

White paper

Determination of Mobile termination charges

February 2007

1	Introduction	1
2	Review of pricing methodologies adopted internationally	2
3	Overview of pricing methodologies	3
3.1	Introduction	3
3.2	Retail price based methodologies	3
3.3	Cost-based methodologies	4
4	Mobile termination charges in India	8
5	Impact of low mobile termination charges	9
5.1	Impact of low MTC on competition	9
5.2	Low MTC a barrier to increasing tele-density and investment	9

1 Introduction

Spectrum was engaged by the Cellular Operators Association of India (COAI) in order to understand the international trends in the determination for mobile termination charges and its relevance to the interconnection framework in India. This report represents the culmination of this work. Its principal findings are that the current price of mobile termination in India is below cost. Additionally, this document highlights the recent trends in mobile termination charges and discusses the detrimental impact of low mobile termination charges.

2 Review of pricing methodologies adopted internationally

In more developed markets many regulators have migrated to cost based methodologies for setting interconnection prices. This is primarily driven by recognition that interconnection rates have remained high and do not reflect underlying marginal costs. Therefore regulatory intervention to set a cost-oriented interconnection pricing is appropriate to protect consumer interests. There are two standard cost-based methodologies: Fully Allocated Costs and Long Run Incremental Costs (LRIC). The table below details the methodology adopted by regulators worldwide in determining interconnection charges.

Exhibit 1: Summary of interconnection rate setting methodologies

Country	Rate setting method	Cost elements considered
Austria	Failing commercial negotiation; cost-oriented based on LRAIC	Opex+ Depreciation +CoC
Bahrain	TRA determines interconnection charges for dominant operators based on the LRAIC of an efficient operator	Opex+ Depreciation +CoC
Denmark	Best practice/ benchmarking	(Opex+ Depreciation +Interest Charge)*1.12 or International Benchmark
Finland	Operators obliged to apply cost-based pricing	Opex+ Depreciation +CoC
France	Price cap; percentage decrease in 2005 and 2006; different percentage applies to one operator	Opex+ Depreciation +CoC
Greece	Cost-oriented; LRIC proposed "fair and reasonable price" obligation for smaller operators	Opex+ Depreciation +CoC
Germany	Cost-oriented based on LRIC; July 2005 different percentage rate cuts applied to different operators	International benchmark
Indonesia	Initial rates determined on a cost-oriented LRIC basis. Although the rates were later adjusted after strong lobbying from operators	Not disclosed
Ireland	Operators obliged to apply cost based pricing principles based on the costs of an efficient operator	Opex+ Depreciation +CoC
Italy	Cost-oriented based on LRIC; network cap (not applicable to all operators)	Opex+ Depreciation +CoC
Macau	Cost-oriented based on LRIC	
Netherlands	Cost-oriented based on a bottom-up FL-LRIC model	Opex+ Depreciation +CoC
Pakistan	The PTA intends to reach LRIC-based costs in a phased manner, therefore the initial step was to determine cost-based interconnection charge on FAC basis	Under determination
Portugal	Cost-oriented, best practice/ benchmarking, price cap	Opex+ Depreciation +CoC
South Korea	Cost-oriented interconnection rates based on LRIC. Non-dominant operators have been allowed to maintain higher rates to compensate for lower economies of scale and different spectrum allocations	Not disclosed
Sweden	Cost-oriented based on LRIC (bottom up/top down); smaller operators' "fair and reasonable price"	Opex+ Depreciation +CoC
Thailand	NTC has stated that the incumbent carriers must provide interconnection at a cost-based price. Regulator is in the process of finalising cost-based interconnect charges	NA.
UK	Regulator sets caps based on RPI minus x%; FL-LRIC basis	Cost based price cap

Source: EU, Press, Regulatory websites

3 Overview of pricing methodologies

3.1 Introduction

Examination of the more liberalised and developed telecommunications markets of the world reveals several key trends with respect to the development of regulatory frameworks over time. First, there is increasing recognition that incumbents can and do try to constrain levels of competition in liberalised markets. This has led to more than 100 countries establishing some form of interconnection regulatory framework. Secondly, the minimum level of interconnection regulation typically involves licence requirements that mandate the provision of access to and interconnection with the licensee's network on reasonable, cost-oriented and non-discriminatory terms. In an increasing number of countries, regulators have supplemented licence requirements with generally applicable rules and regulations on interconnection through industry codes of practice, orders and/or regulatory directives. Thirdly, however, with regard to non-dominant operators, the majority of countries still favour a policy of commercial negotiation with recourse to the regulator in the event of non-agreement. Finally, greater emphasis is being placed on transparency. Operators, especially those with significant market power, are increasingly required to make public their interconnection agreements and charges, which are usually determined directly by, or require approval from, the regulator.

The following section discusses both retail and cost based pricing methodologies.

3.2 Retail price based methodologies

There are two general retail price based pricing approaches – revenue sharing and retail minus.

3.2.1 Revenue sharing

This is the simplest form of interconnection regime which involves an agreement to share the revenue between the originator of the call and any other network that the call is routed over according to predefined proportions. For example, between 1998 and 1999 when the revenue sharing model was applied in South Korea, mobile operators received 65%-70% of the retail price of fixed-to-mobile calls.

The main advantage of this approach is its ease of implementation. However, there is a high probability that interconnection charges will not reflect underlying interconnection costs, especially if the interconnecting operator's tariffs are not cost-based.

The revenue sharing model tends to be used in situations where interconnection charges are negotiated between the involved parties. It also tends to be used in countries which have just begun developing their telecommunication infrastructure. Once the telecommunication industry becomes more advanced, the regulators tend to move to a cost-based methodology to promote more competition. For example, the Philippines and Thailand recently moved from employing the revenue sharing approach to cost-based methodologies and Indonesia is in the process of doing the same.

3.2.2 Retail minus

Retail minus is an alternative relatively straightforward methodology. Under such a pricing regime, the interconnection charge is determined on the basis of retail tariffs minus all avoidable costs not required for interconnection, and is intended to approximate wholesale costs of interconnection. However, a recent OECD report notes that only a minority of interconnection services still adopt this approach.

The retail minus approach can also be relatively easily implemented and has the advantage of linking interconnection, in theory at least, to the operator's network costs, i.e., it excludes an operator's retail and

marketing costs. It can also be regarded as a light handed approach to regulation appropriate in immature mobile markets. More recently, however, retail minus pricing has come to be regarded as a methodology that serves to protect the incumbent operator in that it makes no effort to determine an appropriate profit margin or to reflect the true underlying cost of providing interconnection.

A number of countries have used this methodology as a stepping stone to implement cost-based methodologies. In most developed mobile markets which are close to maturity, the light-handed incentive-based arguments for the retail minus approach no longer apply.

3.3 Cost-based methodologies

In more developed markets many regulators have migrated to cost based methodologies for setting interconnection prices. This is primarily driven by recognition that interconnection rates have remained high and do not reflect underlying marginal costs. Therefore regulatory intervention to set a cost-oriented interconnection pricing is appropriate to protect consumer interests. There are two standard cost-based methodologies: Fully Allocated Costs (FAC) and Long Run Incremental Costs (LRIC).

3.3.1 Fully Allocated Costs

Fully Allocated Costs (FAC), sometimes also known as Historical Fully Distributed Costs (FDC), involves the allocation of all historical costs incurred to date between individual services based on a set of criteria such as relative capacity utilisation, minutes of use or proportionate revenues generated.

FAC has tended to be used by regulators in early stages of market liberalisation as it is a relatively simple methodology which uses readily available data and is straightforward to apply. Furthermore, FAC tends to be favoured by incumbents as it typically leads to significantly higher termination charges compared to other cost based methodologies. However, interconnection charges based on historical, fully distributed costs tend to reinforce inefficiencies in the incumbent's network and operations, and is prone to manipulation by the incumbent operator. Furthermore, FAC is backward-looking and will tend to ignore the impact of new technologies that reduce costs going forward.

3.3.2 Long Run Incremental Costs

The Long Run Incremental Costs (LRIC) approach attempts to achieve increased efficiency associated with the economic principle of marginal-cost pricing and is increasingly regarded as international best practice. Specifically, it involves determining the incremental costs of providing an additional unit of a service or product over current levels over a defined future period of time. Thus, it considers costs that are both forward-looking and incremental, which should generate credible charges that reflect real economic costs of interconnection provision, promote efficient investment and avoid inclusion of historical inefficiencies. **However, LRIC is difficult and complex to implement and is based on estimates of the future which can be a source of contention. Therefore, internationally regulators typically limit the duration of the forward looking period to three years.**

3.3.3 Summary of cost-based pricing methodologies

The key characteristics of the two cost-based methodologies for setting interconnection rates are set out below.

Exhibit 2: The key characteristics of the charging methodologies

Methodology	Description	Comments
Revenue sharing	<ul style="list-style-type: none"> Interconnecting operators pay access provider a share of revenues from services requiring interconnection 	<ul style="list-style-type: none"> Extremely simple – requires no cost analysis Often the result in commercial negotiations Embeds behaviour and inefficiencies of incumbent
Retail minus	<ul style="list-style-type: none"> Interconnecting operators pay access provider a fee based on the retail price of that unit minus all avoidable costs not required for interconnection 	<ul style="list-style-type: none"> Relatively simple for regulator to implement Based on price information with only minimal cost analysis undertaken Does not attempt to control incumbent's margins with the result that methodology can sometimes significantly favour the incumbent However, in some situations, for example, extremely competitive markets, it is possible for the market retail price to be below cost and this may confuse the methodology Debate over which retail price to use
Fully Allocated Costs	<ul style="list-style-type: none"> Interconnection charges based on allocation of historical cost of access provider between services and charged on a per unit basis 	<ul style="list-style-type: none"> Common practice – often viewed as a transition stage between retail based pricing methodologies and LRIC Will build on historical performance, behaviour or inefficiencies of incumbent Does not take into account the impact of future technologies on increasing efficiency Often significant debate over the allocation of costs between services, especially when costs are considered common or joint
Long Run Incremental Costs	<ul style="list-style-type: none"> Interconnection charges based on the additional future costs incurred in the provision of interconnection to another operator Versions include TSLRIC, TELRIC and LRAIC 	<ul style="list-style-type: none"> Increasingly accepted as best practice Closest methodology available to achieve marginal pricing which theoretically results in maximum efficiency for both consumers and producers Incorporates potential impact of new future technologies Requires significant detailed analysis to be undertaken by the regulator

Source: World Bank; Spectrum analysis

3.3.4 Trend towards cost-based, in particular LRIC, methodologies

Cost-based pricing methodologies are argued to be more economically efficient because they more accurately reflect the true underlying cost of providing interconnection services compared to retail price based methodologies for reasons discussed above. Thus, they are more conducive to promoting market entry and competition. Consequently, most countries have moved or are moving towards cost-based determination of interconnection charges. This has been reinforced by the recommendation to adopt such approaches by the WTO, EC and IRG.

As regulators have become more sophisticated in their attempts to introduce competition into telecoms markets, there has been a general trend away from the FAC approach towards LRIC. The FAC approach is considered more prohibitive to market entry since the new entrant may be penalised by prior

actions of the incumbent, which may have been either inefficient or imprudent. Further, the LRIC approach most closely replicates the outcome in a competitive market through the application of marginal-cost pricing. Hence, the LRIC methodology generally results in the lowest interconnection charges compared to the other methods, which is another reason for its choice.

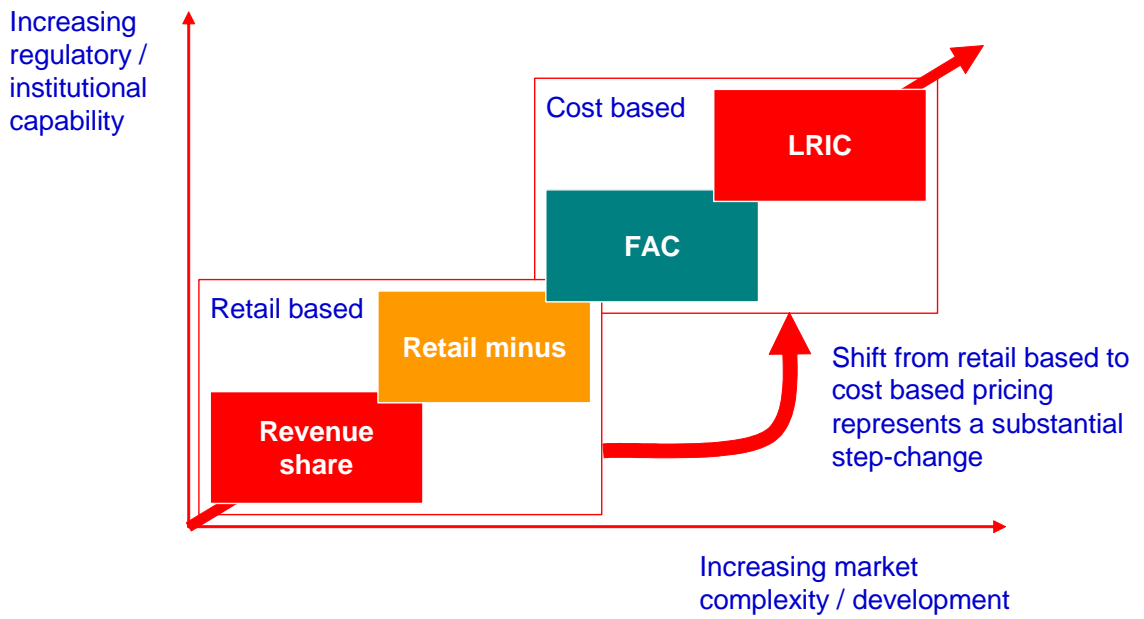
The US Federal Communications Commission (FCC) in the US, the Australian Competition and Consumer Commission (ACCC) in Australia, the EC in Europe, the UK Competition Commission (CC) in the UK, the EC and the IRG have all concluded that LRIC is the most appropriate method to employ. In Europe, the EC Directives 2002/19/EC and 1997/33/EC on access and interconnection require national regulatory authorities to impose ex-ante regulations on mobile termination. The ex-ante regulations include the obligation to provide interconnection services, publish a reference interconnection offer, charge cost-oriented interconnection fees and adopt non-discriminatory practices.

In addition, the EC specified that cost-oriented prices should be:

- based on forward looking Long Run Average Incremental Costs (LRAIC);
- consistent with concepts of current cost accounting and the costs of an efficient operator;
- inclusive of a mark-up to cover a portion of the joint and common costs of an efficient operator; and
- the same regardless of the originating network.

As a result, the LRIC model is becoming the dominant model for the setting of fixed-to-mobile interconnection charges across Europe. In addition to 10 of the countries considered in this report, Austria, Greece, Hungary, Italy, Lithuania, Netherlands, and Sweden all use some form of LRIC as the price-setting method for interconnection rates. More generally, regulators in more developed or liberalised environments have opted for LRIC-based methodologies to facilitate competition and to prevent incumbents from using their market power to impede market liberalisation. In fact, LRIC can be seen as the conclusion of the logical progression from revenue sharing to retail minus to FAC to LRIC which is associated with increasing market development and regulatory expertise over time. Exhibit 3 overleaf presents this general trend.

Exhibit 3: Development of charging methodologies over time



4 Mobile termination charges in India

The initial analysis from comparison against international markets suggests that mobile termination charges in India appear to be very low, potentially suggesting that mobile operators in India may not be adequately compensated for the costs of providing interconnection services. The table below lists the mobile termination charges in non-Asian countries.

Exhibit 4: Average termination charges for selected non-Asian countries

Country	Average termination charges per minute (US\$ cpm)	
	Fixed	Mobile
Belgium	1.04	16.59
Brazil	3.71	19.81
Chile	1.55	20.72
Denmark	0.49	13.28
Finland	1.97	8.40
France	1.09	11.40
Germany	0.80	13.03
Ireland	0.71	11.37
Italy	0.82	15.18
Mexico	1.21	17.34
Netherlands	1.12	12.76
Norway	1.00	9.75
Spain	0.91	15.09
Sweden	0.76	8.14
Switzerland	0.86	16.15
UK	0.44	10.07
Average (excluding India)	1.27	14.9
India	0.70	0.70

Source: Spectrum Strategy regulatory reviews, regulatory websites, Ovum, March 2006

According to the above exhibit, the fixed line termination charges are in the range of only 4-23% of the mobile termination charges which, in most cases, have been set using principles of Cost Oriented Per Minute Tariff/Revenue Sharing / Commercial Negotiation. Compared to this, in India, the fixed termination charges are equal to (100% of) the mobile termination charges.

The exhibit below compares the mobile termination charges in selected Asian countries. Japan has the highest mobile termination rate of 11 US cents per minute.

Exhibit 5: Mobile termination charges in selected Asian countries, US\$ cpm

Country	Average mobile termination charges per minute (US\$ cpm)
Bahrain	3.72
Japan	11
Indonesia	3.9
Macau	1
Malaysia	2.1
Pakistan	2.09
India	0.70

Note: (1) Data for Indonesia is for local Fixed to mobile termination

Source: Spectrum Strategy regulatory reviews, regulatory websites, Ovum, March 2006

5 Impact of low mobile termination charges

5.1 Impact of low MTC on competition

Interconnection between networks is required to enable 'any-to-any' calling, the basics of providing a national telephony service. For new entrants in particular, a significant proportion of calls is delivered 'off network' and, therefore, requires interconnection with another operator, often the incumbent.

Given the dependency of new entrants on their ability to interconnect with other operators, interconnection rates have a major impact on their financial viability and therefore, on competition levels. Both excessive and low interconnection charges deter entry market entry and hinder competition.

With low interconnection charges set below cost, the new entrants will not be able to recover their investments and compete effectively in the market.

Thus in principle, to promote effective competition through market entry and to avoid excessive returns to the incumbent, interconnection charges should be set as close as possible to the costs associated with the provision of the interconnection service. This will most closely resemble an economically efficient perfectly competitive market in which prices are set equal to marginal costs.

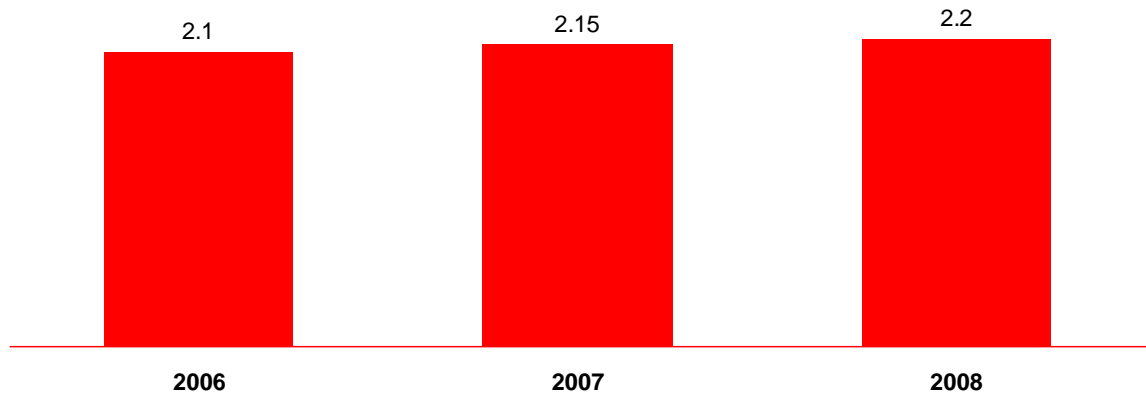
5.2 Low MTC a barrier to increasing tele-density and investment

Although increased competition and dramatic decline in tariffs led to explosive growth in the mobile sector, the mobile penetration in India is low by international standards. The Government of India has envisaged a target of achieving 200 million mobile subscribers by end 2007 and 500m by end 2010. As the subscriber growth in urban regions saturates, the operators will increase their footprint and provide greater coverage particularly in the sub-urban and rural areas in order to reach the target set by the government. With mobile termination charges in India below cost, mobile operators in India will not be adequately compensated for the costs of providing interconnection services, especially as the operators move to the less affluent areas of India. With rural operations not likely to be financially viable at least for a few years, coverage expansion targets may not be met. The following section discusses the developments with regards to mobile termination charges in two key emerging markets.

5.2.1 Malaysia – interconnection regime

The Malaysian Communications and Multimedia Commission ("MCMC"), is using termination charges as a means to compensate the operators for rolling out mobile services in rural areas. The MCMC is of the opinion that rural roll-out costs are mandated by factors external to operators, and hence should be regarded as an unavoidable cost, and should be included in the LRIC cost. Therefore, the MCMC has determined termination charges which reflect the increases in cost if rural roll-out costs are recovered in part from interconnection. The table below shows the local mobile termination charges in Malaysia

Exhibit 6: Mobile termination charges in Malaysia, US\$ cpm

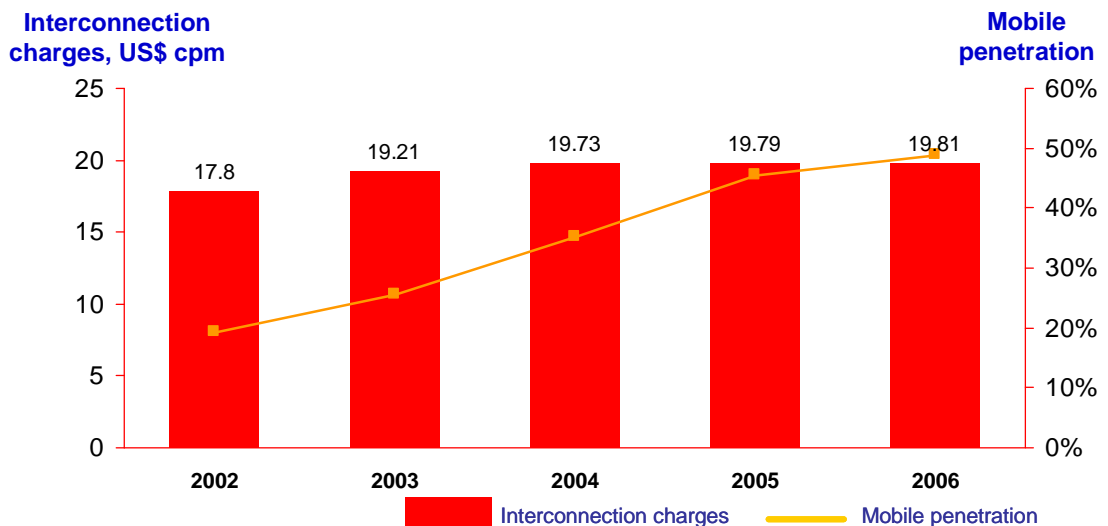


Source: MCMC

5.2.2 Brazil – interconnection regime

In Brazil the regulator has decided not to reduce the interconnection charges in order to accelerate the development of mobile market. The exhibit below shows the increase in mobile penetration and the simultaneous increase in mobile termination charges.

Exhibit 7: Historical average termination charges and mobile penetration for Brazil, 2002 – 2006



Note: (1) Mobile penetration for 2006 is for 2Q 2006

Source: Spectrum interconnection study in Brazil, Informa, Ovum

The interconnection between fixed and mobile networks has played a major role in the growth of the prepaid mobile service, as revenues stemming from it have made possible for operators to provide service to more and more users who are not financially able to subscribe to the post paid service. As prepaid mobile lines originate very few calls - they are basically used for receiving calls, generating very low ARPU - they become responsible for a significant amount of mobile operators' revenues via interconnection charges. Furthermore,

prepaid lines are now around 80% of total mobile lines in Brazil, with very small variation among operators. Thus, the capacity of investment of mobile operators in technological development and coverage expansion has become highly dependant on the interconnection regulation policy. Mobile operators plead that interconnection charges are now an essential factor to avoid stagnation of the mobile sector.

5.2.3 Conclusion

Tele-density in India is much lower compared to other key emerging markets of the world and hence there is a pressing need to accelerate the roll-out telecommunication services and enhance the take-up of services. As operators increase their footprints and roll-out services to less affluent areas, the traffic volumes and consequently revenues generated by users in such area is likely to be significantly less than the revenues generated by the users in urban and affluent areas. Hence in order to adequately compensate the operators for the costs of providing interconnection services in these less affluent areas of India, it is pertinent to consider an increase in the mobile termination charges.

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