

Digital Multimedia Broadcasting

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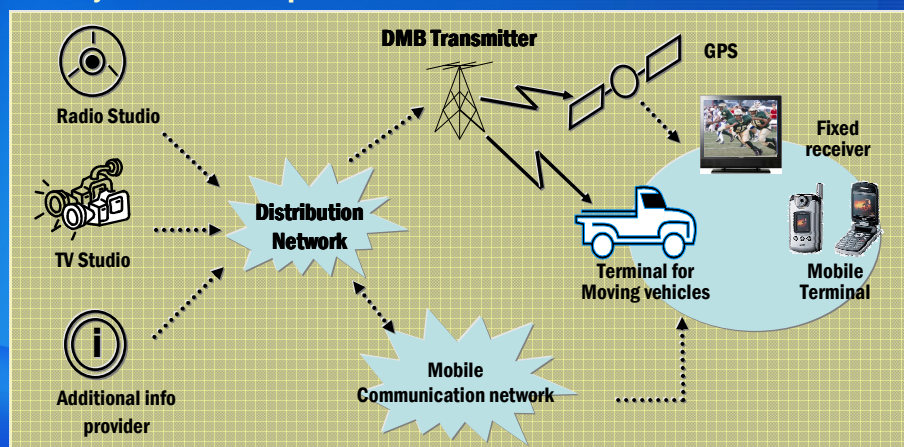
Contents

- I Introduction of DMB
- II Service in Korea
- III Business Model
- IV DMB Overseas Launching Status
- V Future Service

I Introduction of DMB

1. Definition

- Provides video and data services as well as CD-quality audio service
- AV and data standard extension of Digital Audio Broadcasting(DAB)
- Fully backward compatible with Eureka-147



2. Characteristics of T-DMB

Personal

- Personal services using individual receiver
 - . Mobile phone, PDA, Notebook PC, DMB receiver

Mobile

- Seamless reception of broadcasting contents
 - . Any time, anywhere
 - . Good reception at the speed of 150 km/h

Interactive

- Bidirectional services linked with mobile communication network
 - . PPV, on-line shopping, internet services

Personal Mobile Interactive **Multimedia Broadcasting Service**

5

3. Available Multimedia Service

Audio only service

- Stereo(CD-like)

Video service

- Video : VCD quality(7" LCD)
- Audio : Stereo(FM-like)
- Program related Data

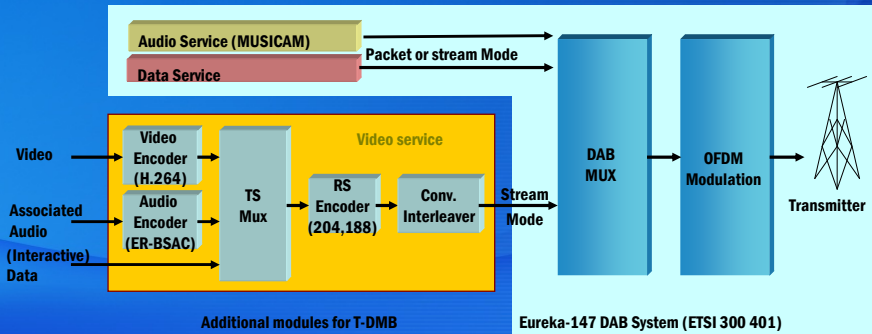
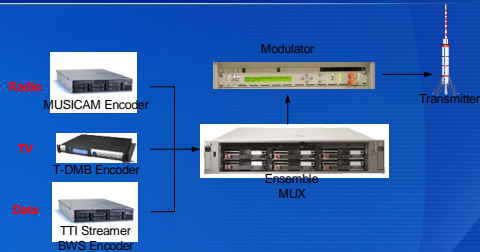
Data service

- Electronic Program Guide
- Headline news, Weather, Stocks
- Traffic, Navigation
- Slide show, Broadcasting Web Service, etc.

6

4. System Structure

DAB system
+ **Multimedia Processor**
= **DMB**



7

5. Transmission Parameters

Signal		COFDM			
Modulation		DQPSK			
Channel Coding		Convolutional : variable rate, constraint length = 7			
Time Interleaving	Ms	Depth = 384			
Frequency Interleaving	MHz	Width = 1.536			
System Bandwidth	MHz	1.536 MHz			
Effective Data Rate	Mbps	0.8 ~ 1.7 Mbps			
Mode		I	II	III	IV
Application		Terrestrial(SFN)	Terrestrial	Satellite/ Cable	Terrestrial
Frequency Band	GHz	< 0.375	< 1.5	< 3	< 1.5
Sub carriers		1,536	384	192	768
Sub carrier interval	KHz	1	4	8	2
Guard interval	us	246	62	31	123
Symbol length	us	1,000	250	125	500
Frame length	ms	96	24	24	48

※ COFDM : Coded Orthogonal Frequency Division Multiplexing
 ※ DQPSK : Differential QPSK

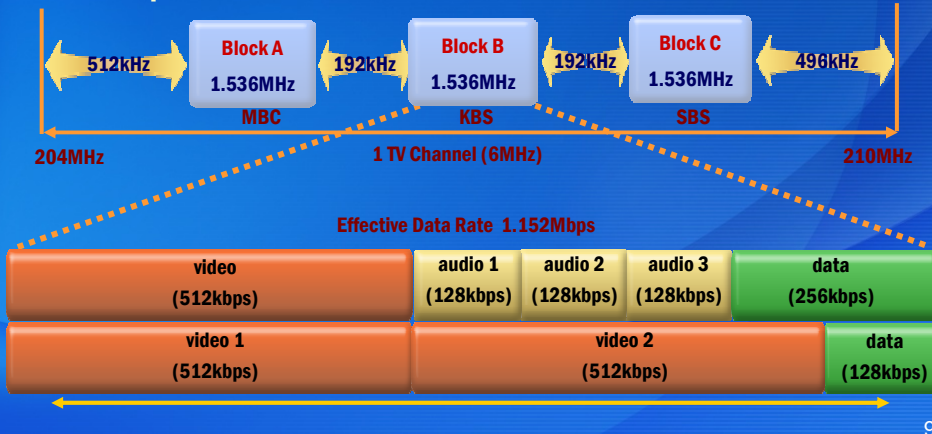
8

6. Spectrum Utilization

Usable Spectrum for T-DMB

- VHF Band-III (TV ch-7~ch13, 174~216MHz)
- L-band (1452~1492MHz)

Example: Ch. 12 in Korea



9

7. Technologies for T-DMB

A/V Encoding

- MPEG-4 Part 10 AVC(H.264) and BSAC/AAC
- Increase Frequency Usage Efficiency

Interactive Data

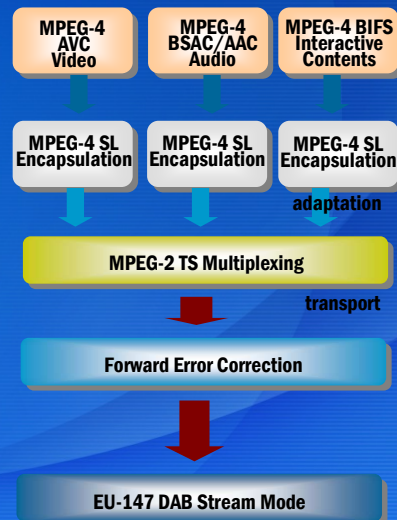
- MPEG-4 System core2D Profile(BIFS)
- Video Program associated Data Service

Error Correction

- RS-Coding, Convolutional Interleaving
- High Quality in Audio/Video

Transmission

- OFDM(Orthogonal Frequency Division Multiplexing)
- Good service quality in high speed moving vehicle



10

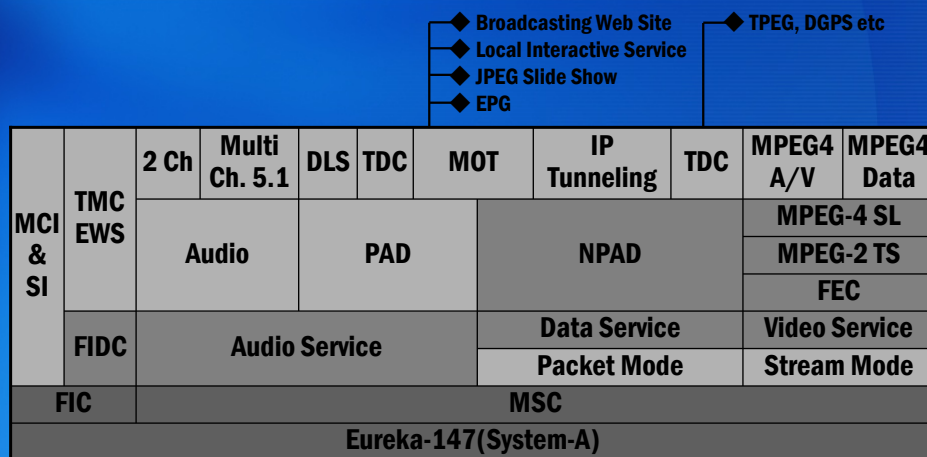
8. T-DMB Service Category and Standard

Type	Quality		Technology
Audio	Near CD quality stereo(BER 10 ⁻⁴)		MUSICAM(MPEG-1,2, layer 2)
Video streaming (DMB)	Video	7" display	MPEG-4 AVC(H.264)
	Audio	Near CD Quality	MPEG-4 BSAC
	Data	Many applications	MPEG-4 BIFS
	Multiplex	A/V/D	MPEG-4 SL, TS
	Channel	Mobile, Urban (BER 10 ⁻⁸)	RS(204, 188), Convolutional Byte interleaver
Data	EPG, news, weather, stock, traffic information, etc.		PAD, NPAD, TDC, MOT, BWS, IP-tunneling, Slideshow, etc.

※ AVC : Advanced Video Coding, PAD : Program Associated Data, TDC : Transparent Data Channel,
 ※ BWS : Broadcasting Web Site, BSAC : Bit-sliced Arithmetic Coding, EPG : Electronic Program

11

9. Broadcasting Protocol in T-DMB



※ DLS : Dynamic Label Segment, EWS : Emergency Warning System, FIC : Fast Information Channel
 ※ FIDC : Fast Information Data Channel, IP : Internet Protocol, MCI : Multiplex Configuration Information
 ※ MOT : Multimedia Object Transfer, MSC : Main Service Channel, NPAD : Non PAD
 ※ PAD : Program Associated Data, SI : Service Information, TDC : Transparent Data Channel
 ※ TMC : Traffic Message Channel

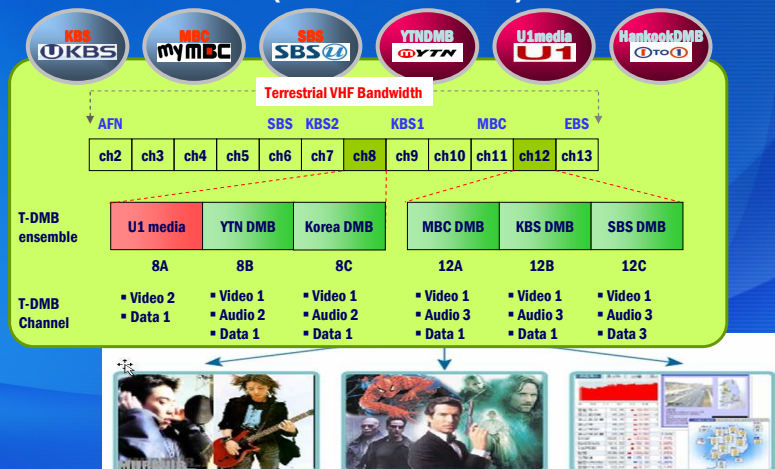
12

II Service in Korea

13

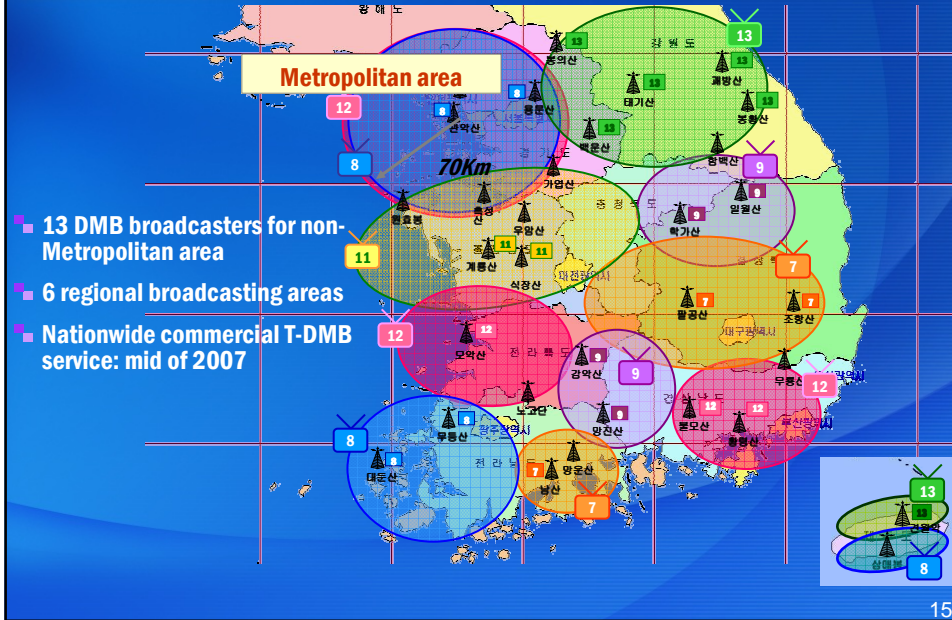
1. Commercial Service in Korea

- Launched in Dec. 2005 covering Seoul metropolitan area
- Total Channel : Video 7 Audio 13 Data 8
- Spectrum : VHF Band III (TV channels 8 & 12)



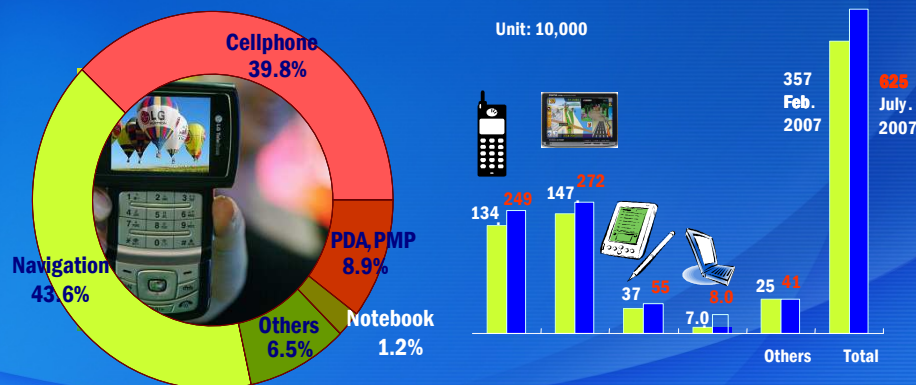
14

2. Nationwide DMB Network





3. Terminal Types

Totally 6.3million Receivers sold in Korea until the last July



4. Available Terminals

High Price Devices \$400 ~ \$800	 Erantech iubi BLUE	 DigitalCube i-STATION	 DigitalCube i-STATION V35	 Zen Networks LEO V10	 New Media Life TAVI	 Samsung yepp	... more
	 neoSOL CLIOD	 Gigatelecom Tube ND-100	 Cowon A2 T-DMB	 Hyundai Autonet HNA-6220	 Samsung DMB-T450	 Samsung DMB-T750	
Mid Price Devices \$200 ~ \$500	 Samsung SPH-B2300	 P&C PT-K1800	 P&C PT-L1800	 LG KD-1200	 LG SB-100	 LG LT-1000	... more
	 Cobalt Technology DMB STICK-K1	 Cerings CTD-100	 UVBro Technology ARTEMIS	 MNBT UD-100	 Caros KSD-7070S	 Perstel DR 402 VK	
Low Price Devices \$50 ~ \$120	 Cobalt Technology DMB STICK-K1	 Cerings CTD-100	 UVBro Technology ARTEMIS	 MNBT UD-100	 Caros KSD-7070S	 Perstel DR 402 VK	... more

17

5. Responses from Users

T-DMB Satisfaction Rate

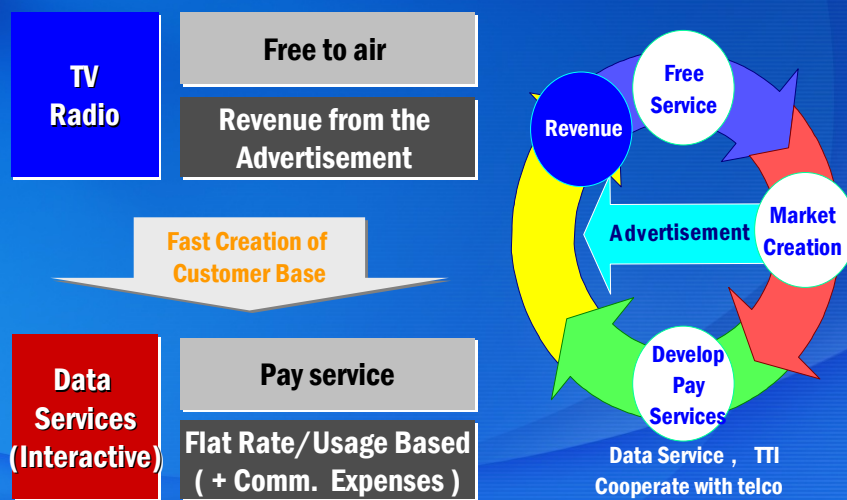


	Item	%
Satisfaction	Watch any where	49.0
	Same contents to home TV channel	27.7
	Mobile reception	16.1
	Audio & Video reception with a single device	5.8
	Contents only for DMB	1.3
Dissatisfaction	Coverage	73.3
	Same contents to home TV channel	11.1
	Contents	6.7
	AV quality	6.7

18

III Business Model

1. Business Model



2. Business Model

Advertisement

- **Condition**
5 million users
- **Total revenue**
1 Video Channel
↳ US\$ 80 million/year
1 Audio Channel
↳ US\$ 18 million/year

Pay Services

- EPG
- TPEG
 - Location Based Services
 - ↳ Shopping
 - ↳ Restaurant
- Weather
- Stock

Added Services

- **TV-Portal**
- **Video/Audio related data services**
 - ↳ VOD, MOD, Capture
 - ↳ Detailed program guide
- **Program community**
 - ↳ SMS Reply
 - ↳ Chatting between audiences
- **Network game/quiz**
- **M-Commerce**

21

IV DMB Overseas Launching Status

22

1. DMB Overseas Launching Status



V Future Service

1. Future Service : Personalized T-DMB

- Dynamic program guide and contents browsing according to program genre and user preferences
 - ToC (Table of Contents) based browsing in terms of segment units
 - Event/index-based summary and access for news programs
 - Keyword-based segment search



※ Services: Personalized News, Personalized T-Learning, etc.

2. Future Service : Advanced T-DMB

Doubled Data Rate

■ 1.062 Mbps → 2 Mbps

1 Multichannel Services

double the number of programs



2 High quality AV service (7" → 15" SD-quality video and 5.1 ch audio)



3. Future Service : 3D T-DMB

■ 3D DMB Verification System

- 3D AV media processors on T-DMB Transmitter/Receiver
- Features
 - Compatible with the standard T-DMB
 - 2D/3D display selectable

3D DMB verification system Applications

3D DMB Receiver prototype 3.5" Autostereoscopic display 3D Cellular phone 3D Receiver over T-DMB

27

THANK YOU

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28