BROADBAND DEPLOYMENT: A PERSPECTIVE ON KOREA

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The Columbia Institute for Tele-Information
June 23, 2005

Some Things to Keep in Mind

• In 1975, 527,000 Korean households had telephones; 1.7 million in 1980; 5 million in 1985; 10.8 million in 1990 (11.4 million households)
• In 1975, there were 419 persons per passenger car; 153 in 1980; 73 in 1985, 21 in 1990, 5.75 in 2000
• Seoul National University is the second largest undergraduate source of US-granted doctorates, 1999-2003 (after UC Berkeley)

Korean Network Characteristics

• Most Koreans live close to KT’s central offices and are (V)DSL-qualified
  – 90 percent live within 2.2 km (7.2 kfeet)
  – 98 percent live within 5 km (16.5 kfeet)
• 48 percent of Koreans live in MDU’s that attract facilities competitors (e.g., Hanaro Telecom’s fiber to complexes with 300 or more units)
• Non-KT operators use fiber-fed VDSL or CableLabs’ DOCSIS standard modems on fiber-coax networks
• Some apartment complexes have shared Ethernet “apartment LANs”

Government Promotion of Infrastructure Development

• Korea Information Infrastructure Plan (1995-02) provided funding and assigned roles to infrastructure operators
• KT 40 percent owned by government until 2002
  – Shareholders’ “ability to influence us [KT] may be limited” as a result of government ownership
  – Required to unbundle local loops
• Powercomm formed by government-controlled KEPCO to provide fiber/coax networks to wireless and cable industry
  – “Powercomm is an enterprise established to contribute to the governmental policy of early construction of the Information Superhighway” – Powercomm web site
  – Acts as “carriers’ carrier” for multiple broadband ISPs
  – Privatized 2002 (sold to LG)

KT’s Broadband Prices Were Not Inexpensive

<table>
<thead>
<tr>
<th>Service</th>
<th>Speed (Mbps)</th>
<th>Monthly Charge (won)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apr 30, 2002</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Magpie Premium</td>
<td>8.0</td>
<td>40,000</td>
</tr>
<tr>
<td>Magpie Lite</td>
<td>1.5</td>
<td>30,000</td>
</tr>
<tr>
<td>Magpie MM (Apt. LAN)</td>
<td>2.0</td>
<td>25,000</td>
</tr>
<tr>
<td>Apr 30, 2004</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Magpie Special II</td>
<td>20.0</td>
<td>40,000</td>
</tr>
<tr>
<td>Magpie Special I</td>
<td>13.0</td>
<td>50,000</td>
</tr>
<tr>
<td>Magpie Premier</td>
<td>8.0</td>
<td>40,000</td>
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<td>2.0</td>
<td>30,000</td>
</tr>
<tr>
<td>Source: KT SEC Forms 20-F</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Notes:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Up to 15 percent discount for term contracts</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exchange rates: 1,300 won/$ 2001, 1,000 won/$ today; OECD purchasing power parity: 761 won/$ 2001, 771 won/$ 2004</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Today’s Subscribers Use a Mix of Broadband Technologies

<table>
<thead>
<tr>
<th>Provider</th>
<th>XDSL</th>
<th>Cable Modem</th>
<th>Apt LAN</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>KT</td>
<td>5,544,879</td>
<td>530,376</td>
<td>6,084,205</td>
<td></td>
</tr>
<tr>
<td>Hanaro Telecom</td>
<td>1,080,290</td>
<td>1,355,143</td>
<td>2,435,433</td>
<td></td>
</tr>
<tr>
<td>Threepoint</td>
<td></td>
<td>1,279,096</td>
<td>3,700</td>
<td>1,282,876</td>
</tr>
<tr>
<td>Other</td>
<td>130,456</td>
<td>1,446,203</td>
<td>259,400</td>
<td>1,846,119</td>
</tr>
<tr>
<td>Total</td>
<td>6,795,665</td>
<td>4,882,642</td>
<td>1,095,653</td>
<td>11,941,505</td>
</tr>
</tbody>
</table>

Note: There are about 15 million Korean households.
The Great Broadband Adoption Wave Occurred in 2000-01

It’s the Demand Side, Stupid

- Government encouragement
  - Promotion of e-commerce, e-government, e-education
  - Apartment building certification (broadband “star” ratings, which increase sale value)
- Hurry, hurry national culture
- Different expenditure patterns than US
  - Most families save for, then buy homes (shelter only 3.3% of household expenditures in 2004 vs. 6.7% for communications; in US its 19.3% vs. 2.3% (telecom))
  - Less than one car per household (no cars for teenagers!)
  - Less expensive, analog-only cable service
  - Unmarried adult children generally live with parents

It’s the Demand Side, Stupid, cont’d

- Measured dial-up rates made broadband cost-effective for many Internet users
- Competitive broadband providers used tenants as commission-based agents to sell broadband Internet access in their buildings
- Broadband online transactions and communities (“an essential tool for life”)
  - Over 22 million online banking users
  - Large number of Korean language web domains
  - Apartment building, extended family, web sites
  - Over 7 percent of world’s online game revenues (2003)
  - Peer-to-peer pornography issue

But All Is not Quiet on the Managed Competition Front in 2005

- In May, the KFTC fined KT $116 million for fixing voice and business Internet access prices with Hanaro, and allocating market share
  - “KT had taken such actions in accordance with the MIC’s supervision and encouragement designed to recover Hanaro from the financial crisis due to cumulative losses … restore Hanaro’s local tariffs … to the level of … July 2002… and adjust local telephony market share similar to that of advanced countries. However the FTC did not buy the argument.” KT Press Release
  - KT will appeal and seek better interagency coordination “so this kind of incident won’t happen again”

All Is not Quiet on the Managed Competition Front, cont’d

- But the KFTC permitted Hanaro to buy Thrunet, the next largest broadband access provider, out of bankruptcy even though:
  - “Hanarotelecom will stabilize the broadband market and put fair competition practices in place by completing Thrunet acquisition … and by doing so it, will also seek to promote profit growth of the overall telecommunications industry.” (Hanaro SEC Form 6-K)
  - “By strengthening partnerships with CATV [operators] the Company attempted to avoid excessive competition.” Hanaro 2004 Annual Report

All Is not Quiet on the Managed Competition Front, cont’d

- The CEO of KT told its 2005 annual meeting that flat-rate Internet access pricing must give way to metered pricing, since subscriber growth has matured, while traffic is growing (and concentrated among a subset of users)
- Hanarotelecom returned its Wireless Broadband license (“Wibro”) due to its need to conserve financial resources
- The MIC has threatened to fine SK Telecom and KT Freephone for failing to make promised investments in their 3G networks
What about the future?

- Key broadband platforms will survive (but operators may consolidate)
  - Copper DSL/fiber-fed VDSL/FTTH
  - Cable modems (DACOM/Powercomm entry?)
  - Wireless
- Business resistance to investment without added revenue may increase and may shape government action (e.g. roll-out of 50-100 Mbps “broadband convergence network”)
- Korea Broadcasting Commission and MBC in conflict over IPTV jurisdiction; KBC wants to control cable-telco competition
- Landline broadband platform operators will try further to “decommoditize” their offerings via applications (e.g. IPTV), as wireless operators are doing