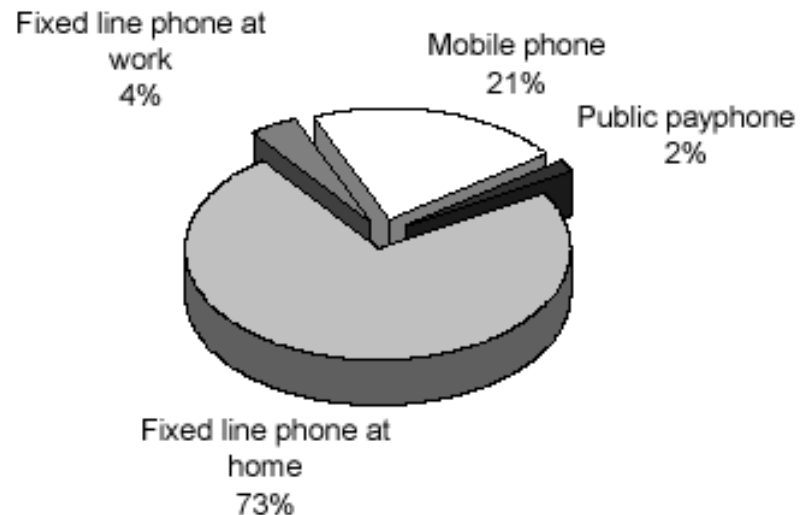


Interconnection of Fixed and Mobile Networks



Main method of making and receiving calls

Base: UK residential consumers aged 15+, May 03, (Base: 2116)

Contents

Access Price

Different Categories of Access Pricing

FM Interconnection Pricing Model

FM Interconnection Price in Korea

What is Access Price?

IXC's LEC access charge (before Devestiture):

per min usage based charge to compensate the service of originating and terminating long distance calls

Customer's fixed subscriber line charge to cover NTS cost and to correct above MC pricing (after Devestiture)

Competition in local, Long line and Wireless operators

Growing interconnection revenue market among networks in Korea: \cong \$3.0B in 2001

Different Categories of Access Pricing

1. One-way access pricing problem

To provide a complete service to end-users, rival firms or networks must purchase essential inputs from a monopoly firm or network but not vice versa

“Classic” access pricing problem

Access charged to a long line service provider from a local network

Local loop unbundling: ILEC leases the local loop at wholesale price to a CLEC

Pricing principles follow principles of regulation of natural monopoly

Different Categories of Access Pricing

2. Two-way access pricing problem

To provide a complete service to end-users, competing firms or networks must purchase essential inputs from a monopoly firm and, in addition, that monopoly firm must purchase inputs from the competing firms

Interconnection of competing mobile networks with one fixed network

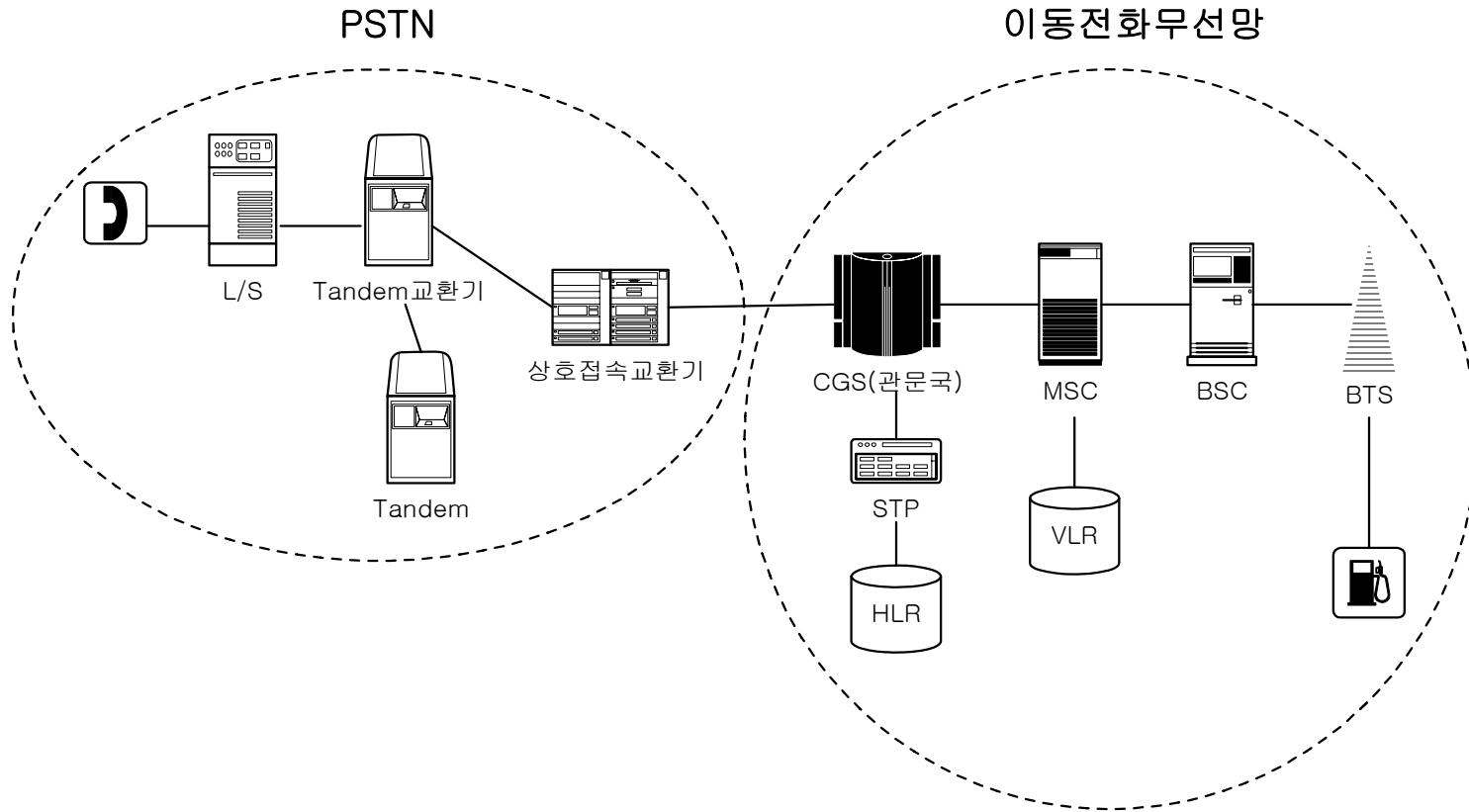
Different Categories of Access Pricing

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3. Two-way access pricing problem

To provide a complete service to end-users, both firms must purchase essential inputs from each other

Fixed and Mobile Network Interconnection



Interconnection Pricing Model (1)

Bill-and-Keep

A pricing scheme for the two-way interconnection of two networks under which the reciprocal call termination charge is zero - that is, each network agrees to terminate calls from the other network at no charge

Operators recover (Bill) their costs directly from their own consumers and no access charge paid (Keep) to other network

Economical and administratively simple method when the traffic is roughly balanced in the two directions

LECs in U.S., LECs in Canada

Interconnection Pricing Model (2)

Revenue Sharing

The practice of sharing the revenues resulting between operators in an alliance

Relatively simple to operate without cost information

Rebalances the returns of operators when retail prices are distorted at the beginning of mobile network

Typically, mobile operator takes 80% of the revenue from a call and the fixed operator takes 20%

Interconnection Pricing Model (3)

Fully Distributed Cost (FDC)

Common costs are allocated in proportion to the number of outputs of each service

Mobile operators computes pure access cost and FDC of access service from common cost

Interconnection charge/min/call

Interconnection Pricing Model (4)

Long Run Incremental Cost (LRIC)

Interconnection charges are not limited to the exchange of interconnection costs between current service providers or communications networks, but can also be a crucial factor determining new market entry and investment

The level of cost which would result from the construction of the most efficient communications network and adopts this cost as the access cost, TELRIC

Applied by regulators in UK, US and elsewhere since the Telecommunication Act of 1996

Interconnection Pricing Model (5)

FDC vs. LRIC

Model	FDC	LRIC
Cost based on	Accounting cost	Economic cost
Cost involved	Historic cost	Future cost
Common cost	Entire share	Relatively small share
Operators	Current network	Hypothetical network
Condition required	Transparent accounting	Most efficient tech. (forward-looking tech.) for reasonably foreseeable capacity requirement

Interconnection Price to Mobile Network in Korea (1)

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Interconnection price is based on the structure of telecom industry: monopoly \rightarrow competition

Interconnection price in Dec. 1992

KT vs. Korea Mobile Telecom (SKT)

LM call rate $<$ LM cost

KT suffers loss for every call, when price = cost

High initial investment cost and low initial traffic

LM interconnection price

LM call rate (150 won/min) - LL call rate (13.3 won/min)

Interconnection Price to Mobile Network in Korea (2)

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1st amendment of access price in Sept. 1995

Competition in long line and cellular networks

Jan. 1996: Dacom starts long line service

April 1996: Sinsegi starts cellular service

KT's mother network concept

LM interconnection price = LM call rate - Cost of fixed network

Interconnection Price to Mobile Network in Korea (3)

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2nd amendment of MTR in Dec. 1997

Competition in mobile networks and international lines

Oct. 1997: KTF, LGT and Hansol starts PCS service

Increase of mobile calls

End of 1997: Onse starts international line service

KT, Dacom (1991), Onse (1997)

LM interconnection price

Revenue sharing

Cellular: 70% in 1998, 65% in 1999

PCS: 75% in 1998, 70% in 1999

Bill and keep in MM

Interconnection Price to Mobile Network in Korea (4)

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3rd amendment of access price in Oct. 2000

Competition in local networks

April. 1999: Hanaro starts local service

Jan. 2005: Dacom starts local service

Competition in wireless service by 5 operators

Conversion from fixed to wireless network

Revenue in 1999: \$8.9B (f) vs. \$9.1B (w)

Subscribers in 1999: 21M (f) vs. 23M (w)

LM interconnection price

Cost based interconnection pricing: cost of the most efficient network

Cellular: 84.475 won/min in 1998, -7.76%/yr

PCS: average access price of the 3 PCS in 1999, -10.75%/yr

Cost of cellular in MM

Inteconnection Price to Mobile Network in Korea (5)

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4th amendment of MTR in March 2002

Competition in wireless service by 3 operators

LM interconnection price

Cost based interconnection pricing: cost of each network

SKT: $(63.6 \text{ won/min in 2001} + \text{estimated cost } 38.3 \text{ won/min})/2$
 $= 51/\text{min}$,

-10.3%/yr until 2006, 45.7 won/min in 2002

KTF: SKT * 1.17 due to characteristics of frequency band and traffic volume, 53.5 won/min in 2002

LGT: 65.7 won/min in 2001 -10.3%/yr, 58.9 won/min in 2002

Cost of each network in MM

Interconnection Price to Mobile Network in Korea (6)

		Mother Net (1997)	Revenue sharing (1998~1999)		Cost based (2000~2001)		Cost of each network (2002~2003)		LRIC (2004~)
LM access price won/min	SKT	146	98 108.1	99 100	00 68.9	01 63.6	02 45.7	03 41.0	Under development
	PCS	104	92.1	85.9	73.6	65.7	KTF 53.5	KTF 48.0	
LGT 59.0							LGT 52.9		
MM	$\frac{1}{2} * \text{LM}$	Bill and keep	SKT LM Access price	Same as LM					

Interconnection Price in Korea (7)

LRIC cost based interconnection pricing (2004 ~)

Depreciation cost of local loop is included in the fixed network cost during 2006-2010

3G network investment cost partly included in the mobile network cost

< '06년, '07년 사업자별 접속요율 >

(단위 : 원/분)

구	분	2005년	2006년	2007년
KT	시내	16.4869	16.5735	17.3277
	시외	18.1328	18.2074	18.9849
SKT		31.1853	33.1346	32.7757
KTF		46.7002	40.0648	39.6049
LGT		54.9759	47.0077	45.1317



Comparison of Intreconnection Price (1)

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LM call rate in Korea = 56% of EU average

MTR in Korea = 37% of EU average

Country	ML	LM	MTR
Denmark	18.24	17.31	15.16
Finland	24.70	22.33	19.22
France	23.96	24.46	19.37
Germany	48.14	20.81	16.14
Italy	34.75	30.00	22.39
Netherlands	38.44	25.83	24.27
Norway	29.61	13.82	10.30
Spain	18.05	28.60	22.76
Switzerland	30.20	28.15	24.66
UK	12.65	26.34	20.56
Average (A)	27.87	23.77	19.48
Korea (B)	15.43	13.34	7.13
B/A	55.4%	56.1%	36.6%

From Ovum, 요금 및 접속료는 PPP를 감안하여 조정한 수치(가중치 : 환율4, PPP6)

Comparison of Interconnection Price (2)

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EU: MTR = LM call rate * 82%

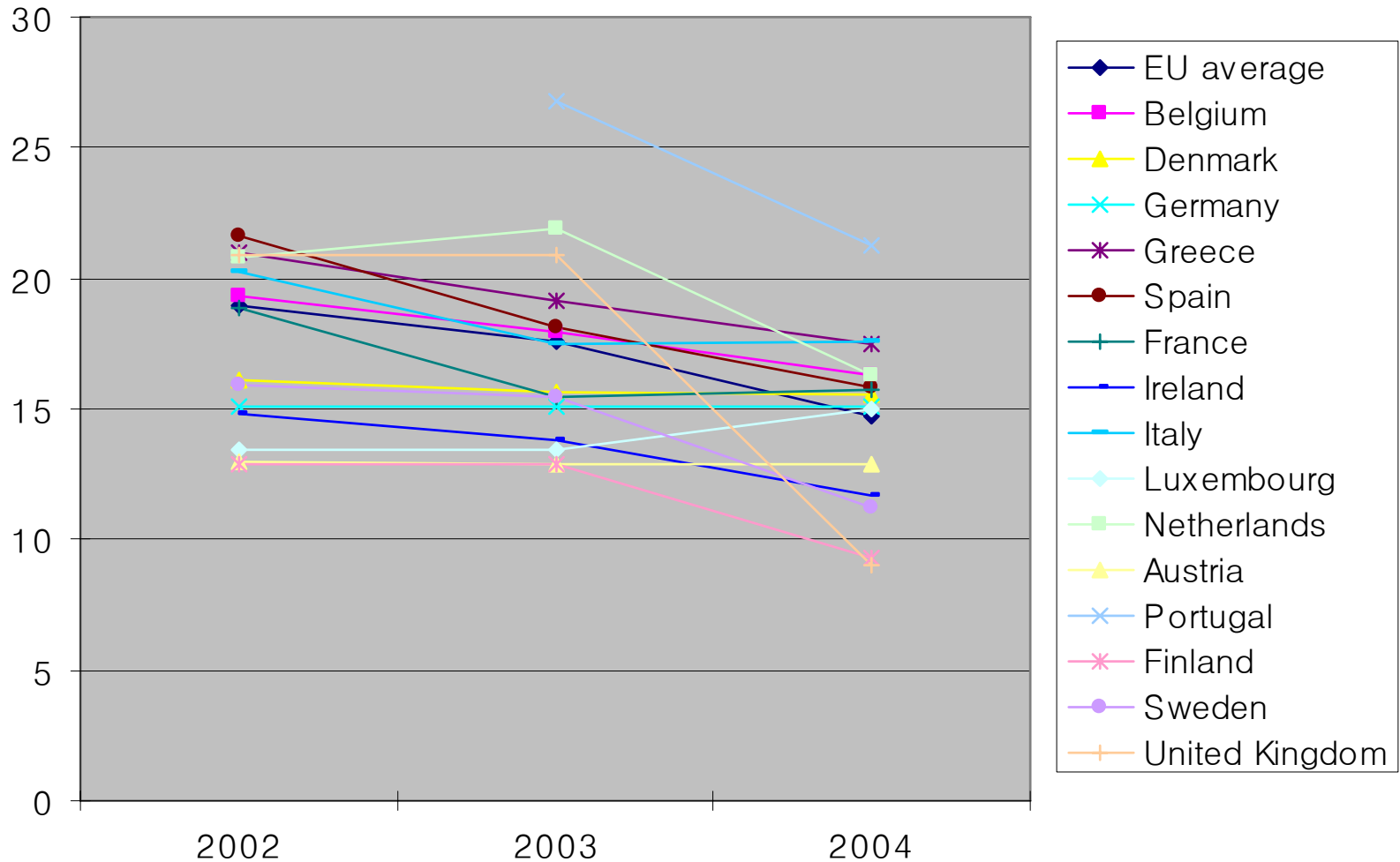
Korea: MTR = LM call rate * 53%

(Cents/min)

Country	LM	Fixed Opr' Revenue	MTR	Fixed:Mobile
Denmark	17.31	2.15	15.16	12:88
Finland	22.33	3.12	19.22	14:86
France	24.46	5.10	19.37	21:79
Germany	20.81	4.66	16.14	22:78
Italy	30.00	7.61	22.39	25:75
Netherlands	25.83	1.57	24.27	6:94
Norway	13.82	3.52	10.30	26:74
Spain	28.60	5.84	22.76	20:80
Switzerland	28.15	3.49	24.66	12:88
UK	26.34	5.78	20.56	22:78
Average (A)	23.77	4.28	19.48	18:82
Korea (B)	13.34	6.21	7.13	47:53

Effect of progressive regulation

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Summary

One-way access , Two-way access

Categories of Access Pricing

Bill-and-keep

Revenue sharing

FDC

LRIC

Reciprocal compensation between providers