



Immersive Telepresence

The word 'Kirari!' is written in a large, black, sans-serif font. Above the letters 'i' and 'r' are two small, four-pointed stars. A curved line, colored with a gradient from yellow to blue, arches over the word, ending in a small blue star.

Kirari!

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Concept of Kirari! project



Feeling as if they are experiencing the atmosphere of the sporting venue, wherever they are



Feeling “speed”, “height”, “strength”

Kirari!
Hope to make user's eyes
twinkle

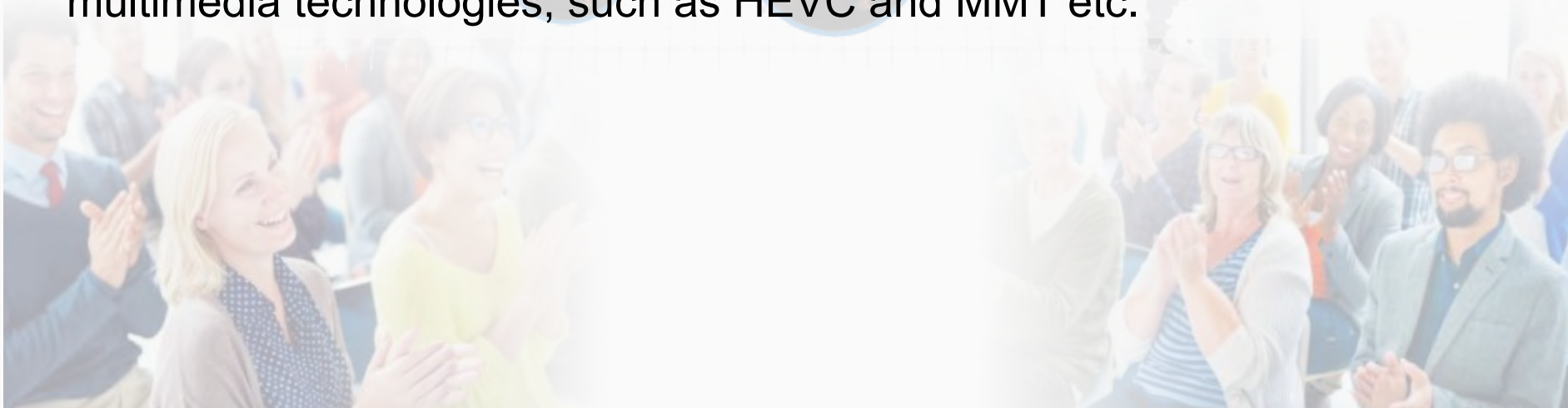


Background and Motivation



Innovative R&D by NTT

- In Japan, UHDTV service has been launched in this August.
- In 2020, people will enjoy this high quality service widely and we can share our excitement by watching on large screen at stadium, cinema etc.
- NTT has been contributing to “sharing the excitement” by using latest multimedia technologies, such as HEVC and MMT etc.



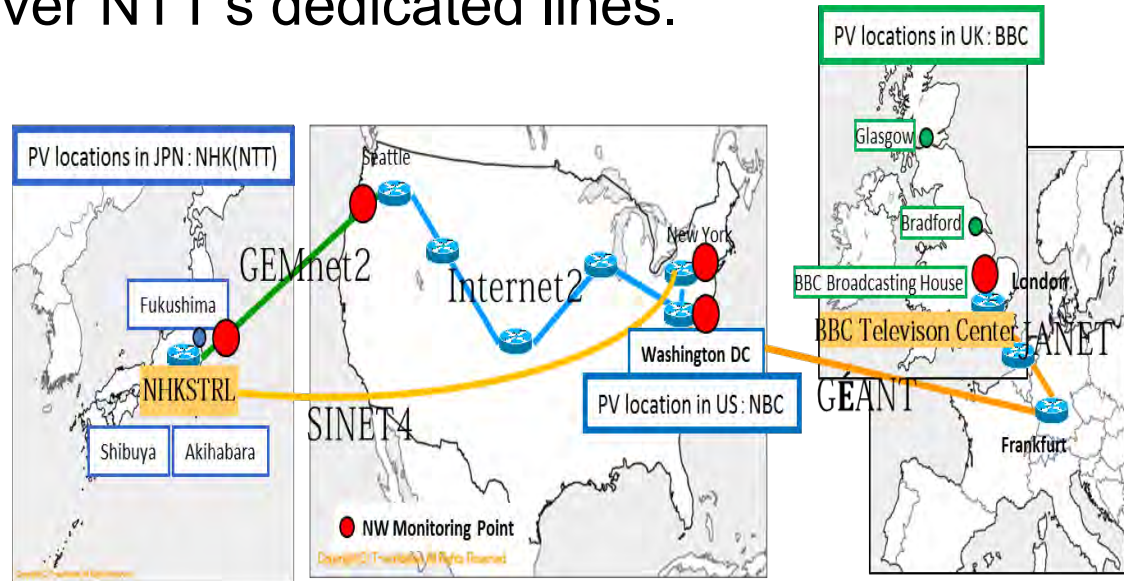
Background and Motivation



➤ In Japan, UHDTV service has been launched in this August.

➤ **Live Viewing of the 2012 Olympics**

- Stream super high definition video from London to Tokyo in real time.
- In Japan, SHV videos were distributed to several places by IP multicasting over NTT's dedicated lines.



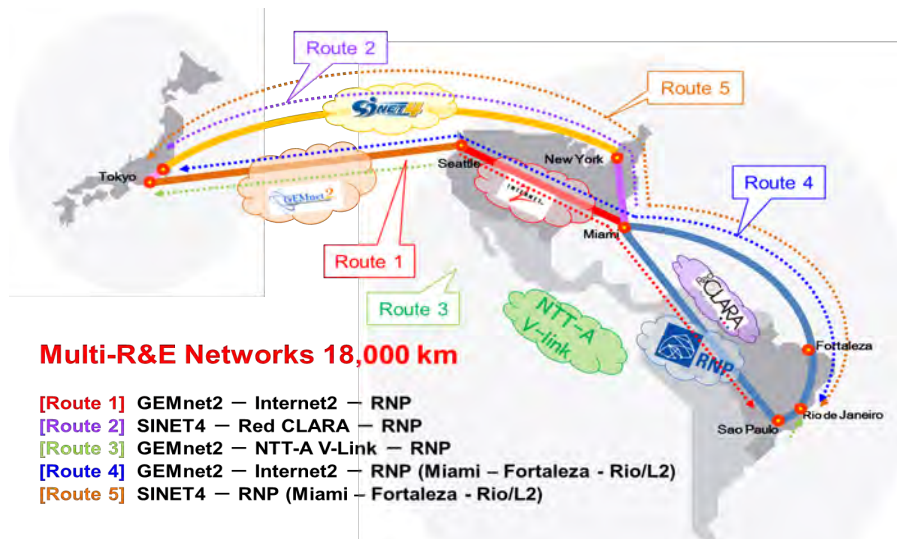
Background and Motivation



➤ In Japan, UHDTV service has been launched in this August.

Live Viewing of the 2014 FIFA World Cup

- Stream 8K super high definition videos with 300Mbps IP transmission in real time.
- 19,000km from Rio de Janeiro to Tokyo
- 8K videos were distributed to 4 cinema locations.



9 games were shown to an audience of 10,000 at 4 locations.

Background and Motivation

But realistic is not enough to make user's eyes **twinkle**..

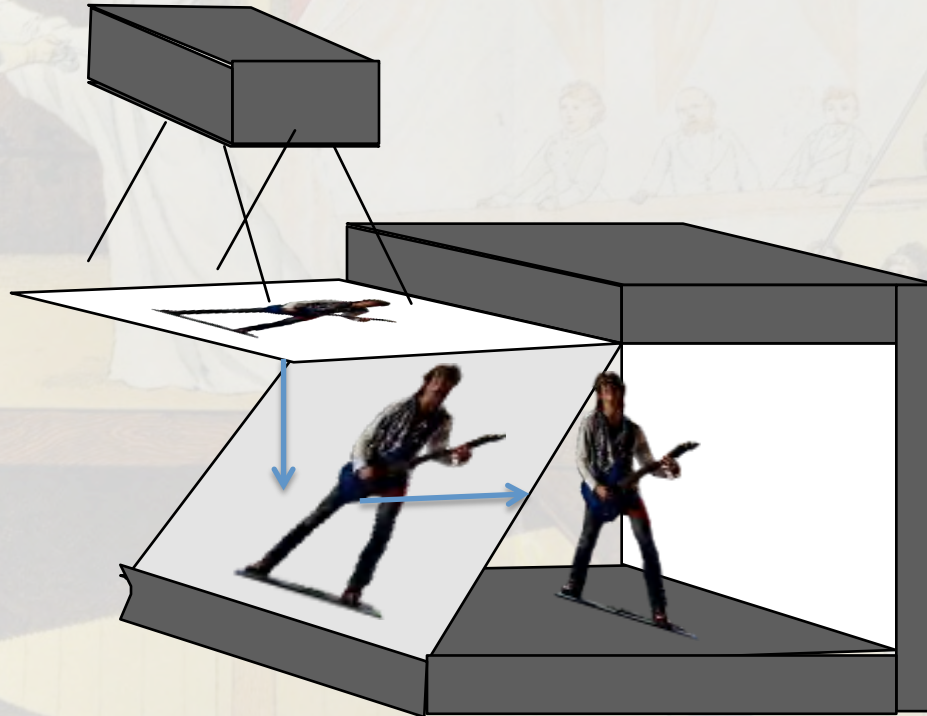
We brought an illusion technique named **Pepper's ghost** to Kirari!



Toy's demonstration

System configuration

(1) Video is projected onto top screen or played on monitor.



(2) Projected video is refracted onto transparent foil.

(3) Audiences see refracted video at center of the box.

Latest Trial Events

Immersive Telepresence

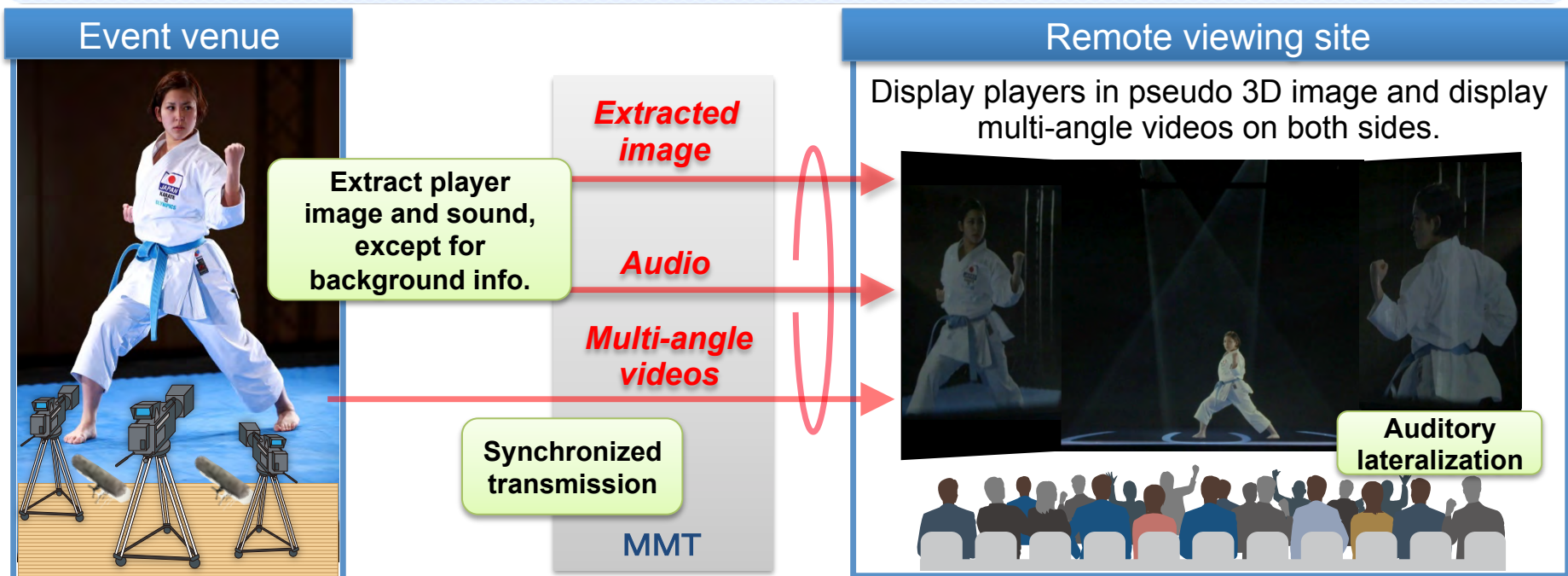


Karate Enbu by Kirari! at NTT R&D Forum 2016



We have demonstrated real-time pseudo-3D video transmission and sound field reconstruction for powerful Karate performance.

⇒ Real-time target image/audio extraction, synchronized live transmission and sound image reproduction by virtual speaker are proofed in this demonstration.



Digest Movie of NTT R&D Forum 2016

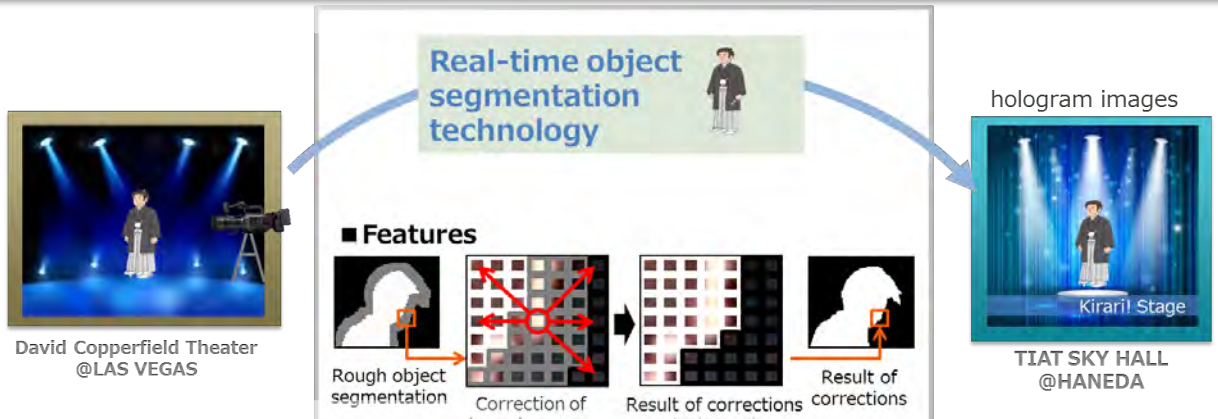


<https://www.youtube.com/watch?v=HQfwt0I374E> (Japanese version only)

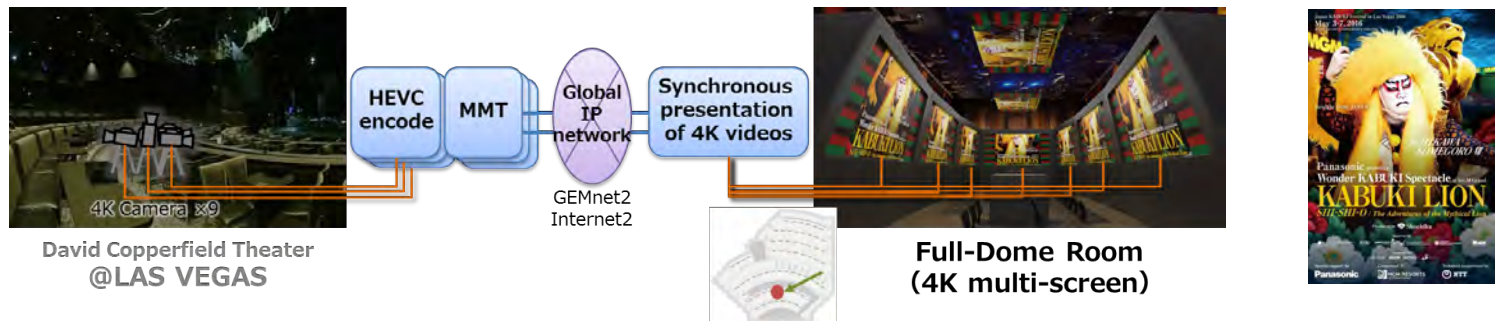
Live viewing of KABUKI "SHI-SHI-O" from Las Vegas



World's first remote live greeting reproduced as hologram images using "Kirari!"



World's first spatial reproduction using multi-4K screens (Full-Dome Room)



KABUKI LION 獅子王



<https://www.youtube.com/watch?v=E0D67sBsCY0>
(Japanese version only)

More use case of Kirari!



Sports



Stage Performance



Remote venue

music



Speech



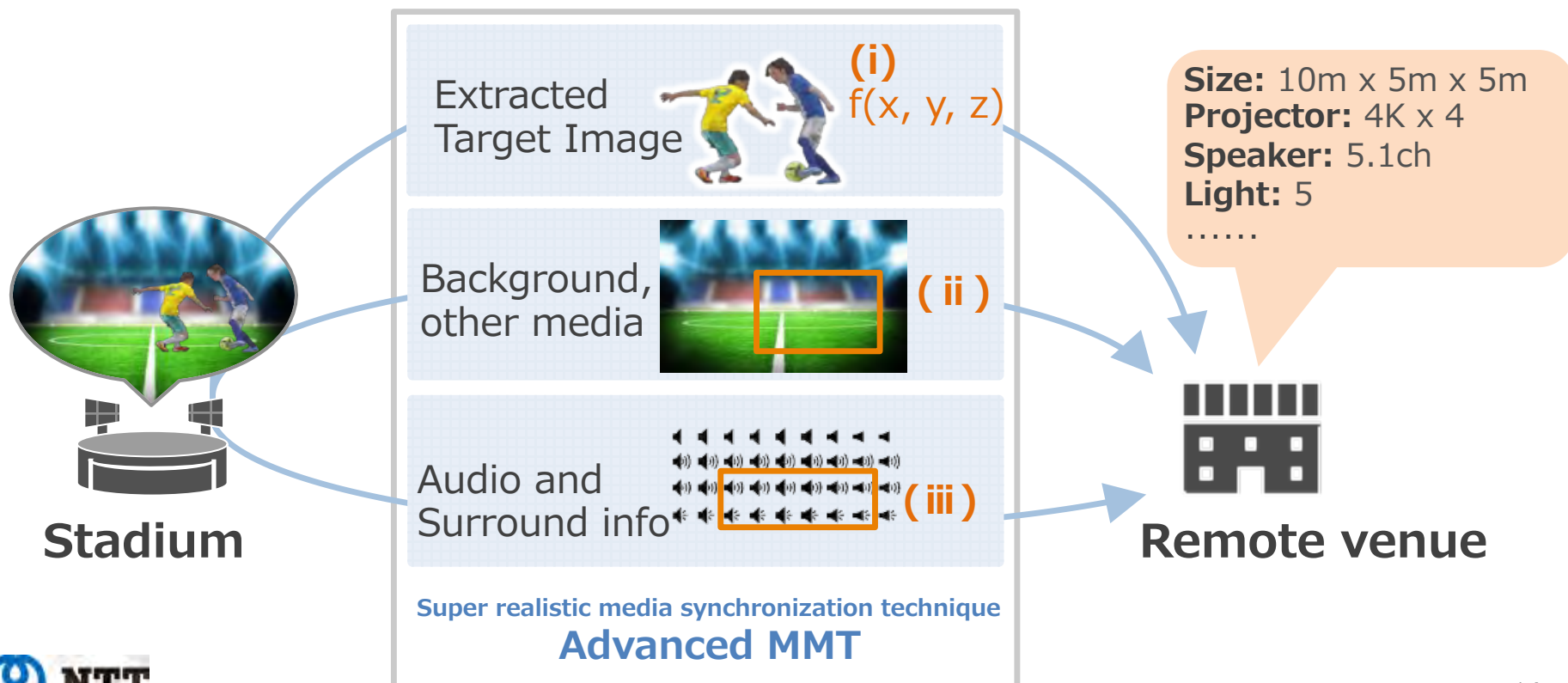
Technologies

- Media Transport, Video, Audio Technology -

Challenges for live media transmission using Kirari!



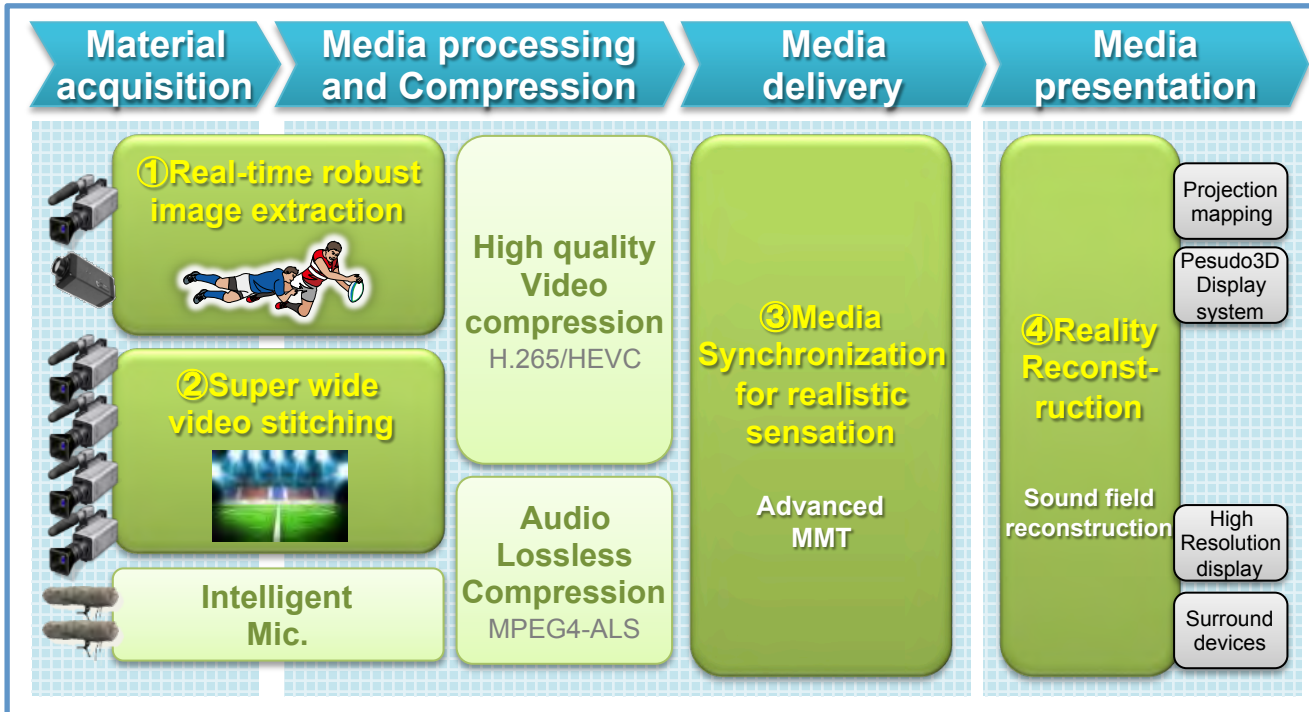
- ◆ Media acquisition part (what do we need to capture?)
- ◆ Media processing part (a part of making kirari! contents)
- ◆ Media delivery part (we use MMT but is not limited to use other)
- ◆ Media presentation part (how to use pseudo 3D image effectively?)



Individual technology and current progress



A stadium



Remote Venue



NTT Developed:

- ① Real-time image extraction technology for simple background and for a few target images
- ② Real-time distortion correction and stitching technology for video captured by multiple 4K cameras
- ③ Synchronized transmission technology for spatial information (such as size of target image positional relationship, and direction of sounds, etc) , as well as audio/video
- ④ High-realistic images and sounds field reconstruction technologies

Conclusions



- We introduce Kirari! technologies and recent activities.
- We believe Kirari! has some promising use cases.
- But there are a lot of open issues to realize flexible Kirari! services.
- We welcome joint study if you or your company is interesting in these technologies.

Thank you!