

Comments

On

Consultation Paper

On

Review of Interconnection Usage Charge (IUC)

(Issued by TRAI on 31st December 2008)

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Q.1. What components of Interconnect Usage Charge (IUC) should be reviewed?

To our belief the review is required in the following components of the IUC:

- termination charges;
- carriage charges, and
- transit charges.

We also advocate the change of IUC costing methodology from the Fully Allocated Cost (“FAC”) methodology to the Hybrid Long-Run Incremental Cost (“H-LRIC”) methodology.

The rationale for our suggestions is explained in details in the following sections of this paper. However, the key reasons for the suggestions are:

- **The growth of the Indian telecom industry.** Aiming to increase mobile penetration and to maintain service cost and quality acceptable to subscribers, the regulator should pursue to attract new investments to the industry. This objective can be achieved using a number of measures, and the decrease in IUC rates could be one of them.
- **The change in the network capacity utilization by the incumbent operators.** The spectacular growth witnessed in the Indian mobile industry in recent years has resulted in the capture of significant economies of scale for these operators due to a critical mass of subscribers. Such critical mass has resulted in a steep decline in the average cost per minute and average cost of serving a subscriber, since the costs associated both to the initial investment in the network and to the service delivery to the end customers (fixed costs to a large extent) are now distributed among a very high number of minutes and subscribers. The developments described therein require the IUC to be adapted to the new realities of the industry. Experience in many international markets, as described in Appendix 2, shows that Regulators in other markets evolve the regulatory framework towards LRIC based models once economies of scale are achieved by incumbent or “SMP” operators (i.e. operators with “Significant Market Power”). The IUC, therefore should reflect only the incremental costs the incumbent operators incur on delivering the services (under the Hybrid FL-LRIC methodology), not the total costs.
- **The Indian Government’s goals for 2007-2012.** The plans contain expansion of telephone, deployment of the wireline and wireless broadband connectivity, set-up of 3G and other technological advancements. The telecommunication service expansion is planned across rural areas, with emphasis on broadband connectivity for secondary schools, health centres, Gram Panchayat, etc.

Q2. In view of the details provided in the paper, please give your opinion whether TRAI should continue with the existing methodology of fully allocated cost with appropriate assignments for termination charge or changeover to LRIC or its variant. Please provide full justification.

Although the Fully Allocated Costs (FAC) method is relatively straightforward in its application, it has drawbacks, such as that it estimates the cost of termination for existing operators, using their existing network deployment. While this is not typically an issue in competitive markets, the regulators typically believe that the use of FAC in markets of limited competition may entrench

inefficient network roll-out and may provide limited incentive for existing and new operators to strive for efficient behaviour. Also, the behaviour of regulators in other countries suggests that the FAC methodology is appropriate when economies of scale have not yet been reached by operators and therefore their costs incurred in the past need to be somehow compared. This however, as stated above, is no longer the case in India.

Compared to the FAC, the LRIC stipulates efficient operations as it considers costs that are both forward-looking and incremental. As a consequence, under LRIC the termination charges can be set so as to reflect the real economic costs of interconnection provision, promote efficient investments, and avoid the roll-forward of historical inefficiencies. Note that LRIC is based on estimates of the future which can be a source of contention.

From implementation view, it is crucial that in estimating incremental costs the increments are appropriately defined, the cost categories are sufficiently granular and the cost-volume relationships are sufficiently robust. If each of these objectives is met, then an incremental cost approach offers superior costing information and insight into the economics of a mobile operator than the FAC does.

We also advocate the use of Hybrid FL-LRIC – the approach that reconciles the results derived from the bottom-up and the top-down costing exercises. According to the best practices, H-LRIC approach is usually expected to provide more robust results than either of bottom-up or top-down exercises provide standalone.

Note that countries such as UK, Netherlands, Austria, Belgium, Bahrain, Turkey, Jordan and others apply LRIC or its derivatives. Refer to appendix 3 of this document for a list of selected countries and the IUC costing methodologies applied by them.

Q3. Should termination charge be strictly 'cost-based' or should the principle of 'cost-oriented' be applied taking into account other affecting factors? Give reasons in support of your answer.

Although the notion “cost-oriented” termination charges may provide for higher flexibility in the IUC costing, we advocate the “cost-based” approach as being more transparent than its counterpart and, therefore, more acceptable under the high-expansion conditions in Indian telecom market currently.

Also, the “cost-based” approach we advocate is not inflexible, as the “cost-based” termination rates should take into account the assumptions that limit biases of the efficiency and the specifics of business model adopted by any single operator. In this approach, the cost-based pricing should eliminate biases such as, but not limited to, the efficiency of historical investments, the load over network capacities, the deployment of network infrastructure, and any other factors reflecting the performance of an individual operator rather than that of the industry as a whole.

Q4. In the absence of cost data for value added services, how should the revenue of such services be taken into account for determination of termination charge?

As an alternative to cost-based methodologies, the termination charges for the value added services (VAS) could be derived from the market prices less the margin implicit in providing such services. Note that such charge-setting methodology would yield efficient results only if:

- the market for VAS is competitive enough to set the VAS price at efficient level;

- the VAS price components can be efficiently and fairly allocated among providers of different components of the service (e.g. content providers, operators, etc.);
- the margin on such services is established on international benchmarks, or on other basis allowing to promote provision of such services without creating incentives, *ceteris paribus*, for new entrants to enter the market, or for incumbents to leave it.

Note that with regards to the Short Message Service (“SMS”) termination costs, we believe that the regulatory intervention may lack justification for application in the SMS market due to the following:

- **The low cost incurred by operators to deliver incoming interconnect SMS traffic to their customers.** As a principle, Swan Telecom advocates for interconnection charges for all services under the following principle: interconnection services are services by which a company delivers a service to one of its subscribers by leveraging, in part, on the infrastructure (and therefore capex and opex) incurred by a third party. As such, the 3rd party involved in delivering such service should be compensated in a proportionate manner to the costs it involves delivering such service. Under this guiding principle, therefore, SMS interconnection charges should be introduced in the market.
- In the specific case of SMS, however, a careful estimation of the interconnection charges that should be introduced to be fair to all parties yields the following results. Under the COAI model, the cost born by an operator to carry SMS traffic in its network is 144 times lower than the cost born to carry voice traffic. Following the proportionate principle for interconnection charges, being the cost of providing a minute of voice traffic estimated at INR 0.09-0.10 / min currently (COAI model), subsequently the costs of providing an SMS should be estimated at INR 0.0006-0.0007 / SMS. Given the extremely low interconnection rate that should then be introduced, the TRAI should weigh the merits of such introduction vs the additional complexities that would be required from an implementation perspective to introduce such new process in the market. Therefore, we advocate for the TRAI not to introduce SMS termination charges.
- **The comparable ease of use of the Sender-Keeps-All** billing method applied currently, and the potential complexity in defining the economically efficient regulation for SMS market on a cost-based approach.

Q5. Are asymmetric termination charges justified? If yes, which of the following should be the basis

- (i) Existing service providers vs. new entrant**
- (ii) Urban lines vs. rural lines**
- (iii) Mobile termination charge vs. fixed termination charge**

Give justifications for your answer.

When introducing asymmetric termination charges (“ATC”), regulators in general aim to develop:

- **the telecommunication services market** – asymmetry could be introduced in favour of new entrants, in order to attract new investments. We believe that this is a preferred regime given the current situation in the Indian telecom market and the Indian Government’s objectives for 2007-2012 (refer to section 1 earlier in this report).
- **specific geographical areas** – asymmetry could be introduced in favour of operators that develop networks in rural areas, in order to develop investments in such higher-cost areas, as may be the case in India. We believe that the necessity to impose asymmetry in IUC for rural vs. urban areas should be considered in the light of whole economic and investment environment in Indian telecom market recently as well as should take into account the subsidizing provided via the use of Universal Service Obligation Fund.

Asymmetry in favour to increasing competition

We believe that asymmetric charges for the benefit of new entrants are justified because they would assist the development of the telecommunication industry as a whole and would:

- **Increase penetration and attract investments in network.** ATC introduction would stimulate the growth of the market by allowing the new entrants maintain their financial positions at sustainable levels, develop their networks and market their services. Note that the new entrants currently estimate that most calls originating in their networks would terminate in other networks, resulting in a net outflow of termination charges, should the IUC rates remain symmetric. Under these conditions, the business development activities by new operators may be limited by financing available. Note that under the current capital market conditions raising finance may be challenging due to limited liquidity available.
- **Decrease of undue competitive advantage.** Due to economies of scale, the costs and CAPEX per minute or subscriber of existing operators are lower than those of new entrants at initial stages. The introduction of ATC would temporarily decrease this competitive advantage exercised by early-entrants and by supporting the development of new-entrant business would create additional surplus for consumers in the long-term.
- **Decrease undue advantage of spectrum costs.** Costs of coverage in 1800MHz band, the spectrum allocated to new entrants, are higher than those of coverage in 900MHz, the spectrum available to incumbent operators. In order to promote competitiveness in the market, the introduction of asymmetry should eliminate the undue competitive advantage until the new entrants will have been allowed sufficient time to achieve similar economies of scale.
- **ATC regime is considered as acceptable market regulation practice** in various countries in Europe, Middle East and Asia. Therefore the arguments supporting the introduction of the ATC may go beyond these stated in the current paper. Refer to appendix 2 to this document for further details country-by-country basis.

Please refer to chart 1 provided later in this report for the list of selected countries that introduced asymmetric in interconnection rates.

Asymmetry in favour to operators in rural areas

Asymmetric termination charges in favour of operators in rural areas may be justified if the regulatory support to these operators serves the development of rural-areas connectivity,

stipulation of communication in rural areas, or other purposes accepted by the regulator and the operator.

It is our belief that as a tool of subsidizing the development of telecommunication services in rural areas, the asymmetry in favour of operators in rural areas would complement the usage of the Universal Service Obligation Fund (“USOF”). To our belief, the subsidies available currently should be compared to the subsidies required for meeting the Government’s plans, and as a conclusion of such analysis the imposition of asymmetry in favour of rural areas should be either accepted or declined.

Note that according to publicly available information and the reports by TRAI, the total size of USOF as of 2007-2008 has been estimated at INR 205-250 billion, while the utilized part stood at 27% or INR 55-68 billion. This compares to INR 120 billion, which is the estimated total cost of rolling out the mobile service infrastructure in rural areas (refer to the article “Universal Service Obligation Fund: A resource for what?”, the Economic Times of 30 December 2008). It is therefore our belief that given the funds available via USOF, and the estimated costs of network rollout, the usage of USOF and ATC as subsidizing tools should be considered in combination – should the ATC be imposed, the USOF contributions might need a substantial revision downwards.

Please note that the imposition of such asymmetry may face a number of challenges:

- **Administration of the regulatory framework.** administration of the urban-rural asymmetry might pose substantial difficulties, such as the calculation of cost and therefore the termination rate for rural and urban calls with any degree of accuracy (note that per-minute costs are demand driven as operators derive revenues from both “resident” subscribers and “roamers” while the costs may be estimated at a level of single cell and taking into account the cell utilization), the estimate of impact on termination costs of incoming calls from public and private phones in different areas, etc.
- **Control over subsidy levels.** Should TRAI and DoT consider imposing asymmetric charges for operators in rural vs. urban areas, they would need to set the regulatory framework such as to ensure that any incremental benefits, which operators receive because of the asymmetry in termination charges, are used for the pre-agreed purpose, such as network development in rural areas, rather than are transferred to different areas / service lines of the same operator and used for purposes other than those that had been agreed on.
- **Reaching consensus among wireline and wireless operators without distortion of competitive economics in the market.** Operators of both wireline and wireless networks should be consulted before imposing any asymmetry in order to prevent de-averaging of development of either wireline or wireless networks in rural vs. urban areas.

Precedents of asymmetry in favour of operators in small rural areas exist in Canada, USA, Finland and Chile, however for the wireline operators only.

Asymmetry in fixed-to-mobile and mobile-to-fixed termination rates

Note that according to the studies by the World Bank, different developing countries applied fixed-to-mobile termination rates substantially higher than mobile-to-fixed. As mentioned later in this report, we believe that equivalent principles and methodologies should be used for equivalent services, and that asymmetry in wireline and wireless termination charges lacks basis for implementation in India.

Q6. Should the existing practice of applying the same principles and methodology for calculation of fixed and mobile termination be continued? If not then what should be the methodology for fixed and mobile termination charges? Give full justification.

We believe that equivalent principles and methodologies should be used to estimate costs of equivalent services despite the underlying technology. We also advocate the change of methodology in the instances where functionality and benefits to service users change, rather than in the instances where technology changes. Note that the rule may not hold true if one of technologies is superior to the other because of higher estimated benefits to service users or providers in the long-term, and if the superior technology is proved to suffer from cost inefficiencies due to temporarily low acceptance of technology for commercial use.

As the fixed-line and the mobile technologies provide the same service– voice transfer – which is subject to regulation, and as none of the technologies is implicitly superior to another, the termination rates for voice services should be set using equivalent principles and methodologies despite the technology.

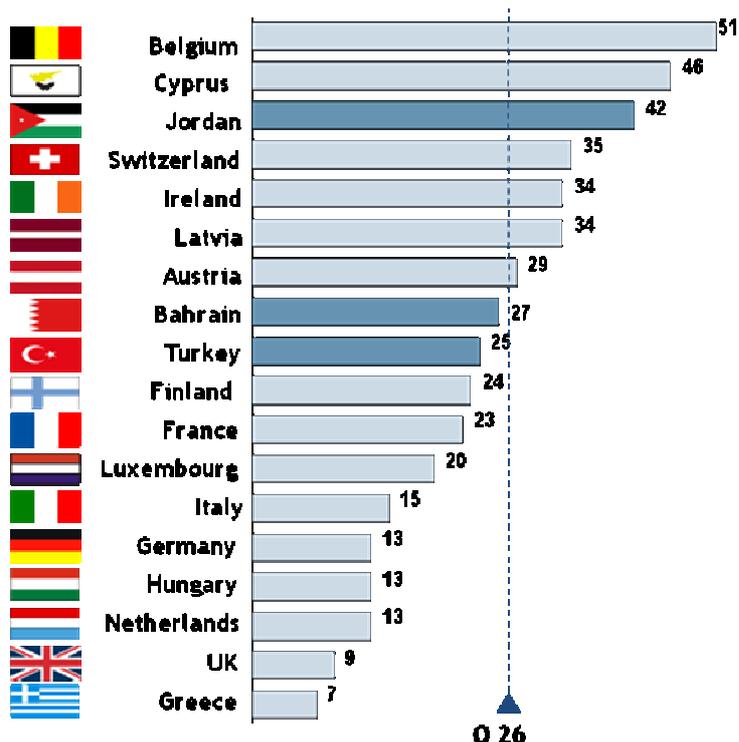
Q7. Explain in detail the impact of the proposals being submitted by you for mobile and fixed termination charge on tariff and why?

The consultation paper outlines details on arguments for asymmetric and symmetric rates to be applied for mobile and fixed termination. Note that although not discussed explicitly at this stage, the charges might need to reflect the interconnection being single-tandem or double-tandem, as well as the termination being executed at peak or off-peak time. Apart from these matters, based on the above methodologies and our models, the termination charges should be set as follows:

Asymmetric rates

Based on the rate asymmetry introduced across a number of markets ranging from UK, France, and Belgium to Jordan, Bahrain and Turkey, the average premium that new comers were granted over the rate of incumbents was 26%. Furthermore, we believe that should the Regulators decide to introduce IUC asymmetry in the market, a comprehensive modelling exercise would need to be undertaken to either support or amend the international benchmark, which, if applied without further consideration, would increase the termination rates from INR 0.30 / min currently to INR 0.378 / min.

Chart 1. The third operator termination rate premium over the rate to the first operator



Source: Delta Partners analysis.

Note that regulators in many countries, subsequent to imposing asymmetric termination rates, impose glide path towards symmetry, i.e. a decrease in new entrant premium rate over incumbent rates. Therefore the asymmetry is effective for certain number of years only, usually three to five, while any difference is eliminated afterwards. Please refer to appendix 4 of this document for case studies of glide to symmetry in Sweden and Portugal.

Symmetric

- Mobile termination – INR 0.10 / minute
- Fixed termination – INR 0.09 / minute

Note that these estimates have been developed under the methodology equivalent to that suggested by COAI, however under different assumptions. The assumptions supporting our proposed charges are provided in appendix 1.

We would also like to draw your attention to the possible shortcoming of the termination charge calculation provided by COAI (as detailed in “Assumptions and outputs of the FL-LRIC model” of 17 November 2008 by Spectrum Value Partners). Note that these are the key variables that may need to be reviewed, should the conclusions of the model require revision or development:

- **the data gathered for the analysis may be insufficient to draw pan-India conclusions.** The four circles selected for analysis – Delhi, Maharashtra, Kerala and Orissa – and the four operators that supplied the data for analysis – Bharti, Vodafone, Idea and Aircel – may have provided the data that is not representative of the pan-India operations due to bias towards geographical, population and other factors implicit in these circles and by these operators.
- **the network coverage** estimates, which include 86-93% coverage by 2012 in rural areas on circle-by-circle basis, may be assessed as quite aggressive.

- **theoretical operator market share** is estimated to decrease from 25% in 2009 across all circles to 13-14% in 2012. The model estimates that an efficient operator maintains substantial market share in 2009, an assumption which to our belief marginally reflects the fact that new entrants will be entering the market in 2009.
- **the traffic per subscriber (MOU) growth** (which impacts at least the cost allocation to the outgoing on-net and off-net traffic, as well as to the incoming traffic) is estimated at 1-4% in 2009-2012 varying on circle-by-circle basis. To our belief, these assumptions may be quite conservative given the MOU evolution in recent years. If these assumptions are revised, to our estimate the COAI's estimated termination charges may decrease by 7-30% in 2009-2012.
- **the assumed mark-up on cost** varies within 46-51% in 2009-2012, an aggressive estimate to our belief.
- **the spectrum allocation in 1800MHz band** may be a reasonable estimate for the expected spectrum allocations, however may not be a reasonable assumption for a "theoretically efficient operator", given that many existing operators have spectrum allocated in both 900MHz and 1800MHz bands.

Q8. Are asymmetric domestic and international termination charges justified? If yes, then whether international termination charge should be fixed higher/lower than domestic, should be on reciprocal basis with other countries or left under forbearance? Give justifications.

The international termination charges should be set to achieve the following:

- maximize the incoming traffic revenues for Indian operators. Consequently, the termination charges should be set to maximize the volume of incoming calls given that the marginal costs for a call may be insignificant;
- set such price per minute for calls outgoing from India as to maintain an acceptable level of surplus transferred from operators to subscribers.

We believe that additional analysis is required to establish efficient level of the international termination charges. The analysis should take into account the regime for regulating international gateways on pan-India level.

Q9. What should be the ceiling of carriage charge for long distance calls?

- (i) Maintain at the same level**
- (ii) Increased/ decreased on the basis of current data**
- (iii) Higher ceiling for remote/ rural areas and one ceiling for rest**

Please give sufficient reasons with data in support of your answer.

Based on our calculations, the ceiling for the long distance carriage costs should be set at:

- INR 0.09 / minute for carriage of 50-200 km
- INR 0.11 / minute for carriage above 200 km

The costs were recalculated on the basis of FL-LRIC costing methodology and the theoretically efficient operator assumption (refer to appendix 1 for further details). Note that as discussed

earlier in this report, we advocate equivalent carriage charges for long distance calls in both remote/ rural areas and any other areas.

Q10. Which of the following options should be the TAX transit charges for intra SDCA transiting?

- (i) Maintained at the same level**
- (ii) Left to forbearance**
- (iii) Increase/ decrease on the basis of current data**

Please give sufficient reasons with data in support of your answer.

TAX transit charges should be reviewed given that:

- BSNL TAX POI are the only route for SDCA traffic in the absence of adequate direct links, the existence of overflow of traffic from any route;
- transit costs may be substantial for the new entrants at initial stages of the network deployment;
- operators are required to route through BSNL in case sufficient E1s are not obtained from operators on direct routes. BSNL are the sole user of scarce resource in this instance.

We believe that additional analysis is required to establish efficient levels of TAX transit charges.

Q11. What should be the transit/ carriage charge from LDCA to SDCA?

- (a) No need to specify separately**
- (b) Under forbearance**
- (c) Increase/ decrease on the basis of current data**

Please give sufficient reasons with data in support of your answer.

Given that the handover of intra-circle traffic originating from mobile network and terminating in the BSNL fixed line network at Level-II TAX is mandatory (the current charge is INR 0.2/min), the charge is unavoidable. As a consequence, the market for providing such routing service is effectively a monopoly served by BSNL, which is not motivated to set the prices at competitive levels provided that it pursues to maximize profits. Therefore this service requires regulation.

The prices should be strictly cost based on the basis of current and projected data. We believe that additional analysis is required to establish efficient levels of LDCA to SDCA transit charges.

Q12 India is preparing for launch of 3G mobile services. Which of the following option would you consider best? Give reasons, practicality and method of implementation of your choice.

- (i) 3G termination charge same as 2G termination charge**
- (ii) Forbearance of 3G termination charge**
- (iii) Higher or lower 3G termination charge?**
- (iv) Should be considered at a later stage?**

We believe that this matter should be considered at a later stage, when the 3G market conditions are framed to higher level of clarity than achieved currently.

Q13. New developments like WiMax, HSPA, FMC, NGN and further advancements in access technologies are expected to complicate the termination scenario further. What should be done in the current review to take care of these future developments?

To our belief, the developments of new technologies should be considered at the stage when commercialization of the technologies becomes foreseeable and when Regulators decide whether any of the technologies require regulatory support with the aim of providing additional benefits to the ultimate service users.

Key assumptions underlying the FL-LRIC model applied by Swan Telecom

1. Network architecture

The network architecture has been defined on the basis of a theoretical efficient operator in order to identify key existing switching and point of inter-connection locations and network elements as per assumptions outlined in the TRAI's IUC Regulation.

2. Service portfolio modelled

For the purpose of the model, the following services has been defined

2.1. Inbound/ Outbound calls

2.2. On-Net calls

3. Use of routing factors to link the key network elements required to meet the service demand

A routing table has been developed intuitively based on assumptions outlined in the TRAI's IUC Regulation to define the key network elements that are used to deliver each type of service.

4. Determining the network infrastructure needed to meet the service demand

The network infrastructure has been dimensioned by reference to the network architecture methodology, service demand and routing factors

5. No significant difference in the usage of network elements for certain categories of services

It is assumed that there is no significant difference in the usage of network elements for providing certain services for e.g. mobile-to-fixed, mobile-to-mobile. Hence for the purpose of the model usage of network element have been considered to be the same.

6. Savings in OPEX resulting from infrastructure sharing has not been considered

For the purpose of this model, implications of sharing of infrastructure on CAPEX and OPEX have not been considered. If the same will be considered, the cost based charges would further be lower.

7. Other specific assumptions

- For the IUC exercise, TRAI had taken the CAPEX, Depreciation and OPEX as derived from the audited BSNL figures. The components include data on Depreciation charges during the year, Net Block, Capital Works in Progress, Current Assets, Current Liability, Employees Remuneration and administrative expenses. Information on the number of DELs at the end of the period is also provided. CAPEX + Depreciation costs and OPEX costs have been converted to cost per line against these heads by dividing the costs with the

DELs. The derived values have been also adjusted for costs attributable to telephone service with the assumption that only 95% of total revenues are derived from these services. The overall CAPEX and OPEX have to be allocated to different parts of the network. TRAI had allocated these costs to the various network elements for arriving at per minute costs based on average usage of the respective network elements. For the purpose of average usage, TRAI relied on the data on minutes of use attributable to various Network Elements is as provided by BSNL.

- There are many methods of depreciating an asset, however most commonly used methods, which are also prescribed under The Companies Act and The Income Tax Act, are Straight Line Method (SLM) and Written Down Value (WDV) Method. The depreciation charge under SLM is constant throughout asset's life but under WDV method accelerated depreciation is charged in initial years of asset's life. **In these calculations SLM has been used as it ensures price smoothness. SLM is also internationally accepted and practiced norm.**
- TRAI in its IUC Regulation of 2003 had considered the fast technological changes and obsolescence of telecom equipment. Considering this aspect, TRAI has estimated that the weighted average depreciation rate based on economic life of assets and by assuming 5% of its value as scrap value as 8.84%. The depreciation rate of 10% has been applied to calculate depreciation expense.
- It is observed that the mobile traffic has grown considerably. The traffic figures have been taken based on performance report of TRAI (July 2008). For proper assessment of per minute costs, route traffic matrix based on route diagram given in TRAI's Regulation dated 29th October 2003 has been employed.
- Year end DELs and average DELs of BSNL for the year 2006-07 are **37,294,867** and **37,645,141** respectively¹.
- For arriving at the CAPEX and Depreciation, year-end DELs were considered whereas for arriving at the OPEX and Revenue, average DELs have been considered. This cost model for IUC is based on the broad assumptions made by TRAI in its IUC Regulation of 29th October 2003;
- Cellular component from Capital Works in Progress (CWIP) have been removed in line with TRAI's consideration in the existing IUC Regulation;
- Life time for cables have been taken as 20 years;
- Routing factor adjustments have been made based on actual traffic routing possibilities in place of earlier consideration;
- IUC for origination has to be higher than for termination (additional operating expenses relating to selling, acquisition, billing and bad debts are incurred at the originating end while the work done is almost the same). IUC for termination should

¹ Source: Annual report of BSNL

be made identical for all similar handovers (for all the cases viz. Full Mobility, Limited mobility, NLDO and Fixed line operators).

- It is evident that the cost, revenue as well as traffic data on which the calculations of IUC were done by TRAI in 2003, was on the basis of BSNL networks. TRAI has subsequently modified the applicable IUC based on revised calculations taking in to account cost/ traffic data of private operators also. TRAI had examined the cost structure of various NLDOs, including the incumbent with respect to their backbone infrastructure. The cost estimates of the network elements differed considerably across operators, particularly with respect to the incumbent. The average cost per minute after considering the cost in respect of all NLDOs as determined by TRAI was Rs. 0.52. A mark-up for the ceiling considered by TRAI was in the region of 15-25%, however, TRAI adopted the highest of the range i.e.25% for this purpose. This resulted in the ceiling carriage charge of Re.0.65 per minute;
- It has been assumed that total outgoing minutes for fixed lines have remained same as that of 2003 level, however, the traffic dispersion has changed considerably due to changes in the subscriber base of various categories and drastic reduction in

Call type	Minutes (only outgoing)		Minutes (only o/g) taken by TRAI
Same Local exchange	696	11.2%	1,044
Same SDCC (Tandem)	3,133	50.4%	4,177
Intra circle 95 calls (up to 200Kms within BSNL)	721	11.6%	521
STD intra-circle	603	9.7%	166
STD inter-circle	1,043	16.8%	295
ISD OG	21	0.3%	14
Total	6,217		6,217

applicable tariff.

- The minutes of use calculated for each network element on the basis of above considerations and taking incoming to outgoing ratio of 48:52 (this figure is opposite to incoming to outgoing ratio of 52:48 for GSM subscribers²) have been calculated to be :

Type of call	BSNL to BSNL minutes		BSNL <-> other fixed		BSNL <-> cellular	
	Outgoing only		Outgoing	Incoming	Outgoing	Incoming
Same Exchange	696		0	0	0	0
Same SDCC (Tandem)	1,567		157	568	1,410	2,679
Same Tax L2	469		17	60	266	505
Same Circle Tax L1(Intra Circle)	554		14	49	5	10
Circle L1-L1(Inter circle)	209		52	189	782	1,486
International	0		21	81	0	0
	3,494		260	947	2,463	4,680

Total number of call minutes per subscriber (all calls counted only once)

11,843

² Source : TRAI's Performance Indicator Report of July 2008

- The cost of origination (network operating costs only) can safely be taken as equal to cost of termination, however, overheads for originating service providers pertaining to cost of subscriber acquisition, marketing/ advertisement, bad debt etc. need to be added over this cost.
- Since the details of capital expenditure for components of network elements was not available in the Annual Reports, dispersion of capital expenditure has been taken based on the ratios of cost of network equipments arrived by TRAI in 2003, while calculating per minute costs. This is a fair assumption, since the variation in percentage cost (increase/ decrease) could fairly be taken as same across all type of equipments/ network elements.
- Similar cost model has been applied to Mobile networks and based on the same the per minute cost based termination charges for Metro and Non-Metro service areas have been calculated. For calculation of mobile termination charges, relevant cost data as well as subscriber base have been taken from annual reports of BSNL, MTNL, Airtel, Idea and Spice for the year 2006-07. The number of minutes per subscriber per month has been taken for GSM subscribers from the TRAI's performance Indicator Report of July 2008.
- The cost per minute should have been lower due to reduction in cost of equipments and increase in traffic during the current period, however, since the cost of administration and staff has increased, this would offset the reduction. Therefore, a fair assumption has been made that cost and subscriber data of 2007 together with traffic data (minutes) of current period would give a reasonable estimate of mobile termination charge.
- Number of minutes per month per Subscriber has been taken as 493.

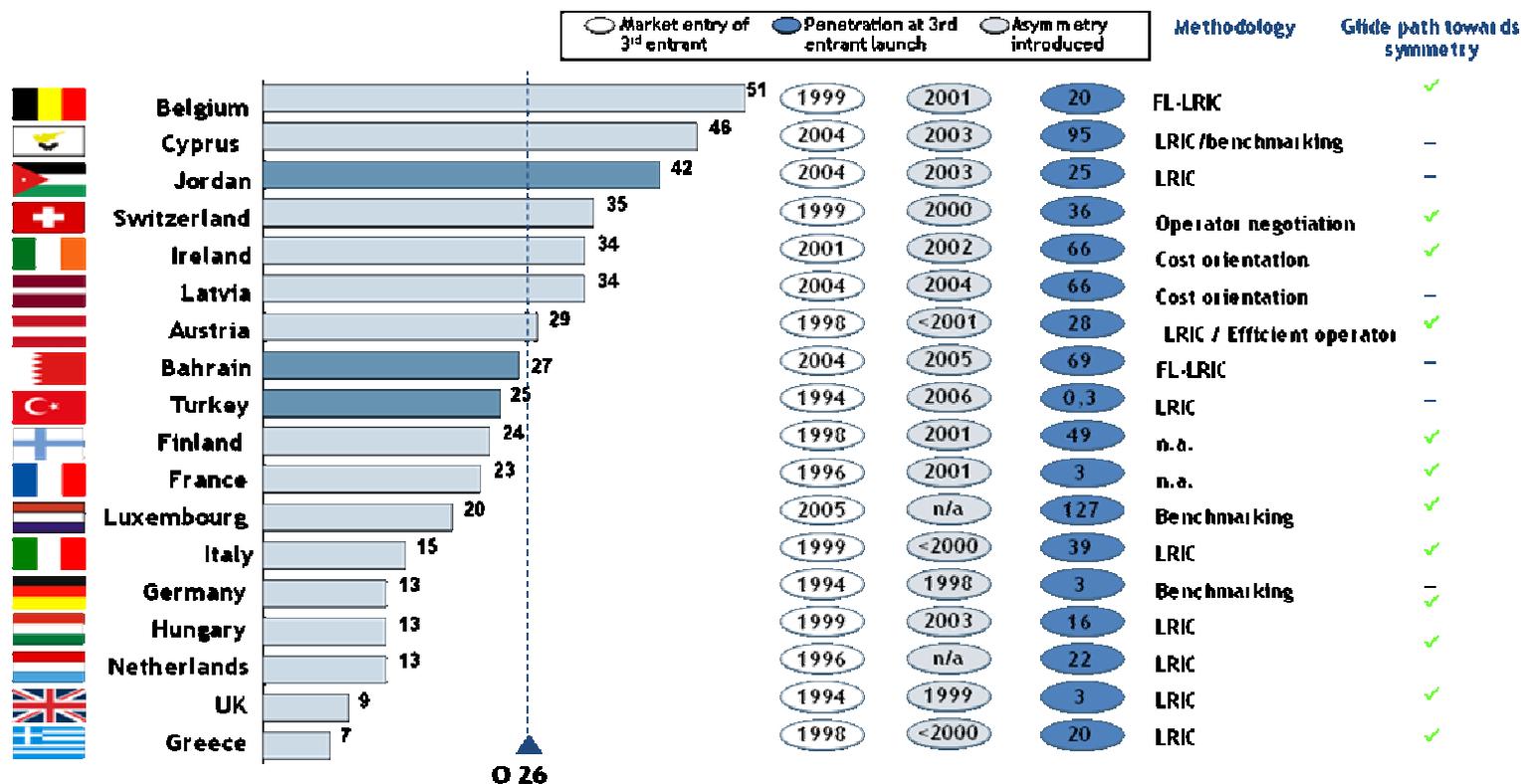
Information on termination rate asymmetry introduced across selected countries

	Year of introduction	Undue economies of scale	Difference in spectrum allocation	Other	
ATC introduced	Bahrain	2005	✓		
	Belgium	2001	✓	KPN base	
	France	2001	✓	ByT	Traffic imbalance
	Germany	2006		E-plus, Telefonica	
	Greece	2006	✓		
	Italy	2001	✓		
	Ireland	2002	✓		
	South Korea	2002	✓	LG, KTF	
	Switzerland	1998	✓	Orange, Sunrise	
	UK	1998		Orange, T-mobile	
	ACT not introduced	Australia	Indicative, but enforceable benchmarks		
Malaysia		No substantial cost advantage			
New Zealand		Ongoing			
Oman		No basis			

Information on termination rate asymmetry and termination rate costing methodology across selected countries

3rd operator termination rate premium, percentage of 1st operator

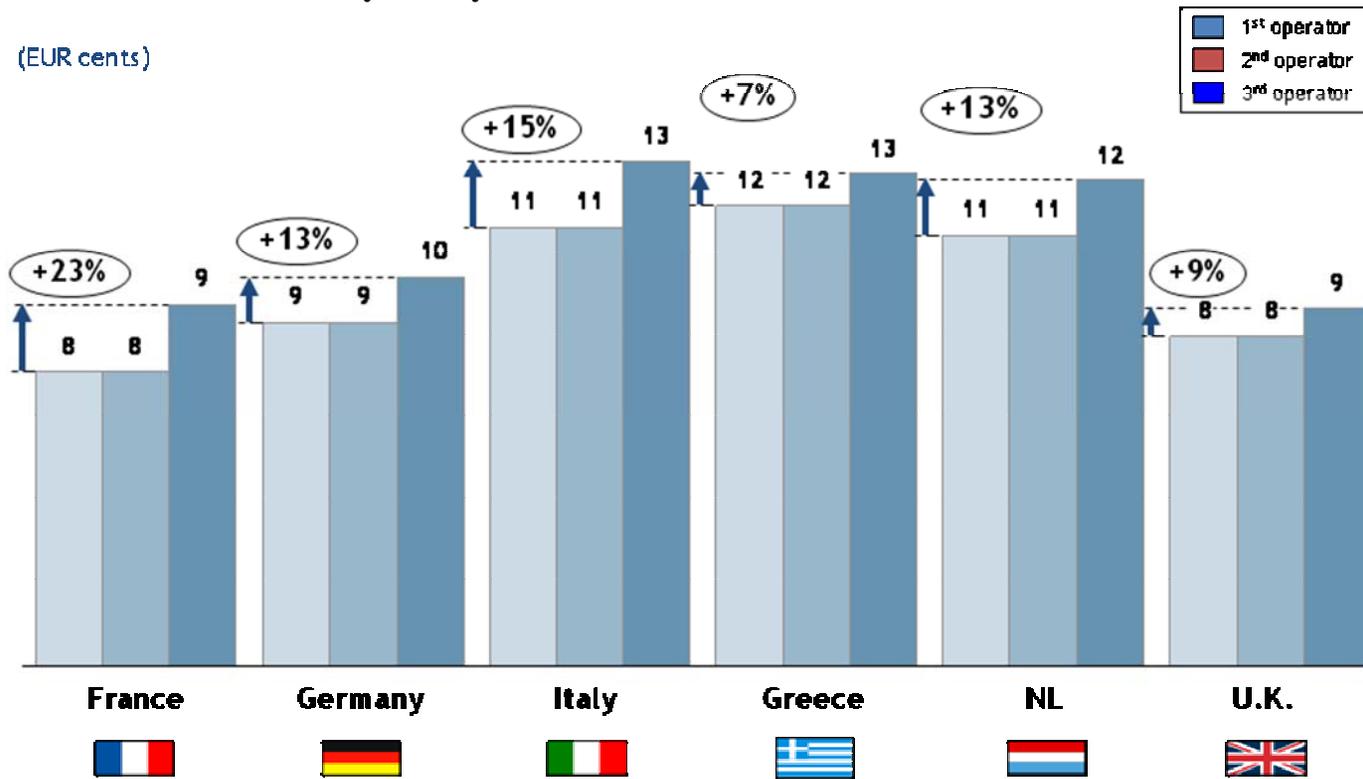
✓ Yes
- No



* 2006 data for Jordan and Turkey. Bahrain data for 2nd operator instead of 3rd; Source: Orum; WCIS; Cullen International; NRA Interviews
Source: Delta Partners analysis

Appendix 4.
Mobile termination rate asymmetry in selected countries

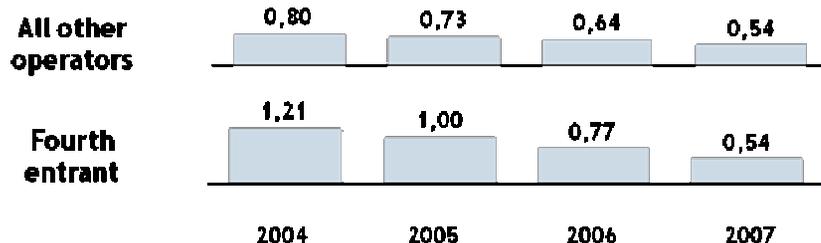
(EUR cents)



Source: Ovum

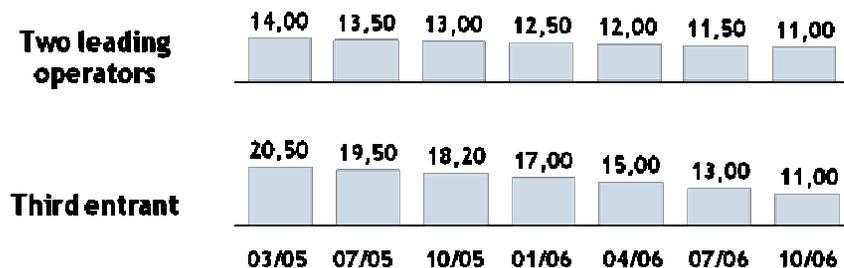
Glide path towards symmetry in mobile termination rate in Sweden and Portugal

Sweden 
(SEK)



- All operators assigned SMP status
- Fourth entrant initially protected, but current market share is considered to be enough for equal conditions

Portugal 
(EUR Cents)



- All operators assigned SMP status
- Third entrant market share is around 17%
- Termination fees high in comparison to EU benchmarks, need to bring down

Source: Cullen International