Mobile Communications in Japan

5th April 2007

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Ministry of Internal Affairs and Communications, JAPAN
Changes in the number of mobile phone subscribers

<table>
<thead>
<tr>
<th>Year</th>
<th>Number of Subscribers</th>
</tr>
</thead>
<tbody>
<tr>
<td>1996</td>
<td>10.0 million</td>
</tr>
<tr>
<td>1997</td>
<td>15.0 million</td>
</tr>
<tr>
<td>1998</td>
<td>20.0 million</td>
</tr>
<tr>
<td>1999</td>
<td>25.0 million</td>
</tr>
<tr>
<td>2000</td>
<td>30.0 million</td>
</tr>
<tr>
<td>2001</td>
<td>35.0 million</td>
</tr>
<tr>
<td>2002</td>
<td>40.0 million</td>
</tr>
<tr>
<td>2003</td>
<td>45.0 million</td>
</tr>
<tr>
<td>2004</td>
<td>50.0 million</td>
</tr>
<tr>
<td>2005</td>
<td>55.0 million</td>
</tr>
<tr>
<td>2006</td>
<td>60.0 million</td>
</tr>
<tr>
<td>2007</td>
<td>65.0 million</td>
</tr>
</tbody>
</table>

- Mobile phones: Approx. 95,762,300 units
- Mobile IP connection service:
  - Approx. 83,407,900 units
- IMT-2000: Approx. 67,081,300 units

February 2007
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Start of i-mode, EZ-web and J-Sky service

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### Frequency Allocation and Licences for 3G and BWA in Japan

#### FDD system

<table>
<thead>
<tr>
<th>Band</th>
<th>Current Status</th>
<th>Future</th>
</tr>
</thead>
<tbody>
<tr>
<td>700MHz</td>
<td>Used for PDC (2G) and 3G</td>
<td>For 3G deployment</td>
</tr>
<tr>
<td>800MHz</td>
<td>Used for PDC (2G)</td>
<td>For 3G deployment</td>
</tr>
<tr>
<td>900MHz</td>
<td>Currently deploying for 3G</td>
<td>For 3G deployment</td>
</tr>
<tr>
<td>1.5GHz</td>
<td>- NTT DoCoMo&lt;br&gt;- KDDI&lt;br&gt;- Softbank</td>
<td>Reallocating frequencies</td>
</tr>
<tr>
<td>1.7GHz</td>
<td>- NTT DoCoMo&lt;br&gt;- KDDI&lt;br&gt;- Softbank</td>
<td>For 3G deployment</td>
</tr>
<tr>
<td>2.0GHz</td>
<td>NTT DoCoMo&lt;br&gt;- Assigned to cope with spectrum congestion</td>
<td>For 3G deployment</td>
</tr>
<tr>
<td>2.5GHz</td>
<td>- NTT DoCoMo&lt;br&gt;- KDDI&lt;br&gt;- Softbank</td>
<td>For 3G deployment</td>
</tr>
</tbody>
</table>

#### TDD system

<table>
<thead>
<tr>
<th>Band</th>
<th>Current Status</th>
<th>Future</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.0GHz</td>
<td>IP Mobile [New entrant]</td>
<td>For introduction of BWA</td>
</tr>
<tr>
<td>2.5GHz</td>
<td>- eMobile [New entrant] - NTT DoCoMo&lt;br&gt;- KDDI&lt;br&gt;- Softbank</td>
<td>- WiMAX&lt;br&gt;- MBTDD-Wideband&lt;br&gt;- MBTDD 625k-MC&lt;br&gt;- Next-generation PHS</td>
</tr>
</tbody>
</table>

**Notes:**
- Analog television service to be discontinued.
- Shift/Convergence
- Started Service: March 31, 2007
- To be used as pair bands after July 2012

**Current status:**
- NTT DoCoMo
- KDDI
- Softbank
- eMobile [New entrant]
- IP Mobile [New entrant]

**Future:**
- For 3G deployment
- Reallocating frequencies
Evolution of Mobile Phone Applications

- **GAME**
- **TV**
- **Telephone**
- **Electronic Money**
- **Credit Card**
- **Broadband Communication**
- **Information Code**
- **2D Bar Code, Camera, High-resolution Display**
- **Wireless Media**
- **GPS**
- **Digital TV (1 Seg)**
- **W-LAN**
- **Bluetooth**
- **Infrared**
- **Built-in RFID**
- **Season Ticket**
- **Built-in RFID**

- **Information Code**
Changes in the Number of Telecommunication Service Users

(Unit: 10 thousand)

- **Fixed Communications (Subscribers Telephone + ISDN)**
- **Subscribers Telephone**
- **Mobile Communications (Cellular + PHS)**
- **Subscribers to High/Ultra High Speed Internet**
- **IP telephone** (DSL + CATV + FTTH + Wireless)

Reversal in lead for number of contracts of fixed → mobile (November 2000)

※ As of Feb 07 2006/9

10,068
10,000
9,648
9,147
8,665
8,112
7,482
6,780
6,196
5,678
5,100
4,954
4,380
3,825
2,691
1,170
1,146
830.5
2,000
4,000
6,000
8,000
10,000
Sales in Japan’s Telecommunications Market (FY05)

A. Major mobile phone carriers
- NTT DoCoMo ¥4.7659 trillion
- au (incl. Tu-ka) ¥2.5103 trillion
- Vodafone ¥1.4693 trillion
- Willcom ¥209.8 billion

B. Major long distance/international carriers
- NTT Com ¥1.1278 trillion
- KDDI ¥619.3 billion
- Japan Telecom ¥343.5 billion
- Space Communications ¥17.9 billion
- JSAT ¥40.1 billion
- Other power companies ¥151.8 billion
- J-COM Group ¥83.6 billion
- CTC ¥32 billion
- Other carriers

C. Major local carriers
- NTT West ¥2.296 trillion
- NTT East ¥2.1253 trillion
- NTT Com ¥1.1278 trillion
- KDDI ¥619.3 billion
- Japan Telecom ¥343.5 billion
- Other power companies ¥151.8 billion
- Other carriers

D. Sales Transition of Major Japanese Telecommunication Carriers

The sales of major telecommunications carriers have increased three-fold since 1985.

Note 1: The above diagram is created from the financial statements (total sales revenue) based on accounting regulations for telecommunication carriers submitted by carriers that provide basic telecommunication services and the financial reports based on the accounting regulations for telecommunication operations submitted by certified telecommunications carriers (the total sales profits of telecommunication businesses and other operations except for TEPCO showing only the sales profits for their telecommunication operations).

Note 2: The sales of NTT DoCoMo and the sales of KDDI fixed and each category of au were created by settlement short lines.
Growth of Data Access Speed in Fixed and Mobile communications

- **1990**: Voice band, modern
- **1995**: ISDN, CATV/xDSL, modern
- **2000**: FTTH, VDSL, 802.16 family, 802.11 family
- **2005**: IMT-2000, W-CDMA HSDPA (30M), cdma2000 EV-DO (2.4M), W-CDMA HSDPA (14M)
- **2010**: IMT-Advanced, 802.16 family, W-CDMA HSDPA (384k), W-CDMA HSDPA (384k)

Data access of fixed communications:
- FTTH
- VDSL
- CATV/xDSL

Data access of mobile (including nonadic) communications:
- PHS
- ISDN
- Browse phone (pre-IMT)
- W-CDMA HSDPA (384k)
Future development of IMT-2000 and IMT-Advanced

ITU-R Rec.M.1645

Mobility

High

Low

IMT-2000

Enhanced IMT-2000

New Mobile Access

New Nomadic / Local Area Wireless Access

IMT-Advanced

Peak Useful Data Rate (Mb/s)

100 Mbps

1 Gbps

denotes interconnection between systems via networks, allowing flexible use in any environment without making users aware of constituent systems

Predicted Spectrum Requirements for the future development of IMT-2000 & IMT-Advanced [studied by ITU]

Predicted Total : 1,720 MHz

Net additional : 971-1027 MHz

(Growing Spectrum Needs)

(High User Demand)
MIC’s “Frequency Open Policy” and promotion of efficient frequency use

Recommendations made in “Radio Policy Vision”: Response from Telecommunications Council (July 2003)

Goal: To build the world's most advanced wireless broadband environment

Prompt response to Growing Future Needs

Frequency Open Policy

- Survey and Evaluation of the Radio Frequency Usage
- Guideline for Frequency Reallocation
  - Surveys on Actual Radio Spectrum Usage of the frequency bands above 3.4GHz
    Within 5 to 10 years, 1.38GHz at maximum shall be reserved for the use of mobile radio communication system

- Action Plan for Frequency Reallocation
- National Table of Frequency Allocation
    Measures to ensure the frequency bands for IMT-Advanced (3.4-4.2GHz and 4.4-4.9GHz bands)
  - National Table of Frequency Allocation “Frequency Assignment Plan”
    <3.6-4.2GHz and 4.4-4.9GHz bands>
    Mobile service: from 1 Jan 2010
    Fixed service: until 30 Nov. 2012

- Charge of the Spectrum User Fee System

- Spectrum Usage Fee
  (before Dec. 2005)
  Fixed radio station (3-6GHz band)
  ¥16,300
  (after Dec. 2005)
  Fixed radio station (3-6GHz band)
  (bandwidths of 3-30MHz)
  ¥1,000,000 (Approx) [area 1]
  ¥500,000 (Approx) [area 2]
  ¥100,000 (Approx) [area 3]
  ¥60,000 (Approx) [area 4]
Within 5 to 10 years, a width of approx. **1.38 GHz at maximum** shall be reserved, mainly in the 5 to 6 GHz band and below.

- **VHF/UHF bands** (at present, used for broadcasting): part of the bands
- **800 MHz band** (at present, used by regional disaster prevention radio and airport Dispatch services): width of 10 MHz
- **1.5 GHz band** (at present, used by Dispatch services, etc.): width of 18 MHz
- **3.5 GHz band** (at present, used for broadcast transmission): part of the band width of 200 MHz
- **4 G/5 GHz bands** (at present, used by telecommunication carrier fixed communication): part of the bands

**Predicted Spectrum Requirements by the year 2020 for IMT (ITU CPM Report)**

<High User Demand>

Predicted total : 1720 MHz
Net additional : 971 - 1027 MHz
Candidate Bands for the Future Development of IMT-2000 and IMT-Advanced in ITU

- 410-430 MHz: lower cost and larger coverage but limited spectrum bandwidth
- 450-470 MHz:
- 470-806/862 MHz:
- 2300-2400 MHz:
- 2700-2900 MHz:
- 3400-4200 MHz: wider bandwidth for high data rate application
- 4400-4990 MHz: Suitable for IMT-2000 and IMT-Advanced
MIC’s Action Plan for Frequency Reallocation

MIC developed the “Action Plan for Spectrum Reallocation” in August 2004 to ensure a smooth and stable follow-up of concrete spectrum reallocation processes based on the relevant evaluation results and subsequently keeps the Action Plan up to date in a timely manner.

[Example]

Measures to ensure the frequency bands for the future development of IMT-2000 & IMT-Advanced

(3.4 – 4.2 GHz and 4.4 – 4.9 GHz)

- **frequency shift measures** of existing wireless systems to higher frequency
  (Fixed services, other mobile services)

- **frequency sharing measures** between existing wireless systems (Fixed satellite services) and IMT-2000 & IMT-Advanced

http://www.tele.soumu.go.jp/e/freq/process/actionplan.htm