A Vision for Wireless Broadband Service

‘WiBro’

2005.2
Outlines

I. Introduction
II. Business Environment
III. Business Strategy
IV. Service Plan
I. Introduction

1. What is WiBro?

High Speed Internet in Your Pocket!

“Wired Internet + Mobility”

- **“While on the Move”**
  - Nomadic Service
  - in the early stage
  - Low Mobility

- **“Anywhere at Anytime”**
  - Seamless Anywhere
  - High Mobility

- **“High Data Rate”**
  - 1 Mbps/User
  - Even Higher Later

- **“Low Access Cost”**
  - $30~$40/Month
  - Mixture of Meter Rate & Flat Rate

User Terminal

- Phone Type
- PDA
- Handheld PC
- Laptop

Laptop connected to Phone

Laptop or PDA with PCMCIA modem card
II. Business Environment

1. Korean Wireless Data Market

- Wireless Data Market will expand from 3 tril. Won in 2004 to 6 tril. Won in 2006\(^1\)

\[\text{Wireless Data Market expands rapidly.}\]
- 0.18 tril. Won(2000) \(\rightarrow\) 1.9 tril. Won (2003)

\[\text{WiBro Market in 2008: } > 1 \text{ tril. Won (assuming 20% market share)}\]
- EV-DO (meter-rated billing) takes over 10% market share in 2 years.

\[\begin{array}{|c|c|}
\hline
\text{Institution} & \text{Rate of Growth(2005~2010)} \\
\hline
\text{OVUM (2003)} & 20\% \text{ (National)} \\
\hline
\text{IDC (2003)} & 31\% \text{ (International)} \\
\hline
\text{ARC (2003)} & 45\% \text{ (National)} \\
\hline
\end{array}\]

\[\text{\langle IT Market Analysis (KISDI) \rangle}\]

\(^1\) Reference : KT Business Management Research Lab
II. Business Environment

2. WiBro Market

- Market Size in Y+5: 9.2~10.7 mil. subscribers
- WiBro will create 270,000 new jobs, and the gross product of 18 tril. Won
- Systems and User Terminal Market is greater than 10 tril. Won
  (1 Device per Home → 1 Device per User → 1 Device per Appliance/Machine)

**Market Prediction**

- SKT: 11
- KT: 9.6
- KISDI: 9.2

**Economical Effect**

<table>
<thead>
<tr>
<th></th>
<th>17.98 tril. Won</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gross Product</td>
<td></td>
</tr>
<tr>
<td>Value Created</td>
<td>7.43 tril. Won</td>
</tr>
<tr>
<td>Total Export</td>
<td>6.28 tril. Won</td>
</tr>
<tr>
<td>Total Import</td>
<td>4.63 tril. Won</td>
</tr>
</tbody>
</table>

**<Jobs Created>**

<table>
<thead>
<tr>
<th></th>
<th>Y</th>
<th>Y+1</th>
<th>Y+2</th>
<th>Y+3</th>
<th>Y+4</th>
<th>Y+5</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(Reference: ETRI, IT Industry Trend Analysis, 2003.10)
II. Business Environment

3. Evolution Path

- Evolution of the Technology
  - Wired Internet: IEEE802.3(LAN) → IEEE802.11(WLAN) → IEEE802.16(WiBro)
  - Cellular Network: 1G (Analog) → 2G (Digital) → 3G (IMT-2000) → 3.5G (HSDPA)

- WiBro is a ‘last mile’ extension of the wired Internet.
II. Business Environment

4. Service Positioning

Service Characteristic

Cost Effectiveness

Data Rate

Mobility

Terminal Portability

Data Oriented

Voice Oriented

WiBro

3G (WCDMA, HSDPA)

Service Positioning

Orientation: Coverage, Mobility

Orientation: Broadband, QoS, Cost

WiBro/3G/WLAN complements each other.
II. Business Environment

5. Technology Comparisons

<table>
<thead>
<tr>
<th>Item</th>
<th>WiBro</th>
<th>W-CDMA</th>
<th>CDMA 2000</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>R4</td>
<td>1x EV-DO</td>
</tr>
<tr>
<td></td>
<td></td>
<td>R5 (HSDPA)</td>
<td>1x EV-DO Rev.A (1)</td>
</tr>
<tr>
<td>Duplex</td>
<td>TDD</td>
<td>FDD</td>
<td>FDD</td>
</tr>
<tr>
<td></td>
<td>FDD</td>
<td>FDD</td>
<td>FDD</td>
</tr>
<tr>
<td>Multiple Access</td>
<td>OFDMA</td>
<td>CDMA</td>
<td>CDMA</td>
</tr>
<tr>
<td></td>
<td>CDMA</td>
<td>CDMA</td>
<td>CDMA</td>
</tr>
<tr>
<td>Bandwidth (FA)</td>
<td>10MHz</td>
<td>5MHz x 2</td>
<td>5MHz x 2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1.25MHz x 2</td>
<td>1.25MHz x 2</td>
</tr>
<tr>
<td>Frequency</td>
<td>2.3~2.4GHz</td>
<td>UL :1.94<del>1.98/DL:2.13</del>2.17G</td>
<td>800M/1.8G</td>
</tr>
<tr>
<td></td>
<td></td>
<td>800M/1.8G</td>
<td>800M/1.8G</td>
</tr>
<tr>
<td>Max. Data Rate (1FA 1sector)</td>
<td>Down</td>
<td>18.432 Mbps</td>
<td>2 Mbps</td>
</tr>
<tr>
<td></td>
<td></td>
<td>13.976 Mbps</td>
<td>2.4576 Mbps</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2.072 Mbps</td>
<td>2 Mbps</td>
</tr>
<tr>
<td></td>
<td>Up</td>
<td>6.144 Mbps/User</td>
<td>2 Mbps/User</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2 Mbps/User</td>
<td>2 Mbps/User</td>
</tr>
<tr>
<td></td>
<td></td>
<td>153.6 kbps/User</td>
<td>1.2288 Mbps/User</td>
</tr>
<tr>
<td></td>
<td></td>
<td>850 kbps</td>
<td>825 kbps</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5 Mbps</td>
<td>850 kbps</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1.04 Mbps</td>
<td>850 kbps</td>
</tr>
<tr>
<td>Average Throughput (1FA 1sector)</td>
<td>Down</td>
<td>5.95 Mbps</td>
<td>2 Mbps</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5 Mbps</td>
<td>850 kbps</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1.04 Mbps</td>
<td>850 kbps</td>
</tr>
<tr>
<td></td>
<td>Up</td>
<td>1.53 Mbps</td>
<td>1.21 Mbps</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1.5 Mbps</td>
<td>266.1 kbps</td>
</tr>
<tr>
<td></td>
<td></td>
<td>266.1 kbps</td>
<td>465.4 kbps</td>
</tr>
<tr>
<td></td>
<td></td>
<td>465.4 kbps</td>
<td>465.4 kbps</td>
</tr>
<tr>
<td>Standardization</td>
<td>802.16e D3 (04.05)</td>
<td>2001.3</td>
<td>2000.10</td>
</tr>
<tr>
<td>Network Deployment</td>
<td>yr. 2006</td>
<td>Seoul Area</td>
<td>yr. 2006</td>
</tr>
</tbody>
</table>

(1) In Revision A, the performance of 1x EV-DO is increased to that of 1x EV-DV.
II. Business Environment

6. Relationship to Similar Services

**WiBro vs. xDSL**
- WiBro provides **High Speed Internet Access** as xDSL.
- WiBro’s **Mobility and Portability** will attract xDSL users to WiBro.

**WiBro vs. WLAN**
- Demand for coverage expansion in WLAN will attract WLAN users to WiBro.

**WiBro vs. 3G**
- Low access cost will attract 3G users to WiBro.
- There will be partial competition between the services; however, they will complement each other in general.

---

![Service coverage of WiBro and WCDMA(HSDPA)](image)
III. Business Strategy

1. KT-WiBro Vision

- WiBro: Cornerstone of Wired/Wireless Convergence/Ubiquitous Network

Wired/Wireless Convergence and Ubiquitous Network

<table>
<thead>
<tr>
<th>Customer Base</th>
<th>Positioning</th>
<th>Infrastructure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Create Mass Market using KT-xDSL and KT-WLAN customer base</td>
<td>Create New BM for Convergence and Ubiquitous Era</td>
<td>Create synergy combining KT&amp;KTF Infrastructures</td>
</tr>
</tbody>
</table>

Create Future Business

- Secure Wireless Data Market
- Leading IT Industry
- KT Group Level Synergy

- Keep dominating in the Wired-Data Market(xDSL)
- Utilizing KTF’s Contents Marketing/Dist. Systems, Service Platforms

KT Vision 2010: 5 Business Engines

Exp. Annual Sales in 2010: 17 tril. Won
III. Business Strategy

2. Key Strategic Factors

- **User Terminal Development**
  - Early DBDM chipset development
  - Develop Business alliance model with vendor
  - Early standardizations of the User Terminal features for timely development

- **Building Wireless Networks**
  - Reuse or share the conventional network infrastructures to reduce capital expenditure.
  - Secure network construction/operation/management personnel

- **Systems Development**
  - Early Int'l standardizations to create Multi Vendor Environment
  - Development Managing Systems for early system development

- **Marketing**
  - Categorizing customer's needs
  - Recognizing Target market
  - Develop Package services in connection with other services and their customer base.

- **Application Development**
  - Develop Killer App exploiting the Broadband and Mobile Characteristics of WiBro
  - Develop Detailed Marketing Strategy for each App Service

- **Contents Development**
  - Develop Key Application Contents
  - Develop Business alliance model with Contents Provider
III. Business Strategy

- **Killer Applications**: Exploiting the Mobile and Broadband Characteristics.
- **Convergence Services**: User Convenience and Max. Revenue.

**Conventional Services**
- **Wired**
  - Information: Web search, e-Mail
  - Entertainment: Movie, VOD
  - Others: e-Stock, e-Banking, e-Learning

- **Wireless**
  - Short Messaging Service (SMS)
  - VOD, Simple Games, Entertainment
  - e-Banking, m-Commerce

**WiBro Killer App.**
- **Multimedia**
  - MMS (Multimedia Messaging Service)
  - High Quality video-mail/messaging
  - “Push” type Services
  - Group video chat, Ad & Coupons
  - Game: IP-based Network Game
  - LBS (Location Based Services)
  - IP Multicasting Services
  - High quality VOD and Movie
  - Real-time Broadcasting

- **Convergence**
  - xDSL, WLAN, CDMA, DMB integrated services

Use KT’s WLAN/xDSL Networks & Operation Know-How
Wired< Lacks Mobility > + Wireless< Small BW > → Convergence

Up-grade to Multimedia/3D+ Convergence Services
IV. Service Plan

1. WiBro Portal

- Use KT's Internet Portal ('Paran') as a WiBro Portal
- Develop Wireless+Wired Portal with KTH
- Develop Easy-to-Use/Customer-Friendly UI
- Develop New Contents, and Up-grade KTH's Conventional Content Service
IV. Service Plan

2. WiBro Contents

- Contents Development and Management Strategy
  - Utilize KT’s Conventional Portals and Services to Develop Multi-Purpose Portals (VOD, music, game etc.)
  - Utilize KT Group’s Contents: KTF (Fimm/MagicN), KTH (Paran), KDB
  - Utilize KTH’s MCP: Strengthen CP Relations
  - Develop CP Management System: CP Selection, Support, Evaluation

- KT Convergence Biz Group
- KT New Biz Develop Group

- KTF/KTH/KDB
  - Collaborate with FIMM/MagicN/Paran/KDB for sharing Contents

- WiBro–customed Contents
  - Out-sourcing for WiBro–customized Contents Development

- Collaborate with HomeN/HomeMedia/NESPOT for Contents Development (Video/Music/Game etc.)

- Contents Sourcing & CP Management
  - Video
  - Music
  - Game
  - Education
  - News
  - LBS
  - Commerce

- MCP (KTH)
  - Contents Supply
  - CP Management
IV. Service Plan

3. User Equipments

- Variety of User Equipments: PCMCIA card, Laptop, PDA, HPC, Smart Phone
- Wireless+Wired Integrated Terminals: Friendly and Easy-to-Use UI
- DBDM, TBTM Equipments: WiBro + WLAN/CDMA/DMB

<table>
<thead>
<tr>
<th>Type</th>
<th>Roadmap</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Introduction Stage</td>
</tr>
<tr>
<td>Laptop</td>
<td>WiBro only</td>
</tr>
<tr>
<td></td>
<td>WiBro only</td>
</tr>
<tr>
<td></td>
<td>WiBro only</td>
</tr>
<tr>
<td></td>
<td>Embedded Modem</td>
</tr>
<tr>
<td>PDA</td>
<td>WiBro only Portables</td>
</tr>
<tr>
<td></td>
<td>WiBro + CDMA</td>
</tr>
<tr>
<td>Smart Phone</td>
<td>DBDM Portables</td>
</tr>
<tr>
<td></td>
<td>WiBro + CDMA</td>
</tr>
</tbody>
</table>

- Single Chip
- Personal/Business
- Convergence
- Application Specific

- Customization
- Multi-mode
- Single Chip
- Customization

- Single Chip
- Personal/Business
- Convergence
- Application Specific
IV. Service Plan

4. Network Planning

- 3-Stage Network Deployment Plan

Network Planning

- Prep. Stage (2005): APEC Demo, Test Service
- Stage 1 (2006): Seoul, Metro, Major Cities (20)
- Stage 2 (2007): Medium Size Cities (18)
- Stage 3 (2008): Rural Cities (46)

Access Network Integration

- 2G/3G: Voice-Oriented, Wide-Area, Narrow-Band
- WiBro: Urban Cities
- WLAN: Home, Hot-Spot, Airport etc.
IV. Service Plan

5. Network Planning

- Sharing the Conventional Network Infrastructure to reduce Capital Expenditure
  - KT Internet Backbone, KT Optical Networks, KT Transmission Lines
  - KTF 2/3G Base Station Infrastructure, KTH Service Platform
  - Sharing Access Network with other WiBro Service Providers
  - Capex/Opex Reduction: 420 billion Won

WiBro Network Structure
IV. Service Plan

- Production Schedule

<table>
<thead>
<tr>
<th></th>
<th>RAS (Base Station)</th>
<th>PSS (Mobile Station)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vendor</td>
<td>Samsung, LG, POSDATA</td>
<td>Samsung, POSDATA, Orthotron, RunCom</td>
</tr>
<tr>
<td>Schedule</td>
<td>End of 2005</td>
<td>End of 2005 ~2006</td>
</tr>
</tbody>
</table>

- 2005.11 Busan APEC: City-wide **WiBro Demonstration**
- 2006.04 Seoul: **Commercial Service** (Service extends to 84 cities within 3 years)
KT, HTI, DACOM, SKT has been competing for WiBro Service license.
Government announced the competition results last month. (2005.1)

KT: 1st Place  SKT: 2nd Place  HTI: 3rd Place

KT will select one frequency band of its choice at the end of this month.
Commercial service begins

KT: 2006.4  SKT: 2006.6  HTI: 2006.6
Thank You

Let's KT
[Appendix] R&D / Standardization Efforts

- **R&D**
  - Develop Cell Design Tool **CellTrek/OPT.** 2004. 4
    - Optimized for WiBro Cell Design
      - Reducing the time and man power needed for cell planning

- **Standard**
  - Actively involved in **TTA standardization** and ETRI 's **HPI Project**.
    - Playing major role in TTA standardization.
    - Shortest standardization resulting **timely-commercialization**.
    - Contribution for HPI Project : 3 Billion Won (2003~2005)
  - Playing major role in IEEE802.16 standardization.
    - Establish International Standardization Forum, **BWF.** (2004.1.20)
      - Leading vendors are actively participating (Intel, Samsung etc.)
    - Harmonizing TTA and IEEE Standardizations
      - Contributing 24 key technical drafts

- **Industry Coalition**
  - Establish **PII (Portable Internet Initiative).** (2003.3.11)
    - Over 100 Member Companies (2004.9)
    - Contributions
      - Develop WiBro Business Model
      - Sharing technical and business information among members

[www.pii.or.kr](http://www.pii.or.kr)
KT developed a first **TDD Repeater** in South Korea.

- TDD Repeater R&D Working Group (2004.2)
- Initiating TDD Repeater Research (involving 5 Companies and 6 Systems)
  - Optical Repeater: Solid Tech., Eastelsystems, Neotelecom
  - RF Repeater: Acetech, C&A Microwave
- Demonstration and Test
  - High Power TDD RF Repeater Demo (2004.8.23)