ICT and Broadband in Korea

September 2011
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Sangmyung University
01 Digital Convergence
02 Information Communication Technology
03 Broadband Network
04 Mobile Network (3G/4G)
05 ICT and Broadband in Korea
06 Conclusion
01  Digital Convergence

02  Information Communication Technology

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05  ICT and Broadband in Korea

06  Conclusion
Digital Convergence

• Technology Paradigm

- Changing of Value Foundation
- Convergence
- Desiring for Healthy Life
- Convient Entertainment Mobility

Technology Improve

Highly Customer needs

Material Industry: SIC, Embedded S/W, FPD, 2nd Batter
Eletronic Industry: Home appliance, Home networking, Telemetics, HD DVD,

Broadcasting Industry: Video, Software, DMB Advanced Communication

Medical Industry: DNA, Biomedical DB

Service Industry: Financial, Logistics, Banking

Cultural Contents: Entertainment, Game, Digital Contents

Environment/Energy: Micro Cell & Fuel
Digital Convergence

• Information Technology Paradigm
Information Communication Technology
• **What is ICT?**
  
  – ICT stands for Information Communications Technology. ICT refers to any device or system that allows the storage, retrieval, manipulation, transmission and receipt of digital information.

  – Using digital technology, communications tools, and/or networks to access, manage, integrate, evaluate, and create information in order to function in a knowledge society.
• Global ICT
  - The last decades have seen uninterrupted growth in terms of telecommunication and ICT infrastructure development and service uptake
Global ICT

- While the number of estimated Internet users worldwide continues to grow rapidly, penetration levels in the developing world remain low.
• **ICT in Asia**
  
  – E-participation index: one tool that enables governments to dialogue with their citizens

<table>
<thead>
<tr>
<th>Country</th>
<th>E-Information</th>
<th>E-Consultation</th>
<th>E-Decision-Making</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>United States of America</td>
<td>93.33</td>
<td>100.00</td>
<td>75.00</td>
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<tr>
<td>Republic of Korea</td>
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<td>83.33</td>
<td>87.50</td>
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<td>France</td>
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<td>77.78</td>
<td>87.50</td>
<td>83.67</td>
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<tr>
<td>Australia</td>
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<td>100.00</td>
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<td>50.00</td>
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<td>Singapore</td>
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<td>18.75</td>
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<td>37.50</td>
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<td>38.89</td>
<td>31.25</td>
<td>38.78</td>
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</table>
**Information Communication Technology**

- **ICT Index**
  - **Infrastructure Index**

<table>
<thead>
<tr>
<th>Country</th>
<th>Internet Index</th>
<th>PC Index</th>
<th>Cellular Index</th>
<th>Main Telephone Lines Index</th>
<th>Broadband Index</th>
<th>Infrastructure Index</th>
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</thead>
<tbody>
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<td>Sri Lanka</td>
<td>0.023</td>
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<td>0.093</td>
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<td>0.581</td>
<td>0.922</td>
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</tbody>
</table>

- **Infrastructure Data**

<table>
<thead>
<tr>
<th>Country</th>
<th>Internet Per 100 Users</th>
<th>PC Per 100 Users</th>
<th>Cellular Subscribers Per 100 Users</th>
<th>Main Telephone Lines Per 100 Users</th>
<th>Broadband Per 100 Users</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sri Lanka</td>
<td>2.05</td>
<td>3.54</td>
<td>25.88</td>
<td>9.01</td>
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<tr>
<td>Republic of Korea</td>
<td>71.11</td>
<td>53.18</td>
<td>83.77</td>
<td>55.99</td>
<td>29.27</td>
</tr>
</tbody>
</table>
• **ICT Development Index**
  – The selected indicators should correspond to the following three subcomponents of the index

```
ICT Readiness (infrastructure, access) → ICT Use (intensity) → ICT Impact (outcomes)
```

```
ICT Development Index
```

```
ICT Capability (skills)
```
Information Communication Technology

- ICT enabled connected Governance

**ICT-enabled connected governance contributes to:**

**Internally**
- Avoidance of duplication
- Reducing transaction costs
- Simplifying bureaucratic procedures
- Greater efficiency
- Greater coordination and communication
- Enhanced transparency
- Information sharing between agencies
- Security of information management

**Externally**
- Faster service delivery
- Greater efficacy
- Increased flexibility of service use
- Innovation in service delivery
- Greater participation
- Greater citizen empowerment
- Citizen participation

*source: un e-government survey 2008*
The application of ICT in interactions between

- Government and Citizens
- Government and Businesses
- Government and Employees
- Government and Government

- Information available online
- Two-way communication
- Transaction handled online
- Process, system and organisational integration
- Entirely new services delivered cross-agency through a centralized enterprise portal
### Use of ICT in Governance

- **Constraints and Recommendations**

<table>
<thead>
<tr>
<th>Constraints</th>
<th>Recommendations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inadequate Access to ICT</td>
<td>Create one-stop government portal</td>
</tr>
<tr>
<td>Public Awareness about ICTs</td>
<td>Prioritization of Services</td>
</tr>
<tr>
<td>Lack of integrated approach</td>
<td>Improve ICT access by citizens</td>
</tr>
<tr>
<td>Lack of regulatory/legal framework</td>
<td>Emphasize Bangla interface for citizen services</td>
</tr>
<tr>
<td>Absence of processes and systems</td>
<td>Need training and leadership from the government</td>
</tr>
<tr>
<td></td>
<td>Awareness for the use of Open Source</td>
</tr>
<tr>
<td></td>
<td>Payment Gateway</td>
</tr>
</tbody>
</table>
03 Broadband Network
Broadband Network

- Fixed Broadband Internet

Fixed broadband Internet subscribers in Asia-Pacific, 2007

- Upper-middle & high-income economies
- Lower-middle-income economies
- Low-income economies
Broadband Network

• Network Connectivity

**Internet Connectivity vs. Mobile Connectivity**

Source: International Telecommunications Union, 2006

- Worldwide:
  - Internet: 17.4%
  - Mobile Phone: 32.4%

- Developing Countries:
  - Internet: 10.2%
  - Mobile Phone: 41.0%
• What is Broadband Network?
  – Broadband is a term referred to some technologies that offers high speed internet connectivity depending on framework and environment.
  – In general terms broadband referred to communication technology that can employ different channels of data or data streams by using any medium
• Broadband Network

- **PSTN migration**
  - 2005-2007: Field trial + commercialise
  - 2008-2009: Nationwide expansion
  - 2010+: BCN completion
  - Toll + local field trial
  - Toll switch migration finished
  - Local switch migration ongoing
  - Replace remaining local switches
  - BCN completion

- **IP premium network**
  - Converge KT VPN + WiBro NW
  - Nationwide deployment of IPv6
  - DWDM, OXC
  - GMPLS based optical transport network
  - Completely converged IP premium network

- **Access network**
  - APT
  - FTTC + VDSL
  - FTTH + Ethernet
  - FTTC + Ethernet
  - FTTH expanding
  - House
  - FTTC + VDSL
  - Near FTTH
  - Near FTTH
Broadband Network

• Why Broadband Network?
  – Users’ benefits
    • High speed enables user to the exchange of richer content;
    • Sharing of a connection with multiple users. ITU (2003)
  – The economy benefits
    • Broadband is a key driver of economic growth and the competitiveness of nations, OECD, (2008).
    • Broadband is a General Purpose Technology (GPT), OECD (2007) which is having a major impact on the way in which we live and work.
    • Broadband encourages innovation, stimulates growth in an economy, and attracts foreign investment.
Broadband Network

• **Why Broadband Network?**
  – The economy benefits
    • To improve productivity via
    • remote monitoring, logistics management
    • online procurement.
    • online shopping
    • electronic banking services.
  – **Returns on Investment**
    • Access to new technologies,
    • Explore new business opportunities,
    • Access customers and
    • Obtain information about market prices,
    • Raises producer incomes,
01 Digital Convergence
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Mobile and Wireless Communication Networks
Mobile and Wireless Communication Networks

- The grand vision of ubiquitous wireless and pervasive computing leads to a serious capacity problem.

- 2G cellular:
  - Available Bandwidth: ~ 5 Mhz
  - Max capacity: ~ 100 Kbps avg / 1 Mbps peak

- 3G Cellular:
  - Available Bandwidth: ~ 25 Mhz
  - Max capacity: ~ 1 Mbps avg / 10 Mbps peak

- Wireless LAN (802.11x, Hiperlan):
  - Available Bandwidth: ~ 100 Mhz
  - Max capacity: ~ 100 Mbps avg / 1 Gbps peak
Mobile Network

• Comparison of 3G and 4G
  – 3G:
    • Back compatible to 2G.
    • Circuit and packet switched networks.
    • Combination of existing & evolved equipment.
    • Data rate (up to 2Mbps).
  – 4G:
    • Extend 3G capacity.
    • Entirely packet switched networks.
    • All network elements are digital.
    • Higher bandwidth (up to 100Mbps).
Mobile Network

• Comparing Mobile Networks

<table>
<thead>
<tr>
<th></th>
<th>1XEV-DO</th>
<th>W-CDMA</th>
<th>HSDPA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bandwidth</td>
<td>2 x 1.25 MHz</td>
<td>2 x 5 MHz</td>
<td>2 x 5 MHz</td>
</tr>
<tr>
<td>Service</td>
<td>Data only</td>
<td>Voice and data</td>
<td>Voice and data</td>
</tr>
<tr>
<td>Maximum downlink speed</td>
<td>300 – 500kbps</td>
<td>384kbps</td>
<td>10Mbps</td>
</tr>
<tr>
<td>Maximum uplink speed</td>
<td>153.6kbps</td>
<td>2Mbps</td>
<td>2Mbps</td>
</tr>
</tbody>
</table>

Non-3GPP technologies
Mobile Network

• Mobile Networks: 4G

Radio-specific vertically integrated systems with complex interworking gateways

Today’s Wireless Systems

Radio independent modular system architecture for heterogeneous networks

The Future
• ICT Index in Korea

- ICT Development Index 2008 (ITU) (3rd)
- Online Service Index (UN) (1st)
- e-Government Readiness index 2010 (UN) (1st)
- Digital Access Index (4th)
- IT Industry Competitiveness Index ‘09 (16th)
**ICT and Broadband in Korea**

- **ICT Development**

```
IT Revolution  |  Area  | Changing
---           | ---    | ---
Digitalization | Government | - Increase Efficient by e-Gov’ National Service
Network       | Political   | - Participation in Social Issue
              | Economic    | - Internet Utilization of Political Party
              | Personal    | - Increase IT Industry rate
```

- Increase productivity and Competitiveness
- Whole changing of Consumption, Culture, Social life
• **ICT Strategies**
  – ‘Five Future Strategies for IT Korea’ as a blueprint that incorporates the government’s future visions and action plans for the ICT industry.

ICT and Broadband in Korea

• ICT Management Steps

Stage 1: Efficient process
Information within each function of a business is processed using ICT

Stage 2: Integrated process within business
Information is integrated into other functions of a business or into the entire organization

Stage 3: Integrated process between businesses
Information sharing between businesses is enabled in an electronic manner using information systems connected between businesses

Stage 4: Strategic management and new business model development
ICT is utilized in establishing business strategy, analysis and new business model development.

Source: Ministry of Knowledge Economy, National IT Industry Promotion Agency, ‘Survey on E-business and IT Usage in Korean Businesses’, December
• ICT Cast study: Education

- Clarification of conceptual confusion

ICT

- e-Learning
- u-Learning

Tablet PC

Smartphone

Famous actress and Minister of MOE

Students using Smartphone in classroom
• Broadband Project Implementation in Korea

Pilot Project Implementation

- Description
  - Joint implementation by service / manufacturing / solution companies
  - Developing and verifying initial BcN services
- Expected Benefits
  - Creating new BcN market demand
  - Preventing redundant investment and reduce risks in the initial stage

Construction of Quality Management Base

- Description
  - Establishing standards for quality, certification and evaluation
  - Building and operating quality management center
- Expected Benefits
  - Facilitating construction of quality guarantee network
  - Providing differentiated service for each user

Standard Model Development

- Description
  - Provide network architecture that is applicable to each stage of the BcN services
- Expected Benefits
  - Providing directions for network construction
  - Securing interoperability between communications networks

Construction of Open Service Platform

- Description
  - Developing various types of BcN services without regard to certain networks and establishing a test environment
- Expected Benefits
  - Expanding opportunities for new businesses and increasing people’s convenience in using communication services
International Comparison of Broadband

The speed with which Korea’s broadband market developed is remarkable. Broadband services were first launched in Korea in 1998. By 2000 its broadband penetration rate was the highest in the world, remaining...
• **Fixed Broadband market in Korea**
  
  - By June 2009, there were 15.9 million fixed broadband subscribers, equating to a household penetration rate of 94%. Currently, 122 players provide fixed broadband services, including eight fixed telecoms operators and 114 local operators and cable TV operators.

  ![Fixed broadband market evolution in Korea, 1999-2009](image)

  *Note: Penetration rates are calculated on the basis of total number of households*
ICT and Broadband in Korea

- Internet Usages of Subscribers in Korea (2008')

Leisure activities (e.g. music, game, e-book) 92.9
Getting information 89
Communicating (e-mail, messenger) 85.2
Internet shopping & selling 56.2
Education & learning 55.2
Online club / community 49.1
Managing homepage (incl. blog, minihompy) 43.1
Financial transaction 35.4
Electronic civil affairs 10.4
SW download/ upgrade 9.3
Job search 3.9
• Broadband Price in Korea

**Price per Megabyte per second in monthly broadband DSL subscriptions (KRW) 2000-09**

**SOURCE:** POINT TOPIC, OVUM
• Policy for Korea’s broadband success
  – Since 1996 the Korean Government has established a number of master plans for the development of an information society:

<table>
<thead>
<tr>
<th>Year</th>
<th>Initiative</th>
</tr>
</thead>
<tbody>
<tr>
<td>1996 – 2000</td>
<td>First National Informatisation Promotion Plan</td>
</tr>
<tr>
<td>1999 – 2002</td>
<td>Cyber Korea 21</td>
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<tr>
<td>2006 – 2015</td>
<td>U-Korea Master Plan</td>
</tr>
<tr>
<td>2006 – 2010</td>
<td>Phase 1</td>
</tr>
<tr>
<td>2011 – 2015</td>
<td>Phase 2</td>
</tr>
</tbody>
</table>
• Policy for Korea’s broadband success
  - The fund includes contributions from both the Government and the private sector, through spectrum licensing fees, revenue-based contributions from operators and earnings from the operation of the fund, including loans.

**Source of Informatisation Promotion funding, 1993 – 2002**

- **Government budget**: 39%
- **Private sector**: 15%
- **Miscellaneous profit and interest**: 46%
### ICT and Broadband in Korea

- **Infrastructure and application development**
  - Three key broadband infrastructure policies have been implemented since the mid 1990s:

<table>
<thead>
<tr>
<th>Year</th>
<th>Initiative</th>
<th>Speed</th>
<th>Technology</th>
</tr>
</thead>
<tbody>
<tr>
<td>2009 - 2013</td>
<td>Ultra Broadband Convergence Network</td>
<td>100 – 1Gbps</td>
<td>FTTH, WiBro, WCDMA, HSDPA</td>
</tr>
</tbody>
</table>
• **ICT Policy framework in Korea**
  
  – The Korean Government’s approach to promoting ICT in general and the broadband market in particular has been to formulate strategic development frameworks through the use consecutive ‘master plans’ which run over a number of years.
  
  – Through each framework, the Government has outlined broad policy objectives, and has laid out a number of supporting policies, including for example:
    
    • plans for public investment in broadband infrastructure and incentives for private investment;
    
    • initiatives to aggregate and expand demand for broadband services through for example e-Government services and the promotion of e-commerce and digital literacy;
    
    • policies to promote universal access to broadband; and various supporting industrial policies such as R&D promotion and incentives to vitalise venture capital markets.
ICT and Broadband in Korea

- The Government’s policy roles in the market development in Korea

- Introducing new services:
  - Deciding service methods
  - Frequency allocation
  - Provider approval
  - Market competition policy
  - Legal system arrangement

- Establishing infrastructure:
  - Strategy planning
  - Encouraging efficient investment
  - Introducing pilot projects
  - Securing safety and reliability

- Developing new growth engines:
  - Studying source technology
  - Private – Government partnerships
  - Protecting intellectual property rights

- Promoting the market:
  - International cooperation
  - National IR
• Evolution of Mobile Access in Korea

Figure 22: Evolution of mobile access technologies, 1990 - 2010

- **1990**: IS-95 A/B
  - 64 Kbps
- **2000**: IS-95 C 2000.10
  - 144 Kbps
- **2002**: CDMA1-x EVDO 2002
  - Up 300 – 500 kbit/s
  - Down 153 kbps
  - 32.3 Million total subscribers
- **2006**: WCDMA/HSDPA CDMA1-x EVDV 2006
  - 384 kbps for WCDMA
  - 10 Mbps for HSDPA
  - 40.1 Million total subscribers
- **2010**: WiBro
  - Convergence Services
  - Fixed + Mobile
  - TP8
  - WiBro+
  - HSDPA+
  - WLAN+
  - DMB
  - Home Networking
  - 47.0 Million total subscribers

Note: Mobile broadband subscribers are based on total mobile subscriber number
ICT and Broadband in Korea

**Mobile Networks in Korea**
- South Korean is already arranging an auction of 4G wireless licenses across wireless and broadband internet.
- **Successful Demo of Beyond-3G Wireless IP**
  - NEC Europe Ltd announced the successful completion of the three-year “Moby Dick Project”, aimed at developing a seamless converged mobile network architecture based on Internet Protocol version 6 (IPv6).
- **Life After 3G Wireless**
  - With 3G set for widespread launch in 2004 across Europe, operators are already thinking about the post 3G world and what comes next.
- **First Step Towards Full Range of WiMax / 4G Applications**
  - This successful implementation of the OFDM waveform is the first step in Military Technologies plan to implement the complete IEEE 802.16 family of wireless data applications.
Conclusion

• Digital Convergence Networks
• **Lessons from fixed broadband networks**
  
  – The importance of Government intervention programmes at several levels, including research, infrastructure, competition, industry structure, user awareness and ICT education.
  
  – The possibilities for sectoral growth to be based on long-term interventions focused predominantly on opportunity generation rather than direct public investment.
  
  – The importance of direct and infrastructure-based competition in the development process; the Korean Government has actively encouraged intense competition between broadband access providers.
Conclusion

• Lessons from mobile networks
  – The importance of the interaction between the public and private sectors; The rapid introduction and adoption of innovative technologies such as CDMA EV-DO, W-CDMA and HSDPA is evidence of the benefits to be gained from operators, equipment vendors and the Government working collectively to promote the mobile industry.

  – The benefits of flexible policy and regulatory frameworks, implemented by a coordinated body and capable meeting the needs of rapidly evolving high technology markets.

  – Even if a number of features of the market are not conducive to mobile broadband take-up, such as the presence of an established fixed network infrastructure providing reliable services at low cost, with the right mix of policies and the commitment of operators to sensible marketing strategies, significant advantages can be reaped.
Thank You

You have to leave the city of your comfort and go into the wilderness of your intuition.

What you’ll discover will be wonderful.

What you’ll discover is yourself.

- Alan Alda