The current status and the future direction of DMB technology

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1. Introduction

Characteristics of DMB

- **Mobile**: mobile multimedia (audio/video/data) broadcasting (mobile TV up to 200km/h) services at anytime, anywhere with any devices
- **Personal**: Personalized services by handheld receivers (cellular phone, PDA, notebook, PMP, etc.)
- **Interactive**: Bi-directional interactive services in conjunction with mobile communication networks (TTI, PPV, on-line shopping, internet access, etc.)

* TTI: Traffic and Travel Information
DMB Services

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.

DMB Receiver Types

Personal Receivers as well as Vehicle Mounted Terminals

Cellular Phone type
- Maximize user convenience with diverse forms of devices

In-Car type

DMB Dedicated type

PDA type
### Characteristics of T-DMB and other media

<table>
<thead>
<tr>
<th></th>
<th>T-DMB</th>
<th>S-DMB</th>
<th>T-DIV</th>
<th>CATV</th>
<th>S-DIV</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Service Type</strong></td>
<td>Mobile</td>
<td>Mobile</td>
<td>Fixed</td>
<td>Fixed</td>
<td>Fixed/</td>
</tr>
<tr>
<td><strong>(System-A)</strong></td>
<td>(base fee)</td>
<td>(subscription)</td>
<td>(base fee)</td>
<td>(subscription)</td>
<td>mobile</td>
</tr>
<tr>
<td><strong>Program</strong></td>
<td>Multimedia, Audio, etc.</td>
<td>Multimedia, Audio, etc.</td>
<td>5ch</td>
<td>~80ch</td>
<td>~140ch</td>
</tr>
<tr>
<td><strong>Coverage</strong></td>
<td>Regional</td>
<td>Nationwide</td>
<td>Regional</td>
<td>Nationwide</td>
<td>Nationwide</td>
</tr>
<tr>
<td><strong>Receiver</strong></td>
<td>Personal/Mobile (2-7&quot;) (VCI, QGA)</td>
<td>Personal/Mobile (2-7&quot;) (VCI, QGA)</td>
<td>Fixed/Wide (HD)</td>
<td>Fixed/Wide (HD)</td>
<td>Fixed/mobile (HD)</td>
</tr>
</tbody>
</table>

* Seoul Metropolitan Area

### Concept of DMB Service (System-A)

- Terrestrial and Satellite frequency of up to 3GHz with gap filler
Concept of S-DMB Service (System-E)

- Satellite frequency of 2.6GHz with gap filler

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Specification of System-A & System-E

<table>
<thead>
<tr>
<th>Item</th>
<th>SystemA</th>
<th>SystemE</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medium</td>
<td>Terrestrial, Satellite, and Cable</td>
<td>Satellite only</td>
<td></td>
</tr>
</tbody>
</table>
| Broadcasting Frequency | Upto 3 GHz  
- Terrestrial : VSAT(12 GHz)  
- L Band(1.452 – 1.492 GHz)  
OPS/TDM |
| Relay Frequency | No spec.  
- Ku band  
- Down (to Gap Filler) : 11 GHz |  |
| Basic Transmission  
- Bandwidth  
- Modulation  
- Transmission Multiple  
- Audio  
- Transport  
- Inner FEC |  
- 1.368MHz  
- DQPSK  
- OFDM  
- MPEG-1, 2 Layer 2  
- Error Eq 147  
- Convolution Code (4,1,7) Variable Rate, 24 modes) |  
- 25 MHz  
- QPSK  
- DQPSK  
- MPEG-2 AAC  
- MPEG-2 Systems  
- Convolution Code (2,1,7) Variable Rate, 5 modes)  
- RS(204,188) |  |
| AV Multimedia | RS(204,188) |  |
| Video | MPEG-4 Part 10(H.264) Baseline @Level 3 | MPEG-4 Part 10(H.264) Baseline @Level 3 |  |
| Audio | MPEG-4 BSEC | MPEG-2 AAC-LC-24BR |  |
| Add. Data | MPEG-4 Systems BFS | MPEG-2 Systems |  |
| Data Multiplexes | MPEG-4 Systems (SLS) + MPEG-2 Systems | MPEG-2 Systems |  |

- All multimedia spec. added in each System spec.
DMB System-A Standardization Status

**EU Standard**
- WorldDAB Forum
  - WDF standard ('04.12.)
  - ETSI standard ('05.7.)

**Global Standard**
- ITU
  - Approved as the ITU-R Report ('04.11.)
    - Report ITU-R BT [6/122]
  - ITU-R Recommendation at the end of 2005

2004.12.
Erlangen, Germany

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T-DMB Introduced Worldwide

- Beijing Radio: T-DMB for the 2008 Olympic
- Shanghai TV, Foshan Radio
- BLM T-DMB trial ('05.10.) for the 2006 WorldCup
- Interested in ATSC+ T-DMB services
2. Evolution of Broadcasting Technology

Trends in Convergence Era

Trend 1: Mobility
- Seamless wireless mobile telecommunication Services
- Intelligent, personalized Smart Handheld Terminal
- Wireless & Mobile

Trend 2: Multimedia
- Broadband wired & wireless All IP Networks
- Multimedia Contents (movie, music, etc.)
- Digital Broadband

Trend 3: Convergence
- Voice/Data, wired/wireless Integrated Services
- Convergent Services of telecom. & broadcast
- Convergent Service
Creative TV
- Allow viewer to create their own media worlds according to their specific interests or tastes
- Viewers to be able to shape TV
- Viewer are able to participate in storylines, manipulate plots
- Example: New Media for a New Millennium (NM2) EU Project
New Broadcasting Services: Property

Contents digestion
- Retrieval of favorable ones
- Filtering
- Summarization
- Manipulation

Functionalities
- Connection to Home net.
- X-commerce
- T-government

Interactivity
- Selection of contents
- Content based bi-directionality

Through the convergence of both broadcasting & communication, a user can utilize

his/her favorable contents at anytime, anywhere with any devices
3. Schedule and Model of T-DMB Service

Schedule of T-DMB Service

- **2005**
  - Public (6 providers)
    - Multimedia
    - CD quality music

- **2006**
  - Uni-directional Data
    - Traffic, Location, News, Stock, Weather, Goods Information etc.

- **2007~**
  - Bi-directional Data
  - Personal customized
  - 3D Display
  - T-commerce, hotel, performance etc., reservation etc.
### T-DMB BM (I)

<table>
<thead>
<tr>
<th>Service Type</th>
<th>Profit Source</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Free AV service</td>
<td>• Advertisement, TV ad, banner ad, data related ad, web related ad, program sail in on/off line</td>
<td>- S- DMB</td>
</tr>
<tr>
<td></td>
<td>• Program sail</td>
<td>- T- DMB considering</td>
</tr>
<tr>
<td>Constant Fee base AV service</td>
<td>• Constant subscription fee, PPV program or channel, advertisement</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• usage fee of up/down link, file download fee, T-commerce etc.</td>
<td></td>
</tr>
</tbody>
</table>

### T-DMB BM (II)

**Free AV service with Advertisement**

- Contents provider
- Content fee
- Ad, fee
- AV service
- Broadcast
- User
- Goods purchase

![Diagram of Free AV service with Advertisement](image.png)
4. Data Service and Technology

Relationship between Data Service Types

Uni-directional
- Synopsis & Actor of Drama
- Music related information
- (singer, song)
- Player information of Sports

Bi-directional
- EPG
  - Download game
  - Information (weather, traffic, travel, etc.)
- Quiz show, game
  - T-commerce
  - T-learning
  - T-poll

Non-program Related
- Reservation (hotel, theater, performance, etc)
- T-banking/home shopping
- T-government
- E-mail, chatting
Types of data service (I)

Uni-directional program related

Provide data related to broadcasting program and user selection

- data about news, drama
  - news additions
  - talents, synopols, background, place, production infor.
  - tailored travel infor. associated with background

- data about music
  - singer, song, background
  - disk infor.

- data about sports
  - player profile, records, schedule, etc.
  - sports goods AD

Types of data service (II)

Bi-directional program related

Provide data related to broadcasting program and user can return its' opinion and get additional information thru back channel

- quiz show, game
- T-learning, PPV
- T-poll
- T-commerce
Types of data service (III)

- Uni-directional non-program related
  - Provide data not-related to broadcasting program and user selection
  - Game download
  - TTI service
  - Stock infor.
  - Weather

Types of data service (IV)

- Bi-directional non-program related
  - Provide data not-related to broadcasting program and user can return its opinion and get additional information thru back channel
  - T-banking/home shopping
  - T-government
  - reservation
TPEG TTI Service (1)

- User friendly navigation service
  - Live Traffic & Transportation Information
  - Massive Traveler & Location Information
    - Parking, Weather, Restaurant, Tourist Spot Information
    - Environment Information Alert
  - Bi-directional Location Based Service
    - Hotel/Tourist Ticket Reservation Service
    - Travel Information on Demand

TPEG TTI Service (2)

- TTI Information Flow
  - TTI Information DB
  - DMB Broadcasting Server
  - Mobile Reception
  - DMB Transmitter
  - TTI Information Server
Voice based EPG Service

- Features
  - Voice browser based on Voice EPG scenario description language (VoiceEpgXML)
  - Automatic speech recognition (ASR) and synthesis (TTS)
  - Synchronous speech and visual presentation

* TTS : Text to Speech

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Voice enabled Broadcasting Web Service

* VeBWS : Voice enabled BWS
**T-commerce Service (1)**

**Program related T-commerce**

Ordering and purchasing of goods related to the live program through return channel while watching program.

**T-commerce Service (2)**

**Program independent T-commerce**

Ordering and purchasing of goods, of which the information is provided by independent data channel, through return channel while watching program.
Personalized customized Service

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

Service | Personalized News, Personalized T-Learning, etc.

5. Concluding Remarks
Concluding Remarks

- DMB provides a new paradigm of digital broadcasting
  - mobile, personal customized, bi-directional interactive multimedia
- DMB provides ubiquitous infra for the convergence of broadcasting and telecommunications
- DMB can vitalize broadcasting contents and equipments
- DMB can be an easily accessible platform for new services such as 3D video

Thank you for your attention