Wireless LAN in Japan

Technologies, Market and Regulation

Present and Future

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  ◆ Market and Application
  ◆ Regulations

◆ **Future Wireless LAN in Japan**
  ◆ Technologies
  ◆ Market and Application
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History of Wireless LAN in Japan

- **Dec 1992**: Update of Radio Regulation for “Small Power Data Communication System (SS 2.4GHz)” and “Local Area Radio Station (19GHz)”
- **Mar 1993**: The 1st SS 2.4GHz Product appeared (Clarion JX-1100A)
- **Mar 1995**: “R&D Committee of Light Wireless Communication Systems” was established in the ARIB.
- **May 1995**: “Development Committee of Millimeter Wave Wireless LAN” was established in the ARIB. (156-600Mbps / 30-300GHz)
Category of Wireless LAN

Wireless LAN

Radio

- 2.4GHz SS Wireless LAN
  (256k ~ 10Mbps)

- 19GHz Wireless LAN
  (10Mbps ~)

IR / Light

- Millimeter Wave Wireless LAN
  (156Mbps ~)

- IrDA (115.2kbps / 1.152Mbps)

- IR Wireless LAN (10Mbps ~)
Present Situation (SS 2.4GHz)

- Mainstream of Wireless LAN
- Standardization by 802.11 is in progress
- Internationally available (Japanese 26MHz B.W. is the narrowest)
- DS:FH = 1:1 in Japanese market
- 5Mbps ~ 10Mbps products is being announced
Present Situation (19GHz)

- Station license requirement is blocking the spread
- Motorola’s *Altair* the only product in Japan has been discontinued
- More costly than 2.4GHz and slower data rate than millimeter wave
- NTT announced to go on the market in Sept. 1996
Present Situation (IR)

- Up to 150Mbps is possible
- No radio regulation is applied all over the world
- 10Mbps products are already available
- Lower cost and narrower area than 2.4GHz
- IrDA standard will be applied to low data rate wireless LANs
- Seems to be suitable for The Last One Meter of LAN
Present Situation (IrDA)

- IrDA: An nongovernmental organization for standardization of infra-red communication systems
- IrDA-1: 115.2kbps
- IrDA-2: 1.152Mbps/4Mbps
- Active toward 10Mbps
Industrial History and Trend in Japan

- **1993**: Overseas companies with Japanese corporations went on the market (NCR and Motorola)
- **1994**: Domestic companies went on the market (JRC, Clarion, JVC, NTT Data)
- **1995**: Trade companies began to import products. Some domestic companies introduced WaveLAN as OEM products. New 10 companies appeared.
- **1996**: WaveLAN and RangeLAN expand OEM supply. Some new big companies go on the market. 5Mbps product will appear.
Companies Selling Wireless LAN in Japan

- **Communication**: JRC, TOYOCOM, NTT Data, NTT-IT
- **Computer Supplier**: NEC, TOSHIBA, HITACHI, NCR Japan, IBM Japan, SEIKO EPSON
- **Trade companies**: KANEMATSU, Panasonic Group, JEPICO, KANSAI Electric
- **Others**: Clarion, JVC, Soliton Systems, COMTRON
## Present Regulations Overview

<table>
<thead>
<tr>
<th>Category of Station</th>
<th>Radio W-LAN</th>
<th>IR W-LAN</th>
<th>Competitive Systems</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2.4GHz</td>
<td>19GHz</td>
<td>400MHz / 1200MHz</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1.9GHz</td>
</tr>
<tr>
<td>Station License</td>
<td>Small Power Data Comm.</td>
<td>Local Area Radio</td>
<td>Not Specified</td>
</tr>
<tr>
<td>Operator License</td>
<td>Not Required</td>
<td>Required</td>
<td>Not Required</td>
</tr>
<tr>
<td>Bandwidth / Channels</td>
<td>26MHz</td>
<td>80MHz</td>
<td>Not Specified</td>
</tr>
<tr>
<td>Data Rate</td>
<td>No Restrictions</td>
<td>≥10Mbps</td>
<td>Not Specified</td>
</tr>
<tr>
<td>TX Power</td>
<td>≤10mW/MHz</td>
<td>≤300mW</td>
<td>Not Specified</td>
</tr>
</tbody>
</table>

- **Operator License**: Not Required
- **Bandwidth/Channels**: Not Specified
- **Data Rate**: Not Specified
- **TX Power**: Not Specified

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*Clarion*
### Japanese Radio Regulations for 2.4GHz SS

<table>
<thead>
<tr>
<th></th>
<th>USA</th>
<th>Japan</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Frequency Band</strong></td>
<td>2400 - 2483.5 MHz</td>
<td>2471 - 2497 MHz</td>
</tr>
<tr>
<td><strong>TX Power</strong></td>
<td>≤6dBW EIRP</td>
<td>≤10dBm/MHz EIRP measured at antenna terminal</td>
</tr>
<tr>
<td><strong>TX spurious at adjacent band</strong></td>
<td>≤500µV/m measured by field strength</td>
<td>≤25µW measured at antenna terminal</td>
</tr>
<tr>
<td><strong>Processing Gain</strong></td>
<td>≥10dB</td>
<td>Not specified</td>
</tr>
<tr>
<td><strong>Spreading Ratio</strong></td>
<td>Not specified</td>
<td>≥10</td>
</tr>
<tr>
<td><strong>Call ID</strong></td>
<td>Not required</td>
<td>must be memorized and automatically transmitted</td>
</tr>
<tr>
<td><strong>Special antenna connectors</strong></td>
<td>Required</td>
<td>Not required</td>
</tr>
<tr>
<td><strong>Special construction of RF section not to be opened easily</strong></td>
<td>Not required</td>
<td>Required</td>
</tr>
</tbody>
</table>

This table does not indicate all differences.
Update of the Radio Regulations

- More bandwidth in 2.4 GHz: The MPT must guard existing radio stations. Suitable method of frequency co-use with other radio stations existing in 2.4GHz ISM band must be found out.

- 5.7 GHz band: Earnest wish to open this band is the most important.
Technical Characteristics of SS in Japan

- **SAW devices has been often used.**
  - Clarion : SAW Convolvers (SS Modems, SS units)
  - JRC : SAW Matched Filters (JRL-100)
  - HITACHI : SAW Matched Filters (Wireless unit for Flea Power Radio Station)

- **Trend**
  - Digital Signal Processing will become main technology especially for higher data rate.
Higher data rate than 2Mbps by 2.4GHz SS

- Clarion demonstrated 5Mbps SS wireless modem M5 at Communication Tokyo ‘96 in April 1996.

- Clarion will market 10Mbps version M10 in USA from June 1996.

- Other development completed: NEC, HITACHI, Canon and Aironet
# Japan Original SS Wireless LAN Products

<table>
<thead>
<tr>
<th>Model</th>
<th>JRL-100</th>
<th>JU-1100A</th>
<th>M5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Developed by</td>
<td>JRC</td>
<td>Clarion</td>
<td>Clarion</td>
</tr>
<tr>
<td>Type</td>
<td>Stand Alone</td>
<td>Component</td>
<td>Stand Alone</td>
</tr>
<tr>
<td>SS Modulation</td>
<td>BPSK</td>
<td>BPSK</td>
<td>BPSK</td>
</tr>
<tr>
<td>Demodulation</td>
<td>SAW Matched Filter</td>
<td>SAW Convolver</td>
<td>Digital Correlator</td>
</tr>
<tr>
<td>Data Rate</td>
<td>2Mbps</td>
<td>256kbps</td>
<td>5Mbps</td>
</tr>
<tr>
<td>Interface</td>
<td>Ethernet 10BaseT</td>
<td>Original</td>
<td>Ethernet AUI</td>
</tr>
<tr>
<td>Roaming</td>
<td>Optional</td>
<td>-</td>
<td>None</td>
</tr>
<tr>
<td>Price</td>
<td>¥190k</td>
<td>OEM Price</td>
<td>Unfixed</td>
</tr>
</tbody>
</table>
Projected numbers of PCs in Japan

Notebook
Desktop
Total

(Year)

Clarion
Market Estimation of Wireless LANs in Japan

No. of units (×1000)

Year

By Seed Planning Inc.
Application of Wireless LANs

- **Offices**: “Every room is my office”
- **Distribution Industries**: Wireless POS, Warehouse
- **Factories**: AGV, Warehouse, Wireless Observation
- **Hospitals**: Mobile terminals referring patient’s record
- **Tentative LAN**: Exhibition, Disaster restoration
- **Home**: Avoid spoiling the appearance
Conclusion--Japan What’s different

- More attractive market than USA ?!
  - Personality: Sensitive to technical trend.
  - Organization: Frequently changed → Saving rewiring cost is important.
- Office space: Very narrow → Many notebook PCs ← Ideal to Mobile Computing.
- Many time-consuming jobs after sale
  - Buyers understand that price includes set up cost and training.