

# **ITU-T Workshop on Bridging the Standardization Gap and Interactive Training Session**

**(Cyberjaya, Malaysia, 29 June – 1 July 2010 )**

## **Implementation of DTT System Software Upgrade & Terrestrial 3DTV Trial Service in Korea**

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## ■ **Implementation of System Software Upgrade in Korea**

- Digital Terrestrial Broadcast in Korea
- Standards of System Software Upgrade
- Benefits of System Software Upgrade
- Implementation of SDDS

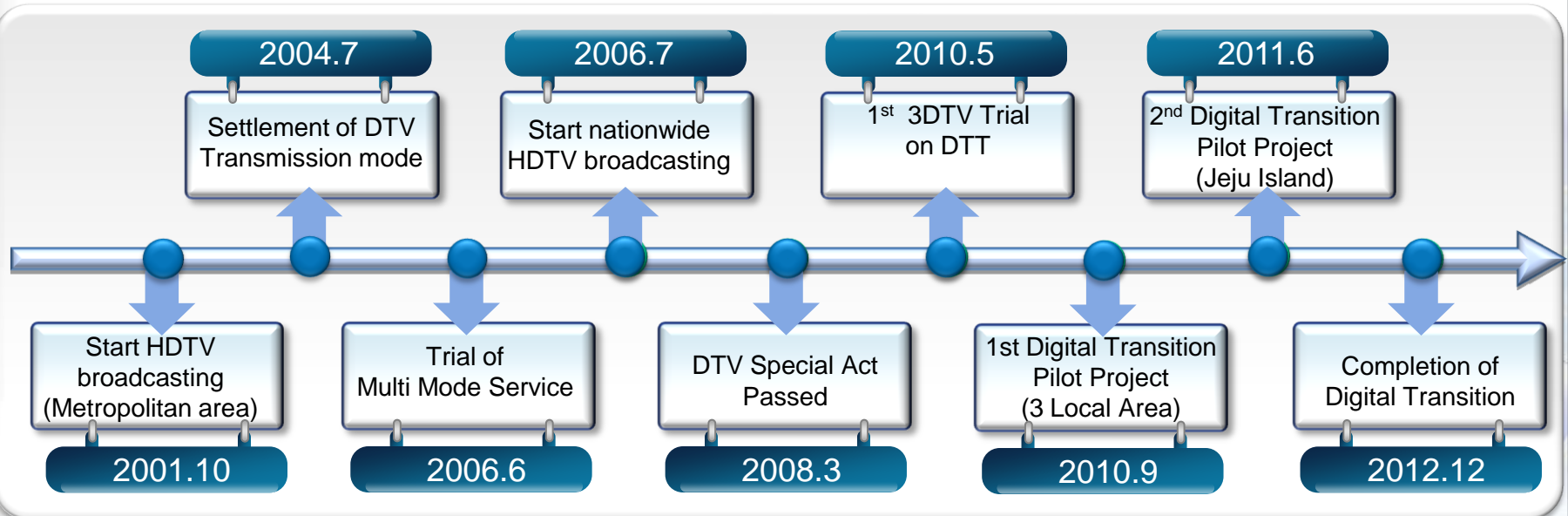
## ■ **Terrestrial 3DTV Trial Service in Korea**

- 3DTV Delivering Technology
- Terrestrial 3DTV Trial Service
- Plans for Terrestrial 3D HDTV Trial Service



# Digital Terrestrial Broadcast in Korea

- In 2001, started HDTV
- In 2006, Multicasting(Multi Mode Service) Trial Service
- In 2010, 3DTV Trial Service
- In 2012, Complete Digital Transition





# System Software Upgrade Standards I

## ■ DVB SSU(System Software Update)

- Simple Profile
  - Based on ETSI standard TS102 006
- Enhanced Profile
  - Also based on ETSI standard TS102 006, includes simple profile.
  - Additional usage of UNT (Update Notification table).
  - Receivers get SSU-schedule information before real update.

## ■ UK OAD(over the air download)

- Developed before DVB-SSU specification was final
- Software upgrade mechanism is in use until now in UK.
- UK is migrating to DVB-SSU due to trouble of too many models in market

# System Software Upgrade Standards II

## ■ NorDig Unified Receiver specification

- Nordig Members developed their own specification referred to as "bootloading" when DVB-SSU standard did not exist at the time

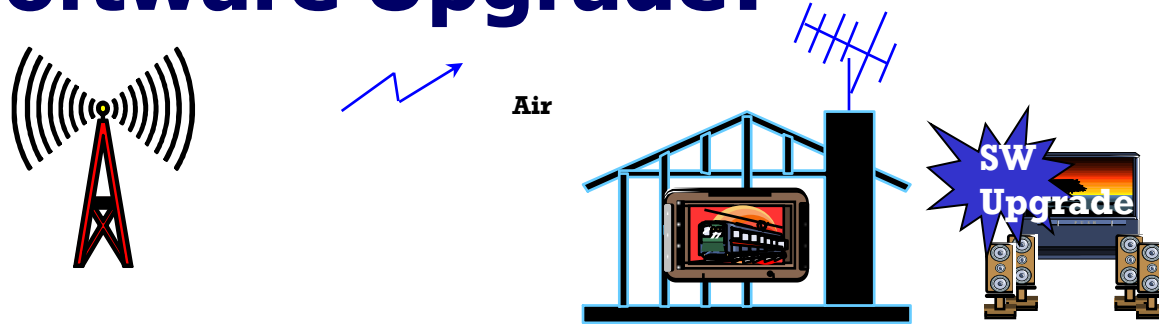
## ■ Proprietary Update Systems

- Various private data formats are known.
- Not recommended because of :
  - Possibly bad side effects on other receivers in market

## ■ ATSC A/97 SDDS(Software Download Data Service)

- ATSC Standard : a data service that may be used to download software to a terminal device using an MPEG-2 Transport Stream via an appropriate physical layer

# What is the Terrestrial System Software Upgrade?



- using the DTT Network for DTT Receivers
- to update and upgrade of firmware, operating system software, device driver software, native application software, middleware and other types of software residing in devices, such as consumer DTV receivers
- to allow receiver manufacturers to dynamically upgrade their products in the field.



# Benefits of System Software Upgrade?

## ■ For CE Manufacturers

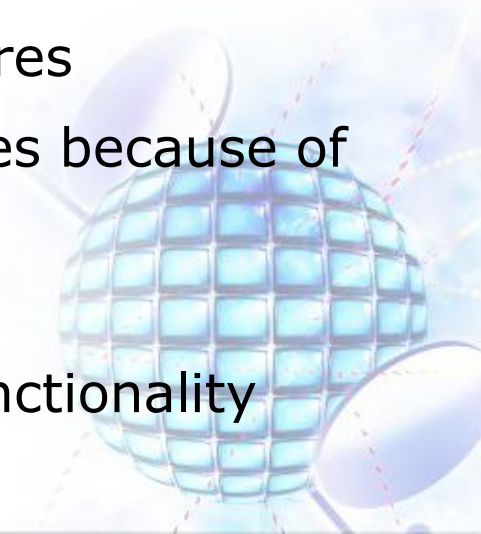
- eliminate the need for an expensive product recall
- chance for manufacturers to update receivers in case of emergency

## ■ For Broadcasters(also Network Operators in Korea)

- easy to launch new services
- chance for broadcasters to add new features
- eliminate the blocks to launch new services because of legacy product

## ■ For Viewers

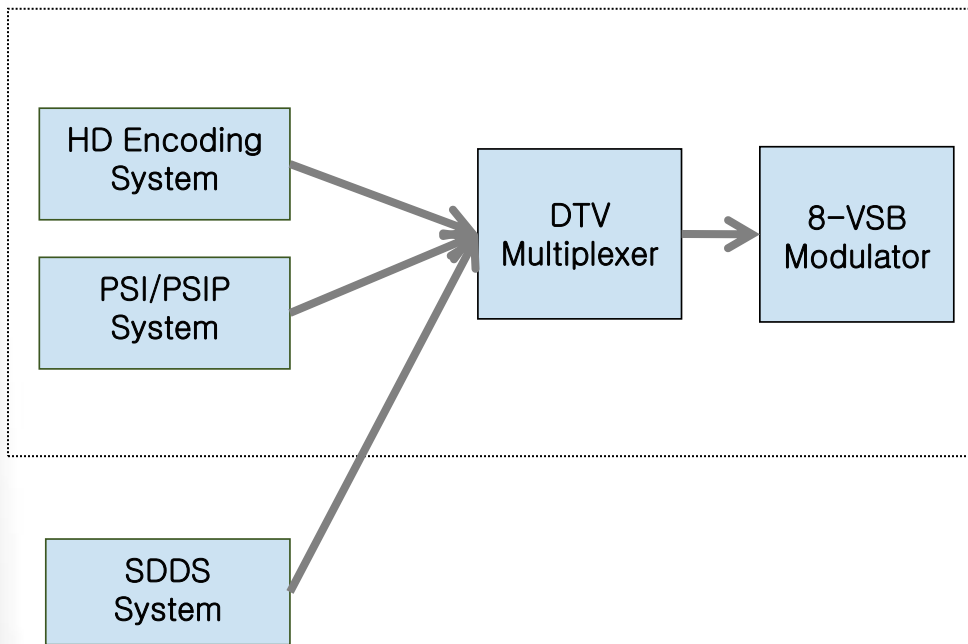
- benefit from new service offerings and functionality
- can fix their products automatically



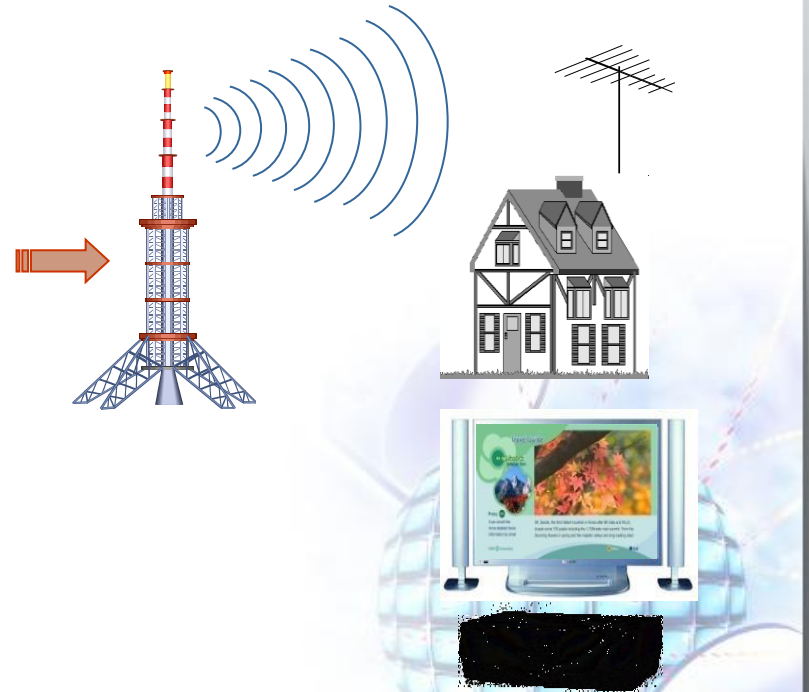


# ATSC A/97 SDDS

- **ATSC standards to download software using ATSC MPEG-2 Transport Stream.**



**DTV System**



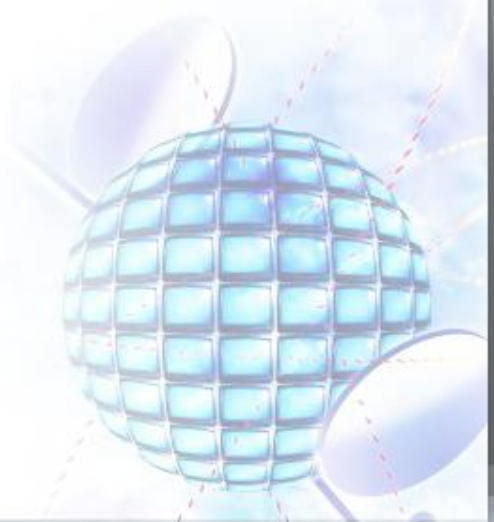
Upgrading DTT Receivers





# SDDS Specifications

- **Based on the 2-layer download carousel scenario covered in the A/90 Data Broadcast standard, which was derived from ISO DSM-CC**
- **Top level signaling is accomplished by a new service type (0X05) in the Virtual Channel Table(VCT).**
- **Stream Type : 0x0B**
- **SDDS is signaled and contained within a special "virtual channel"**
  - KBS2 7-99(hidden, hide guide Channel)
  - Not to be shown to Viewers





# SDDS technology

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## ■ Announcement

- the signaling of future times for the download

## ■ Signaling

- the indication of what is being carried in the transport "now"

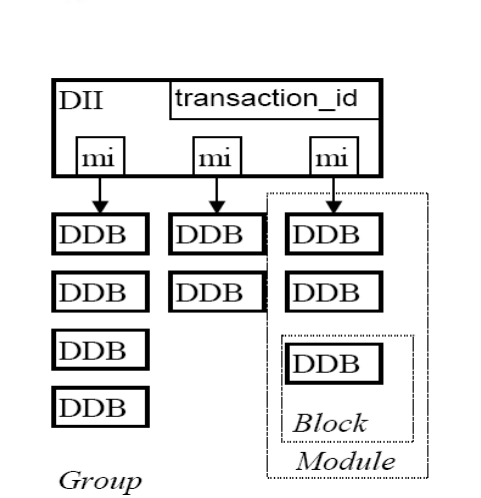
## ■ Encapsulation

- the binding of the download payload to the transport

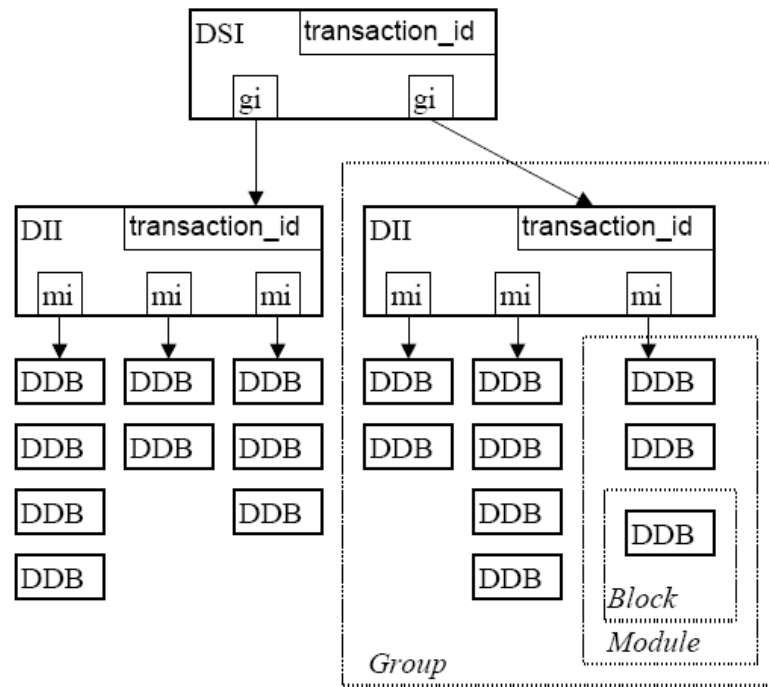


# Protocol of SDDS Download

## 2-Layer Download Carousel



1-layer Data Carousel



2-layer Data Carousel

- DSI: DownloadServerInitiate
- gi: GroupInfoBytes
- DII: DownloadInfoIndication
- mi: ModuleInfoBytes
- DDB: DownloadDataBlock
- : Location reference (transaction\_id)



# SDDS Service Scenario

- **Scenario 1:** A carousel broadcasts modules targeting a single device
  - Typically used in an environment where there is no aggregator and a single manufacturer is creating a carousel to support only one hardware/software model.
  - The carousel targets a single hardware/software version at a time.
  - Additional hardware/software versions would be supported by terminating the carousel and restarting with new announcement, signaling, and data.
  - This is the simplest model.
  
- **Scenario 2:** A carousel broadcasts modules targeting a multiple devices
  - Typically used in an environment where there is an aggregator supporting multiple manufacturers or where a single manufacturer would like to support multiple hardware/software versions on a single carousel.
  - The carousel targets multiple hardware/software versions at a time.
  - Announcements are a critical part of the functionality of this scenario.

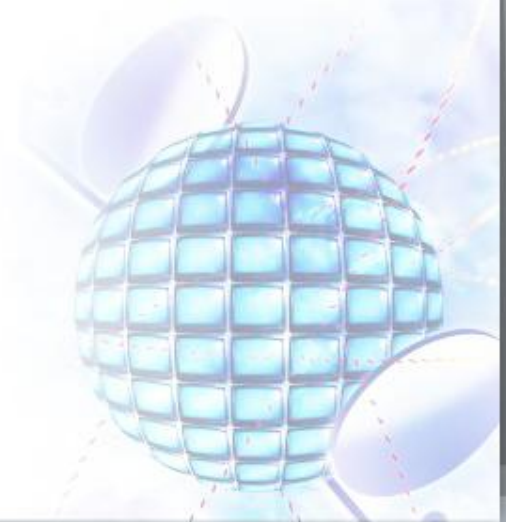


# SDDS Service Scenario

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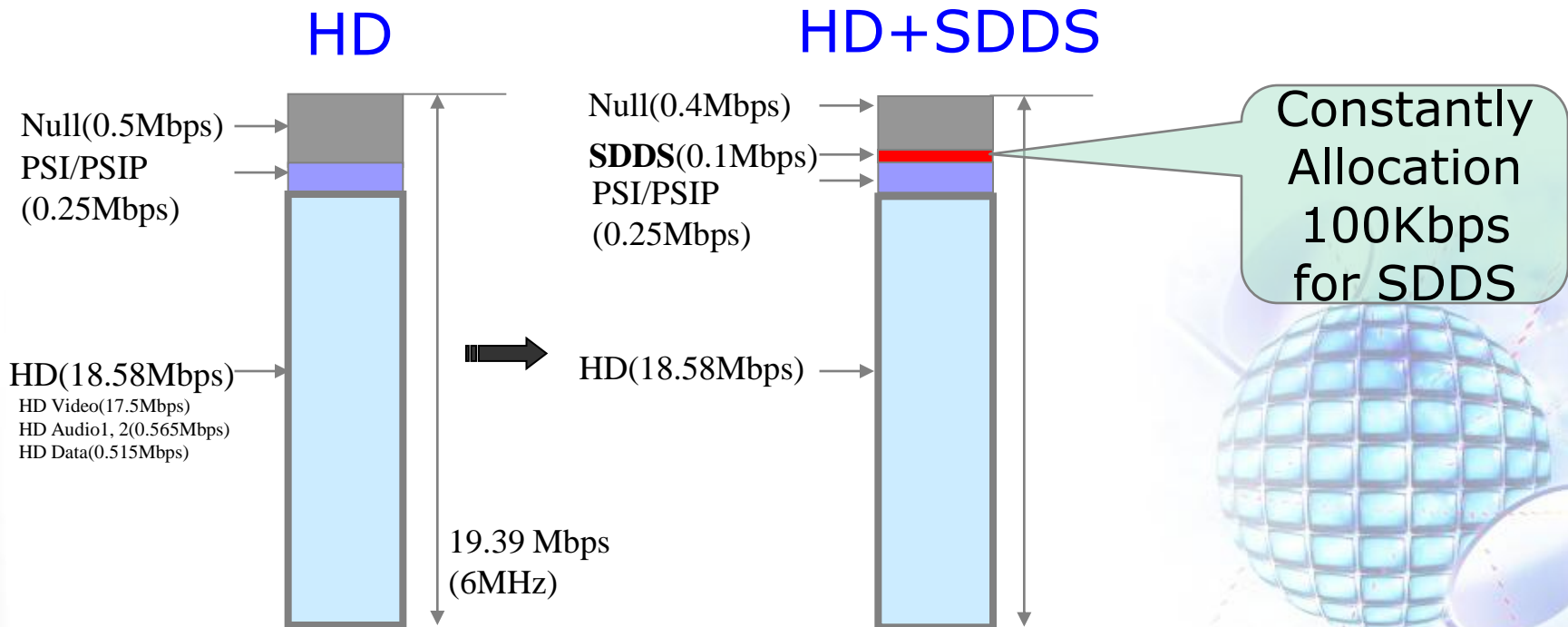
## ■ Scenario 3 : Multiple Carousels

- Typically used in an environment where there is a combination of aggregators and/or individual manufacturers all creating carousels for a single transport.
- Each virtual channel may contain carousel(s) of Scenario 1 or Scenario 2.
- Multiple Virtual Channels containing carousels for software downloads may exist on a single transport



# SDDS Bandwidth Allocation

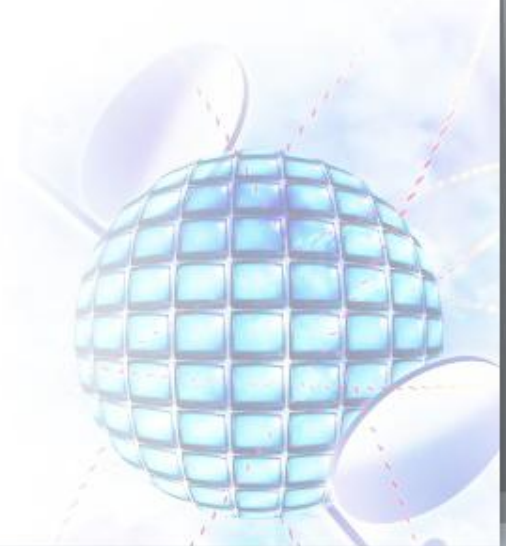
- A various of bandwidth allocation for System Software Upgrade
  - 20Kbps for France, 200Kbps for Sweden
- allocate 100Kbps for SDDS in Korea



# Test Facility

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- Test facility at KBS in Korea
- Take a test when manufacturers develop new models
- Certification is not yet settled in Korea
- Use same circumstances with real transmission facility







# Transmission Facilities

**Download Controller ver. 1.0.5**

System Windows Map | Start | Stop | Config | Connect | 2010.06.08 TUE | 14:24:48

Download Data List

ID	Name	OUI	MDL ID	MDL Name	VER	Version Ali
1	SAMSUNG ELE...	0x00e064	10242	CHELSEA 12...	2000	ver.2.0.0.0...
2	SAMSUNG ELE...	0x00e064	2050	SATURN	9	
3	SAMSUNG ELE...	0x00e064	10240	CHELSEA IG	2	
4	SAMSUNG ELE...	0x00e064	10241	CHELSEA ZG	2	
5	SAMSUNG ELE...	0x00e064	10242	CHELSEA 12...	2	
6	SAMSUNG ELE...	0x00e064	10243	SATURN HD	3	
7	SAMSUNG ELE...	0x00e064	10244	SATURN HD	3	
8	LG ELECTRON...	0x00e091	65531		6	
9	LG ELECTRON...	0x00e091	65530		6	
10	LG ELECTRON...	0x00e091	65531		6	
11	LG ELECTRON...	0x00e091	65531		6	
12	LG ELECTRON...	0x00e091	65535		6	
13	LG ELECTRON...	0x00e091	65535		6	
14	LG ELECTRON...	0x00e091	3	GP2_LE7500	3	
15	LG ELECTRON...	0x00e091	3	GP2_LE7500	3	
16	LG ELECTRON...	0x00e091	5	T-M	5	
17	LG ELECTRON...	0x00e091	5	T-M	5	
18	LG ELECTRON...	0x00e091	6	GP2_PDP_M	6	
19	LG ELECTRON...	0x00e091	6	GP2_PDP_M	6	
20	LG ELECTRON...	0x00e091	65529	22LD350-NB	6	
21	LG ELECTRON...	0x00e091	65528	47LE7500-NA	6	
22	LG ELECTRON...	0x00e091	65529	22LD350-NB	6	
23	SAMSUNG ELE...	0x00e064	10240	CHELSEA IG	2	
24	SAMSUNG ELE...	0x00e064	10504	T-TDTSARCR	1	
25	SAMSUNG ELE...	0x00e064	10504	T-TDTSARCR	1	

Download Status

SID	Start Date	Start ...	End Date	End ...	Service Na...	Status
2	2010-06-04	09:00...	2010-06-05	01:00...	SAMSUNG ...	Complete
2	2010-06-07	02:38...	2010-06-07	05:00...	SAMSUNG ...	Complete
2	2010-06-07	09:00...	2010-06-08	01:00...	SAMSUNG ...	Complete
2	2010-06-08	06:00...	2010-06-09	01:00...	SAMSUNG ...	Downloading
2	2010-06-09	06:00...	2010-06-10	01:00...	SAMSUNG ...	Announcing
2	2010-06-10	06:00...	2010-06-11	01:00...	SAMSUNG ...	Announcing

- SDDS Controller(Manager)
  - ✓ registration of software
    - vender, model, version
    - data file, H/W descriptor,
    - S/W descriptor

- SDDS Controller(Control)
  - ✓ registration of download schedule
    - select the data and
    - register the schedule

**S/W Download Encoder ver.2.0.5**

System Help | Start | Stop | Config | On AIR | 2010.06.08 TUE | 14:25:25

Ch Name : KBS SDDS | Ch Num : 7 | TS ID : 0x0811 | Source ID : 0x0001 | PID : 0x1200 | Service Type : S/W Download Data Service

Status

S/W Download Information | ServiceID = 25

Vender Name : SAMSUNG ELECTRONICS | Duration Time : 100:52:11

Model Name : T-TDTSARCR

Version : 1010 | DTI Period : 1,004 msec

Start Time : 2010-06-04 09:23:13 | Tr Bit Rate : 97,220

Download Channel : 7 - 99 KBS SDDS

Download Status : Download | Progress : 48% | Repeat Count : 68

Total Bandwidth : 1,500,004 bps

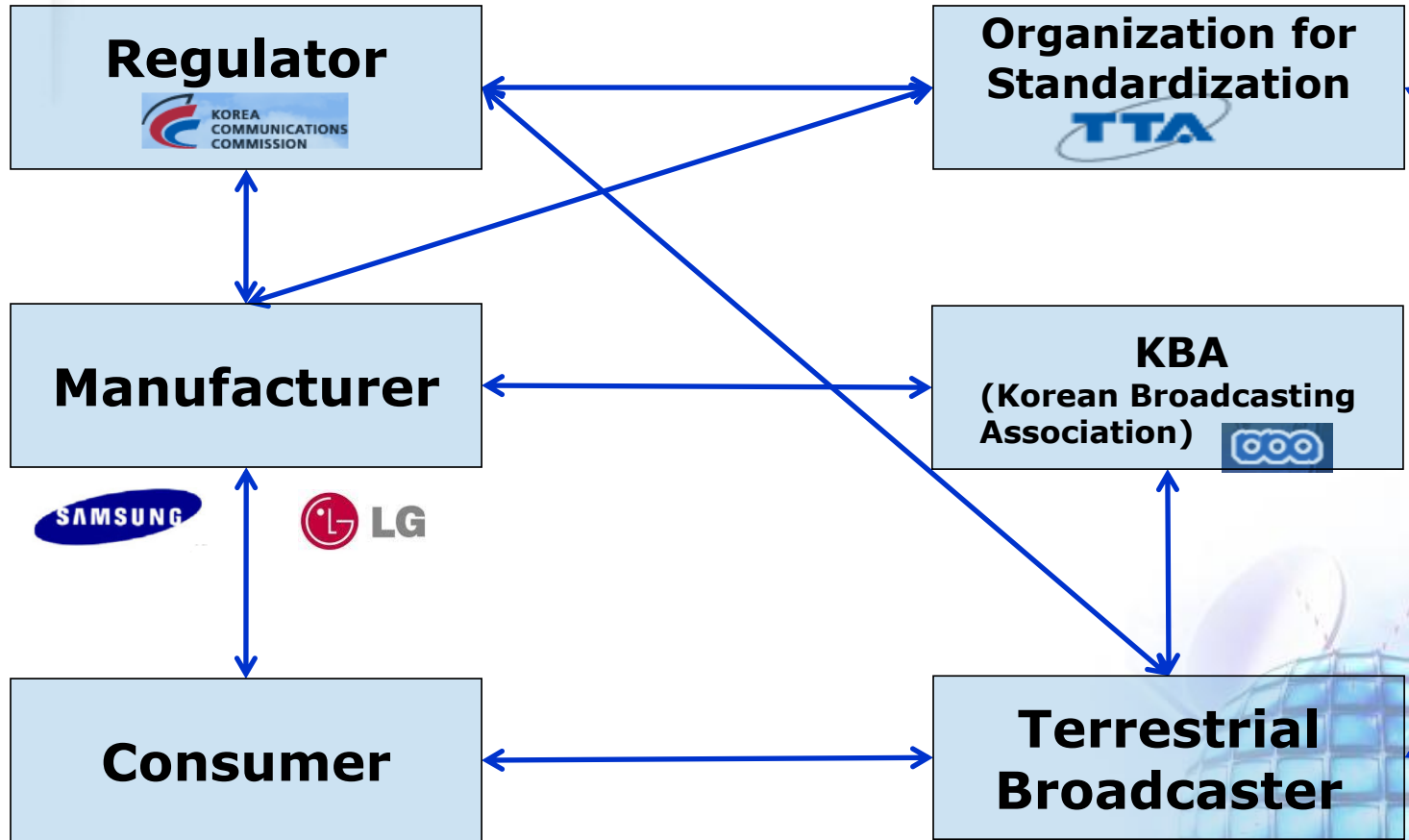
Log View

```

[2010-06-05 01:02:51] Stream Command : BitrateService
[2010-06-05 01:02:51] Bitrate Control Message Received.
[2010-06-05 01:02:51] DSI Period=1000
[2010-06-05 01:02:51] GiD=25 DiI Period=1000 DN BPS=0
[2010-06-07 02:38:51] Received Stream.
[2010-06-07 02:38:51] Stream Command : BitrateService
[2010-06-07 02:38:51] Bitrate Control Message Received.
[2010-06-07 02:38:51] DSI Period=1000
[2010-06-07 02:38:51] GiD=25 DiI Period=1000 DN BPS=100000
[2010-06-07 05:02:51] Received Stream.
[2010-06-07 05:02:51] Stream Command : BitrateService
[2010-06-07 05:02:51] Bitrate Control Message Received.
[2010-06-07 05:02:51] DSI Period=1000
[2010-06-07 05:02:51] GiD=25 DiI Period=1000 DN BPS=0
[2010-06-07 09:02:51] Received Stream.
[2010-06-07 09:02:51] Stream Command : BitrateService
[2010-06-07 09:02:51] Bitrate Control Message Received.
[2010-06-07 09:02:51] DSI Period=1000
[2010-06-07 09:02:51] GiD=25 DiI Period=1000 DN BPS=100000
[2010-06-08 01:02:51] Received Stream.
[2010-06-08 01:02:51] Stream Command : BitrateService
[2010-06-08 01:02:51] Bitrate Control Message Received.
[2010-06-08 01:02:51] DSI Period=1000
[2010-06-08 01:02:51] GiD=25 DiI Period=1000 DN BPS=0
[2010-06-08 06:02:51] Received Stream.
[2010-06-08 06:02:51] Stream Command : BitrateService
[2010-06-08 06:02:51] Bitrate Control Message Received.
[2010-06-08 06:02:51] DSI Period=1000
  
```

- SDDS Encoder
  - ✓ transmission of data with a fixed bit rate
  - ✓ display which data is transmitted

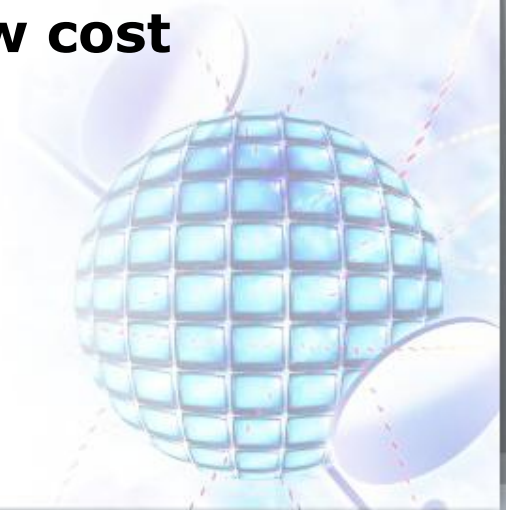
# SDDS Eco System in Korea





# Recommendation for System Software Upgrade Service

- **Adopt standard for System Software Upgrade**
- **Build up relationship between broadcasters, regulator and manufacturers**
  - **Agreement is Essential**
- **Find a solution to nationalize with a low cost**



# Terrestrial 3DTV Trial Service

- **3DTV Delivering Technology**
- **First Terrestrial 3DTV Trial Service in Korea**
- **Plans for Terrestrial 3D HDTV Trial Service in Korea**

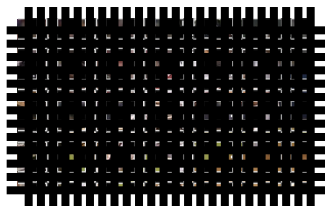




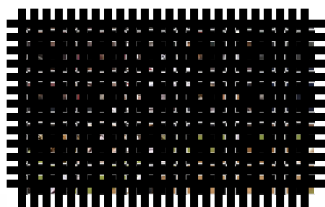
# 3DTV Delivering Technology

## SPATIAL COMPRESSION

Left Eye



Right Eye



Top & Bottom

Left Eye



Side-by-Side

Right Eye



Line Interleave



Column Interleave



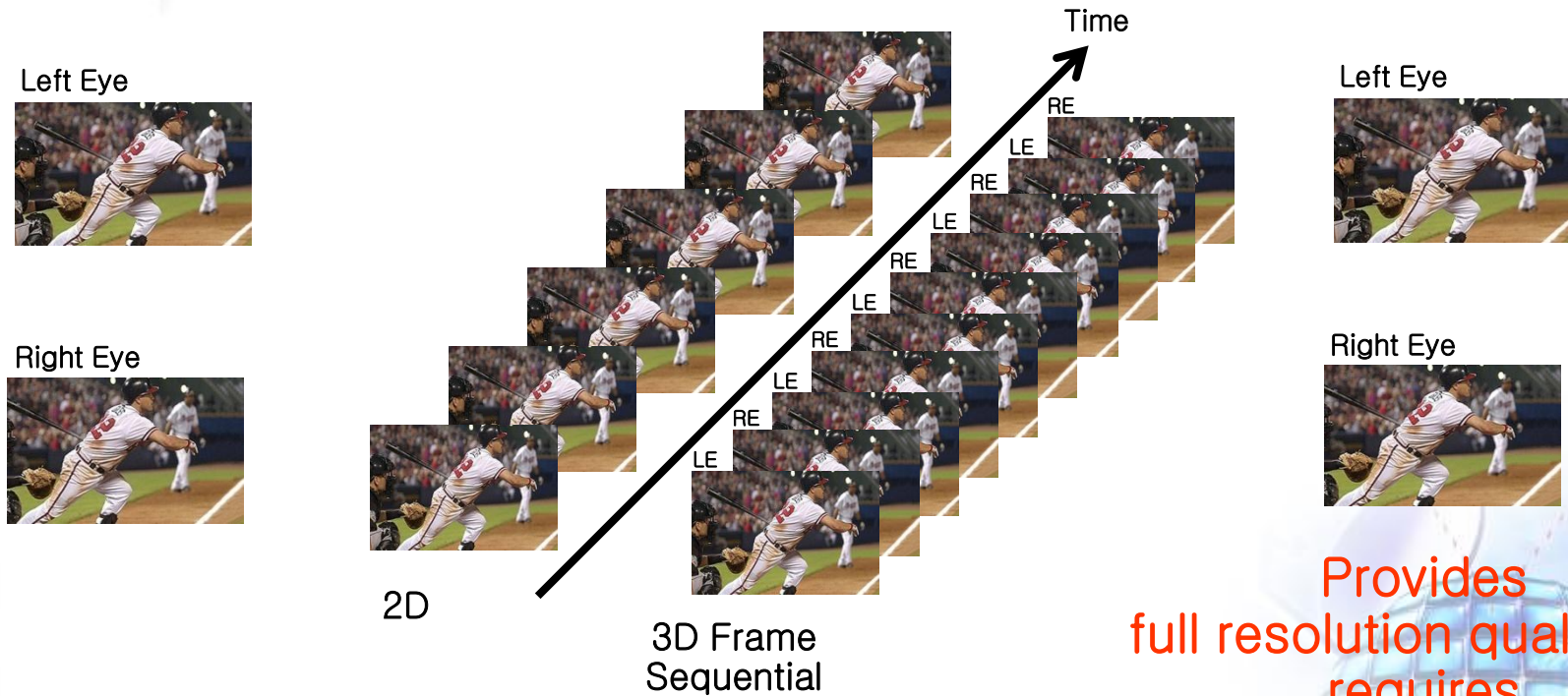
Checkerboard



Provides legacy channel compatibility but reduced picture resolution!

# 3DTV Delivering Technology

## TEMPORAL COMPRESSION



Provides full resolution quality but requires increased channel bandwidth and storage!

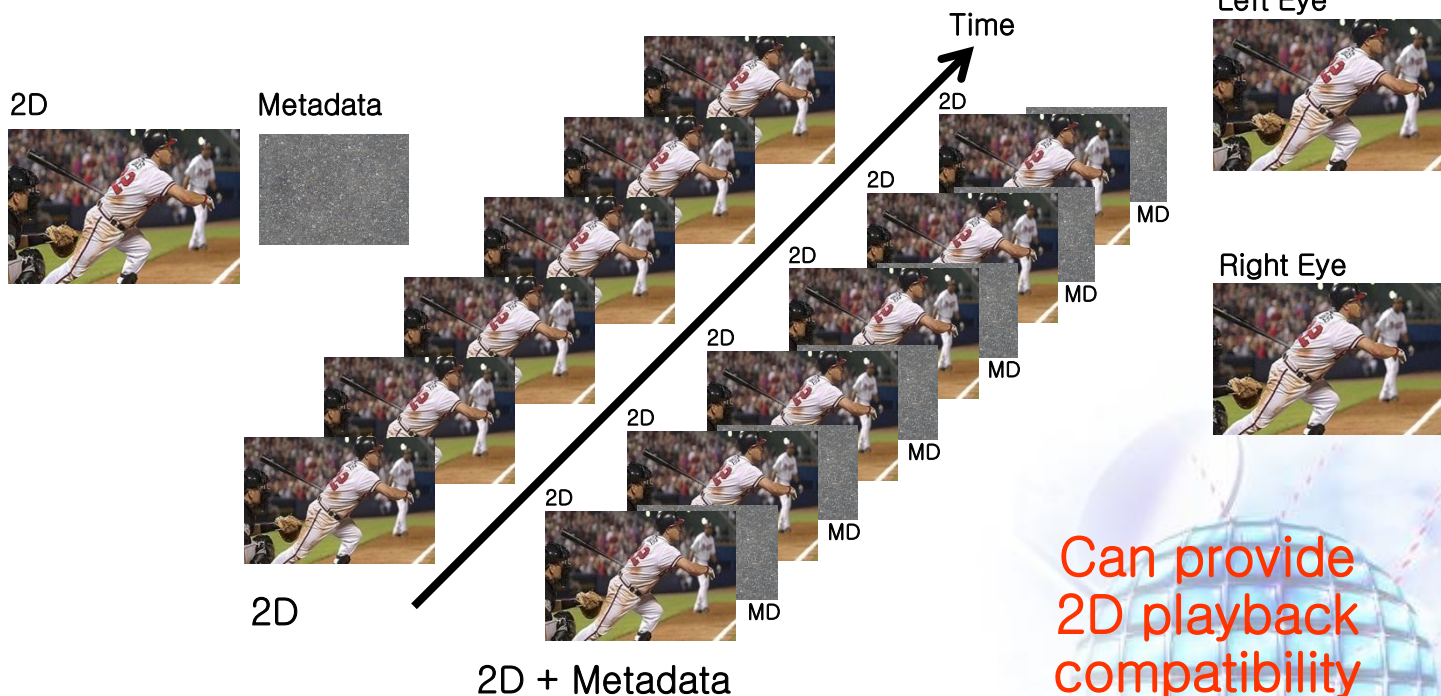
# 3DTV Delivering Technology

## 2D + METADATA

Left Eye



Right Eye



Left Eye



Right Eye



Can provide  
2D playback  
compatibility  
in legacy devices!



# 3DTV Delivering Technology

## CORLOR CODING

Left Eye



Right Eye



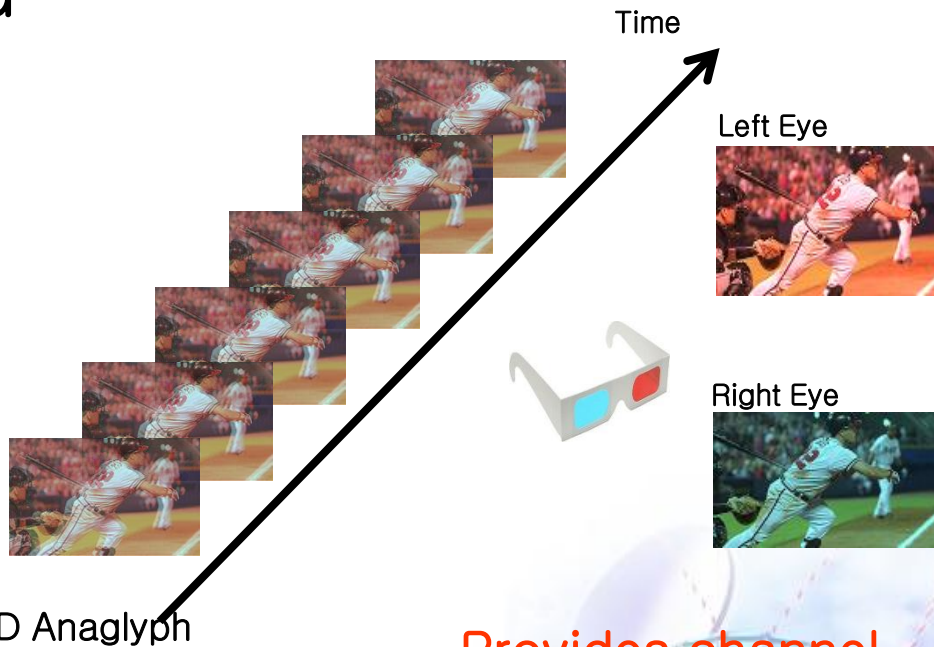
Left Eye



Right Eye



3D Anaglyph



Provides channel compatibility but with a less than compelling 3D experience!

# Terrestrial 3DTV Trial Service in Korea

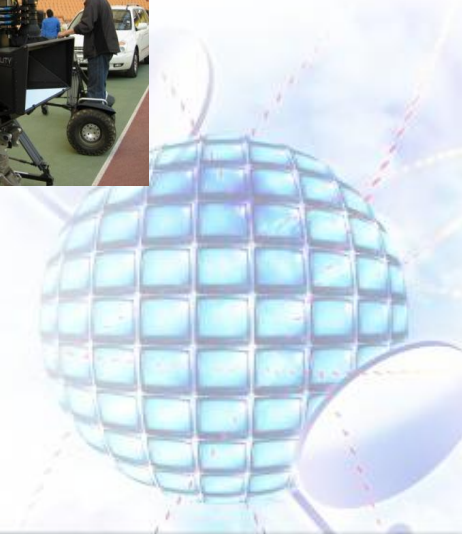
- **World's first terrestrial 3DTV trial service by KBS on May 19<sup>th</sup>, 2010**
  - IAAF World Pre-Championship Meeting
  - FIFA2010 World Cup Game on June 2010



# Terrestrial 3DTV Trial Service in Korea

## ■ Production(IAAF World Pre-Championship Meeting)

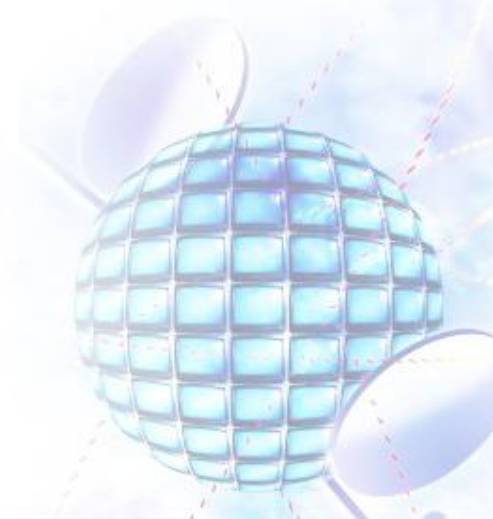
- Facilities : 3D stereoscopic cameras (KBS 1, 3ality 3, redrover 1)
- Specialist : 12 Stereographer
- Production mode : Side-by-side
- Live broadcast



# Terrestrial 3DTV Trial Service in Korea

## ■ Schedule of 3DTV broadcast

- May 20<sup>th</sup> – June 10<sup>th</sup> : every day 3 hours
  - 7:00 pm – 10:00 pm
  - Begin on May 19<sup>th</sup> with IAAF World Pre-Championship Meeting
- June 11<sup>th</sup> – July 12<sup>th</sup> : every day 19 hours
  - 6:00 am – 1:00 am
  - During 2010 FIFA World Cup Game





# Terrestrial 3DTV Trial Service in Korea

## ■ Transmission

- Need additional channel(Ch66)
- can use same transmitter system
- Not compatible with 2D DTV Receiver
- Side by side : Half resolution



LEFT EYE



RIGHT EYE



Side-by-Side

2DTV



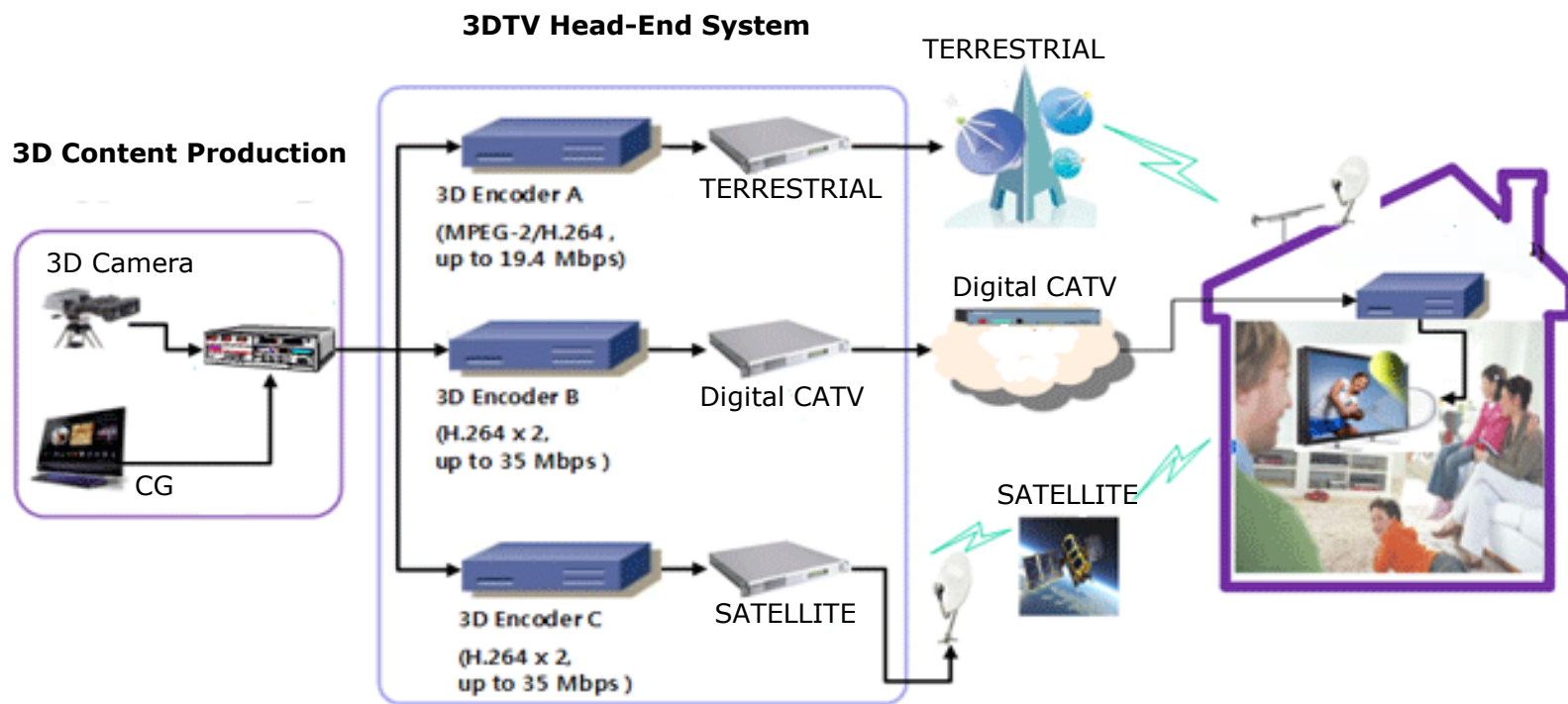
3DTV



Source : 3DTV Broadcasting Promotion Center in Korea

# Plans for Terrestrial 3D HDTV Service in Korea

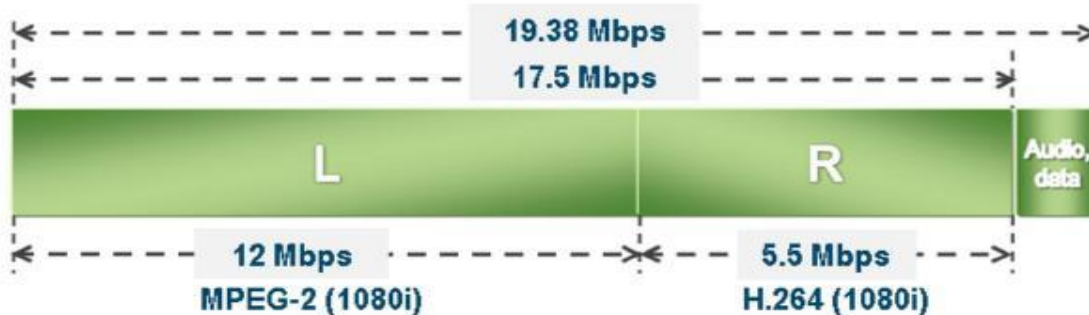
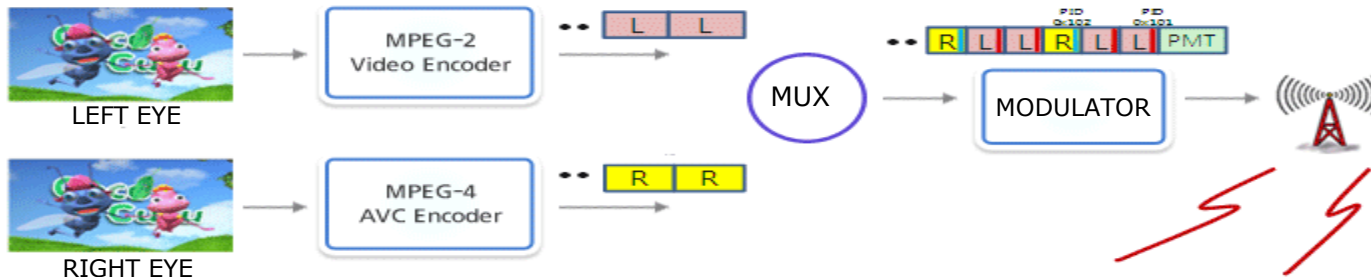
- Planning to do 3D HDTV trial on Oct. 2010
- Terrestrial broadcaster, Cable broadcaster, Satellite broadcaster will be together



Source : ETRI (Electronics and Telecommunications Research Institute)

# Plans for Terrestrial 3D HDTV Service in Korea

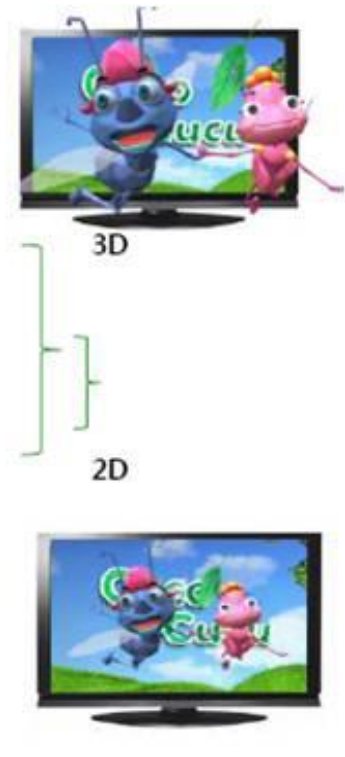
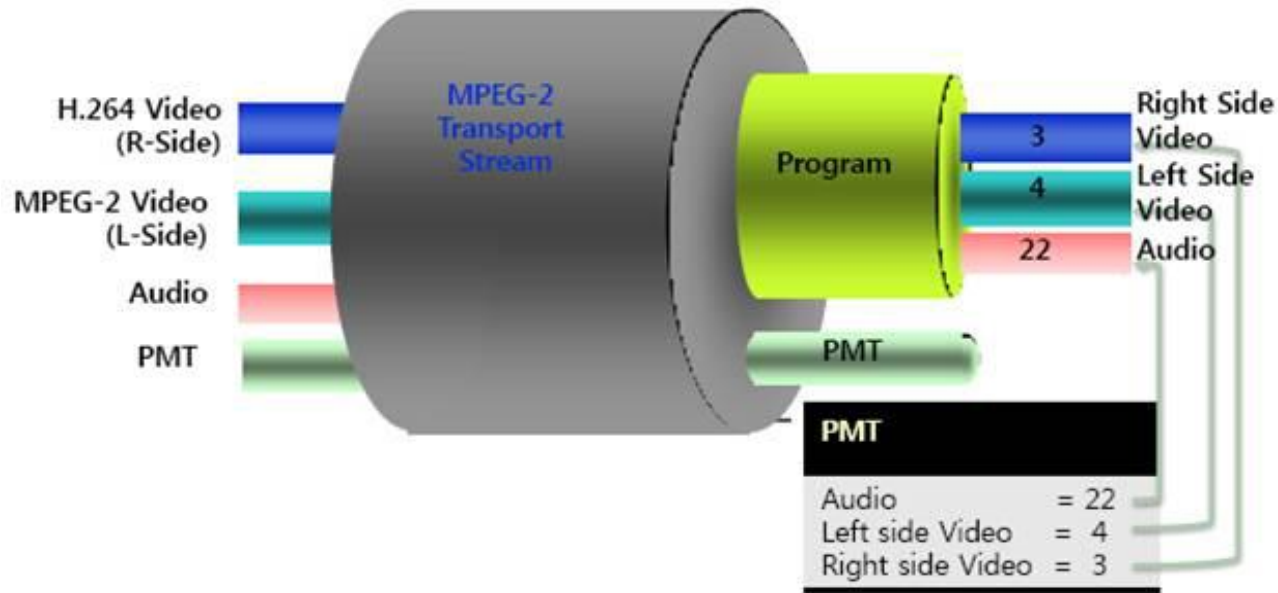
- Compatible with 2D DTV receivers
- Possible to Broadcast 3D HDTV service



Source : 3DTV Broadcasting Promotion Center in Korea



# Plans for Terrestrial 3D HDTV Service in Korea



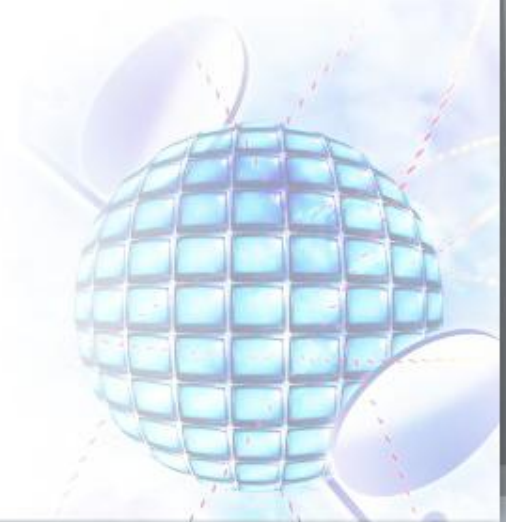
Source : ETRI (Electronics and Telecommunications Research Institute)



# In Conclusion

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- **Digital Terrestrial Broadcast Service is constantly evolving .**
- **Increasing needs for fixing the software of products**
- **System Software Upgrade Service is Essential in Digital Era**
- **Low cost, High effect**



KBS



*Thank You*



**Email: [kst999@kbs.co.kr](mailto:kst999@kbs.co.kr)**

