Successful Innovation of the Korean Mobile Communications Industry and SK Telecom's Role

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Contents

- Overview of the Korean Telecommunications Industry
- Cases of Successful Innovation
- Global Collaboration for Innovation
- Implications & Summary
Growth of the Korean Telecommunications Industry

- With the advanced IT Infrastructure and telecommunications industry development, Korea has been leading the telecommunications market serving as the global test-bed for new technologies and services.


- Top 10 economies by number of mobile broadband subscribers (2005)

Source: ITU
The advancement of ICT services has facilitated growth of various sectors of the ICT value chain, helping contents, platform, devices, and handset industry develop.

In particular, the Korean handset manufacturers have grown to be global major players.

### Ranking Changes in the Global Handset Market

<table>
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<tr>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>Nokia</td>
<td>Nokia</td>
<td>Nokia</td>
</tr>
<tr>
<td>2</td>
<td>Motorola</td>
<td>Motorola</td>
<td>Motorola</td>
</tr>
<tr>
<td>3</td>
<td>Ericsson</td>
<td>Samsung Electronics</td>
<td>Samsung Electronics</td>
</tr>
<tr>
<td>4</td>
<td>Panasonic</td>
<td>Siemens</td>
<td>Sony Ericsson</td>
</tr>
<tr>
<td>5</td>
<td>Alcatel</td>
<td>Sony Ericsson</td>
<td>LG Electronics</td>
</tr>
<tr>
<td>6</td>
<td>NEC</td>
<td>LG Electronics</td>
<td>BenQ Mobile (Siemens)</td>
</tr>
<tr>
<td>7</td>
<td>Samsung Electronics</td>
<td>Alcatel</td>
<td>Panasonic</td>
</tr>
</tbody>
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### Global Handset Market Share (’07Q1)

- **Nokia**: 34%
- **Motorola**: 17.5%
- **Samsung**: 14%
- **Sony Ericsson**: 13.5%
- **LG**: 6.3%
- **Others**: 19.7%
- **BenQ Mobile (Siemens)**: 8.5%
The success of the Korean telecommunications industry was laid with the world’s first commercialization of CDMA in 1996 and the subsequent technological innovation.

**Development in Mobile Market**

- **1G (Analog)**
- **2G (Digital)**
- **3G (IMT2000)**
  - EV-DO
  - WCDMA
- **4G**
- **Enhanced 3G**
  - WiBro (Mobile WiMax)
  - HSDPA

<table>
<thead>
<tr>
<th>Year</th>
<th>Data Transmission Speed (kbps)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1980</td>
<td>14.4</td>
</tr>
<tr>
<td>1996~</td>
<td>144</td>
</tr>
<tr>
<td>2002~</td>
<td>384</td>
</tr>
<tr>
<td>2006~</td>
<td>50</td>
</tr>
<tr>
<td>2010~</td>
<td>100</td>
</tr>
</tbody>
</table>

- **AMPS**: Advanced Mobile Phone Service
- **GSM**: Global System for Mobile telecomm
- **TDMA**: Time Division Multiplex Access
- **EV-DO**: Evolution-Data Only
- **WiBro**: Wireless Broadband
- **HSDPA**: High Speed Downlink Packet Access

*SK Telecom has made a number of historical breakthroughs in the Korean telecommunications industry*

*SK Telecom has been recognized as one of the World’s most innovative companies - ‘Business Week’ (2006.4)*
Overview of the Korean Telecommunications Industry

Cases of Successful Innovation

Global Collaboration for Innovation

Implications & Summary
1) CDMA Technology Innovation: Backgrounds

- By the mid 1990s, Korea had no proprietary mobile communications technology and transition to digital technology was needed to meet the increasing demands.
- To avoid technology dependency, commercialization of CDMA had been decided.

In 1990s, Korea had no proprietary mobile technology and mobile market was dominated by foreign vendors.

Transition to digital technology was needed to meet the increasing demands for mobile communications service.


- Switching System
- Base station
- Transmitter

Handset Market Share (1991):

- Motorola (43%)
- Samsung (20%)
- Hyundai (9%)
- LG (9%)
- Others (19%)

Growth of mobile subscriber:

- CAGR: 88%
- 1986: 7
- 1987: 10
- 1988: 20
- 1989: 40
- 1990: 80
- 1991: 166

- From the late 1980's, demands for mobile communications began to increase sharply.
- In mid 1990s, the only commercialized digital mobile communications technology was TDMA in Europe.
1) CDMA Technology Innovation: Development Overview

- CDMA commercialization was a national R&D project, funded by the Korean government and jointly carried out by Korean handset manufacturers, telecoms service providers, and government-sponsored research institutes.

**CDMA Development Process**

**Phase I**
- '89: Initiation of research on digital cellular technology
- '91: Agreement on joint research program with QualComm
- '93: Designation of CDMA as the technology standard

**Phase II**
- '95: Development of commercialized CDMA system
- '96: Launch of the world's first commercialized CDMA service

**Changing paradigm of innovation from a follower to an innovation leader for the Korean ICT industry**

* Korea Mobile Telecom was the predecessor of SK Telecom. It was a public corporation owned by the Korean government.

** ETRI: Electronics and Telecommunications Research Institute
1) CDMA Technology Innovation: Key Factors for Success

- There are four major factors to the success of CDMA technology innovation.

**Key Factors for CDMA Success**

- The Korean Government timely introduced the cutting-edge CDMA technology and led a large-scale project.
- Development methodology and research management expertise accumulated through the previous ‘TDX project’.
- Korea Mobile Telecom had defined specifications of CDMA systems and also coordinated conflicts between development sub groups.
- Korean government adopted demand facilitation policy.
- Market competition was introduced through the newly licensed operators.

*1996: Commercialization of CDMA service
*1997: Introduction of newly licensed PCS operators
2) Wireless Internet: Overview of the Korean Wireless Internet Market

- With development of cutting-edge technology including CDMA 1x and CDMA 1x EV-DO, the Korean communications market moved away from voice-oriented service to lay the basis for wireless internet service.

- Korean wireless market leads global telecommunications market with highest contents revenue next to Japanese service providers.

- SK Telecom has led wireless internet technology advancement and nurtured wireless internet business to grow nearly 30% of total service revenue.

**Contents Revenue in Major Telecommunications Market (2006)**

<table>
<thead>
<tr>
<th>Country</th>
<th>USA</th>
<th>France</th>
<th>Germany</th>
<th>Italy</th>
<th>Spain</th>
<th>UK</th>
<th>Japan</th>
<th>Korea (rep.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contents</td>
<td>27.2%</td>
<td>29.6%</td>
<td>26.4%</td>
<td>26.6%</td>
<td>21.5%</td>
<td>30.5%</td>
<td>19.4%</td>
<td>9.0%</td>
</tr>
<tr>
<td>% of Total Revenue</td>
<td>3.3%</td>
<td>3.8%</td>
<td>5.5%</td>
<td>4.6%</td>
<td>3.5%</td>
<td>6.9%</td>
<td>9.0%</td>
<td>9.0%</td>
</tr>
</tbody>
</table>

**SK Telecom’s Sales Breakdown (2006)**

- Voice (69%)
- Wireless Internet (28.5%)
- VAS (2.5%)

% of Contents Revenue in Total Revenue

% of Contents Revenue in Data Revenue
2) Wireless Internet : Development of the Korean Wireless Internet Platform

- “WIPI”, the Korean wireless internet platform, has been developed as standardization of wireless internet platform

### Backgrounds for ‘WIPI’ development

1. Inefficiency due to different platforms by each operator
   - Wireless Internet Platforms by Operator(2002)
     - SK Telecom: GVM/SK-VM
     - KTF: MAP/BREW
     - LG Telecom: KVM

2. Royalty for QualComm’s ‘BREW’ platform would have caused an additional cost in the industry

In 2002, SK Telecom, KTF, LG Telecom, Samsung Electronics, LG Electronics, ETRI, and the Radio Research Laboratory successfully developed ‘WIPI’ - the Korean wireless internet platform

**Wireless Data Market Growth**

(KRW Bn)

- 2002: 1,086
- 2003: 1,736
- 2004: 2,424
- 2005: 3,284
- 2006: 3,685

5-yr CAGR: 35.7%

The standardized wireless internet platform has promoted mobile contents development, helping Korea to advance in global wireless internet market.
2) Wireless Internet : Global Expansion

- SK Telecom is making a strong impression on the global market through the exporting of its cutting-edge wireless Internet solution, helping its business partners (contents providers and solutions/platforms providers) advance into the overseas market.

- SK Telecom exports mobile service systems, terminal solutions and contents in the form of one package.

- This new business model contributes to forming cooperative relations between large telecom companies and IT venture companies, helping them advance into the international markets.
3) Convergence Services: Overview

- Based on network advancement, the Korean ICT industry is facing unparalleled changes that are dismantling the boundaries between different industries.
- SK Telecom has pioneered innovative convergence services, providing new values to consumers in mature telecommunications market in Korea.

**Key Drivers for ICT Convergence**

**Corporate Driver**
- New growth engines in matured market
- Market competition

**Regulation Driver**
- Regulation mitigation
- Strategic fostering of new industry

**Technology Driver**
- Wireless Broadband Network
- Device Convergence

**Customer Driver**
- Convenience enhancement
- Personalization needs

**SK Telecom’s Innovative Convergence Services**

- Entertainment
  - Melon
  - GXX
  - Cyworld

- Finance
  - Moneta
  - MBank

- Broadcasting
  - Real DMB
  - June

- Information
  - NATE Drive
  - i-Kids
3) Convergence Services: DMB (Digital Multimedia Broadcasting)

- SK Telecom launched Satellite DMB service via ‘TU Media’ in May 2005, creating a new concept in multimedia mobile broadcasting service that converges telecommunications and broadcasting.

Configuration of S-DMB Service

- Premium mobile broadcasting service by offering nationwide coverage and enhanced content.
- SK Telecom pioneered the development of DMB service with early investment since 2001.
- To promote the Korean IT industry, major system components such as broadcasting center and gap filler were all developed by Korean companies.

Several standards such as DVB-H and MediaFLO are under development.
- S-DMB is the world’s first commercialization of mobile broadcasting service, creating another case for global test-bed.

S-DMB
- Commercially launched in Korea and Japan

DVB-H
- Being tested in France, UK, and Finland

MediaFLO (QualComm)
- Being tested in US
3) Convergence Services: DMB (Digital Multimedia Broadcasting)

- S-DMB has been developed through collaboration with various interested parties including program providers, broadcasters, terminal vendors and government officials.
- SK Telecom has innovated new services based on its satellite DMB technology by developing mobile T-commerce and intelligent telematics service.

- Expands demands for broadcasting services from households to individuals.
- Contributes to the development of broadcasting contents industry.

### Contents
- Program Provider
- Broadcaster

### Platform
- Real DMB
- 15 Video Channels
- 20 Audio Channels

### Network/Satellite
- mbco + SK telecom

### Terminal/Equipment
- Handset vendor
- Gap Filler

### New Innovative DMB Service
1. Mobile T-Commerce
2. DMB Navigation (TPEG)
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SK Telecom has actively collaborated joint R&D projects with leading global players sharing advanced technology and innovative service know-how
TD-SCDMA Cooperation with China

- Specially, SK Telecom seeks a global cooperation with China for the development of next leading telecommunications technologies including TD-SCDMA

**Signed MOU for cooperation on development of the "TD-SCDMA Project"**

- First overseas telecom service provider to agree with Chinese government on development of TD-SCDMA technology
- TD-SCDMA Test-bed opened in Korea, followed by establishment of TD-SCDMA Service Development Center in Beijing

**SK Telecom hopes to contribute to accelerating the commercialization of TD-SCDMA service through systematic cooperation**

- TD-SCDMA network interoperability tests
- TD-SCDMA terminal platform tests
- Developing 3G multimedia and convergence services
- Resolving problems that may arise in the process of launching large-scale commercial services
- Establishing the Korea-TDIA (TD-SCDMA Industry Alliance) to nurture TD-SCDMA ecosystem

**• Strengthening the competitive edge of TD-SCDMA technology and promoting the 3G service in China**
Next Innovation through global collaboration between China and Korea

- SK Telecom seeks to establish a solid foundation for the two countries' cooperation on future generation telecommunications technologies, facilitating subsequent innovation.

- World-first’s implementation of TD-SCDMA / WCDMA Interconnection and TD-SCDMA global video telephony.

- SK Telecom has significant expertise in 3G technologies such as CDMA and WCDMA, and expects to share know-how and experience in TD-SCDMA development.

- SK Telecom is particularly keen to see TD-SCDMA technology established as a global standard.

- SK Telecom will continue collaboration to research and develop beyond 3G and 4G technologies.

- Building a cooperative model for joint China-Korea development in the telecommunications industry, for not only TD-SCDMA technology but also beyond 3G technology and 4G.
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The success of innovation for Korean telecommunications industry has been strongly rooted in the following factors:

- The ICT industry in East Asian region should promote joint collaboration to lead ICT market of next generation.

**Successfully Innovation**

- **Top management’s vision and organizational commitment for growth by innovation**
- **Effective cooperation and partnership with companies in other industries and government**
- **Innovation driven by consumer needs, not by fancy technology**
- **Perseverance to overcome difficulties in the process of technological innovation and new service development**

**Future Challenges**

- Promote global cooperation in the East Asian region to lead the ICT market of next generation
- Achieve standardization of the next ICT technology, including 4G, through joint R&D projects and test-beds in the East Asian region
Thank You