

WBU-ISOG Forum 2014
in Tokyo

Codec Technologies

Standards and Development Update

(Session 2.4 HEVC and DVB S2E)

NTT Electronics Corporation

April 30th, 2014

Challenging Issues of Broadcasters and Operators

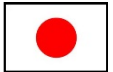
Issue	Needs	Solution
1. Tighter Satellite Bandwidth Reservation	<ul style="list-style-type: none"> - More economical transmission by advanced encode and modulation 	Apply Efficient Method: <ul style="list-style-type: none"> - H.264/AVC or HEVC compression - DVB-S2X modulation - SCPC to MCPC
2. Increase Revenue but Reduce OPEX	<ul style="list-style-type: none"> - Transmission of heterogeneous type of contents together. (Linear Video, File, Data, etc) - Heterogeneous feed bonding (e.g. Satellite + Fiber) 	Apply multimedia friendly transport <ul style="list-style-type: none"> - MMT
3. Requirement for error-free transmission over IP	<ul style="list-style-type: none"> - More robust FEC than ProMPEG is required because high bitrate contents such as HD and UHDTV transmission is increasing 	Apply robust FEC <ul style="list-style-type: none"> - LDGM

1. Efficient Compression : HEVC

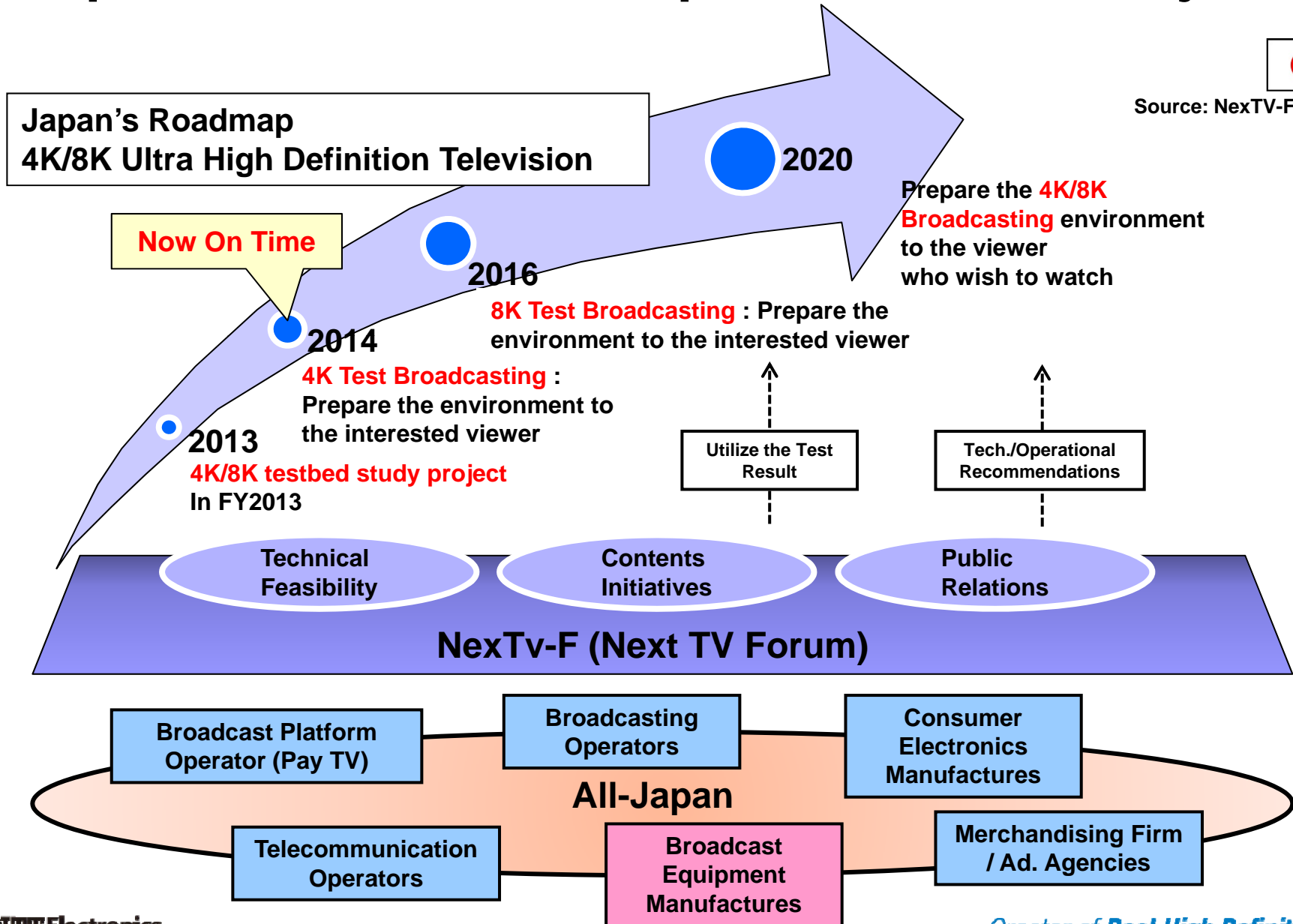
- Targeted efficiency is double of MPEG-4/AVC.
- Standardized as the part of MPEG-H (ISO/IEC 23008).
 - FDIS (Final Draft of International Standard) in Jan. 2013.
 - 4:2:0 support
- FRExt (4:2:2, 4:4:4 support) will be standardized in July 2014.
 - cf. MPEG-2 standardization done in 1995
AVC/H.264 done in 2003, FRExt done in 2007.
- Various applications for Video distribution.
 - Broadcast (UHDTV, HD, SD, Smaller)
 - Internet Video, Packaged Media, etc.
- For UHDTV distribution, HEVC is key technology.

1. Efficient Compression : HEVC

Japan's UHDTV Roadmap and NexTV-F Project



Source: NexTV-F



NTT Electronics Roadmap

- AVC/H.264 Based 4K contribution codecs: Ready

- HEVC
 - Under preparation.
 - Targeted to 4K/HD, also expandable to 8K
 - 4:2:0 and 4:2:2

 - HEVC 4K/HD system : FY2015

2. Multimedia-friendly Transport

- In multimedia era, MPEG-2 system (part.10) is not fit to the broadcaster's requirement.
 - Broadcaster/Operator wants to transmit not only linear video but 3D audio, file, data and control signal.

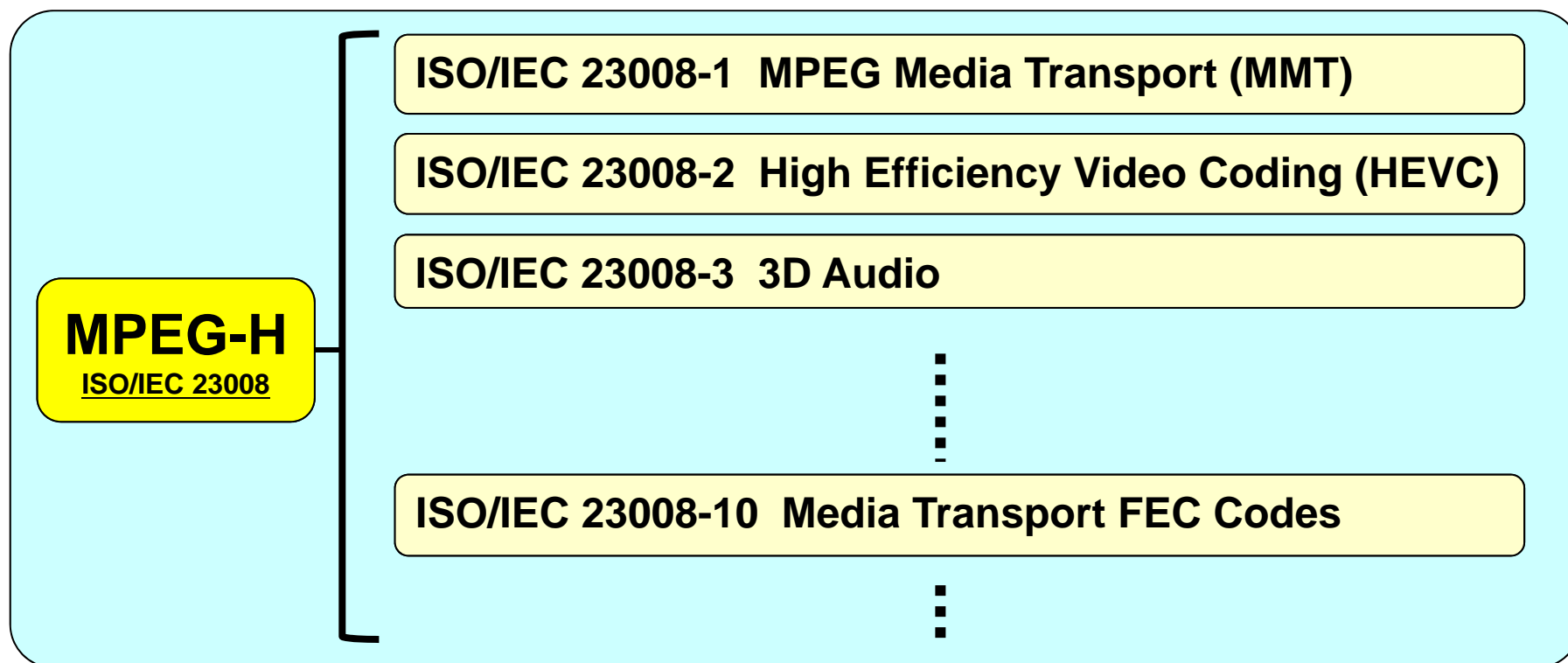
- Need to break the curse from “PCR”
 - Advanced synchronization system for Transport stream is needed.

- Solution
 - Using MPEG-H MMT: MPEG Media Transport
 - Standardized as ISO/IEC 23008-1
 - Efficiency / Usability Improvement

2. Multimedia-friendly Transport

About MPEG-H Standard

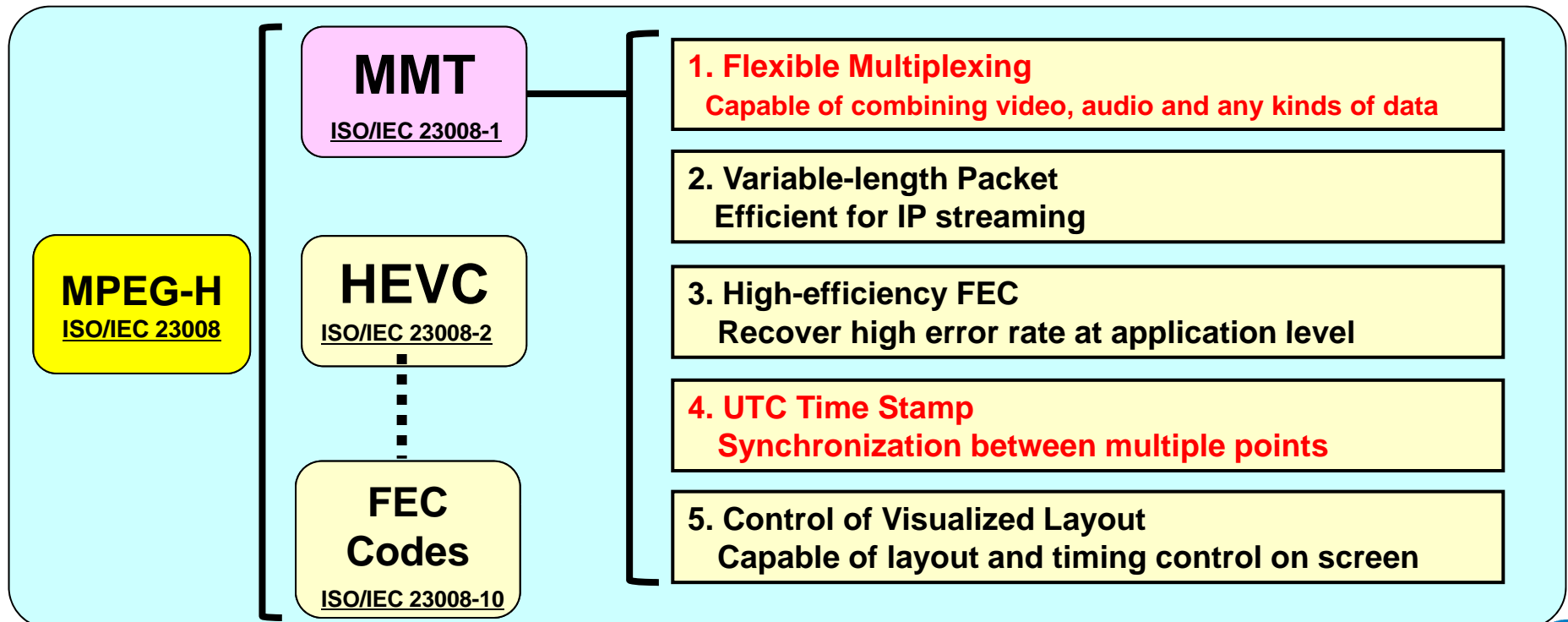
- International Standardized as ISO/IEC 23008.
- Includes MMT, HEVC and FEC codes.
- NTT R&D involved to the Standardization.



2. Multimedia-friendly Transport

MMT (MPEG Media Transport) in MPEG-H

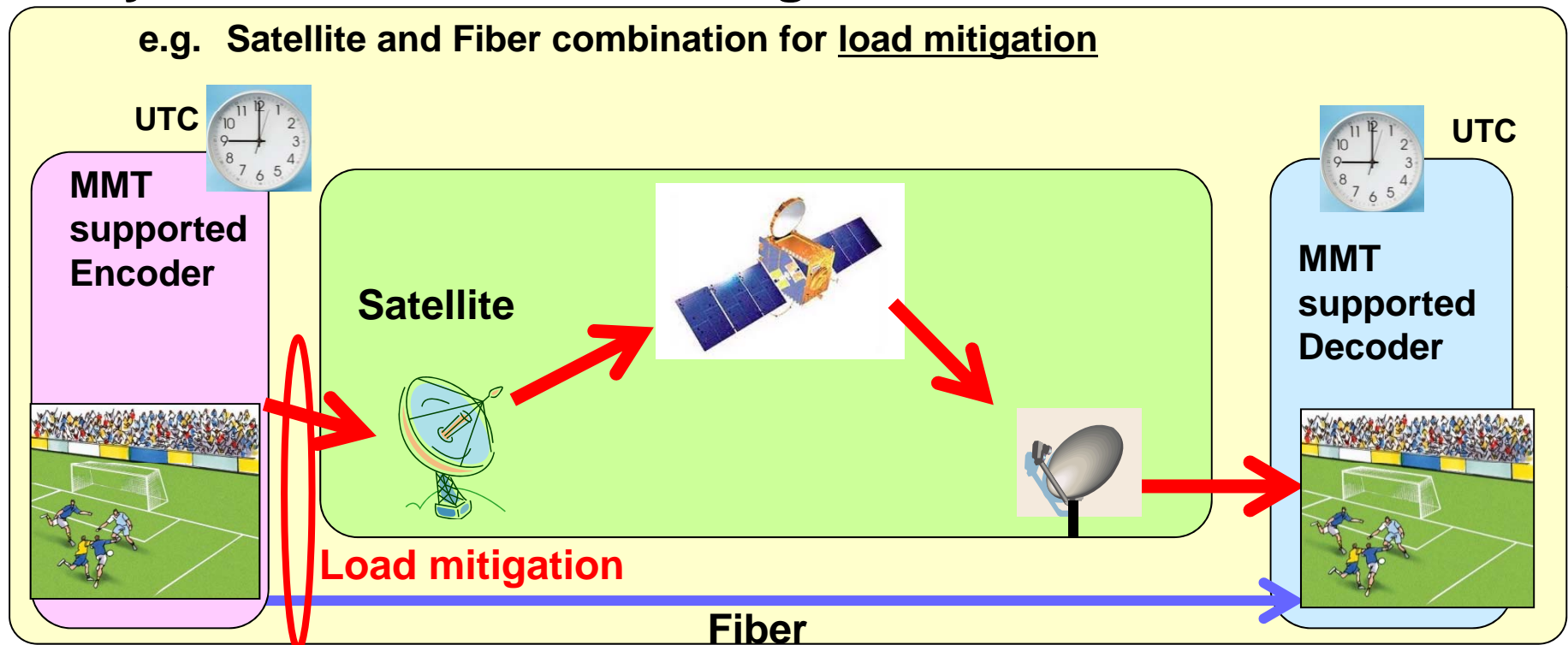
- Standardized as ISO/IEC 23008-1
- Next generation media transport standard which replaces current MPEG-2 TS (ISO/IEC 13818-1). MPEG-2 TS has been used for MPEG-2 video and MPEG-4/AVC video transport.
- Capable of hybrid transmission for video, audio and other media data using satellite and IP network



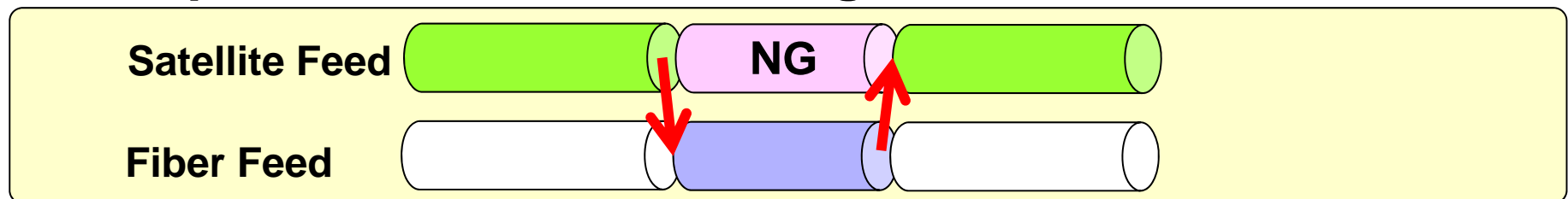
2. Multimedia-friendly Transport

Benefit of Applying MMT (1)

■ Hybrid transmission among different circuit.



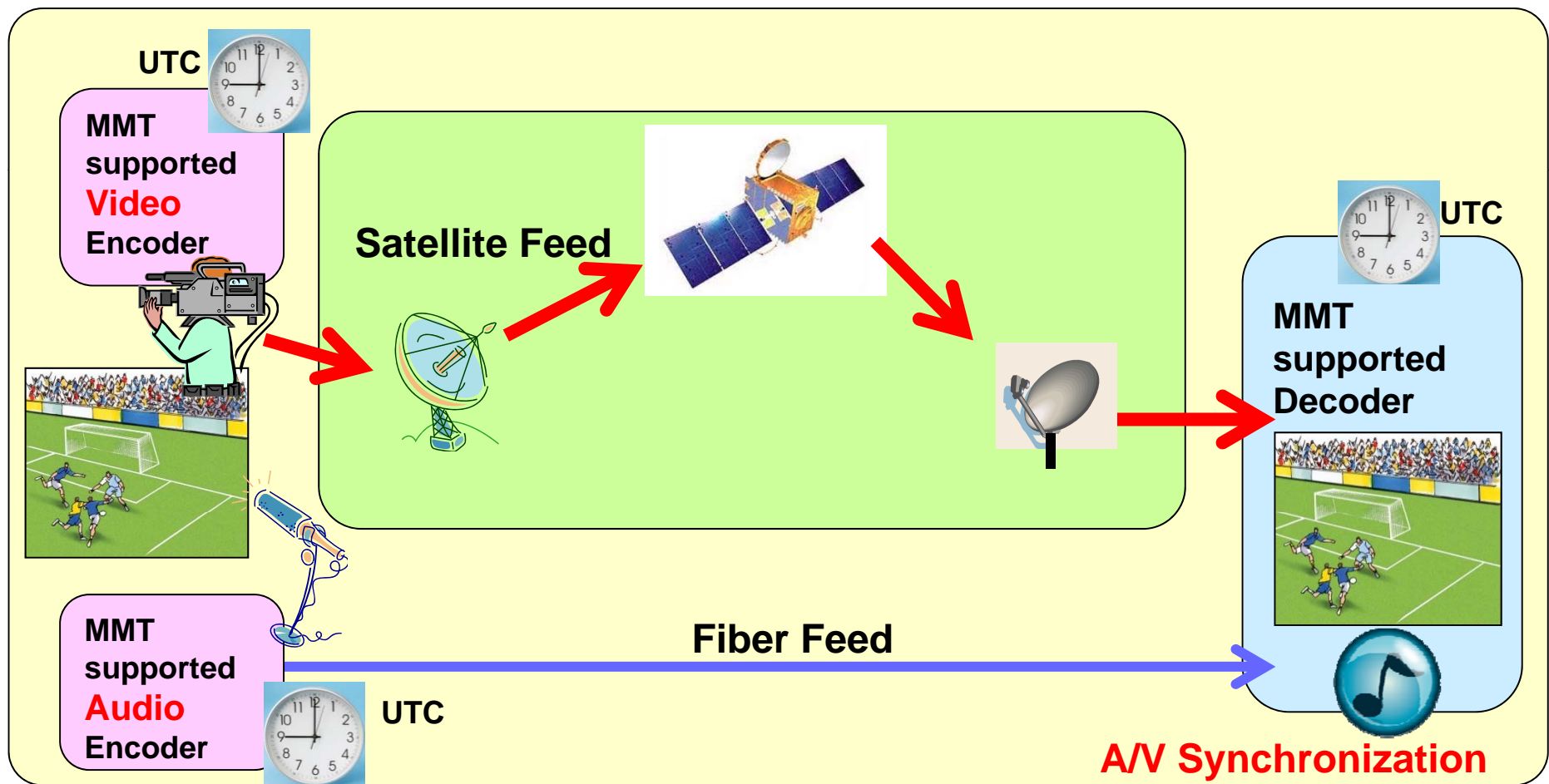
■ Adaptive transmission among different circuit.



2. Multimedia-friendly transport

Benefit of applying MMT (2)

- Using UTC (Coordinated Universal Time) based time stamp enables complete synchronization of the component among different feed.

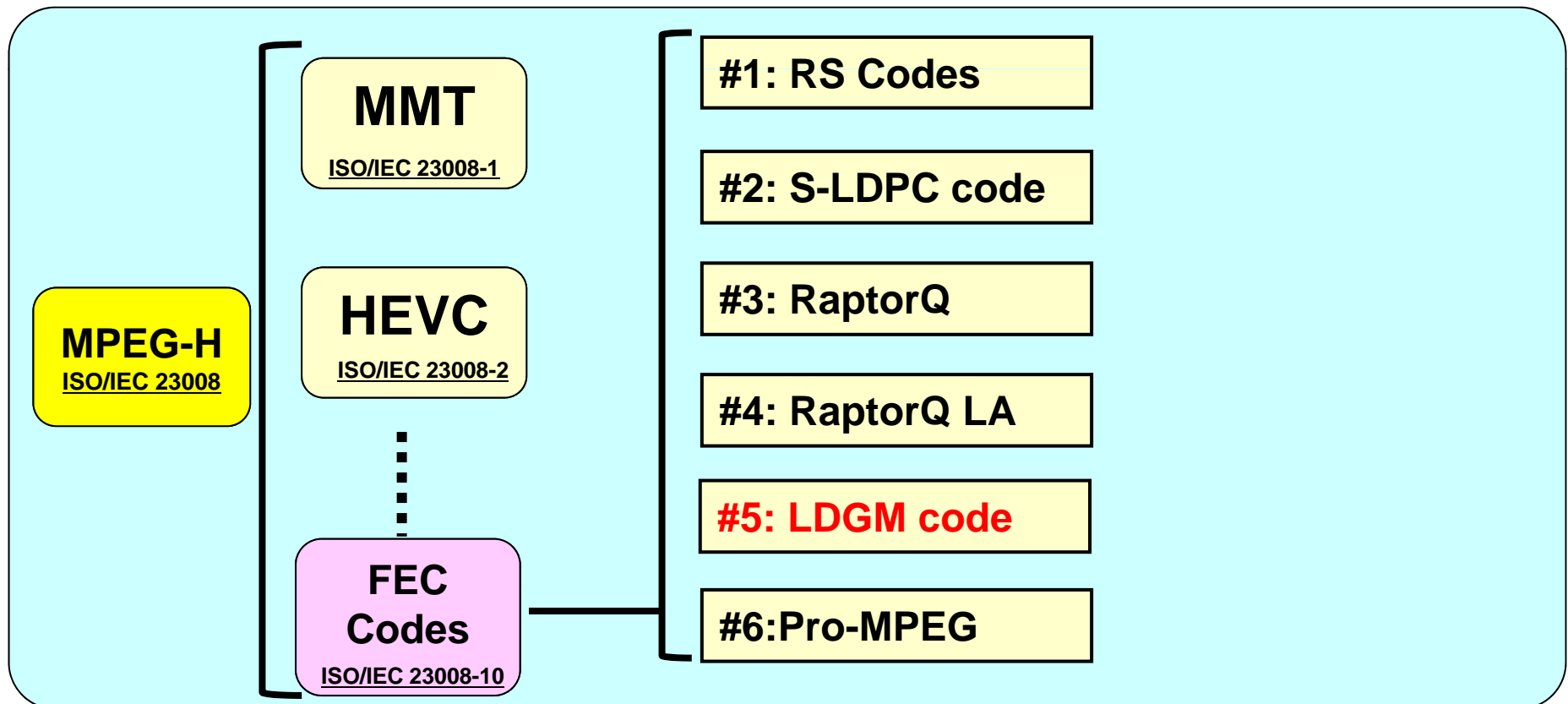


3. Robust IP Transmission

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FEC Codes in MPEG-H

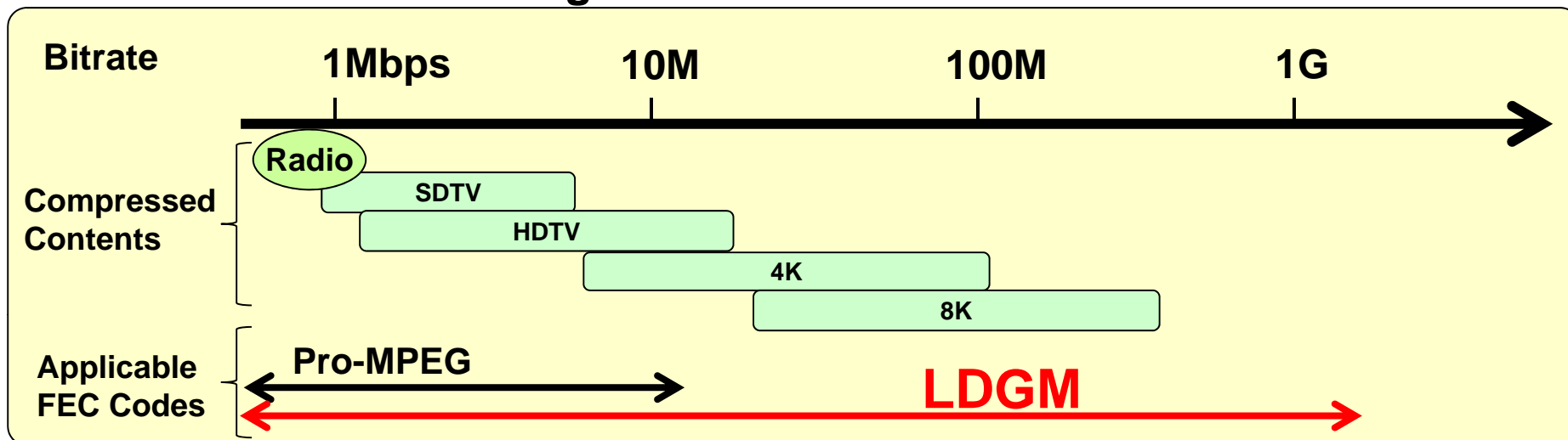
- At IP based transmission, FEC is very important.
Pro-MPEG is commonly used, but not robust.
- LDGM code will be added to ISO/IEC 23008-10 in Oct. 2014. (FDIS)
 - NTT R&D has been involved to the standardization WG.



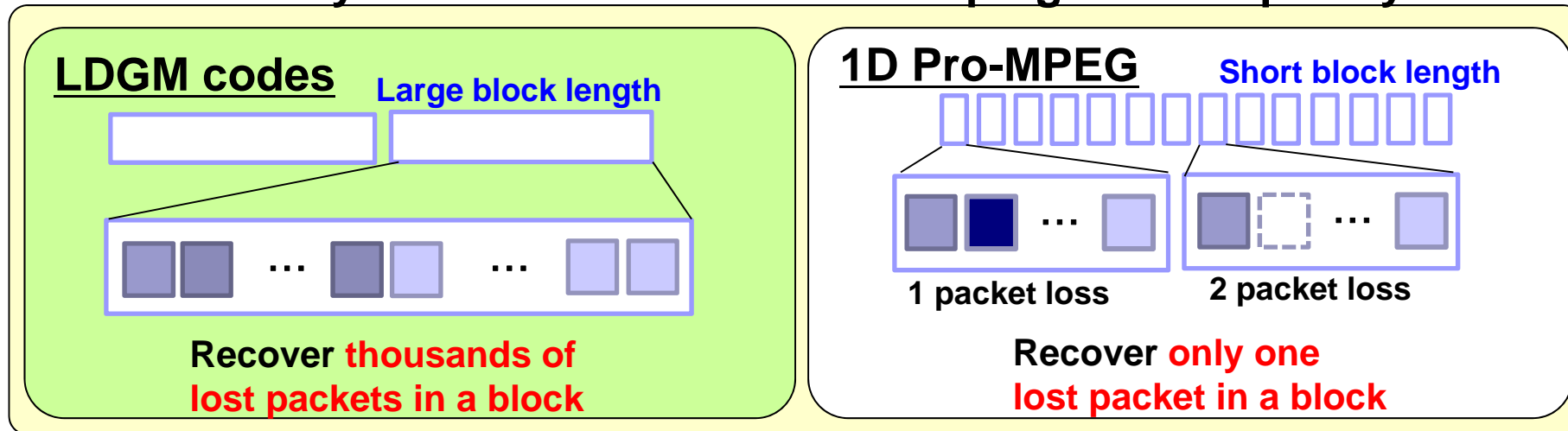
3. Robust IP Transmission

LDGM Codes and Pro-MPEG Comparison

- LDGM covers wide range of IP Bitrates



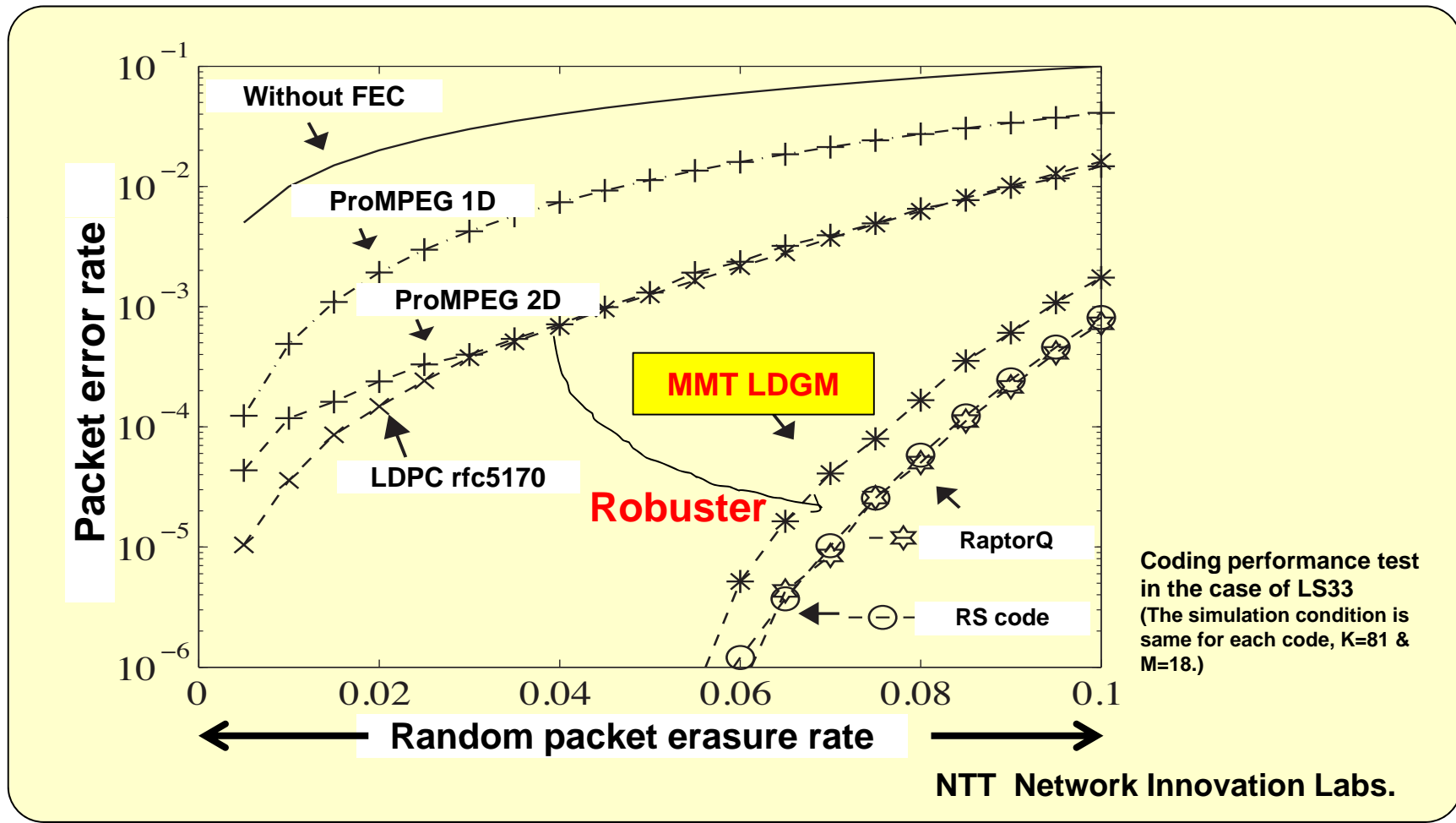
- LDGM is very robust in the meantime keeping low complexity



3. Robust IP Transmission

Robustness Comparison

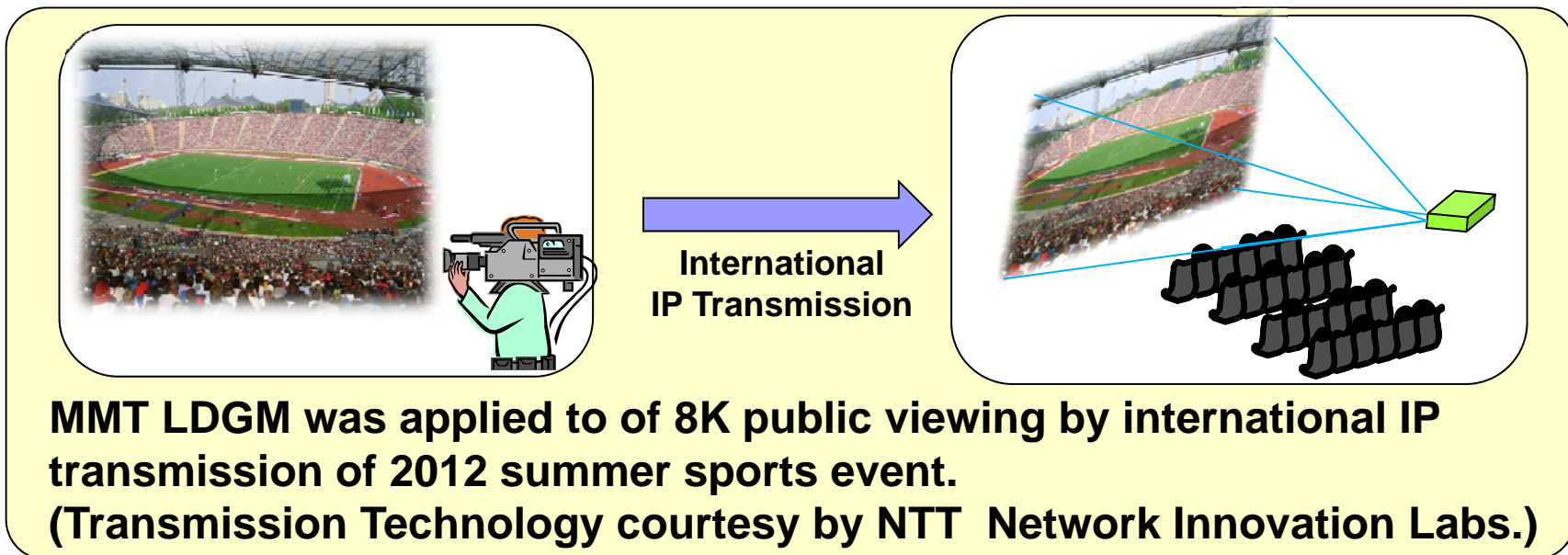
- LDGM code is robuster than ProMPEG and LDPC against the case of Random packet erasure.



3. Robust IP Transmission

Benefit of Applying MMT LDGM Code

- Applicable from Low bitrate to High bitrate.
 - Rate-adaptive
 - Layer-Aware FEC for Scalability
- Efficient Transmission
 - Support very large block length up to 32,000.
 - Applicable to UDP transmission for multicast.



Summary

- **HEVC is the key technology for efficient transmission over the limited bandwidth circuit.**
- **MPEG-2 system (part 10) no longer fits to the current broadcaster's requirement. Applying MPEG-H MMT realizes advanced service and operation.**
- **IP transmission gradually replacing existing ASI based transmission. Pro-MPEG has been used for FEC but not so robust.
LDGM will replace Pro-MPEG and will gain more robustness.**
- **NTT Electronics is developing these advanced technologies for the next HEVC codecs.**

Thank you for your attention