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11 December, 2014

Shri Arvind Kumar,
Advisor (Network, Spectrum & Licensing)
Telecom Regulatory Authority of India
Mahanagar Doorsanchar Bhawan
Jawahar Lal Nehru Marg
New Delhi 110002

Subject : Telewings (Uninor) response to **Consultation Paper on Interconnection Usage Charge** (CP No. 13/2014)

Dear Sir,

Please find enclosed our response to the Consultation Paper subjected above. We have commissioned a pure LRIC based IUC model. Since, the model has specifically not been sought in the consultation paper we have not enclosed with our response. However, we shall be happy to share the same with the Authority should the need arise.

We hope that the Authority will find our response useful and consider our inputs while formulating the recommendations on the subject. .

Thanking you,

Yours sincerely,
For **Telewings Communications Services Private Limited**

A handwritten signature in blue ink, appearing to read 'Pankaj Sharma', written over a horizontal line.

(Pankaj Sharma)
Sr. Vice President and
Head of Regulatory

Encl: a/a

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Telewings (Uninor) Submissions on TRAI Consultation Paper – Interconnection Usage Charge (13 of 2014)

Preamble

Telewings (Uninor) welcomes this opportunity to reply to TRAI’s Consultation Paper on Interconnection Usage Charges (13 of 2014) and looks forward to TRAI’s consideration of the views presented here.

Executive summary

Figure 1 below sets out the structure of TRAI’s consultation and highlights the decision path which Uninor agrees with. In particular, Uninor explains in detail in its response that TRAI should immediately apply a **cost-based** (equal to cost) approach to the Mobile Termination Charge and Fixed Termination Charge, on the basis of **pure long-run incremental costs**. Uninor believes this method best serves inter-operator competition and efficiency in the Indian market, which in turn supports long-term market development to the benefit of consumers. In addition, Uninor disagrees that there is a need to intervene in international settlement and carriage, but there is **a need for TRAI to regulate the international termination charge, domestic carriage charges and TAX transit charges**.

Figure 1: Graphical summary of Uninor’s position on each question



Cost-oriented/cost-based versus Bill and Keep

Uninor believes that the most appropriate approach for determining the Mobile Termination Charges (MTCs) and Fixed Termination Charges (FTCs) is cost based, i.e. equal to cost (as opposed to cost oriented which could be interpreted in many different ways). A majority of leading regulators around the world have now adopted this approach to setting MTCs because it is economically efficient and transparent and because it benefits consumers.

Since we support a cost-based approach we are logically opposed to the introduction of Bill and Keep, an approach which we believe is particularly ill-suited to a country such as India which has a calling party pays regime coupled with large differences in footprint and traffic imbalances between mobile operators.

Use of a glide path

Uninor does not support the use of a glide path to move between the current fixed and mobile termination charges and the new cost-based charges. Given that the current arrangements have been in place since 2009, Uninor believes that reforms are long overdue and the use of a glide path would only delay the economic and consumer benefits of lower MTCs and FTCs. Once the new charges have been introduced Uninor recommends that they should be maintained at a constant level for 3-5 years to provide stability and certainty for operators when planning for the next phases of growth.

Method of calculating cost-based MTCs

Uninor recommends that a single national mobile termination charge should be set using a forward-looking bottom up cost model for a hypothetical efficient operator.

We believe that the most appropriate basis for determining mobile termination charges is pure long-run incremental cost (pure LRIC). In preparing for this consultation, Uninor has commissioned a pure LRIC model for calculating MTCs from Analysys Mason. We are pleased to share this model with TRAI in confidence and this model will be submitted to TRAI separately in addition to our response to this consultation.

Our main justifications for adopting a pure LRIC approach are as follows:

- Pure LRIC is now the preferred approach of regulators in Europe and other parts of the world for setting mobile termination charges.
- The pure LRIC approach will reduce the ability of larger operators to discount on-net calling while recovering a proportion of their costs from other operators through the inflow of mobile terminated minutes. At the same time, the pure LRIC approach to MTCs improves the ability of smaller operators to offer flat-rate any-network calling. The resulting increase in competition will benefit consumers and improve dynamic efficiency.
- The pure LRIC approach means that customers of networks with lower levels of coverage will not be subsidising the additional coverage costs of networks with higher levels of coverage which should, therefore, be borne by the customers of the networks that offer higher levels of coverage (especially for interconnection between circles where the interconnecting operators may not have competing retail offers).
- Pure LRIC based MTCs do not contribute to network common costs that are also supporting data and other origination services, meaning that their operators will need to consider the provision and pricing of coverage and capacity for retail services un-subsidised by incoming MTCs.

We do not support the use of fully-allocated cost (FAC) modelling because it is not in line with regulatory best practice. The main issues with the use fully-allocated costing to determine mobile termination charges are that it is a backwards-looking approach that tends to overestimate future network costs and it is difficult to strip out inefficiently incurred costs and costs that are not relevant to wholesale termination.

Costs to be included

Uninor supports the inclusion in the pure LRIC model of all CAPEX and OPEX that is relevant to an incremental (avoidable) wholesale voice termination business and is efficiently incurred. However, network-related CAPEX should be based on the cost of modern equivalent assets (which will typically be lower than historically-incurred costs) and CAPEX for acquiring spectrum usage rights should be excluded because these costs would not differ in scenarios with and without wholesale termination (operators do not acquire additional spectrum for the purpose of providing wholesale termination to other operators but instead face additional investment in network assets to carry this traffic).

In allocating CAPEX and OPEX to traffic for the purpose of calculating mobile termination charges we think it is important to consider data traffic as well as voice since most network assets are used to deliver both voice and data services and data services account for an increasing proportion of total traffic.

As Uninor recommends that pure LRIC is used to determine MTCs then it would seem logical to use the same approach to determine FTCs. However, since levels of mobile-to-fixed traffic are very small in comparison to mobile-to-mobile traffic use of an alternative method would not have a major impact on mobile operators. Whichever method is adopted for fixed network voice termination charges, TRAI should consider the full range of services available on the fixed network including broadband services and leased line/capacity services. In the worst case, Uninor accepts that TRAI may reluctantly decide to apply FAC to FTCs, simply because it is *proportionate* in the case of very small traffic volumes and *practical* because TRAI may not have a reliable LRIC model available for fixed services.

Method of depreciation and choice of WACC

In a LRIC model it is generally-accepted best practice to use an 'economic' form of depreciation rather than a simple accounting approach. We recommend the use of a demand-modified tilted annuity as a reasonable proxy for true economic depreciation. Uninor recommends that different average lifetimes should be used for different categories of network elements, based on an assessment of their effective economic lifetimes.

We believe that a pre-tax WACC of 15% is appropriate for use in the annuity calculation and supported by Indian benchmark calculations available in the public domain.

TRAI's description of the LRIC approach

TRAI's description of LRIC appears to be long-run average incremental cost (LRAIC) of the whole licensed service area network, allocated by routing factors rather than the pure LRIC approach which Uninor recommends. This being the case, the '+' element in TRAI's LRIC+ only refers to the costs that are common to all licensed service areas, i.e. a share of head office functions which we expect to result in a mark-up of less than 3%.

Uninor therefore believes that TRAI will need to 'run' its model in a pure LRIC mode, by considering the incremental (avoidable) costs of the wholesale mobile termination traffic increment as the last increment in the calculation. This will mean running the model with A) *all services*, and B) *all services except wholesale termination traffic*, then subtracting B from A.

In addition we believe that the TRAI should re-consider the following points in the modelling methodology described in the annex to the consultation document:

► *Spectrum bands used by the hypothetical efficient operator (HEO)*

The consultation document appears to suggest that the HEO should only use 1800MHz spectrum. Given the market shares proposed for the HEO (15-23%) we think using only 1800MHz would be inefficient and recommend the inclusion of 900MHz and 2100MHz spectrum as well.

► *Market share of HEO*

The consultation document proposes to use the Herfindahl-Hirschmann Index in each licensed service area to determine the HEO's market share. We believe that using a 1/N approach, where N is the number of operators active in each licensed service area is a simpler approach and consistent with the approach successfully adopted in other countries.

► *Spectrum allocation of the HEO*

Here the consultation document proposes to use a 1/N approach to the amount of spectrum. Using a different method for market share and spectrum allocation is likely to lead to biased results and we therefore recommend the use of a 1/N approach for both.

► *Definition of geotypes*

Given the way in which the Indian census collects population data (based on the size of individual settlements rather than census areas that collectively cover the whole of India), we think it will be difficult to reach agreement on the size of the four geotypes described in the consultation document. Instead we recommend the use of three geotypes: dense urban (>20,000 people per sq km); urban (all remaining urban areas according to the 2011 census); rural (as defined in the 2011 census).

► *Calculation by licensed service area (LSA)*

The consultation document proposes to calculate the cost of termination by LSA, and then determine the pan-Indian cost of termination as a weighted average (by incoming voice minutes) of the cost of termination by LSA. We believe that the calculations should get to a national level at an earlier stage and propose a suitable method in our detailed comments. We are also concerned that the weighting based on incoming voice minutes is inconsistent with the distribution of market shares based on Herfindahl-Hirschmann indices.

Regulation of additional charges

TRAI has asked a number of further questions regarding the intervention or regulation of other interconnection related charges. Uninor's detailed comments are provided below, however the summary of our position is as follows.

Uninor does not believe there is any need to address any further regulatory issues surrounding international subscriber dialling (ISD) calls, and regulatory oversight compared to intervention is appropriate for international settlement rates and international carriage charge. These markets are reasonably competitive, and while they form part of the cost of an international call, Uninor does not recommend that TRAI intervenes in the international market.

However, when it comes to the international termination charge, TRAI is in a position to regulate the rate charged to international calling parties. Uninor recommends that the international termination charge is raised from 40 paisa to a suitably higher level, in order to address the imbalance which currently occurs on international calling.

In relation to domestic carriage and transit, Uninor believes that TRAI should regulate these charges significantly lower than the level of current prices. In both cases, Uninor suggests a rate which is around 20% of the current rate. Costs for long-distance transmission have fallen substantially with the large increase in bandwidth and cost efficiency arising from long-distance IP-based networks carrying large data traffic volumes. High costs for these services, and other capacity blocking measures (such as refusal to expand interconnect capacity) prevent efficient interconnection and transmission networks to be developed. In the case of costing these services, a pure LRIC model should be applied for the same economic, competition and efficiency reasons as explained above for wholesale termination services.

Finally, Uninor believes there is no justification to have a separate transit carriage charge levied by BSNL for calls carried by BSNL within its own internal network.

Detailed response to TRAI's questions

Q1: Which of the following approaches would be the most appropriate for Mobile Termination Charge and Fixed Termination Charge:

- (i) Cost oriented or cost based;**
- (ii) Bill and Keep**

Please provide justification in support of your response.

Response:

Uninor believes that the most appropriate approach for determining the Mobile Termination Charge and Fixed Termination Charge is cost based.

The requirement for cost-based charging

Uninor believes that as a basic principle charges should be aligned with a measure of costs. Uninor therefore recommends the cost-based approach for setting termination charges and conversely recommends against the Bill and Keep (B&K) approach which fails to take into account any of the costs incurred by the terminating operator. Cost-based pricing is supported by economic theory and provides the appropriate price signals to originating networks and their subscribers for causing cost on the receiving operator.

Many regulators have, for many years, applied cost-oriented pricing for two-sided wholesale markets (mobile termination, fixed termination) and one-sided markets (fixed access, fixed links and broadband connectivity). The list of national regulatory authorities who have applied cost-based pricing for mobile termination is too long to include here, but includes leading regional regulators such as Ofcom (UK), ARCEP (France), ACCC (Australia), ICASA (South Africa), MCMC (Malaysia) and ANATEL (Brazil).

Here, the terms cost-orientation and cost-based should be made clearer. In Uninor's view, cost orientation means in the literal sense 'pointing towards cost'. Uninor believes that prices **equal** to cost (i.e. based on cost) is the correct approach. Simply 'orienting' prices towards cost is not specific, and could be interpreted in different ways, including liberal glide paths. Uninor believes this makes 'orientation' subject to lack of robustness and could be too lenient.

'Orienting' termination costs on the basis of a 'rule of thumb' such as the 'cost of termination should equal the cost of origination' is also inappropriate. This is because this method neglects the different costs required to support termination and origination (such as sales and marketing costs which do not support the origination of off-net minutes, i.e. wholesale minutes purchased by another operator). It also neglects the economics of the two-sided market – which is that operators are buyers and sellers of termination. As buyers and sellers, incumbents may have the incentive to keep charges high to limit competition from the smaller players, on the basis of traffic imbalances.

Setting prices equal to cost (based on cost) is the appropriate method because, as the consultation paper (paragraph 2.21) states, the goal of economic efficiency is generally achieved by establishing charges that are as close to cost as possible, and are specifically based upon cost causation. The use of a cost-based rather than a cost-oriented approach is likely to result in lower termination charges which should benefit consumers by improving competition. The resulting increase in competition will incentivise the operators to make continuing efficiency improvements.

Bill and Keep (B&K) is inappropriate in the Indian context

It might be argued that B&K takes this approach to its logical conclusion by eliminating termination charges altogether. Some academics have argued in favour of B&K on the grounds that it is economically efficient given the existence of call externalities (i.e. the fact that the recipient of a call benefits as well as the caller). However, while a small number of markets currently use the B&K approach to mobile termination (including the USA, Canada, Singapore and Hong Kong) the approach has come about as a result of commercial negotiations between operators or for historical reasons rather than through the actions of the regulator (although the Singaporean regulator has upheld the continuation of B&K on several occasions). Regulators in other markets, such as the UK, have explicitly considered and rejected the introduction of B&K in the past.¹

B&K is most readily applicable in markets where the traffic imbalance between competing networks is small (in which case the net charges would in any case be close to zero) or those where mobile subscribers pay for incoming calls, providing an alternative means of funding the terminating operator's costs. Neither of these situations applies in India and thus Uninor does not believe that the introduction of B&K is appropriate.

TRAI data highlights the unevenness of players at a retail level in India and the resulting traffic imbalances. Given the entry of operators at different points in time and present in different frequency bands and some being pan-India and others being sub-national, there are traffic imbalances between all networks. In this environment non-zero mobile termination charges (MTCs) are a key mechanism to ensure fair compensation for each operator.

¹ See for example, Ofcom's Wholesale mobile voice call termination Market Review, Volume 2 – Main consultation, paragraphs 7.40 to 7.57.

TRAI has migrated from payment for incoming calls to a calling party pays regime since the introduction of IUCs in 2003. Introducing B&K could threaten the continuation of calling party pays regime, a move which Uninor believes would be strongly resisted by the majority of Indian mobile users. Charges for incoming calls could be particularly detrimental to low-income subscribers who typically receive more calls than they make and would act as a brake on further penetration of mobile services into low-income segments. Introducing B&K could also result in more spam telephony on mobile networks (e.g. untrustworthy internet companies could send unlimited automated 'fishing' voice calls into mobile networks without incurring any costs). An increase in spam telephony would undoubtedly be annoying to most subscribers but could also lead to greater numbers of vulnerable customers becoming victims of telephone fraud. Any reverse and premium payment mechanisms which operate through the interconnection system would also need an alternative platform to function if B&K were introduced.

If TRAI introduced a B&K regime, it would discourage further investments to support incoming calls and inter-circle transmission (e.g. gateways, incoming call capacity, efficient and diverse location of points of interconnect, quality of service for cross-network calls) resulting in increased congestion and reduced quality of service. It could also lead operators to price calls to other networks to reflect the zero contribution to the destination network, or route calls inefficiently by near end handover.

Cost modelling based on a Hypothetical Efficient Operator (HEO)

Having argued for a cost-based approach the question arises of how it should be implemented. A bottom-up model for a hypothetical efficient operator can be considered best practice for setting cost-based termination charges. TRAI has experience of this and has described how such a model may work in the consultation paper. There are various reasons why it is desirable to use such a model:

- The TRAI has always set a single national mobile termination charge. This is the simplest approach from an administrative and implementation perspective and could be said to be fair to all operators. There is however, no such thing as an average operator in India. A model is therefore needed to determine what the costs for an average operator would be.
- The use of a published model is the most transparent approach to setting mobile termination charges because all stakeholders have visibility of the input assumptions and the way in which these are used to generate the outputs. Stakeholders can be given the chance to recommend what the input assumptions should be and comment on the structure of the model, which assists in building a consensus around the results.
- A bottom-up model is the most effective way of estimating future costs which could be significantly different from historical costs due to growth in coverage and traffic levels (particularly for data), the migration from 2G to 3G and 4G services and differing cost trends for various CAPEX and OPEX. It is difficult to estimate the cumulative impact of these changes using a top-down approach (based either on fully-allocated costs or long-run incremental costs) but they can all be taken into account in a bottom-up model.
- The bottom-up approach also allows for the exclusion of costs which are not relevant to wholesale termination (such as marketing and other retail costs) and costs which have not been efficiently incurred.

In preparing for this consultation, Uninor has commissioned a bottom-up model from Analysys Mason which we believe is suitable for calculating Indian mobile termination charges in the future. Uninor is happy to make this model available to TRAI in confidence

and this model will be submitted to TRAI separately in addition to our response to this consultation.

Q2: 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?

Response:

Uninor is not in favour of Bill and Keep (B&K) in the short or long term, and therefore a glide path towards B&K should not be applied. Uninor does not support the use of a glide path to reach the reduced charges that would result from a cost-based approach either.

As explained for Q1, B&K would undermine the functioning and effectiveness of the current interconnection market in India. Therefore any medium or long-term glide path to the fundamentally different B&K regime is risky to the stability of market development, and would represent a long term undermining of the well-established calling party pays regime. We note that the prevailing IUC Regulation has been in place since 2009 and reforms are therefore long overdue. The use of a glide path simply delays the benefits of introducing lower cost-based MTCs further. Uninor therefore recommends that charges should be re-based on costs immediately.

Once the new charges have been introduced, Uninor recommends that they should be kept constant for the next 3-5 years. A 3-5 year regulatory period provides stability and certainty for operators when planning for the next phases of growth. A period which is shorter than 3 years greatly increases regulatory risk for operators, diverting attention from pressing operational management and competitive retailing issues. Keeping rates constant for 3-5 years also avoids the need for TRAI to expend constant effort on the topic of interconnection usage charges. Many other regulators apply a 3-5 year period of stable pre-defined interconnection regulation for the same reasons. TRAI should therefore plan to reconsider the market and costs in preparation for the next period in approximately 2018.

Q3: Which method of depreciation for the network elements should be used and what should be the average life of various network elements?

Response:

Which method of depreciation for the network elements should be used?

Uninor believes that demand-modified tilted annuity is the appropriate form of depreciation to apply.

TRAI discusses depreciation methods in its consultation paper, but does not set out a broad range of options. Instead it considers two historical depreciation methods (straight-line method and written-down value method). TRAI also refers only to straight line depreciation in its LRIC model annex.

Uninor considers that straight line depreciation is not appropriate for economic costing of mobile termination. This is because:

- It requires a net book value estimation, which is based upon the historical purchase profile of assets. A LRIC model is meant to be forward-looking, using efficient technology, and is a long-run model, therefore it does not consider the past purchase profile of previous generations of equipment.
- It does not reflect the profile of demand for mobile services. Over time, straight line depreciation results in a lower cost of assets as NBV is declining (and therefore the capital charge on the NBV is declining as well), whereas mobile demand is strongly rising, in particular in the Indian market. This depreciation would therefore lead to unit costs being very high in early years (low demand and large annual cost) and very low in late years (high demand and lower annual cost), which is not a sensible outcome.

At worst, TRAI might find itself needing to adopt straight line depreciation in a fully-allocated cost (FAC) model for fixed termination only (on the basis of having no better information to apply in the fixed environment, and due to the lower importance of fixed termination charges for voice communication given the small penetration of fixed voice services in India). However, in the context of a bottom-up, efficient long-run incremental cost (LRIC) model for mobile services, Uninor strongly argues against the straight line method. It is widely recommended in best practice bottom-up LRIC situations to apply an 'economic' form of depreciation. In the type of model which TRAI is proposing, or a single year model, Uninor believes that demand-modified tilted annuity is the appropriate form of depreciation to apply. This is the approach taken in the cost model that Analysys Mason has developed for Uninor,. We believe this is appropriate because:

- It reflects the changes in the unit cost of assets, typically declining in real-terms, reflecting in turn the underlying real-terms-declining cost of delivering mobile traffic.
- It also reflects the changes in usage, meaning that the recovery of capital costs (and cost of capital employed) is shared out amongst the increasing profile of units of demand
- It can be adjusted to reflect the underlying inflation in India, and present results in nominal terms for the pricing year in question
- It is a proxy for economic depreciation in a single year model (economic depreciation cannot be calculated in a single year model)
- Economic depreciation or (modified) tilted annuities are used by regulators in a number of countries (the list is not exhaustive):
 - Tilted annuities: France
 - Modified tilted annuities: Denmark (also uses economic depreciation), Malta,
 - Economic depreciation: Belgium, Denmark (also uses modified tilted annuity), Netherlands, Norway, Portugal, Romania, Spain, Sweden, United Kingdom.

To assist TRAI, Uninor has summarised the additional depreciation options in an Annex.

What should be the average life of various network elements?

Uninor recommends that different average lifetimes should be assumed for different categories of network elements, based on an assessment of their effective economic lifetimes.

In a FAC model, an estimate of useful remaining lifetime is needed (hence TRAI's reference to statutory tax and accounting regimes). For a LRIC model, an estimate of the

actual or economic asset lifetime is needed. TRAI does not address the question of what the applied lifetimes of assets should be in the LRIC model.

We strongly believe the average life of various network elements adopted by the TRAI to set IUCs should reflect differences in the actual lifetimes of assets rather than use a single value for all network elements. This is because there is a wide range of lifetimes, from 5 to 25 years, and adopting a single value would not be realistic and lead to an underestimation of the annual cost of network elements with a shorter lifetime and an over estimation of the annual cost of network elements with a longer lifetime.

The lifetimes used in our model are presented in Figure 2. They are either the same as in Uninor's IUC submissions to the TRAI or based on international benchmarks.

Assets	Lifetimes (in years)
BTS/NodeB equipment	7
TRX, carriers, CK, HSPA, etc.	7
Own sites	25
Third party sites	only charged as an opex
Leased lines	only charged as an opex
Microwave	10 years
Fibre	25
Transmission MUX etc. equipment, excluding microwave	BSC/RNC to core: 5 Core to core: 8
BSC/RNC switches	10 years
Network switches	10 years
Network servers	10 years except IN: 5, Network billing system: 6
Network Management System	10
Ports	8
Licensing fees	20
Power and fuel cost	only charged as an opex

Figure 2: Assets lifetimes [Source: Uninor and international benchmarks, 2014]

Q4: 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.

Response:

Uninor believes that a pre-tax WACC of 15% is appropriate and supported by Indian benchmark calculations available in the public domain.

Q5: 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?

Response:

Uninor believes that the most appropriate method for estimating the cost is pure long-run incremental cost (pure LRIC).

This question, combined with Q12 is of critical importance to TRAI's regulation of MTCs. Our response to Q12 follows on by setting out the choice of incremental cost.

Uninor believes that a FAC method is not appropriate for estimating mobile termination costs, and not appropriate for estimating fixed termination costs either. However because the vast majority of Uninor's traffic involves mobile networks, Uninor's response is primarily focussed on the determination of MTCs.

A FAC method is not appropriate for setting MTCs because:

- the costs being measured relate to historical periods, reflecting old technology (e.g. time-division multiplexing, 2G-only) and the demand and performance of the network in the past.
- there may be inefficiently incurred costs in the actual costs of different operators
- it is much harder to apply a suitable 'economic' form of depreciation for regulatory costing in a FAC model. In particular, FAC models tend to use historical net book values and actual depreciation schedules. Most FAC models use straight line depreciation which is historical, and backwards looking. At best, a current cost accounting (CCA) could be applied to bring the historical costs into current valuation, but CCA adjustments are complex, opaque and not particularly accurate as they rely on coarse judgements in the current costing stage (such as trending the actual book value down).
- In FAC, the cost categories used will group together all costs associated with, say, radio sites, transmission, staff, etc. It is best practice to do incremental costing and therefore detailed incremental costs need to be identified separately from common costs. With pure LRIC, as Uninor believes is appropriate, common costs within the network, spectrum and business overheads are not relevant items for the termination cost.
- there can be debate over the allocation methods, and some costs which are not caused by the wholesale service of interconnection may find their way into its unit cost, due to inappropriate costing rules or coarse cost categorisation in the accounts (e.g. the presence of some sales or commercial costs in the general and administrative or facilities costs).
- regulatory best practice does not recommend FAC for mobile interconnection (nor for fixed, although FAC is occasionally applied to fixed termination due to the practicalities of modelling).

Uninor supports an incremental costing method for calculating termination costs.

- long-run incremental costing is the recommended as regulatory best practice across the world, by nearly all operators, economists, regulators and independent commentators. Bottom-up LRIC is the most commonly applied method by regulators, including TRAI's 2009 initiation.

- incremental costing is typically ‘forward-looking’, calculating the costs that would be efficiently incurred in the long-run, looking at the expected demand in relevant future periods (2015, 2016, 2017, 2018 etc. in this situation). This means that short-run effects (such as over-capacity caused by a recent large network upgrade) are spread out over a more effective and realistic period of network utilisation.
- calculating efficiently incurred incremental costs is very important to set the right price signals to operators to ensure efficient behaviour, and to ensure that interconnecting operators are not paying unnecessarily high amounts for over-specified models or over-engineered networks. Networks deployed with high levels of QoS and redundancy are targeted at attracting (high-end) retail customers. The decisions to deploy such networks are not under the control of the wholesale buyers of interconnection, who may have customers and business priorities for more modest levels of acceptable QoS and redundancy. For example, in a costing process it is important not to ‘gold-plate’ the network model with overly-high QoS or unnecessary technology:
 - e.g. a typical allowance for 2% grade of service in congested cells is acceptable;
 - e.g. in the Indian market, which is a low-cost and spectrum constrained market, the use of half-rate coding to increase the capacity of networks in the peak hours is reasonable and accepted by users. This means that the modelled efficient network should not ‘gold-plate’ the network to support all calls at full-rate coding
 - e.g. 4G is a nascent technology in India – it is not universally required for all customers, or for voice traffic. This means that ultra-modern, high price equipment incorporating 4G carriers is not ‘typical’ or necessary for operations in India. Here, 2G+3G (HSPA) is acceptable and these technologies are more mature, with much lower equipment prices. Uninor sees no reason for an ‘efficient’ voice interconnection cost model in India to be at the bleeding edge of 4G technology enhancement (with its associated high price high spec technology).
- long-run incremental costs (LRIC) reflect the level of costs that would occur in a competitive or contestable market. Competition ensures that operators achieve a normal profit and normal return over the lifetime of their investment (i.e. the long run). Contestability ensures existing providers charge prices that reflect the costs of supply in a market that can be entered by new players using modern technology. Given that wholesale mobile termination is a regulated (monopoly) service, Uninor believes that incremental costing should be used and that the cost calculation assumes competition and contestability in the supply of mobile termination to interconnecting operators.
- a LRIC method refers to the current (and future) costs of equipment, rather than historical values. The costing model therefore reduces the calculated cost in line with the decline of equipment prices (in real terms), mimicking the effect of contestable entry into the mobile termination market of an operator.
- incremental costing ensures a transparent and objective **causal** link between the increment (i.e. service and traffic) being considered and the costs assigned to it. This ensures that general overhead costs (e.g. head office) and sales/commercial costs, both of which are not caused by wholesale interconnection traffic from another operator, are not allocated to the incremental cost of interconnection traffic. Common costs (e.g. the head office in this example) might be included at the end (as a ‘+’ mark-up) however sales/commercial costs are not caused by wholesale traffic therefore are appropriately excluded in all LRIC approaches for wholesale traffic.

Therefore Uninor's strong recommendation to TRAI is to adopt an incremental costing approach. Uninor's justifications above are in line with the approach being recommended by the European Commission to its 28+ member states, have been widely debated in Europe, and largely accepted and applied by most of the European regulators. Outside of Europe, incremental costing is commonly agreed to be the most appropriate methodology and is extensively applied without significant disruption, business risk or over-riding objection from stakeholders.

On the specific incremental costing method to be applied, Uninor recommends that TRAI adopts the pure LRIC method for the reasons set out in our response to Q12.

Q6: 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?

Response:

Uninor does not support the use of FAC. However, if TRAI decides to adopt this approach then Uninor would recommend implementing forward-looking aspects into a FAC model (including: using a projection of 2015 demand to aim for a target accounting cost, and the application of current cost accounts).

Uninor believes it is still important to develop a forward-looking basis rather than relying entirely on historical data in this case because there are strong downward trends on equipment prices and utilisation will be higher than in the past. This means that historical data is likely to overstate future costs. Modelling some form of hypothetical efficient operator (e.g. adjusting costs for old technologies, inefficiencies or small scale) is also the best way to determine IUCs for the market when the FAC approach is used because individual operators will have different fully allocated costs which may be based on fully depreciated assets or write-offs (both of which represent a lifetime different to the accounting one). Also, there is no guarantee that historically incurred costs reported by the operators are efficient. It is Uninor's opinion that a set of historical FAC values must not be taken at face value in order to set MTRs or FTRs. Proper consideration of their accuracy and appropriateness is needed.

Uninor recommends that historical data is **only** used, suitably adjusted for price trends and efficiency, as a cross-check to a more robust and transparent model such as a bottom-up LRIC model. This type of cross check is recognised by the European Commission in their Recommendation on the subject:

*"NRAs [National Regulatory Authorities] may compare the results of the bottom-up modelling approach with those of a top-down model which uses audited data with a view to verifying and improving the robustness of the results and may make adjustments accordingly."*²

² Source: Commission Recommendation of 7 May 2009 on the Regulatory Treatment of Fixed and Mobile Termination Rates in the EU (2009/396/EC), Recommendation 3

Q7: 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.

Response:

Uninor does not support the use of FAC. However, if TRAI decides to adopt this approach then only network opex and indirect costs which are necessarily and efficiently incurred in support of a wholesale business are relevant. Marketing and other costs which are only relevant to a retail business should be excluded, as should contributions to the costs of the operator's parent group of companies, unless these can be demonstrated to be directly relevant to the operator's wholesale business in India.

Q8: 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?

Response:

Uninor notes that it is not clear if this question refers to the inclusion of CAPEX in the FAC method, the LRIC method or both but believes that CAPEX is relevant to whichever method is chosen.

In the LRIC method, network-related CAPEX should be considered. However, fixed assets should be based on cost of modern equivalent assets for a hypothetical efficient operator, which will typically be lower than historically incurred costs.

If CAPEX is excluded altogether, then operators will not be compensated for a share of the cost of investing in network infrastructure. The price signals which this gives to operators (i.e. that only opex is allowed) means that the depreciation and amortisation, and employed capital costs, for equipment which is directly supporting wholesale traffic would need to be recovered somewhere else. This would mean undermining the incentive for operators to specifically invest in interconnection infrastructure, and equipment which might support incoming calls (for example, operators could choose to block or limit or downgrade QoS of incoming calls in the busy hour, because the impact on capital investment for capacity was not being recognised or compensated).

Uninor does not believe that the costs incurred by operators for acquiring usage rights for spectrum are relevant in our preferred pure LRIC approach, since these costs would not differ between scenarios *with* and *without* wholesale termination (i.e. operators do not acquire additional spectrum for the purpose of providing wholesale termination to other operators, but instead face additional infrastructure and capacity investments for the carried wholesale termination traffic).³

³ See for example, footnote 100, page 114 in Ofcom's Wholesale mobile voice call termination Market Review, Volume 3, 1 April 2010. "Under pure LRIC, there is no allocation of spectrum to voice call termination in our cost model. In principle, if termination traffic were entirely removed then this might entail an MCP avoiding having to purchase some spectrum. Hence, it is possible in theory for pure LRIC to include

In an LRAIC, LRAIC+ or FAC approach it would in principle be appropriate to consider CAPEX related to spectrum usage rights. However, in a forward-looking model there is a problem that future costs are difficult to determine with any degree of accuracy since they are dependent on the outcome of spectrum auctions which have not yet taken place. All non-metro licenses are coming up for renewal starting 2015-2016 along with the spectrum holdings in 800, 900 and 1800MHz bands. There are also expected to be auctions for spectrum in newer bands including 700, 2100, 2300 and 2500MHz (not all of which are relevant bands for voice services). Given that any estimate of the amounts raised in future auctions is highly speculative, Uninor believes that the only sound basis for including spectrum costs would be to use the reserve prices for bands which have a proven value for carrying voice traffic.

Uninor would also suggest that including all, or including high spectrum costs is not necessarily fair because some operators will end up subsidising via interconnection other operators for (very) large auction payments or large unified access service licences (UASLs). Not all operators are present in all LSAs, therefore there would be the risk of considerable arbitrage (for example, small operators operating in less attractive circles with consequently poorer resident populations, having to pay higher IUCs to large operators who have paid high amounts to secure licences in attractive metropolitan circles). Those operators in attractive USALs will also have taken strategic decisions to incur large spectrum payments also to support origination services, current generation data services, and increasingly future generation data services which may not yet be generating traffic volumes.

On this last point, Uninor believes that it is instructive for TRAI to consider the way in which another leading regulator, Ofcom, dealt with the historically high levels of expenditures by UK operators on licences for 3G services before it adopted the pure LRIC approach in 2010. While there was extensive discussion about the issue in 2006 and 2007⁴, the final charge control eventually took into account a licence fee which was substantially lower than the amounts actually paid.

Our proposals on spectrum charges are further discussed in our response to Q11.

If TRAI decides to adopt a FAC approach Uninor believes it is important that, just as with OPEX, CAPEX relating to a service provider's retail business (such as the purchase of IT systems to provide customer support) should be excluded.

In order to calculate annual charges it will be necessary to amortise CAPEX appropriately. Our proposals on amortisation are provided in our response to Q3.

some contribution to spectrum costs. However, there is a particular trade-off between the amount of spectrum used and network costs. For a given amount of spectrum, more capacity can be provided by increasing the size of the network (i.e. increasing the number of base stations and/or traffic-handling capacity at base stations). Or for a given size of network, more capacity can be provided if more spectrum is deployed. At the margin the willingness to pay for the additional spectrum required would be no more than the network costs avoided, so in principle the pure LRIC of termination should be the same under either approach."

⁴ See for example, Annexes 13 and 14 of Ofcom's Mobile call termination statement, 27 March 2007

Q9: 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.

Response:

Uninor does not support the use of an average life of 10 years for all network elements.

While the average asset lifetime may be around 10 years, the contribution to the cost of termination will be made up of a mix of short- and long-lived assets, such as radio network equipment and transmission multiplexers (which have an economic lifetime of less than 10 years) and passive infrastructure at radio sites (which has an asset lifetime of more than 10 years). Therefore, realistic, economic asset lifetimes should be used to properly reflect the contribution mix of costs. The table in Q3 provides our views on suitable asset lifetimes for the major asset groups.

Q10: 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.

Response:

Whichever costing method is chosen by TRAI, Uninor believes that it is important to consider data traffic as well as voice calls when computing termination charges.

Most network assets are used to deliver both voice and data services and data services account for an increasing proportion of total traffic. It is therefore essential that data traffic is also modelled and takes a proportionate share of network asset costs according to its contribution to network loading. We have considered 3G data as well as 2G data in our cost model as we foresee 3G to be the dominant data delivery technology in the medium term (i.e. 3-5 years).

In the case of a fixed FAC model, it is necessary to make large adjustments for subscriptions (line-driven costs), broadband services and leased lines/capacity services. As a result, the FTR is likely to arise from a minority of fixed network costs. This means that TRAI needs to fully consider the breadth of other services present on the fixed networks.

Q11: 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.

Response:

Do you agree with the methodologies explained for various variants of LRIC? If not, please give your answer with justification.

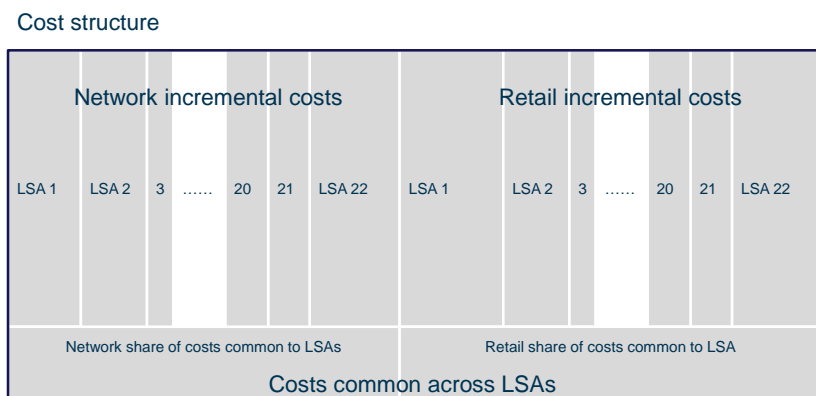
Uninor agrees with the general methodologies presented for the various variants of LRIC from paragraph 3.12 to paragraph 3.23 of the consultation document. However, there is often confusion and interpretation about what form of 'LRIC' is being applied, depending on the increment.

Uninor believes that pure LRIC is well defined and understood as the incremental cost of only the wholesale termination traffic increment, excluding any common costs. In Q5 and Q12, Uninor explains why it believes pure LRIC should be applied in India.

When it comes to TRAI's LRIC and LRIC+, Uninor would like to clarify that the LRIC calculation is essentially the **weighted average LRAIC by LSA** (weighted average incremental cost of the whole LSA network, allocated by routing factors). This means **in addition that the '+' part of TRAI's approach is the costs common to all circles**, which is essentially limited to a share of head office functions (as TRAI correctly identifies). Uninor believes that the 'A' average in LRAIC applies in the case of TRAI's method because the calculation determines the average cost of traffic in the LSA, and routing factors are used to share that cost out according to average consumption.

The cost structure of TRAI's method could be illustrated as shown in Figure 3 which highlights what is included in the LRIC (i.e. the LRAIC) and what is included in the LRIC+ (i.e. the LRAIC+). We also highlight what is included in Pure LRIC in Figure 3.

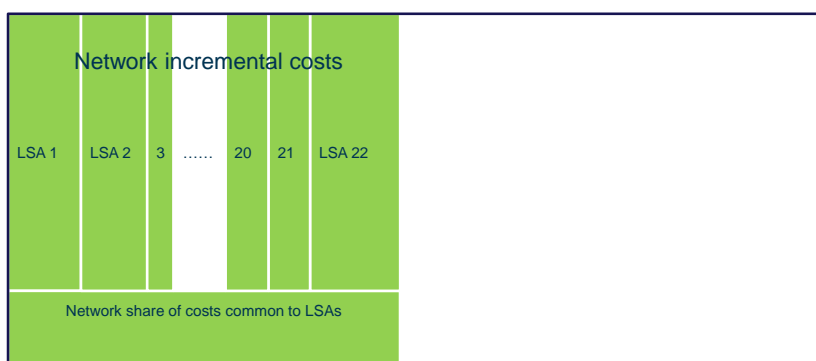
Figure 3: Graphical comparison of cost approaches



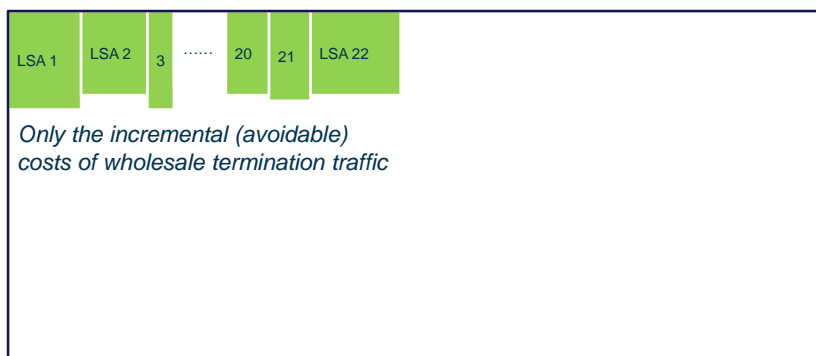
LRAIC (routing factor allocated costs, weighted average of LSAs)



LRAIC+ (routing factor allocated costs, weighted average of LSAs, mark-up)



Pure LRIC (incremental, avoidable costs, weighted average of LSAs)



Uninor believes the distinction between increments should be made clear to avoid any confusion between LRIC and pure LRIC, as illustrated above.

Regarding the treatment of common costs, which are correctly identified by the TRAI as a network share of inter-circle common overheads, we have calculated from our Accounting Separation Reports that the amount of common costs attributable to network services is the sum of:

- 670 million rupees
- 2.1 % of total network costs

This gives a small mark up of less than 3%, which is added on top of the LRIC of termination to obtain the LRIC+ of termination as described in the consultation document.

Do you agree with the detailed description of computation of the termination cost using LRIC model in the Annexure? If not, please give your answer with justification

We believe the following points presented in the consultation document should be reconsidered by the TRAI:

- The spectrum bands used by the hypothetical efficient operator (HEO)
- The market share of the hypothetical efficient operator
- The spectrum allocation of the hypothetical efficient operator within each band it uses
- The definition of the geotypes
- The routing factors
- The way calculations by Licensed Service Area (LSA) is aggregated at the national level
- The cost of spectrum

► *Spectrum bands used by the hypothetical efficient operator*

The consultation document proposes to model a HEO offering full mobility services in GSM in the 1800 MHz band. We believe that this is too inefficient, only reflects old-technology and that the HEO should also use spectrum in the 900MHz and 2100MHz band as:

- The market shares proposed for the HEO are between 15% and 23% in each circle. The operators which have a national market share in this range (Bharti, Vodafone and Idea) all have 900MHz spectrum in at least 10 circles. Therefore, it would be inefficient to attempt to carry 15-23% of market traffic in 2015 using just 1800MHz spectrum.
- Although most of the voice traffic in India is still carried on 2G networks, 3G services are now well established in the country, accounting for an increasing share of data but also voice traffic, and the largest operators have each already deployed 20,000+ 3G sites. Including 3G in the TRAI's model would reflect the actual economies of scale enjoyed by the Indian operators whose market share is in the range proposed for the HEO.

► *Market share of the hypothetical efficient operator*

The consultation document proposes to determine the market share of the HEO based on the Herfindahl–Hirschman Index (HHI) in each LSA. We believe using a 1/N approach, where N is the number of operators active in each LSA, is a simpler approach and is the approach used by regulators worldwide to determine the market share of the HEO in their mobile regulatory cost models. The squaring effect of the HHI method also leads to a higher market share for the HEO in a LSA where an actual operator has a large market share, regardless of the number of other operators present in this LSA, therefore in some way disadvantaging the small operators. This disadvantaging effect is not very transparent and not easy to understand in its implications.

► *Spectrum allocation of the hypothetical efficient operator*

The consultation document proposes to allocate to the HEO the “average of the spectrum held by the various GSM operators in the LSA”. This is similar to the 1/N approach we described in the previous paragraph and we agree with it. However, we believe it is inconsistent to calculate market share in one way (HHI) and the share of spectrum in another way (1/N) and that these two shares should be harmonised. As it stands, the inconsistency between the methods used for market share and for spectrum allocation is

likely to lead to biased results (but the direction of that bias is difficult to comprehend or predict).

► *Definition of the geotypes*

Based on data from the Indian Census, we only use three geotypes in our model:

- *Dense urban*: urban areas with density of population >20,000 people per sq km
- *Urban*: all remaining urban areas according to census 2011: Areas meeting one of the three criteria - 1. Population above 5000; 2. density of population above 400 per sq km; 3. at least 75 per cent of male working population engaged in non-agricultural pursuits;
- *Rural*: based on Census 2011 definition.

We do not think that sufficient data exists in the census or other sources to distinguish between the urban and semi urban geotypes and therefore suggest to only adopt three geotypes.

► *Routeing factors*

We do agree that a routeing table is necessary for the calculation of LRIC (i.e. LRAIC), but our values do not necessarily match the values indicated in the consultation document (for example we uplift voice minutes by the average ringing time per minute of a call, which uses radio resources, to determine the routeing factors of voice minutes on BTSs). It is also important to determine routeing factors for data appropriately, converting the use of resources by data into voice equivalent minutes, taking into account the channel rates and other characteristics of each data traffic technology. As a result, routeing factors per megabyte of GPRS, R99 and HSPA should be different.

► *Calculations by Licensed Service Area (LSA)*

The consultation document proposes to calculate the cost of termination by LSA, and then determine the pan-Indian cost of termination as a weighted average (by incoming voice minutes) of the cost of termination by LSA. We believe that the calculations should get to a national level at an earlier stage, i.e.:

- The network is dimensioned at a LSA level up to the MSCs
- The core switches/servers such as the HLR and network billing system are dimensioned at a national level
- Total national costs are allocated to services based on national volumes for LRIC (according to the routeing table)
- Total national avoidable costs are divided by total national incoming voice minutes for pure LRIC to determine a pan-Indian pure LRIC of termination.

In addition, the TRAI's method to determine the market share of the HEO (HHI) amplifies the market share in some circles (as mentioned earlier) and then applies a different weighting nationwide (one based on incoming minutes). It is probable that the distribution of market share by HHI method is not the same as the distribution of incoming minutes by LSA. We believe a national level calculation which is more 'averaged' by adding up costs and incoming minutes in all LSA, and less amplified by HHI market share effects in specific LSAs, is more suitable, and fairer to the whole market.

The MPLS transmission network used to connect the access network to common nodes (intelligent network platforms, value-added service platforms, Billing systems, ring-tone

platforms, etc.) can be considered part of the LSA access network. This is for signalling and data connectivity to common nodes.

► *Cost of spectrum*

As indicated in our response to Q8, we do not believe that spectrum costs (or licence fees) are relevant in our preferred pure LRIC approach since they do not vary between the scenarios *with* and *without* wholesale termination. This is because the Indian operators are highly spectrum constrained and the reduction in (incremental) traffic from wholesale termination would be accompanied by a reduction in network infrastructure (capacity equipment, some traffic-loaded sites) and not by a reduction in the amount of spectrum needed for the network.

In the event that TRAI decides to adopt a LRAIC, LRAIC+ or FAC costing approach then it would be appropriate to treat the entry fee for the UASL and the spectrum acquired through auctions as CAPEX and the licence fees and the spectrum usage charges calculated based on the Annual Gross Revenue (AGR) as OPEX. However, care should also be taken to ensure that especially high payments are not encouraged by simply allowing for them in the IUCs. Large volumes of spectrum in the 900MHz and 1800MHz band are coming up for renewal in 2015-16. If the TRAI decides to include the amounts operators will pay during auctions to renew their spectrum in its LRIC calculations, then we think the only objective way of doing so is to base costs on the reserve prices which have been provisionally set.

Q12: 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?

- (i) LRIC
- (ii) LRIC+
- (iii) Pure LRIC

Response:

On the specific incremental costing method to be applied, Uninor recommends that TRAI adopts the pure LRIC method. Uninor does not believe that the LRIC/LRIC+ methods are appropriate for mobile termination in India.

In explaining this position, we believe that the difference between LRIC/LRIC+ as set out by TRAI is actually quite small, so in this answer we discuss both under the same heading. As discussed in Q11a, TRAI's LRIC calculation is essentially the weighted average long-run average incremental cost (LRAIC) by local service area (weighted average incremental cost of the whole local service area network, allocated by routing factors). This means that the '+' part of TRAI's approach is the costs common to all circles, which are essentially limited to a share of head office functions (as TRAI correctly identifies). According to the modelling work carried out by Uninor, the share of costs common to all circles amounts to a small mark-up of less than 3%, (see Q13) meaning that TRAI's LRIC and LRIC+ (i.e. LRAIC and LRAIC+) are very close together.

Uninor’s recommendation for pure LRIC to be adopted for mobile termination in India, instead of LRIC/LRIC+ is based upon the following justifications.

Fixed-to-mobile traffic is not material in India

Fixed-to-mobile traffic is a very small proportion of market traffic therefore there is no major consideration of fixed-to-mobile inflow of revenues in the interconnection market. Mobile-to-fixed traffic is also a very small proportion, therefore is also not a major consideration. In the previous regulatory situations in Europe, when there was strong argumentation against pure LRIC mobile termination charges, some operators were in the position of receiving significant fixed-to-mobile traffic and associated revenue inflow. As this revenue flow in India is negligible, pure LRIC can be assessed much more objectively in relation to the mobile market only.

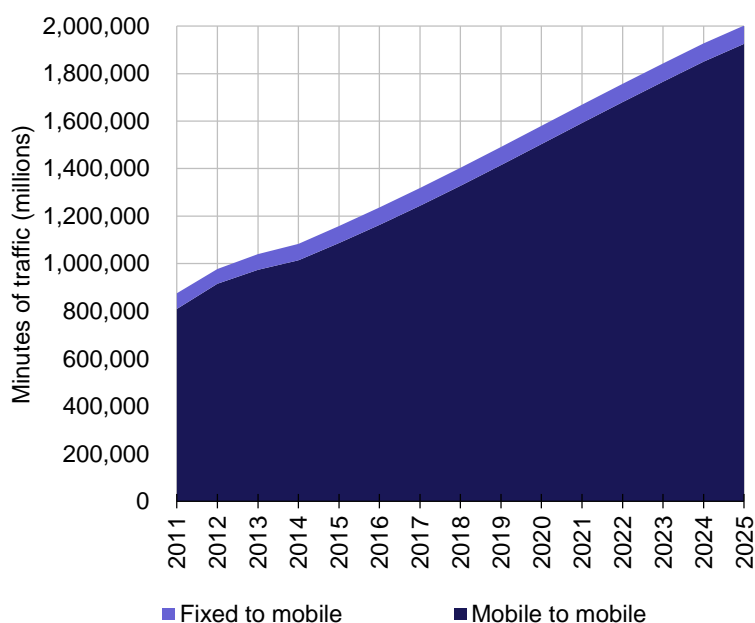


Figure 4: Fixed to mobile and mobile to mobile traffic in India
 [Source: TRAI, Analysys Mason, 2014]

As can be seen, mobile to mobile traffic makes up the vast majority of all voice communication in India. The patchwork of mobile operations and licences means that mobile to mobile interconnection is critical for all operators to deliver nationwide calling services.

Mobile-to-mobile interconnection is a two-sided market. All operators are both buyers and sellers of cross-network mobile traffic. They therefore incur costs, and receive revenues from this traffic. As IUCs decline, the cost incurred and revenue received both decline (for the same pattern of traffic). This means that the direct cost effects of IUC declines are balanced by direct revenue effects and the net direct outcome is significantly smaller than would appear by the simple direct ‘loss of revenue’. However, the effects of lower IUCs are important to take into account as they improve competition between players for cross-network voice traffic, as the market matures from a *subscriber and coverage* growth phase to a *usage and utility* growth phase (i.e. where customers can make more, better use of traditional voice and emerging smart data services).

Hence, the key consideration is mobile-to-mobile traffic flows, and in particular the flow of mobile-to-mobile traffic between operators. Any-network mobile-to-mobile tariffing and calling is beneficial for all subscribers, especially those of small mobile operators, and of sub-pan India mobile operators. On the other hand, on-net tariff discounting is most

favourable to large operators. In the process of competition, wholesale IUC must be taken into account in the cross-network calling for all operators, but competitive small operators face a greater outpayment risk from high IUCs combined with any network tariffing. All operators seek to recover their total costs in some way, but higher IUCs mean that operators recover a larger proportion of their costs from other operators (and other subscribers than their own). Efficiency will be encouraged when operators are responsible for a larger share of their own cost recovery. This means that common costs should not be recovered from IUCs, but instead only the marginal (incremental, avoidable) cost used as the basis for IUCs. Using marginal (incremental) cost pricing for IUCs means that competition can maximise cross-network calling and tariffing, without cross-charging each other for network common costs, which is highly beneficial to all mobile subscribers. The benefits for cross-network mobile to mobile competition will improve dynamic efficiency in the long-run by lowering one of the barriers to competition (lowering it in the wholesale market).

Network externalities are irrelevant and call externalities favour use of pure LRIC

In simplified economic terms, when prices are set at marginal cost, consumption is maximised. However, the need to recover common costs and the existence of a multi-party network means that other more complex economic issues need to be considered:

- Some parties may argue that mobile termination charges should be set high because of ‘network externalities’ (that is, subsidising more customers to join the calling network). Uninor believes this argument is very weak in India. Where subsidies do exist, they are used to entice high-value customers and to improve the take-up of smartphones for data usage. Operators typically spend very little trying to subsidise new low-income customers to join or stay on their networks. Hence there is a low probability that mobile termination charges could efficiently subsidise those marginal (non)subscribers to join and stay connected to mobile networks. Many regulators have explored the issue of network externalities requiring higher mobile termination charges, but very few have applied them. TRAI should simply reject any attempt by operators to argue that such widespread network externality surcharges are appropriate in the Indian market.
- On the other hand mobile customers do benefit from the calls they receive (even if they do not pay the wholesale mobile termination charge or retail price in the calling party pays regime). It is very hard to quantify the benefit (the call externality) of this effect. However, in applying pure LRIC as a cost standard for mobile termination charges, other regulators have essentially accepted that this is a material contribution to benefits, applied as a mobile termination charge excluding common costs.

MTCs should not be used to subsidise the additional coverage of larger operators

The pure LRIC approach is consistent with pricing at marginal cost (i.e. avoidable, incremental costs only) to maximise consumption, consistent with neglecting the requirement to subsidise network externalities through termination (i.e. no need for high mobile termination charges) and taking into account the call externality that customers get from receiving calls (i.e. meaning mobile termination charges should be lower than LRIC/LRIC+). This position can practically be understood well in India, given differences in regional coverage, as follows:

Customer A chooses which network to subscribe to based party on the coverage (and quality) that the operator offers. An operator with good coverage (quality) should have higher subscription/traffic prices, whereas an operator with poorer coverage (quality) should have lower subscription/traffic prices. In choosing which

operator to subscribe to, Customer A also implicitly chooses the features of receiving voice calls, primarily the coverage area and call blocking of the network. When the customer receives calls, it has already taken into account the benefits (disadvantages) obtained from the coverage and quality while receiving calls from customer B on another network. Customer B pays (via the calling party pays system) customer A's network for the costs caused by that incoming call (i.e. long-run, pure incremental costs), but Customer B is not paying costs that Customer A accepted in choosing which network to subscribe to, based on the quality and coverage it expected to receive from the network.

If all operators in India had the same type of subscribers, coverage, technology and network quality, then cross-charging for other operators' coverage costs in the mobile termination charges would be net offset to a large extent. However, given the differences between operators in India, then cross-charging for coverage (quality) will distort the incentives for operators to efficiently tailor their coverage and quality (and prices) to their own customers' preferences. Sub-pan India operators would also find themselves contributing to coverage in circles where they were not licensed, i.e. where they are not even in a position to offer customers a more efficient service.

MTCs should not be supporting data and other origination services

Pure LRIC based IUCs do not contribute to network common costs which are also supporting data and other origination services. This means that operators can take into account the full cost of voice and data origination and their common network and overhead costs when deciding how to operate efficiently, and in setting up subscription packages and usage bundles (excluding the contribution to long-run incremental costs from incoming calls) for both postpaid and prepaid subscribers. This is particularly the case for data traffic. If mobile termination services support any part of the mobile data cost base through network common costs, then operators will be able to leverage calling patterns (and incoming call revenues) into the mobile data market. There is already evidence of highly competitive pricing on data services⁵ which may be subsidised by other services such as mobile termination. There is no evidence of a price war on mobile termination in the Indian market, meaning that some operators will be keen to cover as many costs as possible from an incoming revenue stream.

Following extensive discussion, pure LRIC has been accepted as the best practice approach to MTCs in Europe (and beyond)

Since 2009, the issue of MTCs being set on the basis of pure LRIC has been discussed extensively throughout Europe. This issue was formally raised into debate by the issuance of a European Commission 'Recommendation' to European national regulators, accompanied by economic rationale for this method of cost-based pricing. Many European regulators consequently undertook their own studies, during 2009-2014, to establish the best principles on which to regulate their respective markets. Almost all European regulators have decided to apply pure LRIC to termination, and nearly all have currently completed their regulatory and legal steps to successful implementation. The European Commission (EC) Recommendation on termination⁶ states in its article 6 that:

⁵ <https://www.telegeography.com/products/commsupdate/articles/2014/11/28/opening-salvo-of-new-price-war-as-bharti-rcom-cut-data-costs/>

⁶ COMMISSION RECOMMENDATION of 7 May 2009 on the Regulatory Treatment of Fixed and Mobile Termination Rates in the EU (2009/396/EC)

- “Within the LRIC model, the relevant increment should be defined as the wholesale voice call termination service provided to third parties. This implies that in evaluating the incremental costs NRAs [national regulatory authorities] should establish the difference between the total long-run cost of an operator providing its full range of services and the total long-run costs of this operator in the absence of the wholesale call termination service being provided to third parties. A distinction needs to be made between traffic-related costs and non-traffic related costs, whereby the latter costs should be disregarded for the purpose of calculating wholesale termination rates. The recommended approach to identifying the relevant incremental cost would be to attribute traffic-related costs firstly to services other than wholesale voice call termination, with finally only the residual traffic-related costs being allocated to the wholesale voice call termination service. This implies that only those costs which would be avoided if a wholesale voice call termination service were no longer provided to third parties should be allocated to the regulated voice call termination services.”

The EC puts forward the following considerations before stating its recommended approach to set termination rates (our emphasis):

- “Termination markets represent a situation of two-way access where both interconnecting operators are presumed to benefit from the arrangement but, as these operators are also in competition with each other for subscribers, termination rates can have important strategic and competitive implications. **Where termination rates are set above efficient costs**, this creates substantial transfers between fixed and mobile markets and consumers. In addition, **in markets where operators have asymmetric market shares, this can result in significant payments from smaller to larger competitors**. [...] High termination rates tend to lead to high retail prices for originating calls and correspondingly lower usage rates, thus decreasing consumer welfare.”⁷
- “Wholesale voice call termination is the service required in order to terminate calls to called locations (in fixed networks) or subscribers (in mobile networks). The charging system in the EU is based on Calling Party Network Pays, which means that the termination charge is set by the called network and paid by the calling network. The called party is not billed for this service and generally has no incentive to respond to the termination price set by its network provider. In this context, **excessive pricing is the main competition concern of regulatory authorities**. High termination prices are ultimately recovered through higher call charges for end-users. Taking into account the two-way access nature of termination markets, **further potential competition problems include cross-subsidisation between operators**.”⁸
- “**An incremental cost approach which allocates only efficiently incurred costs that would not be sustained if the service included in the increment was no longer produced (i.e. avoidable costs) promotes efficient production and consumption and minimises potential competitive distortions**. The further termination rates move away from incremental cost, the greater the competitive distortions between fixed and mobile markets and/or between operators with asymmetric market shares and traffic flows. Therefore, it is justified to apply a pure

⁷ Recitals, article (3)

⁸ Recitals, article (7)

LRIC approach whereby the relevant increment is the wholesale call termination service and which includes only avoidable costs.”⁹

As of August 2014, 20 out of 28 Member States of the European Union had set their mobile termination rates based on pure LRIC cost models: Austria, Belgium, Bulgaria, Czech Republic, Denmark, France, Greece, Italy, Malta, Poland, Portugal, Romania, Slovenia, Slovakia, Spain, Sweden and the United Kingdom had built their own cost model; Lithuania was in the process of finalising its model; and Estonia, Latvia and Luxembourg were using a benchmark of pure LRIC rates.¹⁰

Following the consultation on wholesale mobile voice call termination it carried out from April to June 2010¹¹, Ofcom published a statement indicating that:

- “1.13 In this statement, we set out our decision to adopt a charge control for the four national MCPs [mobile communication providers] based on pure LRIC. In deciding to adopt pure LRIC, we have taken the approach we consider will best:
 - 1.13.1 promote efficiency;
 - 1.13.2 promote sustainable competition in the retail mobile market in the UK; and
 - 1.13.3 confer the greatest possible benefits on end-users of public electronic communication services.

In doing so, we also consider whether this approach is objectively justifiable and proportionate. Finally our decision to adopt pure LRIC is consistent with the 2009 EC Recommendation.”¹²

Pure LRIC has also been adopted by regulators outside the European Union, such as those in Norway (currently notified, not yet in action), Jamaica, Kenya, and Tanzania.

Q13: In case your response to the Q12 is LRIC+, what are the common costs that should be considered for computation of termination costs?

Response:

Regarding the treatment of common costs, these are correctly identified by the TRAI as a network share of inter-circle common overheads (illustrated in our diagrams in Q11a). We have calculated from our Accounting Separation Reports that the amount of common costs attributable to network services is the sum of:

- 670 million rupees
- 2.1 % of total network costs.

⁹ Recitals, article (13)

¹⁰ European Parliament, Parliamentary questions, Answer given by Ms Kroes on behalf of the Commission, 21 August 2014, available at

<http://www.europarl.europa.eu/sides/getAllAnswers.do?reference=E-2014-005974&language=EN>

¹¹ Wholesale mobile voice call termination, Market Review, Ofcom, Volume 2 – Main consultation, Ofcom, available at

http://stakeholders.ofcom.org.uk/binaries/consultations/wmctr/summary/wmvct_consultation.pdf

¹² Mobile Termination Review Statement, Statement published 15|03|11, Ofcom, available at <http://stakeholders.ofcom.org.uk/consultations/mtr/statement>

This gives a small mark up of less than 3% for all operators whether small or nationwide, which is added on top of the LRIC of termination to obtain the LRIC+ of termination as described in the consultation document.

If TRAI decides to adopt LRIC+ we think it is important that all costs relating to sales and marketing are excluded as they are not related to the provision of interconnection services to other operators.

Q14: 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?

Response:

Uninor believes the principles for setting IUCs should be consistently applied to the fixed sector to avoid more/less lenient approaches in either market. We have argued that termination charges should be based on the best estimate of long run incremental costs for a hypothetical efficient operator. It follows that if these costs are significantly different for a hypothetical efficient mobile and a hypothetical efficient fixed operator then different termination charges should apply.

Q15: 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?

Response:

In our opinion there are no issues in implementation of this regulation at this point in time.

Q16: 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?

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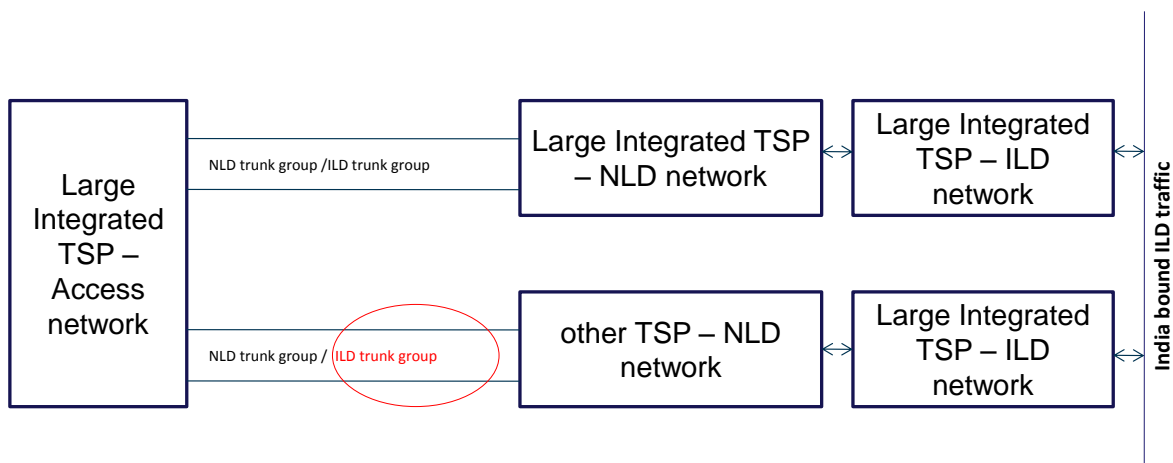
Q17: Is there a need to fix a floor for international carriage charge for incoming international traffic or prescribe some revenue share between access service provider and the ILDO to safeguard the interest of ILDOs?

Response:

We respond to Q16 and Q17 together. No, there is no need for fixing the International Settlement rates and floor for International Carriage. The principle of regulatory oversight rather than regulatory intervention is better suited in this segment.

Figure 5 explains the generic connectivity between NLDO and access providers for carrying NLD as well as ILD traffic.

Figure 5: Generic connectivity between NLDO and access providers for carrying NLD as well as ILD traffic



The other NLD/ILD network terminating traffic in access network are in direct competition with the in-house NLD/ILD network of large integrated service providers. While the termination rates are fixed, the international carriage charge segment is based on competitive negotiation. The calls being collected from international market are for the entire country and not specific to particular access networks. But the ability of other ILDOs to collect India terminating international traffic is restricted by their capacity to terminate these calls in access networks.

Some of the **access providers have a walled garden approach towards other NLDOs** for point-of-interconnect (POI) augmentation (specifically ILD trunk group) in their access network. Hence, there is a need for monitoring of POIs for NLD and ILD traffic terminating in access networks thereby increase in competition in this segment.

Q18: 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.

Response:

The international termination charge in India is regulated by TRAI at 40 paisa, while the international termination rates in other geographies are regulated by NRAs of respective foreign countries. This is a major component of international tariff resulting in high outgoing ILD rates and low incoming ILD rates to India. The table below provides as few examples:

Country	Termination rates of other countries (INR)	ILD outgoing tariff – base rate (INR)*	ILD outgoing tariff – STV rate (INR)**
India	0.40	--	--
Pakistan	5.47	11	9
USA	0.62	6.4 (fixed)	1.2
Australia	3.40	6.4 (fixed), 11 (mobile)	6.6
Nepal	5.87	11	6
Oman	12.98	11 (fixed), 25 (mobile)	6.6 (fixed), 18 (mobile)

Qatar	9.27	11 (fixed), 15 (mobile)	12 (fixed), 10.8 (mobile)
UAE	8.04	11	12
Germany	1.55	6.4 (fixed), 11 (mobile)	6.4 (fixed), 11 (mobile)
UK	0.93	6.4 (fixed), 15 (mobile)	1.8 (fixed), 18 (mobile)

* per minute billing for retail subscriber

** per second billing for retail subscriber

The principle of reciprocity resulting in differential charging for different countries is not a viable option as the resulting arbitrage will open grey market possibilities where ILD calls will be re-routed from higher termination geographies through lower termination geographies towards India.

On the principle of parity, **we propose that International Termination Charge for incoming calls should be suitably raised from the present level of 40 paisa** to balance the skew in incoming to outgoing traffic.

Q19: 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?

Response:

Methodology for domestic carriage:

Uninor is of the opinion that NLD carriage charge should be regulated based on cost. Currently, the high NLD ceiling enable NLDO with strong market positions to significantly overcharge for NLD carriage. According to our calculations, cost based regulation implies a significant reduction of the current 65 paisa ceiling.

All service providers (Access and NLDO) file the 'Quarterly Report – Per Minute Rate of Carriage and The Total Amount of Carriage Paid for National Long Distance Calls'. The weighted average of the domestic carriage charge may be easily calculated from this report. Uninor as NLDO is presently working on a leased model and we source our bandwidth from other service providers. Our weighted average cost of domestic carriage is 8.3 paisa per minute.

This is also very much in line with current competitive rates prevailing in the market, confirming that this cost level appear reasonable

Separate carriage charge for difficult geographies

There are hilly regions in J&K, HP, Assam, NE, TN, Kerala service area. Similarly there are sparsely populated regions of other service areas with large geographical areas. In the same category of difficult geographies the Left Wing Extremist (LWE) affected areas in 9 states of central India have generally less penetration of telecom services. There is no less acknowledging the fact that these regions need penetration of fibre / microwave backbone for faster rollout of mobile towers. The maintenance of infrastructure is also difficult (expensive) in these regions.

A separate carriage charge for these difficult geographic regions, however well-intentioned will pose serious accounting difficulties in segregating the investment done in these specific areas from the investments done for the entire service areas.

There is a death of distance in NLD carriage and the negotiations are done at the basis of pan-India volume of traffic, the resulting benefits of volume based discounts are equally available to customers in these difficult geographic regions.

Hence, we propose that **we should continue with the uniform NLD carriage rates, the present ceiling of 65 paisa should be brought down to 8 - 12 paisa based on actual costs of the service.** Incentives for infrastructure development in remote/hilly regions should be incentivized through USO fund where all service providers are contributing. The existing NOFN project should be extended to provide bandwidth till the mobile towers.

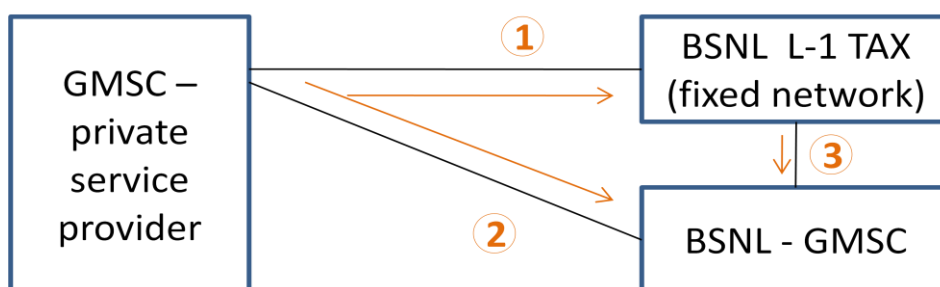
Q20: Is there a need to regulate the TAX transit charges or should this be left to mutual negotiations? In the event, the transit charge is to be regulated, please provide complete data and methodology to calculate TAX transit charges.

Response:

TAX transit charge is levied by BSNL in following scenarios (see Figure 6):

- a) There is no direct connectivity between GMSC for private service provider and BSNL cellone GMSC
- b) Over flow traffic from the direct connectivity with BSNL cellone GMSC

Figure 6: Connectivity between private service providers and BSNL



In the case that a private service provider has sought point-of-interconnection (POIs) with BSNL Cellone GMSC and BSNL has failed to provide direct connectivity within 30 days then there should not be *any* applicability of transit charge as the reasons are solely attributable to BSNL. (This may be the case of new POI or augmentation of existing POI.)

In those situations where a private service provider decides not to establish direct connectivity with BSNL Cellone GMSC purely for network optimisation issues and reasons not attributable to BSNL then TAX transit charge may be levied but Uninor believes on a long-run marginal cost basis.

In the transit situation, the equipment that comes into account is the switching equipment of BSNL fixed network and its associated infrastructure cost. All private operators which are access-seekers to BSNL in perpetuity bear the cost of media and end link infrastructure, hence any other cost should not be included. **The present ceiling of 15 paisa should reflect the fall in network equipment cost and the revised ceiling cost (based on long-run marginal) should be under 3 paisa.**

In addition, TRAI should intervene in cases of lack of augmentation of the 'interconnects' by operators, and the defaulting mobile operators should be penalized. The relevant data is provided to TRAI every month by all mobile operators

Q21: 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.

Response:

Our submission is that transit carriage (only applicable for intra-circle Mobile to Fixed) should not be applicable as it is already accounted for in the mobile to fixed termination charge.

However, if the Authority decides to continue with this component of IUC then we feel that the cost of providing TAX transit and Transit carriage (not applicable, but if decided by TRAI) **should be based on the pure LRIC model and not based on the cost data in ASR.**

The cost of transit exchanges which are directly attributable for the transit of a call from a BSNL fixed exchange to the GSMC of BSNL should be an input to the pure LRIC model for arriving at transit charge. While the cost of network elements which are directly attributable to carrying a call from a BSNL fixed L-II exchange to a BSNL fixed L-III exchange should be an input to the pure LRIC model for arriving at transit carriage charge. Here the fact that the cost of media and end link terminal equipment is borne by private service providers should be taken into account. In addition, the Port charges for E1 ports are paid to BSNL annually in advance along with the infrastructure charges. These seeker costs paid by private service providers to BSNL for incoming as well as outgoing traffic to/from BSNL should be deducted from the directly attributable cost figures of BSNL.

Q22: 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.

Response:

No, there is no justification to have a separate transit carriage charge.

The definition and rate of transit carriage is provided in the amendment regulation is as below:

“(e) Transit Carriage Charge from Level II Trunk Automatic Exchange (TAX) to SDCA. Transit carriage charge for carriage of intra-circle traffic handed over from Cellular Mobile networks to Fixed network, from Level II Trunk Automatic Exchange (TAX) of LDCA in which the call is to be terminated, to SDCA, shall be Re. 0.15 (Fifteen paise only) per minute, irrespective of distance.”

All service providers terminate (calling network) the calls in other service provider network (called network), the termination charge is paid to the called network. It is the responsibility of the called network to carry the call within its own network to complete the remaining leg of the call.

All private mobile service providers connect to BSNL L-II exchange, there after the calls are carried from L-II to L-III exchange of BSNL's own network by their own volition. BSNL L-II exchanges are the designated handover point points for mobile service providers; this has been prescribed by BSNL. It is the responsibility of BSNL to further carry the call within BSNL's network, they are using their monopoly position to coerce us to pay transit carriage charge. BSNL does not allow these intra-circle calls to be carried by private NLDOs and terminate directly at L-III by thus eliminating any possibility of using third party services at competitive rates.

Thus, there **should not be any transit carriage charge payable by private service providers to BSNL for calls carried by BSNL within its internal network on its own volition** for terminating to BSNL's fixed customers.

Annex on annuity depreciation methods

Standard annuity

The standard annuity methodology calculates a fixed annual value including both capital charges and asset depreciation / amortisation using the formula shown below:

$$\text{Annuity} = \text{GRC} \times \frac{\text{WACC}}{1 - \left(\frac{1}{1 + \text{WACC}} \right)^{\text{lifetime}}}$$

Where:

GRC = gross replacement cost of asset

WACC = weighted average cost of capital

lifetime = useful lifetime of asset

Figure 7: Formula used to calculate 'standard' annuity

Traditional tilted annuity

For traditional tilted annuity calculations, an annualised cost is calculated using the formula shown in Figure 8.

$$\text{Tilted Annuity} = \text{GRC} \times \frac{\text{WACC} - \text{tilt}}{1 - \left(\frac{1 + \text{tilt}}{1 + \text{WACC}} \right)^{\text{lifetime}}}$$

Where:

GRC = gross replacement cost of asset

tilt = annual change of annuity

WACC = weighted average cost of capital

lifetime = useful lifetime of asset

Figure 8: Formula used to calculate tilted annuity

This traditional tilted annuity method only factors into the tilt the asset price changes over time, allowing an increase or decrease in depreciation in the early years of an asset's lifetime. This method is commonly used in telecoms cost models, and is favoured in stable contestable markets, where an operator has to reduce its prices based on the cost of its inputs in order to remain competitive with (potential) new entrants to the market. An illustration of a traditional tilted annuity depreciation method is shown in Figure 9.

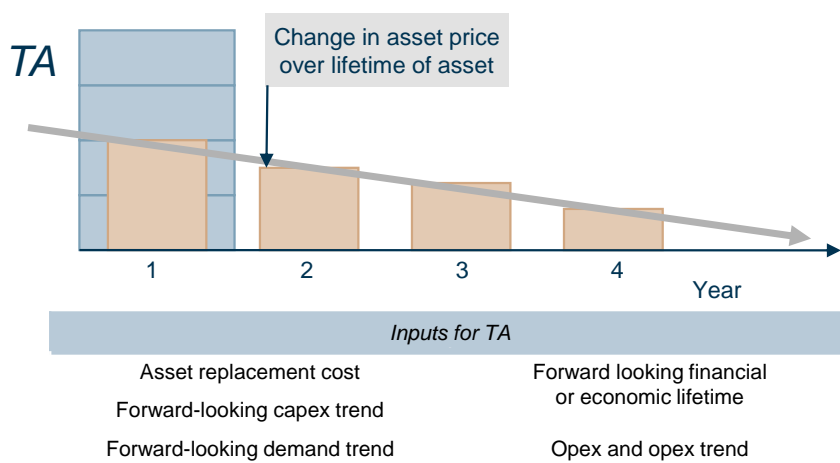


Figure 9: Overview of a tilted annuity depreciation method

Modified tilted annuity

The traditional approach to tilted annuity does not, however, factor in changes in demand. This is particularly important in Indian mobile networks where demand (voice and data services) is rising steadily for all players. The forward-looking 'modified' tilted annuity calculation factors both usage and price trends into the tilt. With this methodology, the asset price trend and the increase in asset utilisation are combined into the tilt using the formula set out in Figure 10.

$$Tilt = (1 + i) \times (1 + p) \times \frac{1}{1 + i \times z} - 1$$

Where:

i = projected increase in asset utilisation

p = asset price trend

z = share of fixed costs as a proportion of total asset costs¹³

Figure 10: Formula used to calculate the tilt
[Source: Agcom¹⁴]

Comparison of the amount depreciated in each methodology

We compare here the amount depreciated in each methodology using the following parameters:

- GRC: 1,000,000
- Lifetime: 10 years
- WACC: 15%
- Average age of asset divided by lifetime: 50% (used for calculating the NBV for SL depreciation)
- Nominal capex cost trend: 1% (used for tilting the cost recovery to take into account underlying real terms equipment price declines and underlying inflation)
- Utilisation trend (CAGR growth of total traffic in voice equivalent minutes over 10 years): 2% (used for spreading the cost recovery to take into account the higher utilisation and growing units of demand in future years)

The results are shown in Figure 11.

¹³ The z-value in the formula has been set to zero throughout our model as we consider the costs of all assets to be volume-dependent, even if they are sunk costs.

¹⁴ Published by Agcom e.g. in Delibera n. 251/08/CONS from 14 May 2008.

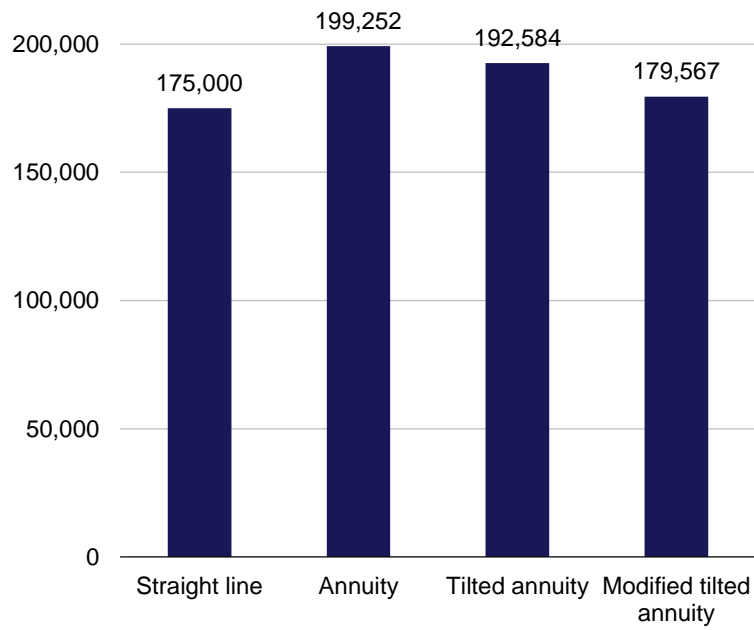


Figure 11: Amount depreciated in each methodology [Source: Analysys Mason, 2014]