia Contents

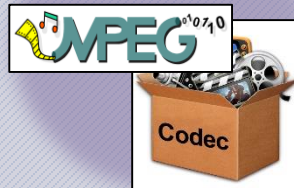Full 3D Light Field Video
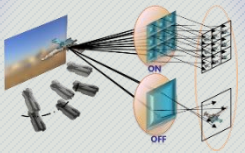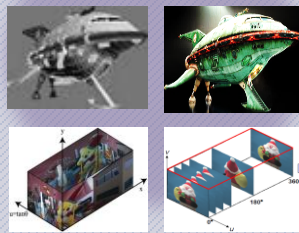
High Resolution Digital Hologram

Orchestrate Media

Teramedia Coding

AV Coding for Teramedia

Codec

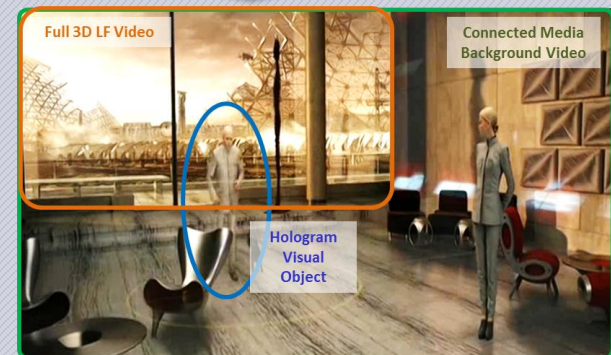**Teramedia Data Format**

Unified Teramedia Data Format

Teramedia Representation

Hologram

LF Media

Orchestrated Reconstruction

Orchestrated Media

Full 3D LF Video

Connected Media Background Video

Hologram Visual Object

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 !