Overview of “Keitai” (Mobile Phone) Services in Japan

IEEE International Symposium on Wearable Computers 2005

October 19, 2005
Osaka, Japan

Akira MATSUNAGA
KDDI Corporation
Table of Contents

1. “Keitai” in Japan - Current Status

2. Overview of “Keitai” Services
   2.1 Location Based Services
   2.2 “Chaku-uta” and Evolution of Music Related Services
   2.3 Combination of “Keitai” and Broadcast
   2.4 Mobile Commerce
   2.5 Other Applications

3. Summary
1. “Keitai” in Japan
- Current Status
Evolution of “Keitai” infrastructure in Japan

1st Generation
- Already out of Service
- Analog
- Mainly for Speech Communication

2nd Generation
- Started 1993
- Digital (in Japan, PDC system: Japanese Standard)
- Mobile Internet offering started
- Data peak rate typically @9.6-64kbps

3rd Generation
- Started in 2001
- IMT-2000 (W-CDMA, CDMA2000)
- Higher Data Communication Capability
  Support of Rich contents, Fixed Rate etc.
- Data Peak Rate up to 2.4Mbps
Cellular Subscriber Growth in JAPAN

Total Subs.: 89M as of end September 2005

- CDMA 1X: 19,547K
- cdmaOne: 1,156K
- W-CDMA: 18,523K
- PDC: 49,899K
- Analog: 0 (end of Srv)

3G: over 42%
As of Sept, 2005

Year End

As of End of Sept., 2005
Source: TCA
Increase of Internet Accessible “Keitai”

As of September, 2005, 77.2 M “Ketai” (Over 85%) are Internet Accessible. (Total Subs.: 89.1M)

- i-mode: 45.1M (90.5%)
- EZweb: 19.3M (79.7%)
- Vf-live: 12.7M (85.3%)

Source: TCA
"au" Subscribers Growth
Seamless Migration to 3G Successfully in Progress

- Over 90% subs. already migrated to 3G.

September, 2005
Total Subs. 20,703,600
CDMA2000 19,547,400
cdmaOne 1,156,300

1x launched 2002
PDC was terminated 2003.

(source) : TCA
Macro Trend of Mobile Market Evolution in Japan

New Markets (Enterprise, Cars etc.)

Consumers

89M (Sept ‘05)

Module Multimedia

Moving Images

Still Picture Data

Text Data

Browser Phone (1999 Feb. -)
Camera Phone (2000 Nov. -)
GPS Navigation Service (2001 Dec. -)
CHAKU-UTA Service (2002 Dec. -)
Packet Transmission Flat-Rate Service (2003 Nov. -)
Full Music Download Service (2004 Nov. -)

2004 Data is based on data of Dec. of 2004.
Macro Trend of Mobile Market Evolution in KDDI

- **Evolution of Services**
  - **2nd Gen. Service**
    - Photo Mail
  - **3rd Gen. Service**
    - Location Service
    - Video Clip Download
    - Game
    - Movie Mail
    - Vocal Music Ring Tone
    - BREW Appli.
    - Full Music Download
  - Dec. 2001
  - Sep. 2002
  - Nov. 2004

- **Evolution of Network**
  - cdmaOne
    - 64kbps Packet
    - Jan. 2000
  - CDMA2000 1X
    - 144kbps Packet
    - Apr. 2002
  - EV-DO Rev.0
    - 2.4Mbps Max Packet
    - Nov. 2003
  - EV-DO Rev.A
    - 3.1/1.8 Mbps Max Packet
    - 2006

Evolution Strategy
Flat Rate Charging for Packet Service

Example: KDDI launched new flat rate “EZ Double-Flat” on August 1, 2004 and launched “EZ Double-Flat light” on May 1, 2005

- EZ Double-Flat: ¥2,000/month (+tax) up to 40,000 packets.
- EZ Double-Flat light: ¥1,000/month (+tax) up to 12,500 packets.
- Unlimited usage at ¥4,200/month (+tax) or ¥5,700/month (+tax) for “PC Site Viewer”.

<table>
<thead>
<tr>
<th>Monthly Rate</th>
<th>Packets used</th>
<th>Rate per Packet</th>
</tr>
</thead>
<tbody>
<tr>
<td>¥5,700</td>
<td>84,000 packets</td>
<td>¥0.05/packet</td>
</tr>
<tr>
<td>(¥5,985 incl. tax.)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>¥4,200</td>
<td>52,500 packets</td>
<td>¥0.08/packet</td>
</tr>
<tr>
<td>(¥4,410 incl. tax.)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>¥2,000</td>
<td>40,000 packets</td>
<td>¥0.05/packet</td>
</tr>
<tr>
<td>(¥2,100 incl. tax.)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>¥1,000</td>
<td>12,500 packets</td>
<td>¥0.05/packet</td>
</tr>
<tr>
<td>(¥1,050 incl. tax.)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Max ¥4,200/month (+tax) Unlimited Usage
2. Overview of “Keitai” Services
Trend of Contents toward Next Generation

Evolution of Contents
- Web
- HDML
- C-HTML
- HTML (WAP2.0, Opera)
- Download
- Sound (Music/Voice)
- Picture (Still/Movie)
- Game, Digital Book
- <DL speed>
  - 9.6k
  - 144k
  - 2.4M

Charge
- Measured
- Fixed

Frequency
- frequent
- less

Data Size
- small
- big

Transaction Contents

Rich Contents
2.1 Location Based Services
GPS and CDMA Network

NW System Clock synchronized with GPS.

GPS Satellites (ID-1) (ID-2) (ID-3) (ID-n)

PN-1 PN-2 PN-3 PN-n

GPS Signal

CDMA Network

Utilizes signals from multiple BTSs.

PN-n

BTS (ID-n)

BTS (ID-1)

BTS (ID-2)

PN-2

Pilot Signal
gpsOne™ Position Fix Types

1. GPS Fix ... open sky
   - Requires GPS measurements

2. Hybrid FI X ... partial view of sky
   - Activated when GPS Fix fails.
   - CDMA pilot phase can be used as virtual GPS measurements.

3. AFLT FI X ... indoors
   - Used if Hybrid Fix fails when no GPS measurement is available.
   - Requires CDMA pilot phase measurements

4. Cell Sector Center FI X ... indoors
   If CDMA pilot phase measurements < 3, cell sector center is used as the location.
## Examples of Location Based Services (LBS)

<table>
<thead>
<tr>
<th>Navigation</th>
<th>Find out one’s own location</th>
</tr>
</thead>
<tbody>
<tr>
<td>EZナビウォーク</td>
<td>EZナビウォーク</td>
</tr>
<tr>
<td>EZ助手席ナビ</td>
<td>EZ助手席ナビ</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Track other’s location</th>
<th>Security, emergency</th>
</tr>
</thead>
<tbody>
<tr>
<td>EZナビゲーション</td>
<td>安心ナビ HELPNET</td>
</tr>
<tr>
<td>GPS MAP</td>
<td>ココセコム EZ</td>
</tr>
</tbody>
</table>
EZ Navi Walk
GPS-based navigation service for pedestrians

**Voice guidance 1**
“Start Voice Navigation”

**Voice guidance 2**
“To the left, 50m ahead”

**Voice guidance 3**
“You have reached the destination.”

Map is automatically scrolled.

Real time pinpointing the user’s location.

Map is always heading toward the user’s direction.
EZ “Josyu-seki” Navi - Navigation for a Navigator (1)

- EZ “Josyu-seki” (a seat next to a driver’s seat) Navi helps a navigator to support a driver in showing the way.

- Provides verbal navigation guide to the destination, traffic information, parking space availability info. etc.
Features include:
- Identify the location of lost “keitai” by PC.
- Show where your friend stays now, etc.
- Forward a message to your friend.

Friend Finder
Please call me as soon as possible
090-1234-5678
Mike

© Shobunsha Publications, Inc.
A corporate manager (PC) can monitor the location of GPS Keitai deployed in the field.
Gaming

- Treasure Hunt or “Takara sagashi”
  Search treasures (= Cards) hidden somewhere in Japan using GPS “Keitai”.

- Play tag or “Onigokko”
  Players may trace other players' location by GPS “Keitai”.
Parents will be informed
-if a child approaches the specified area
or
-of the location at specified time.
“Anshin” Navi
Navigation for parents to monitor Kid’s location (2)

Parents can find out kid’s location by Keitai,

**位置確認メール**

if the kid acknowledges the location info. request mail from the parent.

**いつでも位置確認**

or even without the kid’s consent.
2.2 “Chaku-uta® ” and Evolution of Music Related Services
Evolution of the Vocal Music Ring Tone as a part of the Ring Tone Evolution

Full Music Download Service*
laundered November 2004

* Digital rights management is essential for service expansion

Evolution of the Vocal Music Ring Tone as a Music Download Service

Ring Tone
Vocal Music Ring Tone
Melody Ring Tone
Ring Tone Movie

Evolution of the Vocal Music Ring Tone as a part of the Ring Tone Evolution
Full Music Download or “Chaku-uta” full

Digital rights management is essential for service expansion

EZ Music Download

D/ L full music by air
Easier than i-pod

Excellent sound quality
of CD level, w/ jacket
photo, word, etc.

Accessible from new
music portal
“EZ music”

Search by
song/ artist
New song info
Top D/ L ranking
etc.

Full music D/ L
Partial music
D/ L
CD net urchase

“Chaku-uta” and “Chaku-uta Full” are trademark and registered trademark of Sony Music Entertainment.
Growth of “CHAKU-UTA” & “CHAKU-UTA Full”

- 280 thousand "CHAKU-UTA" available from 247 sites. (Apr. '05)
- 60 thousand "CHAKU-UTA Full" available from 46 sites. (Sept. '05)

Cumulative Downloads

Million

- Number of CHAKU-UTA Full download
- Number of CHAKU-UTA download
- Number of CHAKU-UTA handsets
“Kikasete kensaku” or Song Search

Step 1: Activate Search Engine

Step 2: Input a song by letting “Keitai” listen to the music

Step 3: Display search result

Step 4: 

Step 5:
Download “Chaku-uta” or purchase CD
2.3 Combination of “Keitai” and Broadcast
Collaboration with FM Radio by “FM Keitai”

Create New Business Model by collaboration between Analog FM Radio and “Keitai”. Listeners can obtain Program-related information on air on the spot they are listening.

While listening to FM Radio, a listener can
- Exchange E-mails
- Access EZ Web
- Obtain Program Info. on air
- Send a Message or Request to the Program.

Interactive Ads. by the same sponsor as the Program on Air.

Connect to the Web Site of FM Station

Obtain CHAKU-UTA from air
Example of Harmonization with Broadcasting Service (EPG)

- Terrestrial Carrier, BS, CS, EPG
- TV, VCR, DVDR Remote controller

Cooperation with TV Broadcasting by using EPG

Information Window
Broadcast station uses this window to inform new programs or ads. of events, and so on.

35 broadcasting stations use this window (Jan. 2005)

Information or Original contents relatives to the program (ex. Chaku-uta, Chaku-movie, etc.)

Attract audience to mobile services
Provide users with Emergency Report.

1. Register the area on web site.

2. In case of emergency, jump to broadcasting contents automatically.

3. Jump to the web site providing information in the area.

[Standby screen]

Click button
Handset with Terrestrial Digital TV Receiver

- Terrestrial Digital TV broadcast for mobile terminals (ISDB-T 1 segment) will be ready for service April, 2006.

- A prototype handset was exhibited at CEATEC JAPAN 2005, October.

- Wide 16:9 display.

- TV & Data Broadcast Receiver.

- Interactive capability using cellular communication capability.

- A variety of services will be offered by combining broadcast and communication.
2.4 Mobile Commerce
Examples of Mobile Commerce

- **Real goods/products**
  - auRecords
    - CD / DVD shop
  - auAuctions
    - Mobile auction site
  - auShopping
    - Mobile shopping site / portal

- **Payment option**
  - Phone Bill
  - Credit Card
  - Pay at Delivery
Examples of Mobile Commerce

- An user may participate in an auction using “Keitai” any time, anywhere.
- Enhanced convenience by Built-in Camera and BREW applications.

1. Exhibit
2. Bid
3. Transaction, Payment and Delivery
Handsets with Contactless IC Card

Contactless IC Card (Felica ISO/IEC 18092) and R-UIM equipped

- Full Music Download
- 3D Surrounding Stereo Speakers
- Music Download from PC via USB
- 1.3 M Pixel Camera
- QVGA display
- 42 MB & 256 MB external memory
- PC site viewer & PC document viewer

W32H

W32S

Felica is a registered trademark of Sony Corporation.

KDDI Proprietary
The applications of contactless IC card include:

- Passenger ticket, bus fares
- Shopping using Electronic money
- Employee ID, Student ID
“Osaifu Keitai” will add convenience to a variety of use cases. Example: going to a concert.

- Download "Chaku-uta full".
- Check the song on air by EZ FM.
- Take a train *
- Write and read mails while listening to music in a train.
- EZ Navi & Naviwalk will guide you to the destination.
- Admission to the hall by showing Felica Display.
- Purchase Concert Tickets by Net Shopping
- Shopping @ favorite shop by Electronic Money
- Earned points may be used for shopping.
- Keitai may be used as a membership card of "karaoke".

2.5 Other Applications
PC Site Viewer gives users an access to web sites typically developed for PC.

The PC Site Viewer is provided by the Internet browser "Opera Browser," made by Opera Software ASA (based in Oslo, Norway; CEO: Jon S. von Tetzchner).
Digital-Book Service

“Digital-Book” service spreading for PDA, is also available for “au” mobile.

Merit
Digital-Book service is provided by EZ channel. Digital-book can be enjoyed also in off-line mode.

In the Past
It was difficult to receive heavy contents (hundreds to Mega bytes), due to low transmission speed and expensive rate.

1. Provided by EZ Channel
   Contents include stories, cartoons etc, typically heavy in size.
   Advertising media of “Digital-Book” service

2. On demand basis
   Heavy size data download made possible by EV-DO.
   Typical data size; a comic book : 600-800 KB, a novel : 300 - 500KB
   Various menu including comics, magazines, etc. tailored for target users.
Program Distribution Service

EZ Channel: Multimedia program distribution service specialized for WIN

- Select and register a favorite program on EZweb, and multimedia contents (up to 3MB, compliant with SMIL technology) will be downloaded automatically.
- Contents are updated once a day, once a week, etc.

Efficient Utilization of Facility and Spectrum.

Amount of Data Traffic

![Diagram showing network capacity and data traffic over a 24-hour period with EZ Channel and EZ Web Traffic separated.]
Program Distribution Service

Contents Examples

Wide variety of channels

<table>
<thead>
<tr>
<th>Category</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Music / Movie</td>
<td>7</td>
</tr>
<tr>
<td>E-book / E-comic</td>
<td>5</td>
</tr>
<tr>
<td>Sports news</td>
<td>4</td>
</tr>
<tr>
<td>TV / Entertainment</td>
<td>7</td>
</tr>
<tr>
<td>News / Weather / Traffic info.</td>
<td>2</td>
</tr>
<tr>
<td>Hobby / E-learning / Gourmet</td>
<td>3</td>
</tr>
</tbody>
</table>

28 programs as of Jan.17, 2005
3. Summary

What is “Keitai” like in the future?
Now, "Keitai" is recognized as a social infrastructure, and becomes a part of culture.

- Requirement for Mobile depends on lifestyles and social environment, culture of each region.

- "Keitai" in Japan reflects Japanese Culture.

- "Keitai" will bear more social responsibility (Security, Reliability, etc)
Everything on “Keitai”
- We need more for happier life

Japan - Constraint on living environment

- Limited Housing Space
- Commuting by Public Transportation (Trains, Bus etc.)
- Come home late, spending little time at home

- “Everything on “Keitai”” is surely convenient

Home is home, however small.
Everything on “Keitai”  
- We need more for happier life

Whereas in US and Europe...  
Tendency to enjoy an affluent, exuberant life

- Spacious, ample Housing Space  
- Commuting by a Private Car  
- Spend more time in a private Environment  
- Enjoy Movies and Music by “Home Theater” or Car Audio

- Mobiles may be used mainly for communication (telephone and short messages)
Everything on “Keitai”
- We need more for happier life

Objective: Enjoy “broadband” whenever and wherever possible.
- “Keitai” should play a more important role in a “non-telecommunication” domain in order to realize this objective.
- Independent of the technological progress from 3G to 3.5/4G, this trend will be accelerated.
- From mere telecommunication tools, “Keitai” will become essential existence something like air and water.

Two Approaches: “Keitai” as a

Personal Device: Everything on “Keitai”.

and/or

Personal Gateway: “Keitai” as a Communication Hub.
“Everything on Keitai” Mobile as a Personal Device

“Everything on Keitai” will provide human life with various useful features.

Each device function will be assembled.

All in one

- Wallet, Card, Keys, etc.
- Car Navigation Sys.
- Media Player - Camera
- Office Documents - BC
- TV/ Radio
- Magazines, Books
“Keitai” as a Personal Gateway

Information interaction between local network and the external devices will be realized by HUB function of Mobile.

Mobile as communication HUB.

- Local Data
- Contents
- NW

- Wireless LAN
- Bluetooth
- IRDA
- RFID

- Device Interaction (Document Print out)
- Display on the big screen panel
- Remote Control (Operation)
- Data DL from special device (Handy Terminal)
- POS Register (e-commerce)
- Radio Frequency Identification (Transaction)
Ubiquitous Solution Company

Please visit our website @

http://www.kddi.com/