



VIL/LT/14-15/380
22nd December 2014

To,
Shri Arvind Kumar,
Advisor (NSL)
Telecom Regulatory Authority of India (TRAI),
Mahanagar Doorsanchar Bhavan,
Jawaharlal Nehru Marg (Old Minto Road),
New Delhi - 110002

Sub: Consultation Paper on Interconnection Usage Charges (IUC) – Vodafone India response
Ref: Consultation paper No. 13/2013 dated 19th November, 2014.

Dear Sir,

At the outset, we thank Hon'ble Authority for bringing out this important Consultation Paper on "Interconnection Usage Charges". Vodafone India is pleased to submit its detailed response to the said Consultation Paper.

While we are enclosing our detailed response with this letter; we have also provide below a summary of some of the key points addressed in our response.

- We do not support Bill & Keep (B&K) for Termination charges. We have not come across any country where CPP regime is in place in retail market but Bill & Keep (B&K) is applied for termination charges i.e. MTC.
- MTC (and other IUC charges as well) should continue to be cost-based and work-done principle. Hence, there is no rationale to give any glide-path towards B&K.
- The cost methodology adopted for estimation of MTC should consider all relevant costs, including both OPEX and CAPEX recovery, as both of them contribute to allow call termination.
- Spectrum is a scarce and valuable natural resource. It plays a significant role in fostering the efficient provision of mobile voice services, in general, and mobile termination, in particular. Therefore MTC should reflect this cost.
- We estimate an MTC rate of Rs. 0.32 per minute basis FAC-Top down model using TRAI's costing approach and industry data published by it.

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- ILD Termination Charge for incoming international calls may be upwardly revised to at least @Rs.1/min from the current rate of 40p/min. As regards Carriage Charge for domestic long distance calls, the current ceiling of 65p/min should be continued, to cater to all geographic regions as well as specific geographic regions on mutual agreement basis.

We hope that our response will merit your kind consideration.

With Regards,

For Vodafone India Limited



(P Balaji)

Director (Regulatory & External Affairs)

Enclosed: A/a

Copy to:

1. Dr. Rahul Khullar, Chairman (TRAI)
2. Sh. RK Arnold (Member-I)
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4. Sh. Sudhir Gupta (Secretary, TRAI)



A. Introduction

At the outset, we thank the Hon'ble Authority for bringing out this important Consultation Paper on "Interconnection Usage Charges". This is a vital consultation for the industry not only because it directly impacts the industry's development, commercial strategies and commitments which ultimately have an important bearing on consumers, but also because mobile communications is an important facilitator of social participation and economic productivity for the Indian economy at large.

In fact, setting the level of IUC has a direct impact on promoting growth of subscribers (namely, the low income subscribers due to their specific traffic profile) and investment in rural areas, as they represent a critical revenue source for operators who continue to deepen the reach of their networks. By adopting these types of strategies for network deployment, operators have a significant role to play in the promotion of the enormous economic benefits by allowing a broader range of consumers to access mobile communication services and, therefore promoting inclusion and economic growth

Vodafone India is pleased to submit its comments to the Telecom Regulatory Authority of India (TRAI) Consultation Paper No. 13/2014 dated 19th November 2014 titled 'Consultation Paper on Interconnection Usage Charge'.

1. In the present multi-operator multi-service environment, it is necessary to define an effective Interconnection Usage Charges (IUC) regime that enables interconnection at a fair charge. **Providing interconnection network service involves costs for which telecom service providers need to be adequately compensated.** An efficient interconnection and charging regime is central to efficient and seamless connectivity between various networks, but more importantly a facilitator for rural investment and connectivity due to the usage profiles of rural customers, many of whom can only be connected in an economically feasible way with the recovery of their costs through IUCs.
2. Considering the ambitious government goals in connecting rural areas, it is key that the IUC regime balances public and private interests so that the continuous investments in network expansion and upgrades are incentivized while at the same time competition and consumer welfare is enhanced. Therefore, the IUC regime should be established in such a manner so that it promotes the closing of the existing digital divide in India while, promoting operators' investments
3. **There is a consensus** amongst economists, accountants, engineers, experts, operators and regulators that **interconnection prices based on cost are most likely to lead to desirable**



outcomes. While we understand the challenge to define an appropriate “cost-measure”, we believe that it can be solved through proper cost analysis of financial and Non-financial information which are available in the annual and accounting separation reports of telecom service providers.

4. Also, while choosing a specific cost methodology, one must take into utmost consideration the market situation and the main goals to drive market development. Therefore while some methodologies promote further investments in network deployment and increase of coverage and subscribers (such as FAC and LRAIC), other methodologies might be more suitable for countries with higher penetration rates, high coverage levels, high average revenues per users and mature markets (such as LRIC and Pure LRIC models). So, in assessing which is the most adequate cost methodology to adopt, there are various factors that should be taken into consideration such as penetration rates (as measured by the number of people with access to mobile telephony rather than the number of active SIMs), available networks and coverage, network topologies and spectrum allocations.
5. Bearing in mind the need for further investments in network deployment, increase in coverage and subscribers, we believe that adoption of an approach that achieves this end objective is crucial for the future development of the Indian market and achievement of stated Government policies. It is therefore imperative that the cost methodology adopted for estimation of MTC considers all relevant costs, including both OPEX and CAPEX, as both of them contribute strongly to allow call termination. In regards to the latter, spectrum plays a significant role in fostering the efficient provision of mobile voice services, in general, and mobile termination, in particular.

B. The Evolution of the IUC Regime

We humbly submit that the IUC regime evolved in 2003 and key highlights of the said regime are as follows:

1. **Implementation of IUC and CPP regime in India (2003)** - TRAI notified its first interconnection Regulation on 24.01.2003 (effective from 01.05.2003) that most importantly and more than anything else **laid the foundation of a highly progressive, successful and consumer friendly Calling Party Pays (CPP) regime in India.**
2. The above regulation determined various charges (origination, termination, transit, carriage) based on multiple parameters (e.g. type of network in which a call originated, terminated, distance travelled in a service provider’s network; in case of cellular network, MTC was based on whether the destination network was in a metro or a non-metro city etc. and varied from Rs.0.15 (15 paisa) per minute to Rs.0.50 (50 paisa)).



3. **On 29.10.2003, a revised Regulation superseded the earlier Regulation** prescribing a uniform termination charge of Rs.0.30 (30 paise) per minute for all types of calls. The carriage charges remained distance-based.
4. **In 2005, the IUC regime was reviewed again**, and after a detailed consultation process, TRAI decided to keep termination charges at the same level; while a ceiling was placed on carriage charges (amendment dated 23.02.2006 implemented from 01.03.2006). The MTC/FTC in the said review was maintained at the same level on account of future investment in network capacity, rural penetration and to maintain the QoS parameters etc¹
5. **On 09.03.2009, a revised IUC regime was notified** wherein the termination charge for local, NLD voice calls to fixed line and mobile was uniformly fixed at the rate of Rs.0.20 (20 paise) per minute, and we understand that this was carried out after a detailed analysis of Service Profit and Loss account of the wireless segment. Other IUC components determined/retained were carriage charges, ILD termination charge, transit carriage charge and tax transit charge.
6. IUC Review 2011 - We note that TRAI issued a consultation paper to review IUC. It appears that 2011 IUC review was concluded without any regulatory decision.

With respect to the said IUC regime it is important to highlight that TRAI did not consider the CAPEX recovery portion for determination of termination rates which has had serious impact on overall cost recovery of the mobile service providers.

C. Analysis of the extant Mobile Termination Charge² (MTC)

1. We note that TRAI used a fully allocated costing (FAC) methodology and a top-down approach for determination of MTC, **however with a crucial variation** that out of total cost, it considered only a part of OPEX i.e. MTC estimated based on the “relevant” OPEX of the wireless industry divided by the total number of minutes handled by the wireless network for the same period. TRAI estimated relevant operating expenditure as 43% of total operating expenditure, further adjusted by 10% on account of value added services (VAS) to arrive the final relevant OPEX.

¹In the said review, while TRAI noted that MTC/FTC could be lower than the then present specified level of Rs. 0.30/min, but in spite of this, TRAI chose not to reduce it. Please refer to Paragraph 58 and 59 of the explanatory memorandum to IUC regulation, 2006 dated 23 February 2006

² The Telecommunication Interconnection Usage Charges (Tenth Amendment) Regulations, 2009 (2 of 2009) dated 9th March 2009.



2. When growth in the number of subscribers over the period was examined TRAI noted that in the month of January 2009 alone the industry added more than 15 million subscribers while the average monthly addition during year 2008 was about 9million, therefore, TRAI decided to use the per subscriber estimation to avoid any under or over estimation of any costing elements.
3. We note that to work out the relevant OPEX per subscriber for future years for estimation of MTC, TRAI projected the EBITDA Margin and APRU of the industry. Accordingly TRAI considered EBITDA margin as 32% and ARPU (Gross) Rs. 280 for estimation of MTC; based on cost analysis of accounting separation reports of wireless segment for the FY2007-08.
4. It appears that based on the said principles and analysis, TRAI arrived at the MTC of Rs 0.20 per minute. As evident from the 2009 MTC costing exercise, TRAI considered only relevant OPEX and left substantial portion of OPEX and entire CAPEX recovery (i.e. Depreciation and cost of Capital/RoCE) to be recovered from other network service i.e. Originating calls.
5. During the 2009 MTC review exercise, **TRAI noted³ that the GSM mobile industry had surplus revenue of 10 paise per minute and wireless industry on the whole had surplus of 5 paise per minute.** As per TRAI, this surplus indicated (at that point in time), that the service providers were not only able to recover CAPEX, OPEX and reasonable profit from their operations but they were also having surplus over and above that.
6. We also note that at time of 2009 MTC review, wireless industry EBITDA margin was 36.50%⁴ and Return on Capital Employed (RoCE) for the financial year 2007-08 was about 20%. It is noted that in the final determination of 2009, TRAI reduced national MTC from Rs.0.30 minute to Rs 0.20 per minute i.e. a 33% reduction.

D. Financial Health of Wireless Segment

1. We note that over the period of time (2007-08 to 2011-12) the financial indicators of Top 5 access service providers have been steadily deteriorating; and there has been a substantial reduction in the profitability of the access providers as shown below.

³ Please refer to paragraph 5.3.22 of the explanatory memorandum to the IUC regulation 2009 dated 9th March 2009.

⁴ Table 6.2 on page no 58 of IUC Regulation 2009, dated 9th March 2009.



Table-1

Statement of Revenue and Profitability of 5⁵ Access Service Providers (Rs. in Crore)					
Particulars	2007-08	2008-09	2009-10	2010-11	2011-12
Total Revenue	75,031	92,051	99,895	1,13,150	1,24,133
Opex	49,231	64,635	74,204	88,257	96,657
EBITDA	25,800	27,416	25,691	24,893	27,476
EBITDA Margin	34%	30%	26%	22%	22%
PBIT	15,838	16,536	14,376	12,264	11,886
PBIT Margin	21%	18%	14%	11%	10%
Source: TRAI and Vodafone India Analysis					

2. We further note that during the financial year 2012-13, the Industry’s EBITDA margin was at the level of 15.41% (please refer to table below). We believe that this is not a good sign for the industry as a whole, and, is an indication that over the period of time, operating expenditure (OPEX) of the access segment has increased, which should be adequately reflected in the next IUC regime. An EBITDA margin of 15% is insufficient for the long-run sustainability of the industry given the continuing need to invest in networks and spectrum.

Table-2

Statement of Industry's Financial Performance (Rs. in Crore)			
S. No.	Particulars	2012-13	2011-12
1	Revenue from Telecom services	191145	176597
2	Total Revenue	202074	185930
3	EBITDA	31132	25562
4	EBITDA Margin	15.41%	13.75%
5	Operating Expenditure of telecom Industry	170942	160369
6	Opex as % of Total Revenue	84.59%	86.25%
7	Capital Employed	297430	327939
Source: TRAI's Annual Report 2012-13 and Vodafone-India Analysis			

3. From the analysis of cost information / data published in the consultation on ‘Valuation and Reserve Price of Spectrum’, July , 2013, it can be observed that during the FY 2011-12, there was a loss/under recovery of Cost by as much as Rs 15 per subscriber per month, which was 16% of the ARPU. An analysis statement is attached as **Annexure –I**.

⁵ Five access service providers are Bharti, Vodafone, Idea, Reliance and Tata (as per table 23 of TRAI’s study paper on “Shareholding pattern, financing pattern and capital structure of Indian private telecom access service providers” dated 19th November, 2013.



4. We further note that there are **considerable changes in the cost structure and profitability of the wireless segment** if compared between 2008 and 2013.

Table-2

S. No	Particulars	2008	2013
1	EBITDA Margin	36.50%	15%
2	OPEX as % Revenue	63.50%	85%
3	PBIT Margin	21.40%	10%
4	RoCE	19.50%	7%
5	Opex-Capex Ratio		
	Opex	67%	71%
	Capex	33%	29%
	Total Costs (Opex+Capex)	100%	100%
Source: TRAI and Vodafone estimate & analysis			

5. It is important to mention that during the financial year 2008-09, the cost of acquisition of spectrum rights was much lower, whereas presently cost of acquisition of spectrum rights is about 60% of total Gross Block/Investment. Therefore, there is a need to reflect these fundamental and underlying changes in the cost structure under the present IUC exercise and accordingly IUC charges should be revised.

E. Regulatory Approach and Regulatory Impact Analysis (RIA)

1. We note that in many other jurisdictions, regulators generally publish the results of Market analysis and Regulatory Impact Analysis (RIA) along with their Consultation Paper. However, we have noted that in the present Consultation, TRAI has not published any such market analysis, relevant financial and non-financial data of Industry and Regulatory Impact analysis. In the absence of such important information, we believe that stakeholders may struggle to firm up their view/ suggestions.
2. We believe that TRAI will consider the following underlying principles for determination of IUC /MTC:
 - i. The IUC/MTC regime must promote the long-term interests of all relevant stakeholders and support Government’s ICT objectives, most notably rural roll-out (connect the unconnected) and the closure of the increasing digital divide across India, as both are important facilitators of social participation and economic productivity.
 - ii. The legitimate business interests of access service provider/ telecom service provider (TSP)’s investment in network services/ infrastructure should be considered, namely for



- operators that continue to invest in the expansion of the network in all areas and not only focused on urban areas and subscribers.
- iii. The work done principle and costs incurred to provide the telecommunication services/ network services should be considered for determination of price/charge for a particular product/ network service.
 - iv. The cost must include operating expenditure (OPEX) and recovery of Capital expenditure (CAPEX) i.e. Depreciation, Reasonable return on capital employed (RoCE) and spectrum acquisition and utilization costs.
 - v. There may be a section on Regulatory Impact Analysis (RIA)⁶, forming part of the regulatory decision
 - vi. The IUC regime must promote sustainable competition and investment in the sector setting the right incentives for all geo-types that coexist throughout India.

F. Costing methodology and approach⁷

1. We believe that an effective costing approach plays a vital role to establish an effective & cost based Interconnection Usage Charges (IUC) regime in any country.
2. We understand that as per generally accepted practices in the telecommunication sector, the selection of cost methodologies and defining relevant costs depends on a number of parameters and policy objectives of that country. There are number of cost methodologies⁸ each with their own defining characteristics, advantages and disadvantages. Implementing a cost methodology or setting the relevant costs in a particular way should depend on its application and on the country specific conditions (including economic, regulatory and legal framework etc). Generally the approach should be consistent over the period of time with similar approaches used for services that are provided in combination unless there is a change in the underlying principles.
3. As Professor William H. Melody in his book ‘Telecom Reform Principles, Policies and Regulatory practices’ notes:
“... Both telecom managers and regulators must develop and apply the specific cost concepts, methods, data sources and interpretations that will address the specific problems they face and inform the specific decisions they must take. These may be drawn from accounting, economics or engineering.”

And he has further noted that

⁶ Regulatory Impact Analysis (RIA) is defined as a systematic, structured, evidence-based analysis of the prospective impacts of a proposed policy measure against possible alternatives.

⁷ This is also known as Cost standards / Methodologies

⁸ i.e. FAC, LRIC and LRAIC etc



“No theory, concept or methodology of cost analysis can claim intrinsic superiority over others on all issues of cost analysis.....”

4. We believe that under the present circumstances, there is a need to adopt a holistic approach by adopting either a FAC or LRAIC⁹ approach – that would effectively help address the national policy objectives of coverage, rural connectivity, increased investments and a healthy and sustainable growth-oriented sector.

G. Estimation of Mobile Termination Charge (MTC)

1. We note that in the recent price determination on ILD calling cards¹⁰, the Hon’ble Authority has very appropriately recognized the generally accepted costing principle for **access segment** under the FAC methodology i.e. *“the work done in the network is the same for outgoing and incoming minutes, **i.e. the cost per, minute is the same whether the network is utilized for generating an incoming or outgoing minute.**”*
2. Based on the FAC-Top down Model by following TRAI’s costing approach i.e. work done principle, the amount of MTC has been estimated as Rs. 0.32¹¹ per minute (with TRAI’s published cost data and Methodology¹²) and Rs. 0.35¹³ per minute (Vodafone cost data from ASR-FY2013-14 and TRAI’s costing methodology¹⁴). The detailed computation sheet is attached as **ANNEXURE-II**.

With the above background and analysis, we submit our responses to the issues raised in the consultation.

⁹ Long Range Average Incremental Cost (LRAIC); this is also known as LRIC+

¹⁰ Para 39 (d) of the explanatory memorandum to International Calling Card services (Access Charges) Regulations, 2014 (11 of 2014) dated 19th August 2014.

¹¹ The above estimation does not include cost of spectrum acquired by the operators during FY13-14 or that is likely to be acquired in the near-future auctions.

¹² Please refer to Table-2 of the explanatory memorandum to International Calling Card services (Access Charges) Regulations, 2014 (11 of 2014) dated 19th August 2014.

¹³ The cost is likely to increase further due to spectrum to be acquired through auction in near future

¹⁴ Please refer to note 12 for costing methodology



Question-wise Response of Vodafone India

Q.1 Which of the following approaches would be the most appropriate for Mobile Termination Charge and Fixed Termination Charge:

- **Cost oriented or cost based;**
- **Bill and Keep**

Please provide justification in support of your response.

Determining the relevant approaches for mobile termination and fixed charges the operating environment of the Indian telecommunication sector needs consideration.

Firstly, it is important to take into account the underlying applicable wholesale charging regimes, namely whether a Calling Party Pays (CPP), Bill and Keep (BAK) or Receiving Party Pays (RPP) applies. Taking this into account the retail level charging to recover costs may then either follow a calling party pays (CPP) or a receiving party pays (RPP) approach.

CPP- In this model, the caller will pay for their communication; the receiver does not pay for the communication. This payment is generally based on a second or minute basis.

RPP- The person who receives the call covers most of the costs, however, as the ITU outlines in certain instances “*the originator (...) might still pay for a local call*”.¹⁵

We note that initially, India followed an RPP regime where a Bill & Keep approach was adopted insofar as interconnection costs were concerned. The total cost of incoming as well as outgoing calls was recovered from the party making or receiving the call. This led to very suppressed usage and stifled the growth of the mobile services as subscribers were reluctant to pay for incoming calls.

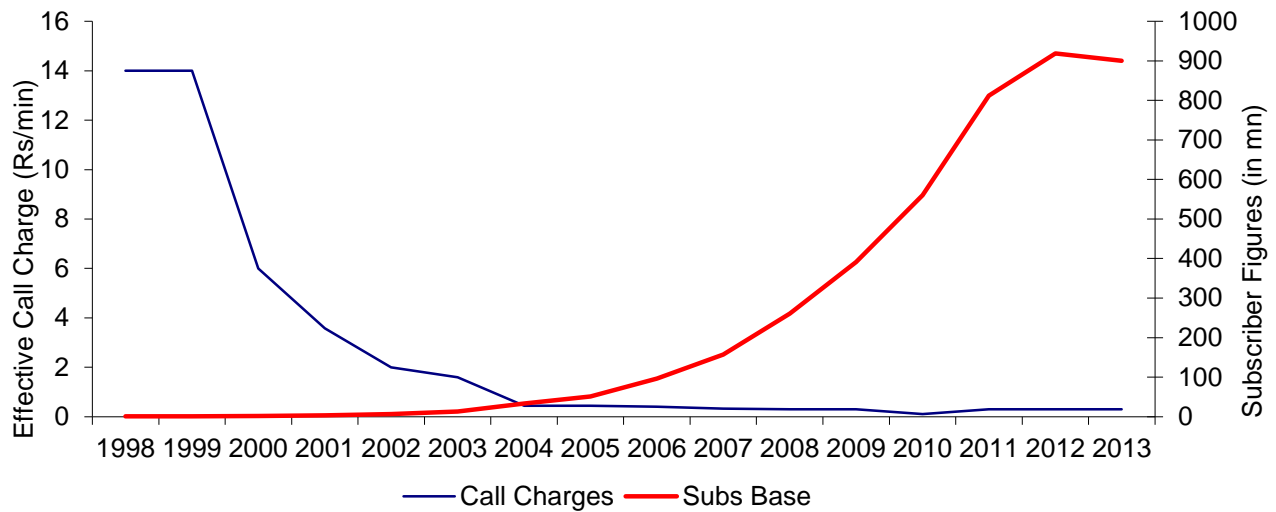
The CPP regime was introduced in 2003, simultaneously; the IUC regime¹⁶ was introduced for the first time – which introduced the concept of cost-based termination charges to be paid by the originating network operator to the terminating network operator. We believe that this was a milestone in the Indian Telecommunication sector which has changed the growth path of wireless segment. The introduction of the CPP regime transformed the entire face of mobile telephony in India, leading to an exponential increase in both the number of subscribers as well as the usage, as is evident from the chart below:

¹⁵ <http://www.itu.int/net/itunews/issues/2010/03/20.aspx>

¹⁶ The Telecommunication Interconnection Usage Charges Regulation 2003 (1 of 2003) dated 24th January 2003.



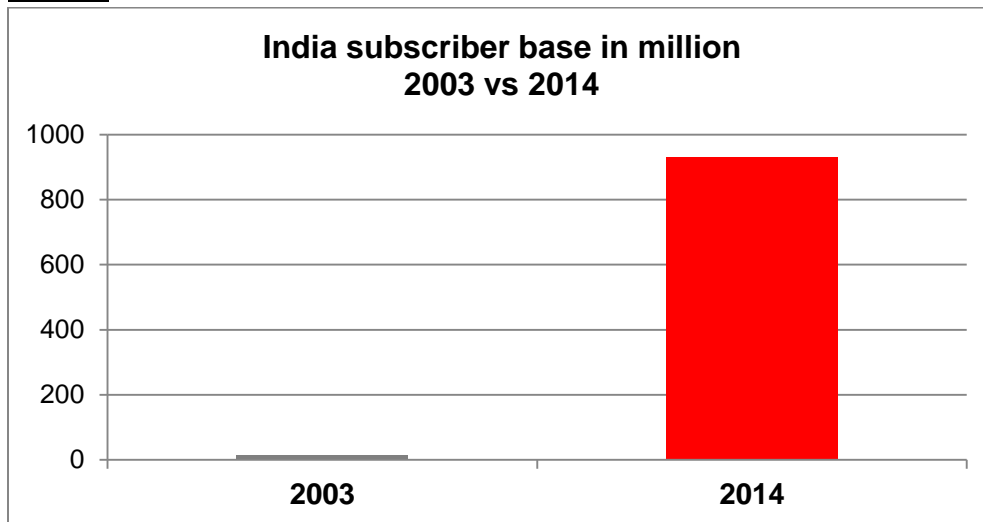
Chart-1



The CPP regime has supported penetration growth across India and allowed marginalized subscribers in rural areas to connect as there are no charges on incoming calls. Further, the related termination regime on a CPP basis has helped operators to invest in rural areas and recover costs from these marginal subscribers facilitating social inclusion and increased economic connectivity.

CPP regime has played an important role to achieve the national stated objectives and we believe continues to do so in the future.

Chart-2



We further note that worldwide wherever CPP regime is applied regulators have implemented cost based/ cost oriented costing approaches for interconnect pricing/ IUC.



To the best of our knowledge, we have not observed any country where CPP regime is in place in the retail market and a Bill and Keep (B&K) regime applies at the wholesale level. The following table published by TRAI in its consultation paper on Review of Interconnection Usage Charges, dated 27th April 2011 illustrates the same.

Table 4

SL. No.	Country	Charging Method	Approach	MTC/FTC Regulated
1	Australia	CPP	Cost Based/ Cost Oriented	Yes
2	Brazil	CPP	Cost Based	Yes
3	Canada	RPP/BAK (Effective Bill and Keep)	Cost Based/ Cost Oriented	Yes
4	China	RPP	Cost Oriented	Yes
5	Egypt	CPP	Cost Oriented	Yes
6	France	CPP	Cost Based/ Cost Oriented	Yes
7	Germany	CPP	Cost Based/ Cost Oriented	Yes
8	Hong Kong	RPP	-	Free to set parties agree for “BAK”
9	Italy	CPP	Cost Oriented	Yes
10	Korea	RPP	Cost Based/ Cost Oriented	Yes
11	Malaysia	CPP	Cost Based/ Cost Oriented	Yes
12	Pakistan	CPP	Cost Based/ Cost Oriented	Yes
13	South Africa	CPP	Cost Based/ Cost Oriented	Yes
14	UK	CPP	Cost Based/ Cost Oriented	Yes (Capping of MTRs)
15	USA	RPP	F to M & M to F- Reciprocal	F to M & M to F- Yes
			M to M- Commercially Negotiated	M to M- No

Source: TRAI’s CP on review of IUC dated 27th April 2011

We further note that **The Interconnection Principles contained in the WTO Regulation Reference Paper** advice for *“cost-oriented rates that are transparent and reasonable, having regard to economic feasibility”*.



We therefore fully support the Hon'ble Authority's decision with respect to Bill and Keep (B&K) as concluded in its IUC Regulation 2009¹⁷ *"The bill and keep proposal of the service providers was analyzed and it was noted that this could mean return to situation prevalent before the present IUC regime was established i.e receiving party used to pay for incoming calls. One of the fundamental principles of prescribing IUC regime was work done principle. It was also noted that tariff before the IUC regime were very high tariff. The service providers may again resort to charging their own subscribers for receipt of calls or increase fixed charges of providing the services. As the service providers do not have to pay for termination of calls into other service provider networks they may offer plans with free calls which could load other service providers' networks. Bill and keep regime may also reduce call completion rate as the terminating network will not have any incentive to complete the call. **Bill and keep scheme would not necessarily lead to the lower tariff as is evident from the tariff offered by the service provider in case of SMS etc"***

The current regulatory and industry environment in India thus calls for continuation of a cost-based regime considering in particular:

1. The applicability of 'calling party pays' (CPP- regime).
2. Policy objectives to accelerate rural network roll-out and socio-equitable service reach under consideration of significant income disparities.
3. The fact of different network sizes and ultimately different network coverage areas and reach.
4. The risk of B&K to generate an inefficiently high level of traffic, which can generate negative call externalities through heightened proliferation of marketing and SPAM calls.
5. The strong "economic rationale" of cost oriented or cost based IUC price regulation as acknowledged by TRAI. In accordance with economic theory, market prices should be set with reference to the costs of an efficient operator to mirror the outcomes of a competitive market. Thereby cost-based IUC charges will limit productive and allocative inefficiencies as they reflect the efficiently incurred costs of service provision.

In view of above facts & analysis, we recommend that under the CPP regime (as applicable in India) only "Cost based or Cost Oriented" approach would be more relevant.

¹⁷ Para 5.3.13 of explanatory memorandum to the telecommunication interconnection usage charges (tenth amendment) regulation, 2009 (2 of 2009) dated 9th March 2009.



Q.2 In case cost-oriented or cost-based approach is used for determining Mobile Termination Charge and Fixed Termination Charge, is there a need to give a glide path towards Bill and Keep and what will be the appropriate time frame to migrate to Bill and Keep regime?

No, as explained in the response to Q1 above, we believe that there is no basis for a glide-path to B&K with a CPP regime.

As Bill and Keep (B&K) regime has fundamentally different parameters and therefore the application of a glide path towards this regime is inconsistent with regulatory principles and policy goals for the Indian telecommunication sector at large.

We believe that as per generally accepted regulatory principles/practices, Bill and Keep (B&K) cannot be implemented under the CPP Regime, and therefore there is no question of migration towards B&K.

In respect of glide path, we understand from other jurisdictions that Regulators have adopted a glide path approach only when the termination charges were fixed/ determined well above the cost base OR initial termination charges were too high; therefore, Regulators have aligned the termination charges to cost by following the glide path approach to allow operators time to adapt their business models. This is not the case for Indian MTC where charges are currently below cost due to the exclusion of CAPEX costs.

It is also observed that in the European countries where initially Mobile Termination charges were high if compared with Fixed Termination Charge (in some cases more than ten times) and mobile termination charges were not cost based OR there is a change in the costing standard or methods; in such cases, Regulator has adopted the concept of glide path; and, we do not think that it is the case in India.

We suggest that IUC /MTC may be reviewed at an appropriate interval time (say every 3~5 Years).

Q.3 Which method of depreciation for the network elements should be used and what should be the average life of various network elements?

Depreciation is an important component of total costs in any capital-intensive industry, such as telecommunications.



We note that in the past TRAI has used Straight Line Method (SLM) for determination of depreciation in all telecom pricing/ tariff fixation/IUC and TRAI has taken 10 years as an average life of various network elements.

We strongly believe that **under a FAC model, SLM would be an appropriate approximation** for determination of “depreciation cost” as it is easily calculated and verified from accounting statements. With respect to average life time, we encourage TRAI to consider our recent cost data submissions which clearly outline the relevant average life times for different network elements. Further, we believe that for spectrum licensing costs the period of the spectrum license should apply.

We further submit that if TRAI were to implement a **forward looking LRIC or LRAIC approach** the “economic depreciation¹⁸ methodology” or “tilted annuity approach” would be more appropriate. We note that worldwide most of the telecom regulators have adopted the “tilted annuity approach” or “economic depreciation” in price fixation if a LRIC methodology was used.

Q.4 Should TRAI continue with a pre-tax WACC of 15% as used in framing other regulations, tariff orders, and regulatory exercises? If not, please state what pre-tax WACC would be appropriate for the present exercise, along with justification and computations.

No, we note that present Pre-tax WACC i.e. 15% was determined by TRAI in 2004, since 10 years have already elapsed, therefore, there is a need for a fresh look of WACC determination, specifically due to change in regulatory, economic and political environments. It is important to mention that over the period of time, regulatory and financial risks of wireless segment has increased manifold.

We note that in other jurisdictions, the regulatory Authorities initiate a separate consultation paper on determination of Weighted Average cost of capital (WACC) of the Industry. This is because WACC is the single-most important input into a cost model as it sets the overall level of return that an efficient investor/operator requires. As noted above, the level of profitability in the industry as at a level that is not sustainable in the long-run. It is important that TRAI gives due consideration to this important parameter by developing its own WACC calculation and inviting industry to comment.

¹⁸ A detailed study titled “Evaluating Economic Depreciation Methodologies for the Telecom Sector” is available on <http://www.vandijkmc.com/files/cms1/Economic%20depreciation%20methodologies.pdf>



As part of that process Vodafone would be happy to provide its own detailed WACC calculation once the preferred methodology of TRAI is understood. **We believe that at least a Pre-Tax WACC of 19% would be appropriate for IUC.** A detailed study conducted by renowned Prof. Steve G Parsons on WACC is attached at **Annexure - III**

Q.5 In case a cost-oriented or cost-based approach is used for prescribing Mobile Termination Charge and Fixed Termination Charge, which method would be the most appropriate for estimating these costs?

At the outset it is important that any chosen costing approach provides incentives for investment, innovation and inclusion.

Further, **it is also necessary that the costing approach must consider the work done principle.**

Considering the opportunities that the right incentives hold for India not only from an industry but more so from an economic productivity perspective, we strongly believe that a Fully Allocated Cost (FAC) method that allows for both CAPEX and OPEX recovery or a Long Run Average Incremental Cost (LRAIC) approach considering common costs, in particular relevant spectrum expenditures are adequate methodologies for estimating the costs involved in providing the termination services.

The Hon'ble Authority has very rightly noted in the present consultation paper that the FAC method has the advantage of simplicity, auditability, and it also ensures that costs corresponding to each network element are reckoned on the basis of work done.

We also understand that in the past and some very recent determinations, the Hon'ble Authority has used FAC method for **determination of charges/ tariff under the regulations or TTOs**, some of the exercises are summarized below;

Table 5

Name of the Network services/ products	Costing approach	Source of Data	Cost base	Costs considered
IPLC (half circuits)	FAC	Accounting Separation Reports (ASR)	Historical cost	OPEX+ Capex recovery i.e. Depreciation and RoCE



Port Charges	FAC	ASR	Historical cost with individual updated cost data	OPEX+ Capex recovery i.e. Depreciation and RoCE
Cable Landing Station (CLS) Access charges	FAC	ASR	Historical cost with individual updated cost data	OPEX+ Capex recovery i.e. Depreciation and RoCE
ILD Calling Card – Access Charge (Outgoing)	FAC	ASR	Historical cost	OPEX+ Capex recovery i.e. Depreciation and RoCE

Therefore, we recommend that under the present circumstances of the wireless industry, the cost based - FAC Top-down approach ensuring both sufficient CAPEX and OPEX recovery may be more appropriate for estimation of various costs under the IUC exercise at this point in time.

Q.6 In case your response to the Q5 is fully allocated cost (FAC) method, would it be appropriate to calculate IUC using historical cost data submitted by the service providers in Accounting Separation Reports (ASRs), Annual Reports/published documents or other reports submitted to TRAI?

Considering the “work done”-principle and the requirements to ensure transparency as well as comparability, we believe that the Accounting Separation Reports provide a good basis for the historical cost data to calculate the IUC.

However, it is submitted that at the time of using the data, there should be consistency in the source of data; otherwise, final result will provide a distorted picture. There should not be any cherry-picking of information from different sources.

Q.7 In the FAC method, what items/nature of OPEX should be considered as relevant for the termination cost? Please provide justification in support of your opinion.

As per generally accepted costing principles/ practices, FAC includes all costs whether it is Opex or Capex recovery i.e. depreciation + RoCE/WACC. All cost items (OPEX+ CAPEX) should be allocated based on work done principles. We note that present termination charges



(MTC and FTC) have been arrived based on the principle of two-part costing/ tariffs, where CAPEX (such as Depreciation and cost of capital) will be recovered through Rental or Fixed Charges whereas OPEX i.e. relevant OPEX has been recovered through per-minute termination charges.

It is important to highlight that the two-part costing/ tariff methodology was devised when access services were dominated by the fixed line service providers (DoT/BSNL/MTNL) where it was possible to implement the two part costing methodology. However, it would not be feasible to continue with the same methodology when access market is pre-dominated by wireless communications and it is further dominated by pre-paid subscribers.

We therefore support the Hon'ble Authority's assessment that "(...) the utility of two-part tariffs is debatable in the Indian market context as the latter is predominantly mobile (not fixed line) as is further dominated by pre-paid subscribers."

We note that in other segments / products, TRAI has not used two-part costing methodology for determination of prices / tariffs.

In fact except for termination charges (MTC and FTC) TRAI has considered the total costs (OPEX+ CAPEX) for determination of charges or tariffs, refer table 6 below.

Table 6

Name of the Products/ Network services	Cost considered for determination
Carriage charges	OPEX+ Depreciation+ cost of capital
Mobile Number portability (MNP) charges	OPEX+ Depreciation+ cost of capital
Roaming charges / SMS termination charges	OPEX+ Depreciation+ cost of capital
Cable landing Station (CLS) access charges	OPEX+ Depreciation+ cost of capital
Domestic leased Circuits (DLC)	OPEX+ Depreciation+ cost of capital
International Private leased Circuits (IPLC)	OPEX+ Depreciation+ cost of capital
ILD Calling Card – Access Charge (Outgoing)	OPEX+ Depreciation+ cost of capital
Port Charges	OPEX+ Depreciation+ cost of capital



We strongly suggest that the same should apply to the calculation of costs for MTC and FTC. Therefore, we do not believe there is any reason to not allow the CAPEX recovery for the purpose of determination of MTC.

It is for this reason that we believe that the following indicative cost items need to be considered as relevant cost for determination of termination cost;

Table 7

Sl. No	Particulars	Cost to be considered for termination cost
	Cost Items	
1	Pass through Charges (IUC)	No
2	Employee Cost	Yes
3	Administration Cost	Yes
4	Sales & Marketing	Yes ¹⁹
5	Maintenance charges	Yes
6	Government Charges (LF+ SUC)	To be loaded separately
7	Network Operating Cost	Yes
8	Other operating Costs-	Yes
9	Other Costs- Loss of sale of fixed assets (net)	No
10	Finance Charges (Excluding Interest on Loans)	Yes
11	Depreciation and Amortization	Yes
12	Return on Capital Employed (WACC Rate * Capital Employed)	Yes
	Total Costs (Opex+ Capex)	

Q.8 Should CAPEX be included in calculating termination cost? If yes, what items of fixed assets from the ASRs ought to be considered relevant for termination cost? How should costs incurred by service providers for acquiring usage rights for spectrum be treated?

Yes, it is submitted that CAPEX is an integral part of total costs for any telecom pricing therefore, it should be included in termination cost as well.

¹⁹ AS per TRAI's approach S&M has not been considered, however we believe that some proportion of this costs could relate to wholesale



The following items of fixed assets should be considered for computation of capital employed and CAPEX recovery i.e. amount of depreciation and cost of capital for determination of termination charges;

SL. No.	Particulars	To be Included for Capex recovery ²⁰ for termination charges
	Tangible Assets	
1	Land	Yes ²¹
2	Building	Yes
3	Plant and machinery (All Network elements ²² which are necessary to provide the termination service should be considered)	Yes
4	Computers	Yes
5	Office equipment	Yes
6	Furniture and fixtures	Yes
7	Vehicles	Yes
	Intangible Assets	
8	License (Entry License Fee and Right to use the spectrum)	Yes
9	Patents / technical know how Others	Yes

Treatment of acquiring usage right for Spectrum:

As per Generally accepted accounting principles (GAAPs), the costs incurred by service providers for “acquiring usage rights for spectrum” should be considered as an Intangible asset and as part of fixed assets of the service providers. Therefore, the amount of amortization and cost of capital on Net value²³ of spectrum right should be the part of CAPEX recovery.

Further, we believe that Spectrum is fundamental to mobile telecommunication system, and wireless services cannot be completed (whether incoming or outgoing) without this

²⁰ Capex Recovery means Depreciation and cost of capital (RoCE)

²¹ Only RoCE

²² Network elements indicated in the Schedule II of The Reporting System on Accounting Separation Regulations, 2012 (7 of 2012) dated 10th April 2012 shall be considered.



resource. Moreover it is a 'scarce' natural resource and cost of using this scarce resource should be reflected in efficient interconnection pricing. Ignoring this fundamental principle will send wrong economic signal, and hence we strongly believe that Spectrum costs needs to be reflected in MTC. In markets where regulators have adopted FAC or LRAIC methodologies, the MTC has always included a share of spectrum costs. Even under the pure-LRIC methodology the European Commission recommended that part of the spectrum costs should be included in the MTC²⁴.

Q.9 Would it be appropriate to take an average life of 10 years for all network elements without any salvage value for the purpose of depreciation in the FAC method? If not, please suggest an alternative method keeping in view the categorization of network elements prescribed in Accounting Separation Regulations, 2012, along with justification.

Please refer our response to Q.3

Q.10 Is there any need to adjust costs associated (as reported in ASRs) with products other than voice calls, for the purpose of computing termination cost using the FAC method? If yes, please suggest the appropriate cost driver along with justification.

Yes, costs pertaining to non-voice products can be segregated based on resource utilization or activity based costing (ABC) i.e. converting the non- voice usage (Data/SMS) into minutes equivalent, and then relevant total cost can be attributed to the total equivalent minutes. The approach and modalities of conversion factors can be discussed among all relevant stakeholders.

Q.11 Do you agree with the methodologies explained for various variants of LRIC, including the detailed description of computation of the termination cost using LRIC model in the Annexure? If not, please give your answer with justification.

LRIC is the incremental costs that arise in the long run with a specific increment in volume of production. An increment is the unit of output over which costs are being measured. Incremental costs measure the cost variance when increasing or decreasing the production output by a substantial and discrete increment.

²⁴ http://ec.europa.eu/smart-regulation/impact/ia_carried_out/docs/ia_2009/c_2009_3359_en.pdf (ref page 11)



It is important to note that each forward looking costing approach i.e. LRIC has its own strength and weakness, therefore methodology must strike the balance between competitive objectives, stated objective under the national telecom policies and in particular investment protection.

With respect to LRIC and its variances, TRAI has noted in its IUC Regulation 2009 that these are very subjective, complex and time-consuming to develop. They are not based on accounting procedures and therefore difficult to audit. Moreover, the Hon'ble Authority has very rightly noted²⁵ that *“Therefore, it would not be appropriate to use a model, which is complex, subjective and does not seem to confer any great advantage for calculating mobile termination charge. On the other hand the top down model taking data from annual report, account separation report etc. of the service providers with proper normalization and adjustment would be less subjective, verifiable and would not lead to of much difference in estimating the termination charge.”*

We strongly believe that even under the present circumstances, the Hon'ble Authority's decision regarding the non- applicability of LRIC model for termination charges is still valid.

However, a critical analysis and comments on TRAI's suggested LRIC approach with respect to its annexure attached to the consultation paper is attached as **Annexure –IV**.

Q.12 In case it is decided to go for an LRIC model for determining termination cost, which is the most suitable variant of LRIC for the telecom service sector in the country in the present circumstances and why?

- **LRIC**
- **LRIC+**
- **Pure LRIC**

We believe that under the present circumstances FAC is the right approach for determination of termination charge, however w.r.t. LRIC approach, we would like to submit the following:

We note that most of the regulators of developed economies are generally using LRIC methodologies including LRIC+ and pure LRIC to price termination rates as per their country specific objectives and policies.

²⁵ Please refer to Para 5.3.9 of explanatory memorandum to the telecommunication interconnection usage charges (tenth amendment) regulation, 2009 (2 of 2009) dated 9th March 2009.



We understand that the preliminary objective of all of the LRIC approaches is that the IUC/MTC should be determined based on the long run incremental costs of providing the service. Long run incremental costs are costs over a specified 'increment' of the service being provided in the long run.

We note that the LRIC/LRIC+ and pureLRIC concepts differ in terms of what the 'increment' is

Under the pure LRIC approach, the relevant increment is defined narrowly as the wholesale termination service provided to access seekers. In contrast, under the LRIC+ approach, the relevant increment is more widely defined to include fixed common and joined costs.

Other things being equal, the costs estimated using a pure LRIC approach will be lower than the costs estimated under a LR(A)IC approach, which themselves would be lower than the costs estimated under a LR(A)IC+ methodology.

We note that Pure LRIC does not take into account traffic-related common costs or organizational-level costs, therefore, access service providers would not be able to achieve full cost recovery if all of its services were priced using a pure LRIC approach.

Pure-LRIC, a LRIC variant, was recommended by the European Commission in 2009, and adopted by a number of (but not all) European Member States, with the main objectives of delivering rate harmonization across jurisdictions, networks and technologies (e.g., between fixed and mobile) and to yield lower rates in the context of high penetration markets.

We also note that the telecommunication experts are of the view that a Pure LRIC approach is generally suited to highly penetrated, mature mobile markets, such as those in Western Europe, and less well suited to developing markets that have less penetrated markets, such as India. The experts have noted that while it may lead to short-term reductions in retail prices, it would reduce operator profitability and hence may lead to a reduction in investment and innovation incentives to the detriment of the longer-term development of the sector and the broader economy. Further, it may lead to retail price increases to recover costs not covered by the IUC regime.

It is important to mention that the Pure LRIC approach has been rejected in a number of countries. For example, the German regulator (BNetzA) rejected using Pure LRIC to inform IUCs in favour of a LRIC+ approach in order to maintain investment incentives and in the Netherlands, the regulator's (OPTA) decision to move to a Pure LRIC approach to inform IUCs was overturned by the Appeal Tribunal as it was argued that Pure LRIC was neither proportionate nor necessary, and that IUCs set on the basis of LRIC+ already guaranteed cost orientation.



In view of above facts and analysis, if the Hon'ble Authority believes that Indian telecom sector is ready to adopt the forward looking costing approach i.e. LRIC under the present circumstances, then we believe that LR(A)IC+ would be most appropriate approach

However, considering the complexities and significant techno-commercial assumptions (whether at Access level or Core level or Transmission level) involved in designing a hypothetical efficient network that would attempt to reflect significant variations of Indian market and geographies; we strongly recommend that there should be an industry focus group created separately, to work out various technical and commercial parameters, including but not limited to routing table, network design, and other financial and non-financial assumptions that play an important role in the framework of LR(A)IC+ approach and final outcome.

Q.13 In case your response to the Q12 is LRIC+, what are the common costs that should be considered for computation of termination costs?

It is submitted that common costs are those costs which cannot be directly allocated to the networks services/ services and these are necessary costs to operate the business.

Common costs are shared by all the network services or products of the company (for example, the fixed costs of acquiring licenses). Common costs include the remainder of the costs that are not directly attributable/ allocable.

We believe that the following costs as relevant common costs:

- Joint and common network costs
 - Research and development costs
 - Headquarter expenses/ corporate office expenses
 - Finance, legal, regulatory and HR department costs
 - License acquisition cost i.e. Entry Fee
 - Enterprise IT system Cost
 - Cost of other supporting departments etc.
-

Q.14 In case there is a significant difference in the mobile termination cost and fixed termination cost, will it be appropriate to prescribe different mobile termination charge and fixed termination charge?



It is submitted that TRAI may continue with its present approach where FTC and MTC are on the same level, unless TRAI believes that there is a significant difference in cost, then the underlying efficient costs of the access service providers may be ensured at an efficient network utilization level.

Q.15 The Authority has already prescribed access charges to facilitate the introduction of calling cards. Is there any other issue which needs to be addressed so that the consumer gets the most competitive tariff for ISD calls?

We have concerns on certain aspects with regard to the Calling Card Regulation, which we have already shared with the Authority. Further, at this juncture, we are of the view that Hon'ble Authority should take urgent necessary legal steps to vacate the interim stay granted by Chennai High Court on TRAI's CLS AFC & COLO Charge Regulation of December 2013 so that desired benefit reaches to the consumers on ISD calls.

Q.16 Do you feel that the Authority's intervention is necessary in the matter of International Settlement Rates? If so, what should be the basis to determine International Settlement Rates?

No, we are of the view that it is not in the jurisdiction of TRAI to regulate foreign operators on international settlement rates. This should be left upon the mutual agreement basis between the Indian ILDOs and Foreign Telcos. However, we request the Hon'ble Authority to upwardly revise the termination charge to be paid to Access operators for incoming international calls to at least @Rs.1/min from the current termination rate of 40p/min. This will strengthen the ILDOs to negotiate a higher settlement rates with foreign operators. This will not only put ILDOs in a comparatively competitive position with foreign operators but also generate more foreign exchange for the country.

Q.17 Is there a need to fix a floor for international carriage charge for incoming international traffic or prescribe some revenue share between access service provider and the ILDO to safeguard the interest of ILDOs?

No, the situation does not arise in view of our response to Question 16 above. The revenue share between Access Providers and the ILDOs should continue to be left upon mutual agreement basis which is dependent on ILD termination rate. The Hon'ble Authority,



therefore should upwardly revise the current ILD termination rate to Rs.1/- per minute from the current rate @40p/min.

Q.18 What is the most appropriate level for International Termination Charge? Should it be uniform or should it depend on the originating country/region? Please provide full justification for your answer.

We are of the view that existing termination charges for the incoming international calls to India needs an urgent review and we recommend an increase of the same to at least @ Rs.1.00 per minute from the current charge of 40p per minute fixed by TRAI in 10th Amendment to IUC Regulations dated 9th March 2009.

We draw Hon'ble Authority's attention on the below rationale behind the recommendations to increase the same at the level of at least Rs.1/ per minute. The same was represented by COAI also vide its letter dated 27th December 2013.

- a. An increase up to the level of 800% has been witnessed on international call termination rates in the past one an year that too in the countries like Pakistan and Bangladesh. The termination rates charged to India by UAE have increased from Rs.6.18 to Rs.8.04 during the last 4 years.
- b. The increased termination rates to at least Rs.1/- per minute will help to reduce the pricing arbitrage currently existing in favour of foreign operators.
- c. An increase in termination rates will help our country to earn valuable foreign exchange.

We do not suggest any regulatory intervention for revenue share between access provider and ILDOs in view of high competition in both the categories and thus it best be left to be decided by market forces on mutual agreement basis.

We are of the view that the ILD termination charge should be on uniform basis to avoid potential disputes / queries by Access Providers and foreign Telcos.

Q.19 What should be the methodology for determining the domestic carriage charge? Is there a need to specify separate carriage charges for some specific geographic regions? If yes, on what basis should such geographic regions be identified? How should the carriage charges be determined separately for such geographic regions?



We are of the view that Domestic Carriage Charge to be paid to NLDO should continue to be @0.65p /min as per prevailing ceiling prescribed by TRAI. By keeping the ceiling of 65p/min intact will cater to all geographic regions as well as specific geographic regions on mutual agreement basis. There is enough competition in NLD segment and thus it should be left upon to be decided on mutual agreement basis within the TRAI ceiling@65p/min.

Q.20 Is there a need to regulate the TAX transit charges or should this be left to mutual negotiations? In the event, the transit charge is to be regulated, please provide complete data and methodology to calculate TAX transit charges.

We understand that this is applicable in case two telecom networks are not directly connected, and an intermediate network is used in exceptional circumstances; through which calls are transmitted to the terminating network.

Generally, since direct connectivity amongst various service providers is permitted and preferred; in such a case, no transit charges are applicable. However, in exceptional situations where direct connectivity may not be possible or due to emergency breakdown etc., and for overflow traffic, traffic can be routed through an alternate route through a transit switch.

In such an interim situation such facility should be time bound and charges for such facility should be cost based and work-done principle.

Therefore we submit that:

1. TAX transit charges should not be levied in case of inability of the PSU to provide connectivity at its Mobile MSC
 2. However, the Tax Transit Charge should only be applicable if due to emergency break-down or an originating network requesting for transit through the transiting/alternative network operators
 3. In such a case, the TAX transit charge should only be cost based on work-done principle
-

Q.21 How can the cost of providing transit carriage be segregated from the cost data in the ASR? Please provide a method and costing details to separately calculate this charge.

AND

Q.22 If the costs of all relevant network elements are taken into account in the calculation of the fixed line termination charge, is there any further justification to have a separate transit carriage charge? Please give reasons for your answer.



We note that under the IUC regime there are mainly 3 components:

1. The origination,
2. The Carriage and
3. The Termination Charge

Therefore considering a 'transit carriage charge' over and above does not appear appropriate. Since, inter-operator usage costs incurred by the operators are recovered through these 3 components; we believe that a transit carriage charge is not applicable.

It may also be noted that BSNL does not provide direct POIs at SDCA, rather has declared Level-2 TAX as the only point of termination for intra-circle calls from mobile to Fixed-line of BSNL. This de-facto makes intra circle mobile calls to BSNL Fixed Line subscribers mandatorily to be handed over by Access Providers /CMSPs at Level-2 TAX where it is carried by BSNL to SDCA in which the subscriber is located; for which BSNL charges this carriage; which is nothing but a monopoly situation.

Also, if a charge for usage of the Access network (whether mobile or fixed) for a call is already determined (i.e. fixed termination charge), there should not be a separate charge for the same service, just because a point of handover is unilaterally decided by the BSNL.



Annexure –I
Statement of Revenue and cost Analysis per user basis

Statement of Revenue and cost Analysis per user basis							
Sl.No.	LSA	LSA Category	ARPU (Rs)	ACPU (Rs)	EBIDTA Margin (%)	Loss per User (LPU) (Rs)	LPU as % of ARPU
1	Delhi	Metro	116.54	128.03	17.62%	11.49	9.86%
2	Kolkata	Metro	79.68	108.36	-6.01%	28.68	35.99%
3	Mumbai	Metro	132.02	186.48	-7.45%	54.46	41.25%
4	AP	A	106.14	106.53	21.38%	0.39	0.37%
5	Gujrat	A	85.59	101.18	5.40%	15.59	18.21%
6	Karnataka	A	100.91	119.13	8.70%	18.22	18.06%
7	MH	A	93.23	100.06	16.91%	6.83	7.33%
8	TN	A	97.89	110.94	14.60%	13.05	13.33%
9	Haryana	B	70.49	94.85	-9.46%	24.36	34.56%
10	Kerala	B	112.66	115.80	16.30%	3.14	2.79%
11	MP	B	72.13	88.17	0.34%	16.04	22.24%
12	Punjab	B	93.08	103.82	11.96%	10.74	11.54%
13	Raj	B	81.58	88.40	12.22%	6.82	8.36%
14	UP- (E)	B	73.70	81.20	8.98%	7.50	10.18%
15	UP- (W)	B	72.41	94.37	-4.99%	21.96	30.33%
16	WB	B	64.26	81.48	-3.17%	17.22	26.80%
17	Assam	C	111.64	127.09	7.59%	15.45	13.84%
18	Bihar	C	68.13	85.43	-2.46%	17.30	25.39%
19	HP	C	71.43	85.56	8.50%	14.13	19.78%
20	J&K	C	137.53	171.33	3.34%	33.80	24.58%
21	NE	C	109.59	116.08	16.65%	6.49	5.92%
22	Orissa	C	69.45	94.27	8.55%	24.82	35.74%

Source: TRAI



Annexure –II

Statement of computation of access cost of outgoing and Incoming per Voice minute basis				
Sl. No	Particulars	Amount allocated to outgoing calls (O/g)	Total access cost wireless Industry FY 2012-13	Amount allocated to incoming calls (I/c)
		(Rs in Crore)		
A	Costs :	46035	80854	34819
	(i) Sales & Marketing Cost	12581	12581	0
	(ii) All other Costs	33454	68273	34819
B	Capital Employed	57873	118108	60235
C	Return on Capital Employed (RoCE) @15%	8681	17716	9035
D	Total Access Cost including RoCE---(A+C)	54716	98571	43855
E	Minutes of Usages (in Crore)	178490	364265	185775
	Access Cost per Minute (Voice) (in Paisa)			
F	Access cost (O/g and I/c) including RoCE ---- (D/E)	0.31		0.24
	Access cost per minute after loading LF (8%) & SUC (5%)	0.35		0.27
G	Mark-up allowed by TRAI	15%		15%
H	Final charges fixed by TRAI for outgoing call	0.40		
	Charges estimated by Vodafone based on TRAI's principle for incoming call (Voice Minute)			0.32
<i>Source: TRAI's Regulation on International Calling Card Services dated 19th August 2014 and Vodafone Analysis</i>				

Weighted Average Cost of Capital (WACC)

Concepts, Best Practices, Calculations & Data

Parsons Applied Economics¹

May 2011

I. Overview

This paper discusses the concepts and principles underlying weighted average cost of capital (WACC) and provides descriptions and sources that discuss international best practice related to WACC in telecommunications.

Moreover, we employ three forms of calculations consistent with best practices for the telecoms industry in India; a summary of the three calculations is shown below in table 1.

Table 1 – Pre-tax nominal WACC for India Telecoms Industry

	Low	Mid	High
10 yr Indian Government Bond Rate	16.05%	19.86%	28.12%
Academic estimated risk-free rate	15.88%	21.65%	29.96%
International country risk premium	12.98%	15.70%	17.65%
Average value	14.97%	19.07%	25.24%

As explained in greater detail in section IV below, refinements to these calculations could be made with additional data. However, absent additional data, an average of the three approaches is a reasonable choice for the WACC to be used in a calculation of an industry-wide call termination rate for India.

This paper is structured as follows:

- Section II outlines relevant best practice documents related to the concepts of WACC and their calculation and application in telecommunications;

¹By Steve Parsons, Ph.D. (President Parsons Applied Economics, adjunct professor Washington University, St. Louis, Graduate School of Engineering) and Jim Ramsey (cost consultant, Parsons Applied Economics, previously cost analyst for Pacific Bell Telephone).

- Section III outlines the general principles of WACC and the CAPM approach generally used throughout the world;
- Section IV describes in more detail our estimates of a range of reasonable WACC values for the Indian telecommunications industry.
- Section V outlines the best practice principles outlined by the Independent Regulators Group.

II. Relevant Best Practice Documents

We identify two important best practice documents that describe the concepts underlying WACC and their application in telecommunications regulation.

The first document comes from the Body of European Regulators for Electronic Communications and the Independent Regulators Group, representing 34 European telecommunications regulators.

- Regulatory Accounting Principles of Implementation and Best Practice for WACC calculation February 2007
http://www.erg.eu.int/doc/publications/erg_07_05_pib_s_on_wacc.pdf

This document is relatively exhaustive in its treatment of the relevant topics. Some of the more important principles of implementation and best practice (PIBs) are listed in section V below. The second document comes from the International Telecommunication Union (ITU) and is a training document presented by the ITU in November 2010 for Asia and Pacific countries. This power point presentation provides short descriptions of many of the key theoretical constructs. In addition, it provides many examples of gearing ratios, risk free returns, beta coefficients for telecom companies or weighted averages for the telecom sector, equity risk premiums, country risk premiums, and complete pre-tax WACCs.

- ITU expert-level training on network cost modeling for Asia and Pacific countries, Cost of Capital – WACC Mobile networks, November 2010

http://www.itu.int/ITU-D/finance/work-cost-tariffs/events/tariff-seminars/Bangkok-10/pdf/part_2_cost_accounting_model_wacc.pdf

A third document is useful, which describes in detail the calculation of nominal pretax WACC for mobile telecoms in Finland. Later, we use this document as a template for calculating the WACC for the telecoms industry in India.

http://www.google.com/search?q=estimating_the_cost_of_capital_for_finnish_mobile_telecommunications.pdf%2F&rls=com.microsoft:en-us&ie=UTF-8&oe=UTF-8&startIndex=&startPage=1&rlz=1I7GFRC_en

III. General Concepts

Weighted Average Cost of Capital (WACC) is the full opportunity cost of money for investments. It is the minimum return that a company must earn on an existing asset base to satisfy its creditors, owners, and other providers of capital, or they will invest elsewhere.

For a simplified description of pre and post-tax WACC, see slide 4 of the ITU, 2010 power point file.²This states:

$$WACC_{pre-tax} = \frac{R_e}{(1-t)} \left(\frac{E}{(D+E)} \right) + R_d \left(\frac{D}{(D+E)} \right) \quad \text{(Equation 1)}^3$$

Where:

R_e is the expected rate of return of equity, R_d is the rate of return for debt, D is the value of debt, E is the value of equity, and t is the tax rate.

Somewhat more specifically, the Capital Asset Pricing Model (CAPM) is the most common tool used to estimate the cost of equity component of the WACC, and is consistent with international best practice. The CAPM approach to estimating cost of equity is estimated as follows:

$$R_e = R_f + \beta_i (E(R_m - R_f)) \quad \text{(Equation 2)}$$

Where:

²http://www.itu.int/ITU-D/finance/work-cost-tariffs/events/tariff-seminars/Bangkok-10/pdf/part_2_cost_accounting_model_wacc.pdf

³ Wikipedia provides (http://en.wikipedia.org/wiki/Weighted_average_cost_of_capital) a more general presentation allowing for multiple types of securities (e.g., preferred stock, and multiple types of debt), but in more complex

form:
$$WACC = \frac{\sum_{i=1}^N r_i \cdot MV_i}{\sum_{i=1}^N MV_i}$$
 where N is the number of sources of capital (securities, types of liabilities); r_i is the required rate of return for security i ; MV_i is the market value of all outstanding securities i . It is best to think of this equation as representing the *post-tax WACC* (and would also represent the special case if the income tax rate were zero). That is, it is best to think of r_i as the required return after all other business expenses are incurred, including the payment of income taxes.

R_e is the expected rate of return for the equity asset; R_f is the risk free rate of return, which is typically the rate on government bond; β_i is the asset beta; and $E(R_m - R_f)$ is the market risk premium, which is the rate of return the investors need (expect) to earn over and above the risk free rate.

Equation 1 represents the **Pre-tax WACC** and is computed as a weighted average of the cost of debt and the tax-adjusted cost of equity (cost of equity divided by 100 minus the percentage effective tax rate).⁴

A cost calculation (such as for call termination rate) should utilize either: 1) the post-tax WACC (which includes the full payment to debt, and the required post-tax return to equity), then explicitly add the cost of associated income taxes; or 2) use a pre-tax WACC in which the income taxes are already implicitly included in the WACC value.

Calculation of the WACC involve several choices between alternative approached. These choices are outlined below.

Pre-tax or Post-tax WACC

One valid method is to utilize the post-tax WACC, and then explicitly add the income taxes that would accrue if earnings were just equal to the level that would yield that return to equity. Alternatively, one can utilize the pre-tax WACC, and the relevant tax costs are already implicitly included in the WACC value.

In telecommunications, the majority of reported and calculated WACCs around the world are nominal pre-tax WACCs. The major exception to the use of pre-tax WACC is the United States. In the U.S., the tradition has been to calculate, employ, and discuss **post-income-tax** WACCs, and separately include the costs of taxes. The reason for this is likely that there are different jurisdictions in the U.S. having different income tax rates. The federal income tax rate is consistent across the U.S., but each state has a different income tax rate (from 0.0% to over 9.0%), and some municipalities also employ an income tax (e.g., the city of St. Louis has a 1.0% income tax rate). Therefore, the FCC established an 11.25% after-tax WACC, but, essentially, left the inclusion of income tax to the individual states.

When WACC is used to set actual market prices, it is appropriate to use pre-tax WACC as this represents the revenue needed prior to taxation to cover the cost of capital.

Choice of the Tax Rate

⁴ See for example, UK Competition Commission “WACC and Tax Adjustments” Appendix 8.3, available at http://www.competition-commission.org.uk/rep_pub/reports/2000/fulltext/445a8.3.pdf

The relevant tax rate is that which would accrue if the firm were just covering its costs and earning its required return on equity. In a more detailed fashion, one could consider the probability distribution of returns that would exist for a given level of risk for the firm, and integrate across the range of equity return (i.e. determine a probability weighted tax rate). It is possible that riskier firms (with higher cost of equity) could have a higher associated tax rate. An additional complication arises due to the higher corporate tax rate for foreign-own companies in India. It is our understanding that the current domestic corporate income tax rate is about 33.6% with a foreign rate of about 41.7% (averaging two different sources with slightly different rates).⁵ For the illustrative calculation, we approximate the weighted average tax rate of 35.5% using the proportion of subscribers for Vodafone and Aircel as a weighting factor.

WACC Weighting

The WACC as shown in Equation 1 yields a WACC for a specific company. To estimate an industry WACC (as required when setting an industry-wide call termination rate), one would need to weight firm-specific values to calculate the relevant industry metric.

If only one termination rate is calculated (for both mobile and fixed), then only one industry (for both mobile and fixed) WACC would be appropriate; employing a weighted average of the WACCs of all the telecommunications industry. If a separate mobile termination rate (separate from a fixed termination rate) were calculated, then the relevant WACC would be the weighted average of the individual mobile companies WACCs only (excluding land-line companies).

There are several approaches that can be adopted to do this weighting. For example, one may use market capitalization (using concept of firm market valuation use some measure of past investments,⁶ or market capitalization⁷), but a difficulty lies with the fact that not all firms are listed within India. For simplicity, in associated excel file, we used the proportion of subscribers by company as our weighting factor in a calculation of an “industry” WACC.

Gearing Ratio

Often WACC calculations will use what is frequently referred to as the “gearing” ratio. “The gearing is a measure of the ratio of debt to company value (the latter being equivalent to the sum of debt (D) and equity (E)) and is defined as: $Gearing = D/(D+E)$.”⁸ In theory, the possible methods (or sources of data) for the gearing ratio are: 1) book values, 2) market values, and/or 3)

⁵ Two different sources show similar, but slightly different values. <http://www.taxrates.cc/html/india-tax-rates.html> domestic rate = 33.99%, foreign = 42.23%; and http://en.wikipedia.org/wiki/Income_tax_in_India "yielding effective tax rates of 33.2175% for domestic companies and 41.2% for foreign companies.

⁶ E.g., net book value. This implicitly assumes that any divergence between market value of the investments of the companies and the net book values (which might diverge due to tax advantages of rapid depreciation for example) is consistent across companies.

⁷ Market cap, by definition, excludes the debt component of the investments of the company; using this measure is

⁸ Independent Regulators Group (IRG) – Regulatory Accounting, Principles of Implementation and Best Practice for WACC calculation, February 2007, (sec 3.2) available at http://www.erg.eu.int/doc/publications/erg_07_05_pib_s_on_wacc.pdf

subjective estimates of optimal/efficient financial structures. As the gearing rises (as the proportion of financing from debt rises) the costs of debt and equity both rise. From the debt holder's prospective, more debt means there are more claimants to the asset at the same place in "line"; hence their risk is greater. From the equity holder's prospective, more debt means there are more claimants to the asset that have moved ahead of them in "line"; hence their risk is greater. The net effect is that while gearing has a significant influence on the costs of the individual costs of debt and equity the total cost of capital (WACC) is likely to be relatively constant over certain ranges of gearing.⁹

Real or Nominal WACCs?

In theory one could calculate or employ nominal or a real (inflation-adjusted WACC). "Hence, the real WACC shows the WACC excluding the impact of inflation."¹⁰ If one wished to decompose the inflation risk from the debt and equity premiums (see below), and one had confidence in future rates of inflation, then one could, at least in theory, estimate and employ a real (inflation adjusted) WACC then separately add the effects of forecasted inflation. And, while economists may wish to consider the influences of factors after removing inflation effects, the real world is dominated by nominal values. For example, income taxes are calculated using nominal, not real, revenues and tax-deductible costs.

As a practical matter, virtually all WACCs calculated and employed for regulated call termination rates are nominal WACCs. Like the termination rate in the great majority of other countries, the call termination rate(s) in India should be calculated using a nominal WACC.

Estimating the Cost of Debt

The cost of debt can be estimated from: 1) a weighting of the accounting measures of the cost of each of the debt instruments (weighted by the proportion of debt each comprises); 2) attempting to "decompose" the cost of debt into the underlying risk free cost plus a company-specific debt risk (the "default risk", that will depend in part on the gearing ratio)¹¹; 3) subjectively attempting to determine an efficient cost of debt. The first approach has the advantage of more readily available data.

Beta and Estimating the Cost of Equity

While there are different methods by which to estimate the cost of equity, by far the most common is the Capital Asset Pricing Model (CAPM) – see equation 2.

⁹See, Modigliani, F.; Miller, M. (1958). "The Cost of Capital, Corporation Finance and the Theory of Investment," American Economic Review 48 (3): 261–297.

¹⁰IRG – Regulatory Accounting, Principles of Implementation and Best Practice for WACC calculation, February 2007, (sec 3.1) available at http://www.erg.eu.int/doc/publications/erg_07_05_pib_s_on_wacc.pdf

¹¹ See, e.g., IRG – Regulatory Accounting, Principles of Implementation and Best Practice for WACC calculation, February 2007, (sec 3.3) available at http://www.erg.eu.int/doc/publications/erg_07_05_pib_s_on_wacc.pdf

A key element of this is β (beta coefficient), which is a measure of the extent to which returns on a company's shares co-vary with the returns on the market as a whole; and ERP - the equity risk premium required for investing in the equity market compared with risk free investments ($R_m - R_f$).

Beta reflects the risks of a particular (company) equity investment vis-à-vis market investments in general. The weighted average beta across all equity investments is 1.0. A beta for a particular company greater than 1.0 indicates an investment that is higher risk than other equity investments. A beta less than 1.0 indicates a lower risk investment.

This approach essentially “decomposes” the return on equity into a risk free component and a component for the risk of equity investments, adjusted by the beta of a specific company.

Decomposing Beta and Country Risk

In theory, one can “decompose” the risk related to both debt and equity investments into various categories, e.g., default risk, currency risk, risk of capital funding, risks associated with changes in technology, and even regulatory risk. As a practical matter, such decomposition is limited to the types of data available, and the purpose for the calculation. For example, for some academic investigations, it may be important to separately identify the risks associated with inflation, while for other purposes separately identifying this source of risk or influence is not important.

When comparing the cost of debt and equity across countries, one of the most important influences is country risk. Often the comparisons will use the U.S. equities market as the base (in part because of the size of that market) assigning a country risk of 0.0% (i.e., the equity risk premium for U.S. equities becomes the benchmark). Alternatively, a weighted average mix of major industrialized countries may be used. In Latin America, for example, country risk is a critical determinant of the WACC.

One measure of the country risk for India is provided by data from New York University, with a value of 3.6%.¹²

IV. Calculating WACC for India Telecoms Industry

The calculation of a WACC for the Indian telecom industry is in the attached excel file titled “WACC_India_Telecom_Example_3_19_11.xls”

In this file we utilize available information to produce a template for computing a telecoms nominal pre-tax WACC for India. It begins with a tab replicating the Finnish example.

¹² <http://pages.stern.nyu.edu/~adamodar/> - Updated Data/Data Sets/Risk Premiums for Other Markets/Country Default Spreads and Risk Premiums table

The last tab shows references to calculated betas for the major telecommunications companies, for ease of comparison. The last tab (India_beta_by_co) references calculated betas for the major telecom companies in India. In some cases we used one companies' beta as a proxy for another. More complete data would obviously be preferred. Note, one should weight the individual company betas by the market value of the assets of the companies. As an approximation, we used the number of subscribers as the weighting factor. The highest and lowest company-specific betas were used in calculating a high and low scenario WACC.

The second tab (WACC_Table_India ERP) uses data on India 10 year bonds as the risk free premium, then uses information from two papers that calculate the equity risk premium specifically in India (<http://www.vccircle.com/columns/what-is-real-cost-equity-india> by SaurabhMukherjea, and <http://www.iimahd.ernet.in/publications/data/2006-06-04jrvarma.pdf> by Varma and Barua). A range of low/mid/high values is created by: 1) the low, weighted average, and high betas for telecom companies; and 2) the equity risk premiums calculated in the two papers. The results are:

Table 2 – Risk-free rate equals Indian Government 10 year bond rate

	Low	Mid	High
Nominal pre-tax WACC	16.05 %	19.86%	28.12%

The third tab (WACC_Table_India ERP2) employs the same approach as in the second tab, except that risk free rates used are those employed in the specific papers (rather than the 10 year bond rate). The results are:

Table 3 – Research estimated risk-free rate

	Low	Mid	High
Nominal pre-tax WACC	15.88 %	21.65%	29.96%

While the mid points are within the range of our expectations, the upper values seem unreasonably high. We therefore employed another set of data, from a researcher at New York University (AswathDamodaran, Finance at the Stern School of Business) on tab WACC_Table_India_CRP. On this tab, we use the decomposed equity risk premium (discussed below in more detail) with a current U.S. equity premium, and then adding a country risk premium calculated by professor Damodaran for India. The India equity risk premium is calculated from the other data sources. The low/mid/high variations are created only by the choice of betas. The results are:

Table 4 – New York University estimates of risk-free rate

	Low	Mid	High
Nominal pre-tax WACC	12.89 %	15.70%	17.65%

The results here yield costs of equity that appear, in our opinion, too close (i.e., too low) compared to the cost of debt in India for the “low” scenario.

The three sets of calculations above should be considered as an illustration, not as a definitive calculation; more data, and more careful review of the data would be necessary to create a definitive calculation.¹³

V. BEREC- IRG PIBs

For convenience, we have copied the twelve PIBs (principles of implementation and best practice) from the BEREC-Independent Regulators Group document. More important conclusions are in yellow highlights:

http://www.erg.eu.int/doc/publications/erg_07_05_pib_s_on_wacc.pdf

PIB 1:

IRG acknowledges that the **WACC is a widely accepted methodology** to calculate the cost of capital, understood by both the finance community and the industry, and already used by many regulators.

PIB 2:

In the view of IRG, the level of gearing should be determined using a method consistent with the relevant cost base and the availability of information, although some adjustments may be introduced, if required.

PIB 3:

IRG acknowledges that the cost of debt can be calculated: *i*) using accounting data, such as the current loan book to derive the interest rate; *ii*) by the regulator calculating an efficient borrowing level and the associated cost of debt; *iii*) **using the sum of the risk free rate and the appropriate company specific debt premium**. These approaches should consider the quality and relevance of the information available in order to obtain an estimate as appropriate as possible.

¹³ For example, we did not have sufficient data to compute a beta for some of the companies in the industry.

PIB 5:

IRG acknowledges that the use of CAPM as a method to estimate the cost of equity is supported by its relatively simple implementation and by its wide use among regulators and practitioners.

PIB 6:

IRG considers that the return on freely traded investment-grade government bonds can generally be used as a proxy for the risk free rate.

The relevant market, the maturity of those bonds and the kind of information to use (current/historical values, average, short/long period...) should be defined considering the circumstances of the local markets.

PIB 7:

Estimating the equity risk premium can be made through the use of one or more of the following approaches:

- historical premium
- adjusted historical premium
- survey premium
- benchmark
- implied premium

These approaches should be balanced considering the quality and relevance of the information available in order to obtain an estimate as appropriate as possible.

PIB 8:

The estimation of the firm's beta can basically be made through the use of historical information, benchmark or through the definition of a target beta. The choice of the approach depends on local market conditions, whether the firm is quoted and on the amount and quality of information available.

PIB 9:

Estimation of the tax rate should give due consideration to the company's effective tax rate and any specific attributes which give rise to a likely permanent difference to the headline tax rate.

PIB 10:

IRG recognizes that in theory the adoption of a differentiated WACC is reasonable from a regulatory point of view. However, the lack of capital market information at divisional level makes the theoretically correct determination of beta in some cases difficult.

PIB 11:

IRG is of the opinion that every proposed methodology to calculate a divisional WACC

has its pro and cons. Therefore, the best approach for NRAs is to compare the results obtained using the different methodologies prior to selecting a final value.

PIB 12:

IRG believes that, when estimating the cost of capital for non-quoted companies or companies which did not issue debt securities, or when estimating cost of capital in young financial markets, NRAs should use proxies, benchmarks and peer group analysis, taking into account country specific conditions. A number of issues should be considered, including:

- what the appropriate comparator companies are, considering a number of relevant criteria for selection;
- performing a high/low scenario approach and sensitivity analysis to average out possible errors in individual parameters' estimation.



Annexure-IV (Response to Question No.11)

The depiction of LRIC methodologies and the LRIC (long run incremental cost) model outline provided in TRAI's Annexure require further consideration among the stakeholders since the analysis of this annexure suggests that there are certain issues which require further deliberations under the present regulatory and legal framework. Further, considering the complexities involved in such costing-cum-modeling exercise, since TRAI has only indicated a high level description, hence our inputs herein are limited to the extent what we see in TRAI's annexure. We would like to see a detailed industry workable model from TRAI on which we could provide more specific comments.

Therefore, there is a need to have:

1. A specific study group of relevant stakeholders and techno-commercial experts from operators to work out the appropriate framework of LR(A)IC model for Indian conditions
2. The proposed framework should identify economic, technical, costing and accounting principles for building an India specific relevant model and,
3. TRAI may publish costing model and its estimated results for comments of the stakeholders

Firstly, the different types of LRIC presented by TRAI only partly matches with European Pure LRIC outlined in the ANNEX on the basis of "avoidable" costs, LRIC+ is usually approximated by a measure of Long run average incremental costs (LRAIC) plus a defined mark- up to capture costs that do not feature in the model calculation.

It is important to note that the economic concept of LRIC+ in its real form has never been modelled due to incommensurable complexity. The approximation via LRAIC is therefore commonly applied practice.

We therefore encourage TRAI to consider an approximation along the line of established best practice with respect to LRIC+.

Specific Comment on the Annexure

Further, we have some comments on the ANNEX provided by TRAI with respect to the outlined LRIC modelling steps structured in accordance with the paragraphs in the consultation document. Please note that these comments are not yet exhaustive.

1. Vodafone India agrees that the predominant technology in India remains GSM, dominated by Voice segment, and therefore the model should reflect the topology and costs of a 2G GSM network



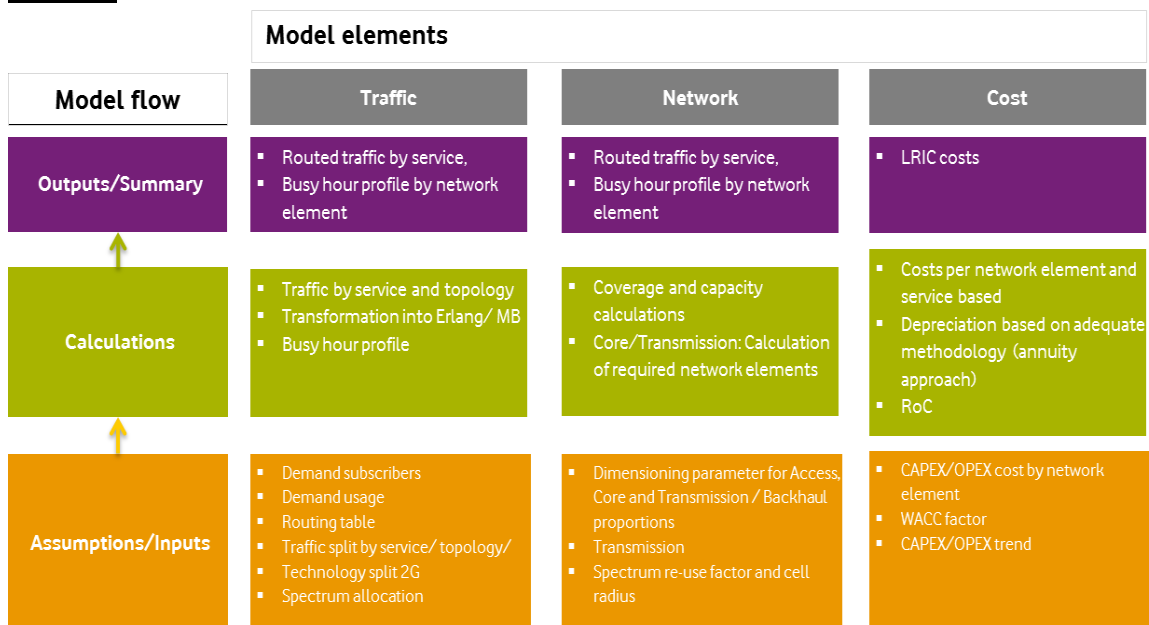
2. In line with regulatory best practice we suggest that the “equivalent operator” should be based on the concept of a *hypothetical efficient existing operator*. Considering Vodafone India’s reach and scope, we therefore believe that our network topology and costs are an appropriate approximation of this *hypothetical efficient existing operator*.

We further believe that a hypothetically efficient 1/n approach should be taken with respect to the average size in terms of subscriber in the licensed service area (LSA). We believe that n=5 is an appropriate depiction for dense urban, urban and semi urban areas and n=3 for rural areas. We therefore reject the HHI proposal outlined in TRAI’s Annexure.

Further, the average subscriber profile must be matched to that of the hypothetical efficient operator in the LSA. The proposal to use an average profile, especially considering large differentials between operators with respect to their customer profiles is not adequate. Further, it needs to be highlighted that in order to compute the termination costs the busy hour profile for the hypothetical efficient operator needs to be determined.

3. The “block schematic figure” illustrates the LRIC model calculation at a very high level and requires further detail. The following outlines the additional dimensions that need consideration:

Figure 1





4. As per the figure above, the calculation of a LRIC estimate requires a more detailed technical description which will be outlined in relation to the following paragraphs of TRAI's Annexure.

6. Data collection – The relevant data has already been provided to TRAI.

We understand that this data may be utilized by TRAI to estimate interconnection usage charges, therefore it is submitted that TRAI may publish the consolidated industry data on the parameters indicated under the heading on Data Collection, so that relevant stakeholders can provide their well-informed inputs.

7 & 8. Estimation of total network demand and allocation by network element: It has to be noted that in accordance with figure 1 (above) the following steps are required to estimate network demand for required capacity network:

- **Forecast of traffic developments based on subscriber, geography, usage patterns and split by services**
- **Determination of busy hour requirement for network dimensioning**
- **Calculation of busy hour equivalent in Erlang for all services**
- **Determination of required network elements**
- **Apportioning of service usage by network element via the routing table (see also comments on paragraph 22):** The network routing table defines how each service uses the network (and its element), i.e. how much of each network element is used by the service on average. The model considers an estimate of the average number of each type of network element used for each service. Routing factors are critical as they determine how intensively a call/minute utilises a network element and hence which costs should be apportioned in an incremental cost scenario. As regards TRAI's routing table, we have the following observations:
 - TRAI routing table does not indicate routing matrix at more granular service and network element level e.g. it has neither indicated anything on transmission part (Fiber and MW level), nor considered the signaling (STP links), nor the crucial and integral MNP platform as every call is checked for an LRN.



- Similarly TRAI matrix indicates only MSC – we would like to know whether it is MSC – VLR or MSC – Erlang (i.e. MGW) since both are necessary network elements for any voice call scenario
- As routing factors are one of the critical most parameters to allocate costs, it requires detailed deliberations before finalisation.

9. Coverage requirements: Considering the concept of a hypothetical efficient operator TRAI should use coverage requirements as detailed in the LSA licence requirements to determine the adequate coverage requirement by LSA and geo-type, and also the new coverage obligations being put under the UL/spectrum allocated.

Geo-type wise population density: With regards the table indicated by TRAI in this regard, it is submitted that the classification of geo-type depends upon a detailed assessment process that includes digital mapping of geographies, various other inputs like field survey results, local expertise, business planning, current & expected traffic profile etc. The digital maps are very extensive giving flexibility to each operator to define/club sub-clutter of various topologies into category of its choice and network architecture. It also goes in hand with the actual ground survey. Therefore, the geo-types indicated by TRAI looks simplistic based just on the population density

10 & 11. Capacity requirements: In line with comments on section 2, we consider that a 1/n approach should be followed to determine relevant Busy Hour Erlang requirements and a hypothetical efficient operator as outlined above for the average GSM spectrum holding.

12/14/15/16/17. We agree with the proposed approach.

13. While the approach suggested is Ok, however with respect to hourly traffic information for a week, sought by TRAI from operators was for a period that had a few public holidays and a weekend; thus the given level of traffic during that specific week may not reflect the normal weekly traffic on an average during the year. Hence we recommend that appropriate consideration should be given in this regard to as to reflect actual network usage in dimensioning.

18. /21. No. of network elements in an LSA: We kindly require TRAI to model the hypothetical efficient operator under consideration of the network deployment

19. Firstly, we require TRAI to outline the relevant time period of the model and the envisaged OPEX and CAPEX trends over this time period. Secondly, with respect to the annualized CAPEX under the LRIC model, it may be computed on the basis of annual



depreciation (Economic Depreciation Methodology or Annuity Method) and pre-tax WACC/ROCE @ 19% per annum. It is important to highlight that as per international best practices, SLM is not used under the LRIC approach.

20. Under the heading (5) Cost Allocation towards Mobile Termination service, it is submitted that cost should be allocated on the principle of work-done.

Further, we note that TRAI has defined an ‘On-net’ call as a call between the same network i.e. both calling party and called party in the call are on the same network. It is important to mention here that **since Access licenses (thereby networks) are given circle-wise therefore same network would be specific to the same LSA** i.e. **calls originating and terminating within the same Access Provider’s Network within the same LSA**; and any call coming from any other Access Provider’s Network from any other LSA and any other Access Provider’s Network within the same LSA; is to be considered as Off-net.

22. The routing table provided by TRAI seems over simplified and does not reflect an extensive routing table covering all possible network elements for all services that would be used in such modeling exercises.

It may be noted that since the routing table decides the network utilization and thus cost allocations, it has to be very technically specific on each possible network element that would be used for any type of service within a network. Therefore we would provide our detailed comments once TRAI puts up a detailed model to reflect the call types, service types and network elements more accurately.

23. The proposed weighted average for the pan-Indian rate will result in a skewed average termination rate. The pan-Indian average therefore needs to be computed based on the total allocated cost towards off-net incoming minutes of all LSAs/ total off-net incoming minutes for all LSAs.