



WIRELESS COMMUNICATIONS

KOREA TELECOM'S WIMAX DEPLOYMENT IN KOREA: CAN THE EMPIRE STRIKE BACK?

Group Project

April 20, 2004

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PROJECT PROPOSAL

To access the business case of Wimax in Korea from the perspective of Korea Telecom (KT) and provide high-level strategic directions

Why is Wimax or “High-Speed Portable Internet” such a hot topic in Korea?

- **Wireless and fixed broadband markets are saturated**

However, major service providers show a subtle difference in their positions

- **Korea Telecom (KT), monopolist incumbent, aggressively pursuing the early deployment through the partnership with US solution providers**
- **SK Telecom (SKT), dominant MNO, not very proactive, claiming to wait until Korean solution providers are ready to compete**
- **Korean government (MIC) in agony as a chief commander of the industry**

The study aims to assess the business case of Wimax service in Korea from KT’s perspective and provide high-level strategic directions

- **Current technical issues and their implications to business**
- **Interests and standpoints of various industry participants**
- **Rationale of Wimax service and high-level strategic directions for KT**

AGENDA

Telecommunications Industry in Korea

Wimax Technologies

Governmental Policies & Issues

Industry Participants

Economics & Business Model of Wimax

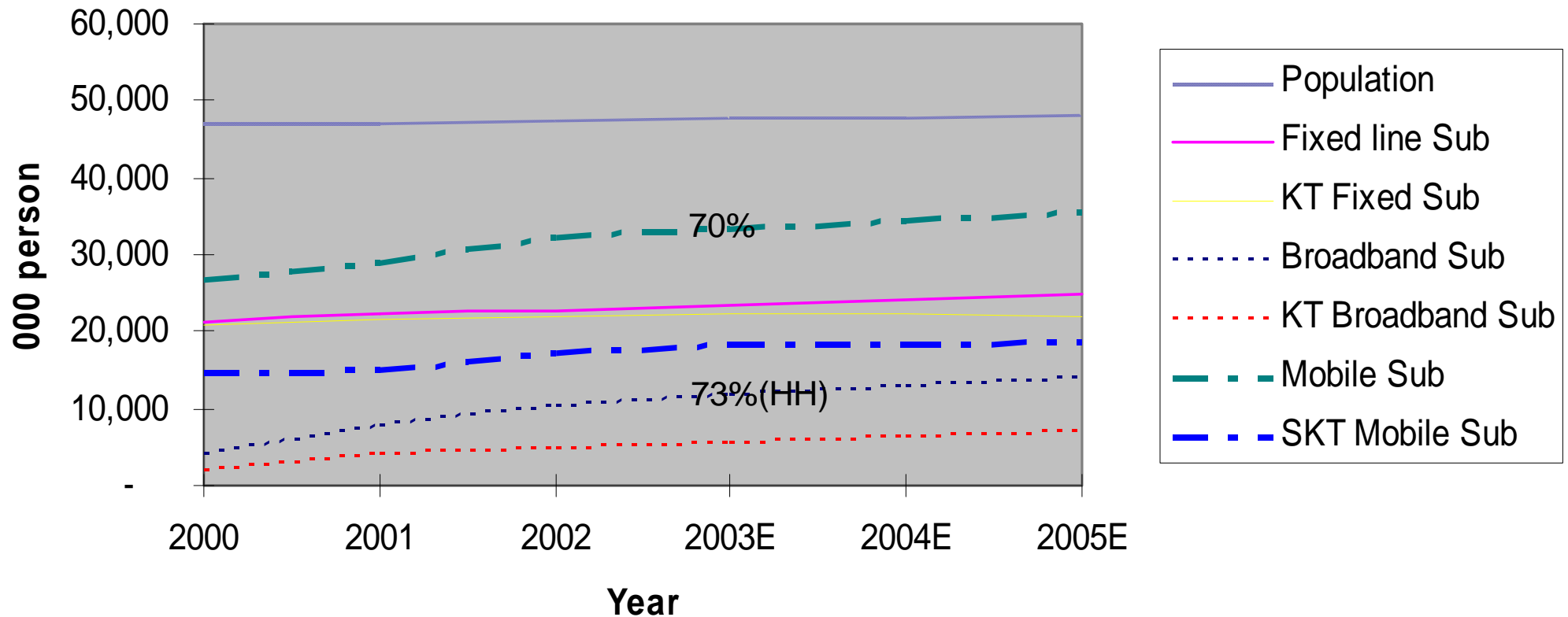
Strategic Directions for Korea Telecom

Wrap Up

TELECOMMUNICATIONS INDUSTRY IN KOREA

Korea's telecom industry has gone into saturation phase

Korea's Telecom Statistics



TELECOMMUNICATIONS INDUSTRY IN KOREA

Two giants dominating each wireless and fixed line service

SK Telecom (SKT)

Leading Cellular Operator

Market Share

- 54.4%(18,169K subscribers, '03)
- Huge gap from KTF 31.3%, LG 14.4%

Introducing Innovative technology and services for continuous growth

- 3G services, DMB, Moneta (Mobile Payment) etc

Issues faced

- Saturation phase of mobile (70% penetration), Number portability, slow growth of 3G data services

Korea Telecom (KT)

Dominant provider of local, long-distance, international fixed-line and broadband services.

Market Share

- Fixed line: 95.4%('03) - Dominant
- Broadband: 48.6% - No 1 player

**Providing advanced services like vDSL, WiFi, but eager for new growth engine
Cutting huge labor force to expand margin**

Issues faced

- Wireless threatened land line business, Saturation of broadband (more than 70% of house hold reached)

TELECOMMUNICATIONS INDUSTRY IN KOREA

Government as a chief commander of the industry

Big, active regulator

- **Different from FCC in US, MIC (Ministry of Information and Communication) plays a big and crucial role in driving telecommunication economy**
 - **CDMA promotion, highest broadband penetration etc**
- **National wide efforts to make Korea the best practice of IT and Telecommunication**

Protector of domestic business

- **Promoting domestic equipment and in house technology**
- **Giving favors minor players to secure the balanced, healthy business environments**
 - **Cap of MNO market share, control of price plans, number portability**

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TECHNOLOGY OVERVIEW – CONCEPT

BWA technology is preferred over WLAN and cellular

Possible Technology Standards : WLAN, Cellular and BWA

Requirements for PI: bandwidth, range, mobility and spectral efficiency.

WLAN has limited range and mobility.

2.5G has limited bandwidth and low spectral efficiency (high capex).

3G has reasonable bandwidth, range and mobility, but still low spectral efficiency.

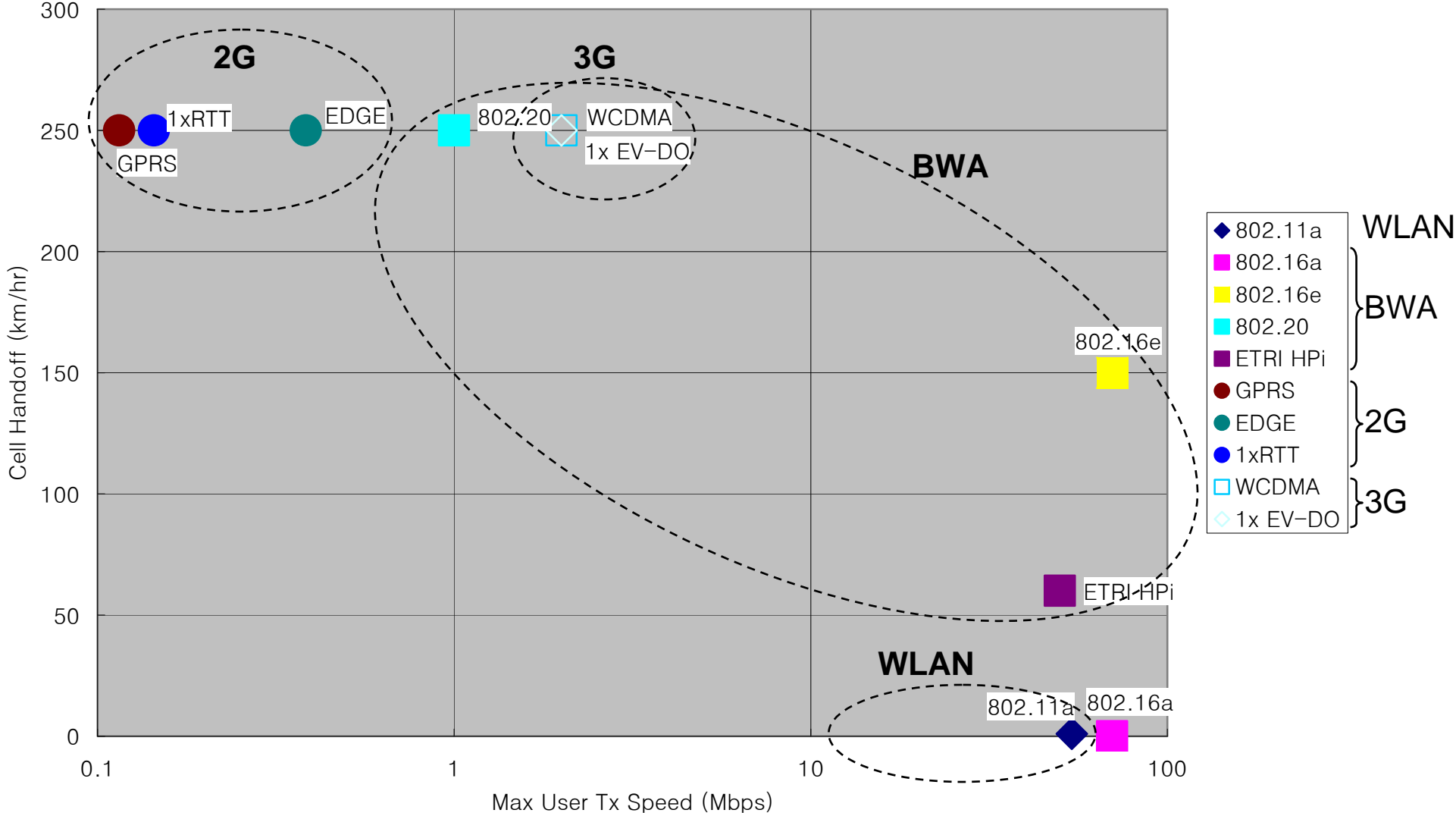
802.16e, 802.20 and ETRI Hpi meets requirement.

Recently, Hpi was adopted as standard.

Standards		Theoretical Max User Tx Speed	Max Range (km)	Max b/s/Hz (isolated cell)	Cell Handoff (km/hr)
WLAN	802.11a	54 Mbps	0.1	2.7	Ped.
BWA	802.16a	70 Mbps	50	5	N/A
	802.16e	70 Mbps	50	5	< 150
	802.20	>1 Mbps	6~7	5	< 250
	ETRI Hpi	50 Mbps	5	5	< 60
2.5G	GPRS	115 kbps	35	0.8	< 250
	EDGE	384 kbps	35	2.4	< 250
	1xRTT	144 kbps	55	0.33	< 250
3G	WCDMA	2 Mbps	28	0.21	< 250
	1x EV-DO	2 Mbps	55	0.6	< 250

TECHNOLOGY OVERVIEW – POSITIONING (WLAN/2G/3G/BWA)

Bandwidth and Mobility of different wireless technology



TECHNOLOGY OVERVIEW – STANDARDS AND SOLUTIONS

Preferred technology standard

- For efficient use of bandwidth, TDD is preferred over FDD.
- Mobility is required (> 50km/hr).
- Technology based on industry standard is preferred. Especially, IEEE 802.16e is preferred because much of HPi spec is incorporated.
- Availability of domestic manufacturers can be considered.

Technical Specification	I-Bust (ArrayComm)	Flash-OFDM (Flarion)	RipWave (Navini)	Broad@ir (Broadstorm)	HPi (ETRI)
RF Spectrum (GHz)	1.9, 2.3	0.7, 2.3	2.3, 2.5	0.7, 3.5	2.3
Multiple Access	TDMA/SDMA	Fash-Hopping OFDMA	SCDMA	OFDMA+ MC-CDMA	OFDM/TDMA
Duplex	TDD	FDD	TDD	TDD	TDD
Peak User Rate-DL (Mbps)	1.06	3.29	2.1	2.5	
Max Mobility (km/hr)	50	100	Pedestrian	100	60
Peak Efficiency (bit/s/Hz/Sector)	4	2.56	3 to 7	3.2	3.4
Standard Status	IEEE 802.20 (due 12/04)	IEEE 802.20 (due 12/04)	Proprietary CDMA	IEEE 802.16 (due 09/04)	HPi
Vendor	Kyocera, LGE, Mitsubishi, NECI	Dutch Phillips, Flextronics	Alcatel, Intel, Snmina, Cal Amplifier, Cryrux	LGE	Samsung

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KOREAN GOVERNMENT'S STANCE WITH WIMAX

MIC has already allocated 2.3GHz for the purpose of the Portable Internet service. However, it faced lots of issues and delayed the schedule to grant 2.3GHz mobile Internet service licenses

Major issues include:

- **Impact on 3G**
 - **Potential risk to WCDMA which cellular operators heavily capitalized on**
- **Homegrown vs. Foreign**
 - **Limited availability of local technology and equipment**
 - **Royalty payments: Lessons from Qualcomm case.**
- **New standard**
 - **Risk of becoming technologically marginalized if Korea jumps in too early without a global standard ready**
 - **Pressure from U.S on setting own standard.**
- **Fair competition**
 - **Ensuring fair competition, not partial judgment**

For those issues, MIC is unwilling to speed up implementation of Portable Internet and rather waits for homegrown 2.3GHz technology (HPi) ready.

Overall policy about 2.3GHz will be mapped out by June 2004 and licenses will be granted toward the end of 2004.

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LANDLINE OPERATORS' STANDPOINTS

KT and Hanaro are aggressively looking for a new market

KT is eager to deploy Portable Internet.

- **Looking for a new market due to stagnant subscriber growth.**
- **Already trialed most technology offerings for the portable Internet.**
- **KT formed industrial association for portable internet, PII.**
- **Wants to deploy PI in 2005.**

KT's advantages

- **Lower network building cost due to the extensive backbone network.**
- **Roaming with its WiFi hotspots can provide Internet access to both indoors and outdoors.**
- **Attract the existing users**

Hanaro Telecom, No. 2 fixed line broadband provider, is also aggressive for Portable Internet.

MNO'S AND VENDORS' STANDPOINTS

SK, leading MNO in Korea, is reserved about Wimax

SKT is reserved about Portable Internet

- **Since SKT is the dominant MNO in Korea, Portable Internet can cannibalize its services (currently CDMA 2000, 1x EVDO and satellite MDB, WCDMA in future).**
- **Compared to KT, SKT has higher cost structure because it doesn't own backhaul.**
- **Wants to deploy PI in 2006 or later.**
- **SKT has some advantages in that roaming with its 1x EV-DO network provides larger coverage than KT (SKT's opinion).**

Different opinions from vendors' side

- **Home grown technology advocates (Samsung, etc)**
 - **To reduce the royalties and increase the profit eventually.**
- **Supporters of early deployment with existing technology (LGE, etc)**
 - **To be competitive in global market by achieving the sizable domestic market in the early stage.**
- **Foreign firms like ArrayComm want all possible technologies be allowed.**

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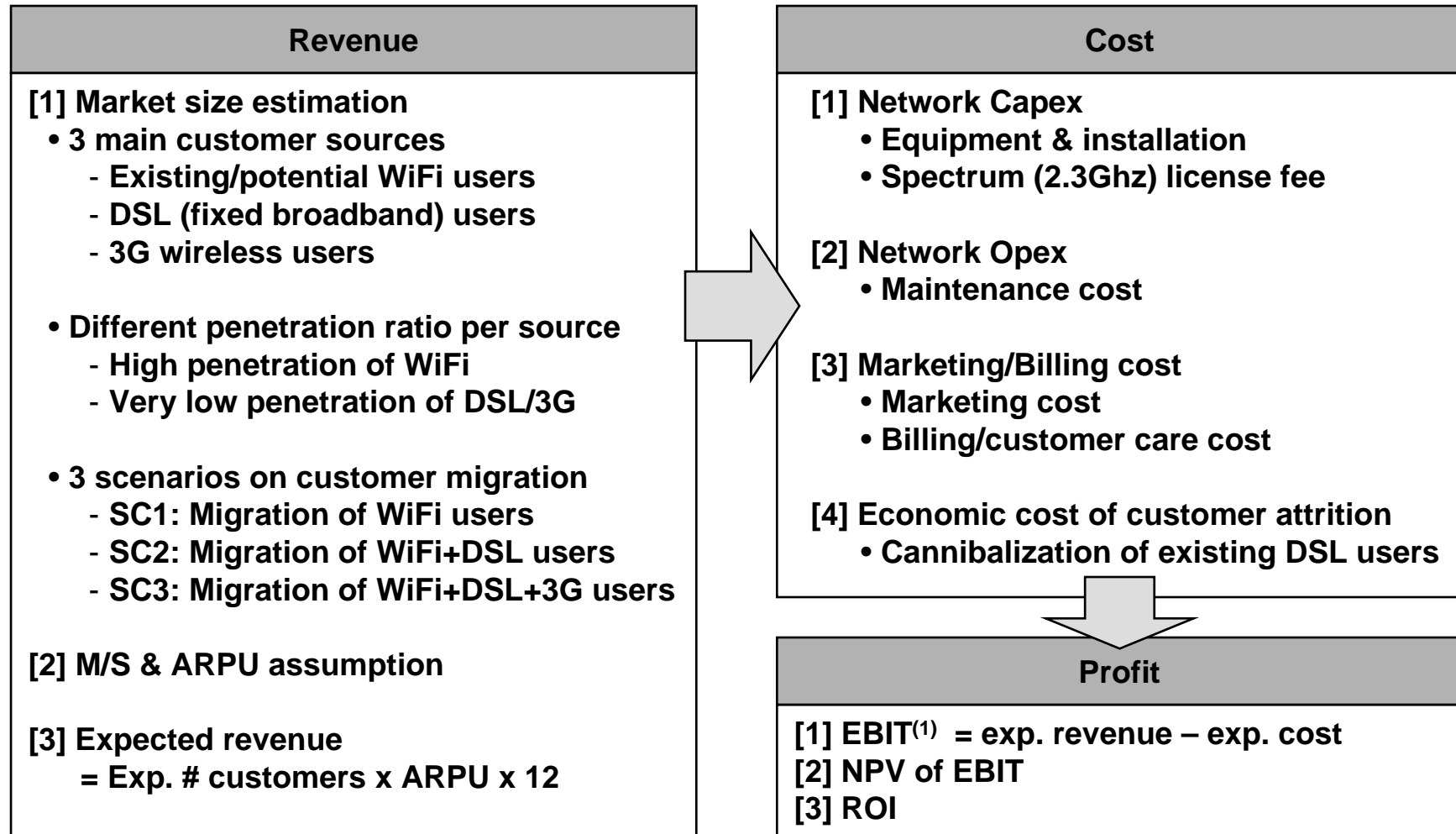
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QUICK-AND-DIRTY ANALYSIS OF BUSINESS CASE

Scenario-based analysis on expected profitability



(1) Earning before interests and tax

KEY ASSUMPTIONS

Revenue

[1] Growth of source market

(Thousand)

	2006	2007	2008	2009	2010	CAGR
WiFi subscribers	1.3	1.8	2.2	2.6	3.2	25%
DSL household	14.7	15.4	16.1	16.9	17.8	11%
3G users	35.8	36.4	36.9	37.4	37.9	2%

Source: press search, MIC, Goldman Sachs, team analysis

[2] Migration ratio from source market

	2006	2007	2008	2009	2010	Scenario
From WiFi	20%	40%	60%	80%	100%	1
From DSL	1%	2%	3%	4%	5%	1,2
From 3G	1%	2%	3%	4%	5%	1,2,3

Source: press search, team analysis

[3] Market share & ARPU

- KT Market share: 60%
- ARPU: \$20 (source: MIC, JP Morgan)

Cost & Profit

[1] Network Capex

- \$21,740K (source: JP Morgan)
- Depreciation: 5 years, straight line
- Spectrum license fee: \$1B (3G license fee)

[2] Network Opex

- Maintenance 30% of Capex per year

[3] Marketing & billing cost

- 10% of revenue each

[4] Cannibalization of DSL users

- DSL ARPU: \$20
- All Wimax customers migrating from DSL are former KT DSL subscribers

[6] NPV & ROI calculation

- 5 years horizon
- Discount rate: 8%

Some of key data are unavailable for the analysis

- WiFi market growth
- Network & license cost

5 YEAR EXPECTED EBIT, NPV, AND ROI

(USD thousand)

Scenario		Exp. revenue	Exp. cost ⁽¹⁾	Exp. EBIT	NPV	ROI	Adj. ROI
1 Migration of WiFi users	Y1	37,632	218,396	(180,764)	(296,132)	(33)%	(33)%
	Y2	71,501	225,170	(153,669)			
	Y3	147,517	240,373	(92,856)			
	Y4	246,565	260,183	(13,618)			
	Y5	379,331	286,736	92,595			
		<u>882,546</u>	<u>1,230,857</u>	<u>(348,311)</u>			
2 Migration of WiFi & DSL users	Y1	79,840	226,837	(146,998)	46,185	5%	(33)%
	Y2	136,899	238,249	(101,351)			
	Y3	261,537	263,177	(1,640)			
	Y4	413,854	293,640	120,214			
	Y5	604,878	331,845	273,033			
		<u>1,497,008</u>	<u>1,353,749</u>	<u>143,258</u>			
3 Migration of WiFi, DSL, & 3G users	Y1	131,453	237,160	(105,707)	433,895	40%	9%
	Y2	215,049	253,879	(38,830)			
	Y3	393,509	289,571	103,938			
	Y4	601,157	331,101	270,056			
	Y5	849,051	380,680	468,371			
		<u>2,190,219</u>	<u>1,492,392</u>	<u>697,827</u>			

(1) Loss of profit from DSL users cannibalization not considered; (2) DSL users cannibalization assumed
 Note: Wimax launch in mid 2005 assumed

IMPLICATIONS FROM ANALYSIS

Switching wireless users seems necessary to turn Wimax business profitable

Migration of WiFi user base alone is not likely to make the Wimax services breakeven

- **WiFi subscriber growth slower than expected**
 - **400K subscribers acquired for 2 years, despite ~20,000 hot spots**
 - **Missing the target number of users below 50%**
- **Demand for “on the street” WiFi access turned out small**
 - **Most of target customers can access wireless broadband at home and in office without subscribing to paid WiFi service**
- **Substitute products for WiFi widely available**
 - **2.5G/3G data service acceptable to many wireless users**
 - **Large install base of Internet cafes with broadband access**
 - **Low penetration of wireless-ready handheld devices, except notebook PCs**

Migration of DSL/cable users is not likely to have much impact on profits

- **DSL/cable already upgrading to vDSL, differentiating with higher bandwidth**
- **Cannibalization of existing DSL subscribers will offset the profits from Wimax**

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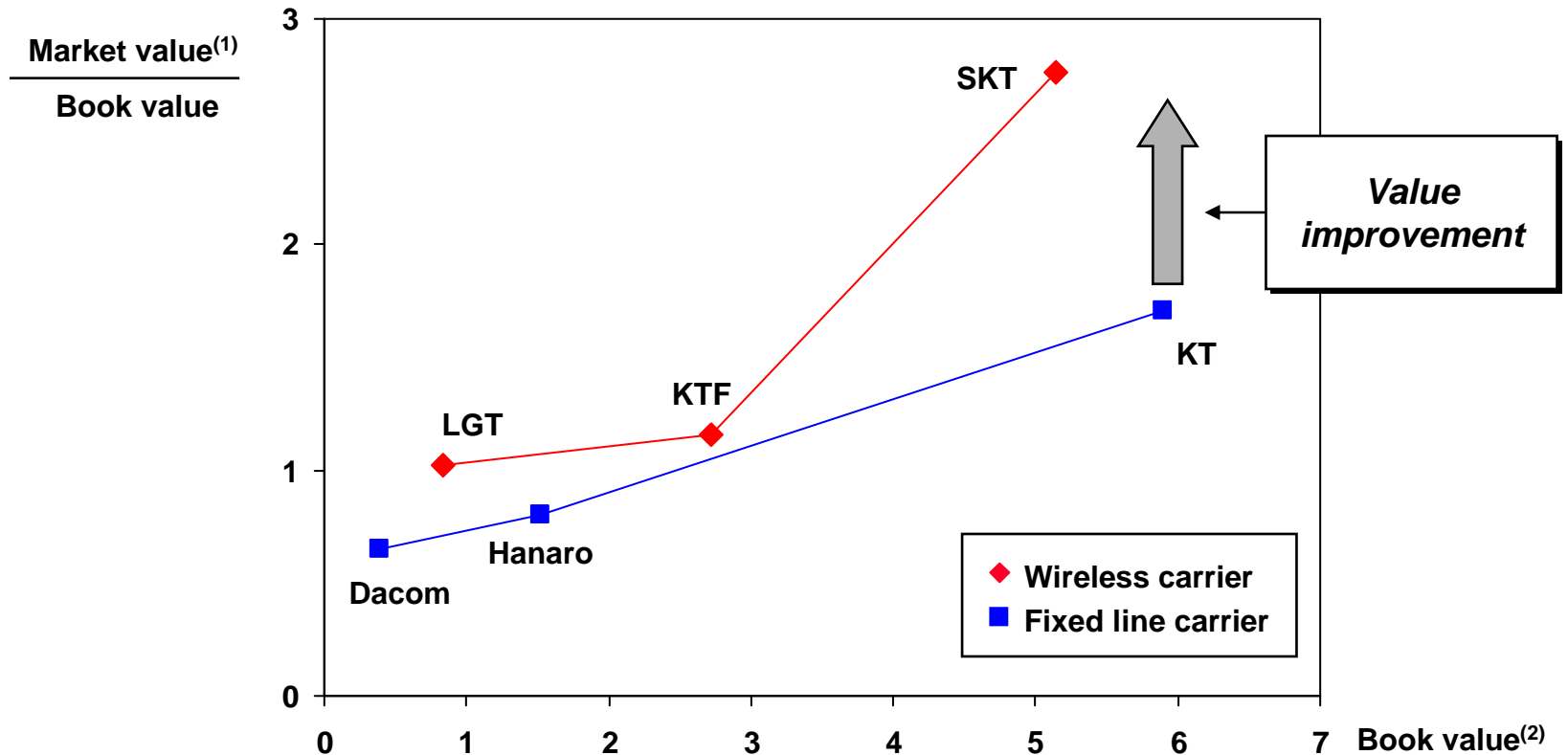
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WHAT DRIVES KT SO AGGRESSIVE ABOUT WIMAX?

KT needs a new growth engine in an era of wireless communications

Market Value and Book Value of Major Korean Carriers



(1) As of 2004/04/16

(2) Net asset (total asset – total liability), as of 2003.12.31

Source: IR data, Yahoo! Finance, Team Analysis

EVALUATION ON KT'S ENTRY INTO WIMAX BUSINESS

Strategic benefits and market uncertainty may offset unattractive business case

Reasons for Go

Show case for industry leadership

- Improved market trust and company value

First mover advantages in an emerging market

Presence in wireless domain

- Brand and customer base as a wireless service provider

Economy of scope

- Retention of existing customers by providing bundled services

No big risks involved

- No pre-made 3G investment
- No big investment (NW Capex ~\$20M)

Reasons for No-Go

Business case not attractive

- Growth potential of core market (WiFi users) uncertain
- Cannibalization of existing DSL customers will deteriorate profits

Conflicts with a wireless subsidiary

- KT owns 47% of KTF, 2nd largest wireless carrier
- KTF with a big investment in 3G

Relationship with Korean government

- No need to push a big boss for a token

RECOMMENDED STRATEGIC DIRECTIONS FOR KT

Criteria	Strategic Direction	Rationale
1 Target customers	<ul style="list-style-type: none"> • Potential WiFi users • 3G wireless users 	<ul style="list-style-type: none"> • Obvious upgrade needs • Necessary for sizable business
2 Value proposition	<ul style="list-style-type: none"> • Better mobility for WiFi users • Better price performance for 3G wireless users 	<ul style="list-style-type: none"> • Key advantage in mobility • No clear advantage in bandwidth/mobility
3 Competitive positioning	<ul style="list-style-type: none"> • Position as an “one stop shopping” <ul style="list-style-type: none"> - Economy of scope 	<ul style="list-style-type: none"> • Edge over SKT or Hanaro <ul style="list-style-type: none"> - Only KT can do it
4 Entry strategy	<ul style="list-style-type: none"> • Early launch 	<ul style="list-style-type: none"> • Compete with 3G service
5 Product strategy	<ul style="list-style-type: none"> • Bundling <ul style="list-style-type: none"> - Wimax with DLS or local/LD • VoIP 	<ul style="list-style-type: none"> • Advantage in economy of scope • Attract 3G wireless users
6 Pricing strategy	<ul style="list-style-type: none"> • Fixed flat rate, unlimited access 	<ul style="list-style-type: none"> • Attract 3G wireless users
7 Communication strategy	<ul style="list-style-type: none"> • “Mobile leader” for WiFi users • “Rational consumer” for 3G users • “Leading one-stop shopping” as a company brand image 	<ul style="list-style-type: none"> • Message aligned to <ul style="list-style-type: none"> • Value proposition for target customers • Competitive positioning

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SUMMARY

.For KT, Wimax service is regarded as a new growth engine that can help the empire regain the industry leadership

- **Voice market is facing saturation**
- **SKT, the wireless archrival, is taking initiative over KT**

However, regulatory environment is uncertain and the business case of Wimax service seems unattractive

- **Korean government (MIC) in agony, delaying the announcement of schedule**
- **National standards (HPI) may not be compatible with US partners' solutions**
- **Wimax service may not be profitable, unless more customers migrate, especially from 3G wireless subscribers**

.Nevertheless, KT will have more strategic benefits from entry into Wimax service

- **Regain of market confidence with a new source for growth**
- **First mover advantages in the emerging area**
- **Retention of existing customer base**

For the success in Wimax, KT should target 3G wireless users, as well as WiFi core users, and maximize the competitive advantage as a “one-stop shopping”

- **Promise of better price performance to 3G wireless users**
 - **VoIP and fixed flat rate aligned**
- **Bundling of Wimax with DSL or local/long-distance**

LIMITATIONS AND DISCUSSION POINTS

Refinement of the initial business case analysis

- **Growth potential of WiFi core customers**
- **Network implementation cost**

Possible disadvantage of high dependency upon foreign solution providers

- **Qualcomm in CDMA services**

Contingency plan in case of Korean government's decision to delay the deployment

Asymmetrical regulations on KT

- **Ban or limitation on bundling**