TVR/VIL/042
19 April 2012

The Telecom Regulatory Authority of India
Mahanagar Door Sanchar Bhawan,
Jawahar Lal Nehru Marg, ,
Old Minto Road, New Delhi- 110002

Dear Sirs/Madam,

Sub: Response to the Consultation Paper on Access Facilitation Charges (AFC) and Co-location Charges (CLC) at Cable Landing Stations,

Ref: Consultation Paper No.08/2012 dated 22nd March 2012.

Vodafone India welcomes the Consultation on Access Facilitation Charges and Co-location Charges at Cable Landing Stations.

Vodafone thanks the Authority for the opportunity to respond to the Consultation Paper and we attach, as **Annexure- 1**, our response to the issues and questions raised therein. We, inter-alia, have demonstrated in our response as follows:

1. The charges for Access Facilitation & Co-location charged by Indian OCLS to interconnect with the international submarine cables have remained unchanged since 2007 which is neither reflective of an effectively competitive market nor consistent with the International rates,
2. The cost to build and operate the submarine cable, including its landing and lighting, are recovered through submarine cable owners therefore only incremental costs incurred in providing access to non-OCLS should be included in AFC and CLC on 'Per Link' basis rather than on a 'Per Capacity' basis to make it consistent with the cost causality principle.

We also attach our Expert Report from Venture Consulting titled 'Forward-Looking Cost Model To Determine Efficient Cost Based Cable Landing Charges' as **Annexure-2.** The Expert Report findings clearly shows the efficient cost-based AFC and CLC derived by utilizing tilted annuity depreciation method on cost causation principle using only the costs incurred as a direct result of providing access facilitation & co-location within the CLS.

We request the Authority that both the Annexures 1 & 2 may kindly be treated as the integrated Vodafone submissions to the Authority.

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We do hope that the Authority finds our inputs pertinent and useful to be taken into consideration while framing cost based Access Facilitation Charges & Co-location Charges at Cable Landing Stations in India.

We will be pleased to provide any further clarifications / inputs as the Authority may so desire.

Kind regards,

Sincerely yours,

T. V. Ramachandran
Resident Director
Regulatory Affairs & Government Relations

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ANNEXURE- 1

RESPONSE TO CONSULTATION ON ACCESS FACILITATION CHARGES AND CO-LOCATION CHARGES AT CABLE LANDING STATIONS

VODAFONE INDIA

Vodafone India welcomes the *Consultation on Access facilitation Charges and Co-location Charges at Cable Landing Stations*.

Our comments are in continuation to the detailed submissions made in the previous Pre-consultation exercise undertaken by TRAI in Aug/Sept 2011. Needless to mention, CLS access charges in India have remained consistently high for the last four years, even though the prices of international capacity and global Internet transit have fallen by 55% to 80% over this period. As a result CLS access charges are now a very significant, and growing, proportion of total international circuit costs for domestic operators in India. The current remedy by way of approved RIOs is clearly not effective. The cable landing station (CLS) charges levied by the cable landing station owners (OCLSs) in India under the RIO are more than an order of magnitude higher than charges elsewhere in the world.

THREE FACTORS CLEARLY DETERMINES URGENCY OF REGULATING COST BASED ATC & CLC IN INDIA

1. **Telecommunications prices for Indian consumers**

Indian consumers have enjoyed very substantial reductions in the prices they pay for telecommunications services over the past 10 years. Until very recently the price of international services was important to relatively few Indian consumers. But that is now changing with the rapid growth of 3G-based mobile broadband services. Most of the applications which use mobile broadband are Internet-based and require low-priced international capacity to be attractive. The current CLS charges form a barrier to the development of the mobile Internet and its promise of an e-society and e-economy for India. This impact will be further magnified as 3G services spread into rural areas.

2. **Telecommunications prices for Indian businesses**

India leads the world in offshore business process outsourcing (BPO). But it faces growing competition from other countries such as the Philippines and South Africa, which are beginning to erode India's share of this fast-growing market. The offshore BPO business is heavily dependent on the price of international telecommunication services, which are now falling more slowly in India than elsewhere in the world because of CLS charges. The high cost of CLS access will have an adverse impact on the offshore business process outsourcing industry.

These arguments also apply, albeit in a less dramatic fashion, to all businesses in India which rely on international telecommunication services. They also affect foreign direct investment. There are many studies, such as those conducted by the World Economic Forum, which show that the cost of international telecommunications is a very significant factor in determining where multinationals locate their regional offices.

3. Impacts on telecommunications competition in domestic Indian markets

The high CLS access facilitation charges in India distort and weaken competition. The operators which own cable landing stations compete with operators that do not in the Indian domestic markets. The latter must pay the high CLS charges, while these charges are an internal transfer price for the latter. At the same time the OCLSs recover their costs from cable owners. This gives OCLSs a substantial cost advantage when competing in the segments of the domestic Indian market where international facilities form a significant component of the costs. This includes the supply of Internet services and mobile broadband.

The high and unchanging CLS charges in India mean that end user prices for international services in India are now higher than they should be, and falling more slowly than they should.

The current high CLS charges in India are against the public interest. They raise end user prices, slow the take-up of mobile broadband in India, and damage the competitiveness of Indian businesses in world markets. They also weaken competition within the domestic Indian telecommunications market.

In view of the above, therefore, there is an urgency that the Authority regulates the cost based Access Facilitation Charge and Co-location Charges.

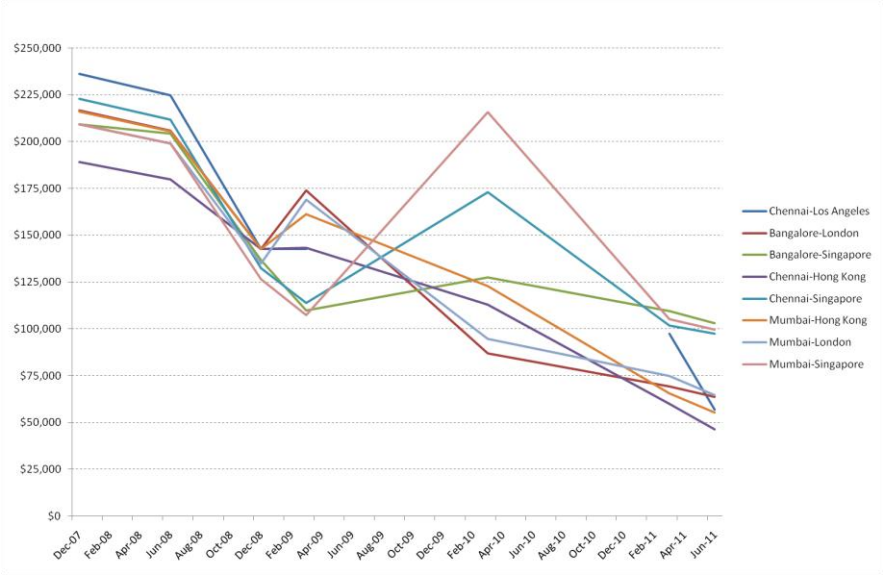
PRELIMINARY SUBMISSIONS

We submit there are two distinct markets involved in the provision of international bandwidth:

1. market for capacity on international submarine cables; and
2. market for access and co-location in cable landing stations located in India.

Market evidence clearly demonstrates that the market for capacity on international submarine cables is effectively competitive and Indian operators have seen declining prices over time. FIGURE 1 below shows the decline in monthly capacity charges on selected submarine cables. The bandwidth cost for a STM-4 link out of Mumbai, Chennai and Bangalore clearly show an average 30% yearly average decline since 2007.

FIGURE 1
MONTHLY STM-4 BANDWIDTH COST (RS)

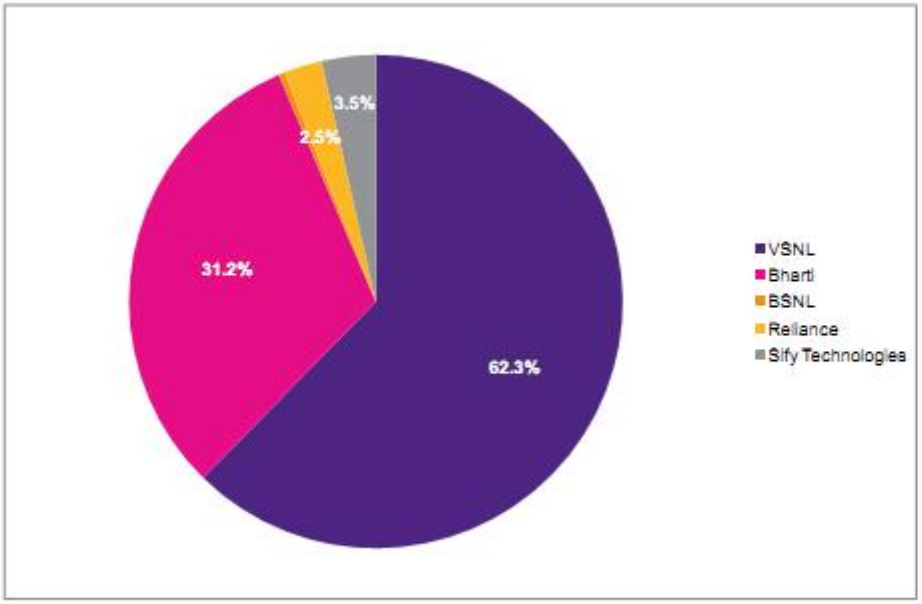


Source: Telegeography

On the other hand, the prices charged by Indian OCLS to interconnect with the international submarine cables have remained unchanged since 2007. The new CLS proposed (such as Airtel's EIG CLS) are almost double existing CLS charges. Vodafone submits that this is not reflective of an effectively competitive market. All the evidence suggests that the Authority should intervene to ensure that cost-reflective charges exist.

Such high prices reflect the lack of competition in the market for CLS access. The expert report by Plum Consulting UK shows that two operators have over 90% market share of CLS access (see below). This clearly demonstrates a lack of competition in the market.

Figure 3-1: Indian cable landing station market share by operator (lit cable capacity)



Source: Plum Consulting, Vodafone Essar

Further, the data shown in TRAI's consultation document show that the charges imposed by OCLS for access are substantially greater than that seen in other markets. This is consistent with the data provided by Vodafone in our earlier submission to TRAI's pre-consultation paper. (Please refer below Table):

TABLE
RATIO OF INDIAN CLS CHARGES TO INTERNATIONAL CLS (STM-16)

	Bahrain	Fiji	Singapore	Brazil	Africa	UK
AIRTEL EIG	79.2	2.3	219.4	29.1	16.0	79.2
AIRTEL	50.6	1.5	140.2	18.6	10.2	50.6
TATA (Chennai)	31.9	0.9	88.3	11.7	6.5	31.9
RCOM (Versova)	1.0	0.0	2.8	0.4	0.2	1.0

Charges reflect the combined access facilitation and collocation fees for a 3 year period (see our submissions in pre-consultation paper)

TABLE above demonstrates that the major Indian CLS impose charges far above what is seen worldwide.

The evidence is clear: the pricing imposed by OCLSs for access to and collocation in India is inconsistent with international rates. There is no commercial, policy or economic reason why CLS charges along the same submarine cable materially differ.

Vodafone therefore strongly supports the introduction of price regulation for CLS access facilitation and co-location charges. VFI recommends TRAI adopt incremental pricing principles, with top-down calibration using ASR data. Key principle to follow is cost-causation – only costs that are incurred by providing access to other operators should be included. Importantly, costs that are reimbursed by submarine cable owners must not be double recovered through CLS charges. For example, SEA-ME-WE-4 cable customer documentation makes it clear that the cost for an IRU includes one-off set up charge payable to the submarine cable includes cost of wet segment and the CLS. Only recurring O&M is payable to CLS owner.[1]

Vodafone submits that the TRAI adopt regulations consistent with the observed best practices used in markets worldwide. Observed best practice can be summarised as follows:

- **Access facilitation charges**
  - These charges relate to the costs associated in building, operating and maintaining the cable landing station and the equipment needed to interconnect to the submarine cable, including the distribution frame and relevant cable links that convert the high capacity submarine cable into land-side backhaul links.
  - Only incremental costs incurred in providing interconnection to non-OCLSs should be included in AFC and CLC. The cost to build and operate the submarine cable, including its landing and lighting, are recovered through submarine cable charges.
  - There is a growing trend for regulators to set these charges on a "per link" basis rather than on a "per capacity" basis. This is because a "per link" charge is consistent with the cost causality principle – that is, the costs associated with the CLS are driven by the number of cables landed and the number of links backhauled. For example, the distribution frame within the CLS may have a link capacity of 48 links, enabling 24 fibre pairs with a redundancy maximum of 20 pair links. As a result, the cost of the ODF is driven by those 20 links – the throughput of each link is irrelevant, a STM-1 costs the same as a STM-64.
  - Capacity-based charging is relevant for the IRU or leasing payable to the submarine cable owner(s) as the submarine cable itself has a finite throughput.

[1] http://www.seamewe4.com/pdfs/home/Customer_event/SMW4_Customer_event_with_Backhaul_slide.pdf

- **Collocation charges**
    - Cost-based charging reflecting the cost of a standard ETSI rack and power levels required.

In addition to price regulation, Vodafone submits that the TRAI also impose several non-price conditions on the behaviour of vertically integrated OCLSs. Regulation is needed so as to minimise the potential for vertically integrated CLS owners to exploit CLS ownership in retail domestic telecommunications market. For instance, regulation should be designed so as to ensure that Reliance/Bharti/Tata do not self-supply CLS access at a rate more favourably than it supplies externally.

Vodafone submits that the TRAI adopt the best practice approach adopted in the West African Telecommunications Regulators' Assembly (WATRA) in relation to supply of alternative co-location premises. The WATRA Draft Guidelines states that when collocation at the CLS is not possible, the OCLS must take reasonable measures to propose an alternative solution. Such alternative solution may include option such as virtual or remote collocation conditioning additional equipment space, optimising the use of existing space or finding adjacent space[2]. For this purpose remote or virtual co location means a connection to the CLS outside the cable landing station, whether adjacent or at a distant location from such station; at which it is possible install its equipment so as to access the submarine cable capacity from the cable landing station. **The link between the remote or virtual co location point and the CLS will be provided at no cost by the CLS operator.**

Such a rule will remove incentive for OCLS to artificially claim that co-location is full at CLS building.

RESPONSE TO SPECIFIC ISSUES FOR CONSULTATION

Please find below Vodafone's response to the specific issues for consultation.

Q1: Which of the following method of regulating Access Facilitation Charges and Co-location charges (AFC & CLC) should be used in India?

a) The prevalent method i.e. submission of AFC & CLC by owner of the cable landing station (OCLS) and approval by the TRAI after scrutiny
b) Submission of AFC & CLC by OCLS and approval by TRAI after consultation with other stakeholders
c) Fixing of cost based AFC & CLC by TRAI
d) Left for mutual negotiation between OCLS and the Indian International Telecommunication Entity (ITE)
e) Any other method, please elaborate in detail.

Vodafone strongly prefers that cost based pricing be imposed by TRAI. As outlined above and as shown in the TRAI consultation paper, the CLS market is dominated by few players. As a result of such domination, the charges imposed by Indian OCLS are far in excess of what is seen in other markets.

Vodafone believes that method (c)—i.e. cost-based prices being set by the TRAI—is the only appropriate option for regulating Access Facilitation Charges (AFCs) and Co-location Charges (CLCs) in India.

The other options are highly inappropriate given the circumstances and experience to date.

[2] http://www.itu.int/ITU-D/projects/ITU_EC_ACP/hipssa/events/2010/WA5.2.html

- Method (a) and method (b) are essentially the same, the only difference being that additional scrutiny of the proposed prices is introduced through consultation with ITEs. However, both methods (a) and (b) suffer from the same fundamental problem in that prices are proposed by OCLSs (so they are in control of the process) and require to be approved by TRAI (which is a difficult task to perform effectively, and leads to delays and inertia in the setting of rates). It is for these reasons that AFC and CLS charges have remained stagnant and far too high for over four years.
- Allowing AFCs and CLCs to be negotiated between OCLSs and ITEs (i.e. method (d)) can only work where there is strong competition between OCLSs, which drives down the negotiated prices towards the level of cost. As the TRAI recognises by virtue of its initiation of the present consultation, and as is recognised in the consultation paper (in sections 2.18–2.19), such competitive conditions do not exist in India. Further, (as recognised in section 2.23) experience over the last four years shows that ITEs have been unable to achieve lower prices through negotiation with OCLS even though the OCLSs costs have reduced considerably during that time as the volume of international traffic (voice and data) has risen and new OCLS have entered the market.

It is clear that the current regulatory regime of submission of AFC and CLC by OCLS and approval of TRAI is failing the market and leading to unnecessarily high data prices in India.

The fixing of cost-based rates is also consistent with international best practice for markets that experience a lack of effective competition in the market for CLS access.

Regulators worldwide, especially in markets that have limited access to international bandwidth have adopted the essential infrastructure doctrine as the basis on which to regulate CLS access and charges. Essential facilities doctrine specifies when the owner(s) of an "essential" or "bottleneck" facility is mandated to provide access to that facility at a "reasonable" price[3].The bottleneck arises where a firm in the downstream market (retail telecommunications market) also owns the upstream bottleneck (the CLS). For example, Airtel, RComm and Tata all own CLS and also compete in the retail market with other non-CLS owners. The implications are that the CLS have an economic incentive and ability to charge prices that are advantageous to themselves, and which are likely to damage competition and consumers in the downstream market.

It can be seen that the countries that have regulated CLS access and charges are those that have limited access to, and ownership of, CLSs (either through regulation or economic realities). This is particularly relevant for most emerging markets that have limited access to submarine cables, typically Africa and India. We note that there is less regulation on the competitive routes such as trans-Atlantic or trans-Pacific (this also depends on operators being able to build new CLS free of regulatory restrictions).

In addition, regulators are increasingly moving towards a more disaggregated charging regime, so as to ensure that CLS owners are not unnecessarily burdening access seekers with services that are not required.

Observed best practice can be summarised as follows:

- **Access facilitation charges**
    - These charges relate to the costs associated in building, operating and maintaining the cable landing station and the equipment needed to interconnect to the submarine cable, including the distribution frame and relevant cable links that convert the high capacity submarine cable into land-side backhaul links.
    - Only incremental costs incurred in providing interconnection to non-OCLSs should be included in AFC and CLC. The cost to build and operate the submarine cable, including its landing and lighting, are recovered through submarine cable charges.

[3] See OECD 1996 Roundtable Discussion, available at: http://www.oecd.org/dataoecd/34/20/1920021.pdf and ICT Tool Kit Sect.2.4.4, available at: http://www.ictregulationtoolkit.org/en/Section.1713.html.

- There is a growing trend for regulators to set these charges on a "per link" basis rather than on a "per capacity" basis. This is because a "per link" charge is consistent with the cost causality principle – that is, the costs associated with the CLS are driven by the number of cables landed and the number of links backhauled. For example, the distribution frame within the CLS may have a link capacity of 48 links, enabling 24 fibre pairs with a redundancy maximum of 20 pair links. As a result, the cost of the IDF is driven by those 20 links – the throughput of each link is irrelevant, a STM-1 costs the same as a STM-64.
- Capacity-based charging is relevant for the IRU or leasing payable to the submarine cable owner(s) as the submarine cable itself has a finite throughput..

- **Collocation charges**
  - Cost-based charging reflecting the cost of a standard ETSI rack and power levels required.

In addition, we note the conclusion from Plum Consulting UK, who undertook an expert review of the CLS regulatory regime worldwide. Plum analysed the access facilitation charges and the relevant commercial and regulatory regimes. Plum concluded that it is a standard international practice for the cable landing station owners to recover these costs of building and operating the CLS from the submarine cable owners. At the same time there is strong evidence that:

- These costs are excluded from the cost based used to estimate cable landing station charges in countries where these prices are regulated.
- Some of the Indian cable landing station owners recover these costs from cable owners as well as through access facilitation charges.

For example, SEA-ME-WE-4 cable customer documentation makes it clear that the cost for an IRU includes one-off set up charge payable to the submarine cable includes cost of wet segment and the CLS. Only recurring O&M is payable to CLS owner.[4]

We strongly recommend, therefore, that the TRAI undertake to fully understand the extent to which CLS costs are recovered from submarine cable owners. Where costs are recovered from cable owners (or where CLS owners refuse to cooperate with TRAI), Vodafone recommends that the cost of building and maintaining the CLS be excluded from charges levied on India operators.

Q2: In case AFC & CLC are regulated using method (a) or method (b) above, is there a need to issue guidelines containing algorithm and network elements to be considered for calculating AFC & CLC to the OCLSs? If yes, what should be these guidelines?

Vodafone believes that in order to achieve consistency between CLS owners and to verify accuracy of data with audited accounts, the TRAI should issue guidelines on reporting requirements on costs associated with operating CLS facilities.

First, we reiterate our recommendation that the new Accounting Separation Report (ASR) Regulations contain specific reporting lines for CLS owners. For example, include network elements such as ODF and number of racks available for co-location. Once a standard reporting structure is in place (including audited financial reports), the TRAI can develop a consistent top-down model utilising standard data. However, based on best international practices Vodafone is willing to develop the Pricing Model on incremental cost methodology to determine AFC and CLC. We expand on the method that should be adopted in response to question 6 below.

[4] http://www.seamewe4.com/pdfs/home/Customer_event/SMW4_Customer_event_with_Backhaul_slide.pdf

Vodafone further submit that only equipment landside of the optical distribution frame (ODF) should be included in CLS charges – as the international norm is to recover the costs of the CLS building and landside submarine cable equipment from the submarine cable owner. As per cost causation principles, only the incremental costs incurred to provide interconnection to the international submarine cable should be recovered via AFC and CLC.

Detailed comments on the proposed models contained in the consultation annexes are provided in question 6 below. However, we wish to raise some general issues with respect to the models.

First, there is potential for double counting of building depreciation/rent components in the AFC and inclusion of similar costs in the CLC. For example, item B3 in Annexure III is for rental per rack. This generally refers to rental for the floorspace occupied by the colo rack. However, charges to recover the cost and maintenance of the co-location building is recovered through AFC (eg, item A(b)24 in Annexure III). This interpretation may not be correct, but either way, TRAI should issue guidance that makes it clear that where building costs are recovered through AFC, no rental/depreciation of space used can be charged under CLC.

Second, we note there is reference to two separate DXC – one in equipment room floor B and one in co-location room floor C. These are items A(a)1 and A(a)4 in Annexure III. It is not claim why there is need for multiple ODF and DXC nor the separation between floors B and C. As per international best practice, equipment and buildings required to transform the international submarine cable data into the interconnect ODF should be recovered from the submarine cable charges rather than interconnect charges. We note that DXC costs may be recovered for virtual interconnect services where access seekers require capacity less than STM-64.

Q3: In case, AFC & CLC are regulated using method (a), (b) or (c) above, please suggest the value of pre-tax WACC, method of depreciation and useful life of each network element? Please provide justification in support of your answer.

TRAI refer to previous WACC values of 13-15% used in previous regulatory processes and a report from AVENDUS discussing Indian ROCE and its developments. We note that TRAI continues to err in its calculation of WACC and is fundamentally incorrect in comparing ROCE and WACC.

Vodafone strongly disagrees with the discussion contained in paragraphs 3.17 to 3.20. We have raised concerns about the TRAI's approach to WACC and its connection to ROCE previously in IUC consultations. Vodafone has previously provided expert report from Professor Parsons of Washington University in USA, titled "Weighted Average Cost of Capital (WACC): Concepts, Best Practices, Calculations & Data".[5]

Calculation of WACC

The weighted average cost of capital (WACC) is a method to assess the returns required by the providers of capital. It measures the minimum economic return required by investors. It does not measure actual performance of companies, or past results. In the context of setting regulated prices, WACC represents the economic profit that must be made on the investment.

Professor Parsons undertook a detailed study, using public Indian data, analysing the WACC for the Indian industry. Professor Parsons produced a range of values which utilise low, medium and high range input assumptions. In conclusion, Professor Parsons states that the medium range WACC for the Indian industry is **19%**.

[5] Vodafone response to TRAI, 18 May 2011, Annexure B. Available at the TRAI website.

We note that TRAI may disagree with the calculations performed – but since WACC is a well-used and understood method, the TRAI should consult on the values it believes should be used in the CAPM based WACC. Specifically, TRAI needs to inform the industry of, and provide full justifications for:

- the nominal risk-free rate;
- Debt premium;
- cost of debt;
- equity risk premium for India;
- equity beta (using actual variances for Indian-listed mobile operators);
- gearing; and
- tax rate.

Absent of such data, the TRAI cannot adequately assess the appropriate WACC. Vodafone submits it is not appropriate for TRAI to randomly pick a WACC value without undertaking proper calculation.

ROCE cannot be used to assess WACC

TRAI appears to use the term ROCE as if it were equivalent to the cost concept of WACC. While ROCE and WACC may sound similar they are entirely different concepts. WACC is an economics/finance concept relating to the level of returns that investors (both debt and equity holders) require in order to continue providing funds to the business. In contrast, **ROCE** is a measure of **actual past performance**. ROCE can be greater than or less than WACC and ROCE may even be negative for some period of time. Suffice to say that it is the economic cost of capital WACC that is appropriate to be applied, not ROCE. Indeed, regulatory discussions regarding capital costs around the world revolve around WACC, not ROCE.

TRAI points to a study by AVENDUS, suggesting ROCEs were in the 7-8% range for the telecom sector, but likely to increase to 10-14% over 2012-14. Since ROCE is a measure of past performance, this should come as no surprise; retail telecom rates in India appear to be unsustainably low. Estimates of actual returns in the future also have no relevance for assessing the level of returns that investors (both debt and equity holders) require in order to continue providing funds to the business.

The use of ROCE to assess WACC begs the question, had AVENDUS, or another tracking entity, produced negative ROCE calculations for some period, would TRAI have recommended a negative WACC?

Vodafone submits that the WACC be estimated as per international norms and not through reference to ROCE values.

Depreciation

Vodafone recommends the use of tilted annuity depreciation. This method best enables future prices to reflect declines in prices over time. The current approach to depreciation assumes a flat 10-year straight line depreciation period. Straight-line depreciation is a reasonable approach except in cases where input prices are changing substantially year-on-year, in which case a tilted-straight line method may be preferred. However, if the cost modelling approach assumes an efficiently constructed CLS every year (i.e. costs are perpetually set on the basis of first-year depreciation) then a tilted annuity is the best approach so that the capital charge is the same in each year of the asset's life.

Useful life of network elements

Asset lives should be established separately for different cost components to reflect their very different cost profile. Although accounting lives may be used if the data is provided to the TRAI by the CSL operators, it is

preferable to use economic lifetimes which are best derived from international benchmarks of similar regulated price-setting exercises in other countries. Using for example:

- 5 years for transmission equipment; and
- 20 years for buildings.

Q4: Which cost heads/ network elements should be included/ excluded while calculating Access Facilitation and Co-location charges? Please enumerate the items with specific reasons.

Vodafone further submit that only equipment landside of the optical distribution frame (ODF) should be included in CLS charges – as the international norm is to recover the costs of the CLS building and landside submarine cable equipment from the submarine cable owner. As per cost causation principles, only the incremental costs incurred to provide interconnection to the international submarine cable should be recovered via AFC and CLC.

Calculating AFC

AFC could contain both one-time non-recurring fee and a monthly charge. The charge basis should be per link not capacity basis, as it is the number of links, and their installation, that incurs costs not the capacity of signal that flows through them. Furthermore, access seekers need to obtain and purchase cable capacity directly from the submarine cable owners – the CLS owner does not sell capacity to the submarine cable.

The AFC non-recurring charge allowed should reflect the cost to install an international link – known as the "**IFC Link installation charge**". This represents the link between the international optical distribution frame in the CLS and access seekers' equipment in the CLS or alternate space. This is a one-off installation charges set at costs representing time and material basis. The following items are typically included in the **IFC Link installation charge:**

- *Cost of the physical fibre cable* between the distribution frame and access seekers' equipment either in the CLS or an alternate location – the cost is calculated on the length of cable required and all necessary equipment for installing cable.
- *Fibre cable installation fee* – the labour cost of installing the cable. Typically allow a maximum of four man hours.

The AFC may also comprise a recurring cost for the "**CLS Link Rent**", which relates to access seekers' share of the interconnect optical distribution frame (ODF) and the link to the distribution point within the CLS. The following items can be included in the **CLS Link Monthly Rent**:

- *Annualised capital cost of the optical distribution frame equipment and installation* – cost per ODF.
    - The capital cost of the ODF needs to be annualized at an appropriate WACC and allocated to the fibre capacity (for example, 48 links, or 24 pairs).
    - The cost needs to be separated between owner's access and the capacity available to access seekers. For example, if the owner reserves 50% of link space, then only 50% of costs can ever be recovered from access seekers.
    - The costs should be distributed over all available links, as this will provide incentive for CLS owner to maximize access seeker use.
- *ODF space rental* – cost per ETSI standard rack. The cost allocated to the access seeker should reflect the actual space occupied/allocated.

- *ODF and CLS Link Maintenance* – typically assumed to be 10% of the equipment allocated capital costs.
- *CLS service continuity charge* – compensate the CLS owner for its capacity to rapidly deploy technicians to address any service failure and guarantee service recovery.

In summary the AFC should reflect only the costs incurred in providing connectivity for access seekers from the co-location location to the ODF. Cost incurred for landing or lighting the submarine cable should not be included. Nor should costs of multiple distribution frames or digital cross connects be recovered from interconnection charges – again, only distribution frames required to physically interconnect access seekers should be recovered through AFC.

The CLC should reflect costs related only to the meet-me-room where co-location physically occurs. Costs associated with other parts of the CLS should be recovered directly from submarine cable owners. Costs that can be included are:

- *CLS space preparation* – charged on hourly basis, reflects time to prepare space where co-location racks will be deployed.
- *New power feed* – charged per item
- *Cable tray* – charged per tray basis. Typical to estimate as one tenth the cost of a cable tray as the tray will be shared with other cables.
- *Standard Rack Size* – charged per rack up and includes base requirement of power.
- *Additional power requirements* – additional power can be obtained in increments of 1kW/h up to a total of 7kW/h.
- *Site Access* – providing access to access seekers for planned or unplanned work during or outside normal working hours.

Q5: What should be periodicity of revision of AFC & CLC? Support your view with reasons.

Based on international benchmarks of similar regulated price-setting exercises in other countries, Vodafone believes that a three year forecast period would be appropriate. At each review the TRAI should set prices for the following three year period, with annual reductions based on predicted cost trends. However, the TRAI might wish to retain scope for annual price reviews initially to review the implementation of the new charging regime and to assess its impact on CLS access. Such an approach would achieve an appropriate balance between market certainty and the need to ensure a reasonable return on investment in CLS facilities

Q6: In case, cost based AFC & CLC are fixed by TRAI, which costing methodology should be applied to determine these charges? Please support your view with a fully developed cost model along with methodology, calculation sheets and justification thereof.

We support the accepted cost modelling principles of cost causation and incremental costing. Specifically, incremental costing meaning that only costs that are incurred to provide the service should be included; and cost causation meaning that costs of an asset are allocated to the factor that causes the cost to be incurred.

Vodafone strongly supports the development of a forward-looking efficient cost model that is consistent with international best practices, including cost causation and exclusion of CLS costs recovered from submarine cable operators.

Since OCLS are vertically integrated operators in direct competition with non-OCLS in the retail domestic market, there is a real incentive for OCLS to use the ownership of a key bottleneck asset to increase the costs of competing networks. Vodafone recommends TRAI be vigilant to ensure that only costs that are efficient, necessary and directly related to the provision of submarine cable interconnection services be recovered through AFC and CLC.

In the current context this means:

- Cost of building the CLS incurred for the purpose of landing the cable. As such, cost should be recovered through cable charges not interconnection. Equipment such as the SLTE, NPE, DXC and non-interconnect ODF should also be recovered through submarine cable charges not CLS access and interconnection.
- Only equipment directly incurred for the purpose of providing international interconnection with submarine cable capacity should be recovered through AFC and CLC. This means equipment landside of the interconnect ODF – that is, the distribution frame that access seekers physical connect to. If interconnect occurs at a shared ODF (ie used by OCLS and access seekers) then the cost of transmission to the interconnect ODF should not be recovered from AFC. Only when interconnect occurs at a dedicated ODF, and there are legitimate reasons why interconnect cannot occur at the OCLS' ODF should transmission costs to interconnect ODF be recovered through AFC.
- AFC and CLC should be charged on a per link basis, as this is the driver for new investment. That is, the ODF and co-lo racks have a physical limitation as to how many links that can be handles. It does not matter the throughput of the links.

Vodafone supports the use of top-down models to calculate the relevant AFC and CLC – so long as the above principles are adhered to. Vodafone supports the use of top-down calibrated incremental cost model, utilising modern efficient asset prices, tilted annuity depreciation, WACC and only include costs incurred to provide interconnection at CLS. This is due to the discrete assets required to provide international interconnection at CLS – that is, costs are either incurred to land the cable and are recovered through submarine cable charges, or are incurred to provide interconnection and this able to be recovered from AFC and CLC.

Annex to this response contains detailed line-by-line comments of Vodafone on the TRAI models listed in ANNEXURE III in the Consultation Paper. With respect to alternative location and virtual location models we offer the following comments.

Vodafone fundamentally disagrees with the generic description of items considered by OCLSs for AFC and CLC at alternative locations. We disagree with all of ANNEXURE IV. First and foremost, co-location at an alternative location comprises three aspects: AFC fixed and recurring charges, CLC charges and transmission costs between CLS and alternative location. When co-location must occur at alternative location because the CLS is full, no additional charges should be levied. Vodafone notes that due to the bottleneck nature of CLS, the OCLS has an incentive and ability to leverage its monopoly power to impose additional costs on the competitors of OCLS. This can be done by dictating interconnect occur at alternative locations.

Vodafone disagrees with the generic description of items considered by OCLSs for calculating AFC in case of virtual co-location. Virtual co-location incurs the AFC elements only and the cost of transmission to the location nominated by the access seeker. The cost of transmission depends on the location at which the virtual co-location is to occur – for example, we note that in most CLS RIO virtual co-location is defined as co-location outside the CLS. If the cost of transmission is incurred by the access seeker, then the only additional cost that should be levied is the cost of transmission from ODF to relevant manhole adjacent to the CLS.

Q7: Whether Access Facilitation charges and O&M charges should be dependent on capacity (i.e. STM-1, STM-4 or STM-16) activated? Support your view with reasons.

All charges should be set on cost causation basis. As discussed above, AFC costs are caused by the installation of fibre links. The capacity of each fibre link installed does not impact on the costs incurred. Therefore, all AFC should be set on a per link basis. See above answers for full justification.

Q8: If Access Facilitation charges and O&M charges are fixed on the basis of capacity activated;

a) Should the charges be linearly proportionate to the capacity activated; or

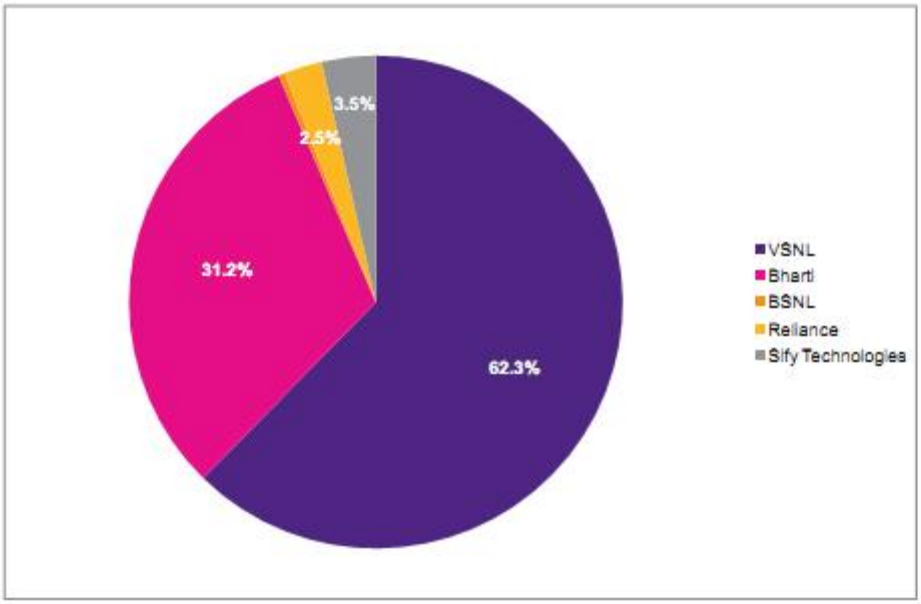
b) Should the interface capacity as provided by the submarine cable system at the cable landing station be charged as a base charge while higher or lower bandwidth be charged as the base charge plus charges for multiplexing/ de-multiplexing?

All charges should be set on cost causation basis. AFC costs are caused by the installation of fibre links. The capacity of each fibre link installed does not impact on the costs incurred. Therefore, all AFC should be set on a per link basis. See above answers for full justification.

Q9: Whether there is a need to fix Access Facilitation charges for all types of submarine cables? If no, which kind of submarine cables may be exempted and why?

Vodafone believes that the TRAI should set the AFCs and CLCs where there is market dominance and/or evidence of anti-competitive or excessive prices. As the TRAI has already demonstrated in its consultation paper, there is a huge discrepancy between AFC and CLC prices being charged by all of the OCLSs in India compared to international benchmarks. The market for CLS in India is extremely concentrated. The expert report by Plum Consulting UK shows that two operators have over 90% market share of CLS access (see below). This clearly demonstrates a lack of competition in the market.

Figure 3-1: Indian cable landing station market share by operator (lit cable capacity)



Source: Plum Consulting, Vodafone Essar

As a result, Vodafone submits that all CLS in India be declared and subject to specific cost-based charges, as per method outlined above in question 6.

Q10: Is there a need to introduce any new provision or to modify/delete any of the clauses of the 'International Telecommunication Access to Essential Facilities at Cable Landing Stations Regulation 2007', in order to facilitate access to essential facilities at cable landing station?

Vodafone believes that there are a number of important improvements that can be made to the *International Telecommunication Access to Essential Facilities at Cable Landing Stations Regulations*, as follows:

(i) **Regulation 3(3)—** Vodafone is of the view that TRAI mandates cost based Ceiling prices for AFC and CLC. While once the ceiling prices are mandated there may not be a need for giving approvals on CSL-RIOs however, if TRAI thinks it fit to do, Vodafone believes that CLS-RIOs submitted to the TRAI for approval should be made available for public comment before the TRAI considers whether or not to approve the CLS-RIO. Vodafone notes that the TRAI is already aware of the reasons why ITEs such as Vodafone consider this an important part of the CLS-RIO development process. Vodafone does not believe that such a consultation process would unduly delay the finalisation of a CLS-RIO.

(ii) **Regulations 5(2), 15(3) and 17(1)**—The ability of an OCLS to refuse to comply with the access facilitation procedure or to provide co-location space should be tightly limited. Currently, the OCLS is permitted to refuse such key elements of the access regime 'for any valid reasons' and there is no ability for ITEs to challenge or verify the grounds for refusal. There should be few valid reasons for an OCLS to refuse requests for access facilitation or co-location, and the TRAI should specify the acceptable reasons in the Regulations. Vodafone accepts that a lack of space is a valid reason for refusing a request for co-location (regulation 17(1)) but believes that greater transparency should be introduced by requiring the OCLS to publish, and keep up to date, a register that shows the amount of space that is available for co-location. Each OCLS should also specify the virtual co-location options in their CLS-RIO.

(iii) **Regulation 8(1)**—ITEs are required to arrange a backhaul circuit within 10 days of entering into an agreement with an OCLS. However, the ability of an ITE to meet that timeframes is not entirely within the ITE's own power as it may have to rely on other parties that are not subject to a similar timeframe or obligation. ITEs should not be subject to such a timeframe unless all potential suppliers of such backhaul circuits are obliged to accommodate such a request within the same timeframe.

(iv) **Regulation 10(1)**—As explained above, the Regulations should stipulate that AFCs are to be set based on LRIC, and these charges should be specified by the TRAI as Ceilings rather than being left to be proposed by the OCLSs.

(v) **Regulation 18(1–2)**—An OCLS should not have the power to decide whether or not an ITE is permitted to 'replace, modify or re-arrange' any of the ITE's co-location equipment in the co-location space. Vodafone accepts that the time of access for such a purpose should be mutually agreed between the OCLS and the ITE but the ITE should retain control over decisions relating to the upgrade or replacement of elements of its network.

Annex - Comments on model in Annexure III of TRAI Consultation Paper 8/2012

Item	Comments
(a)	**CAPEX Components**
1	Do not agree that cost of DXC should be included for AFC. Cost causation dictates only cost incurred for interconnect should be included. Only interconnect ODF should be included
2	Agree. Capital cost should be divided by this to get the per port cost
3	Disagree. Same cost should apply to all ports. Total costs not ports allocated must be the numerator
4	Disagree. Apportioned cost should = ½
5	DXC should not be included. Co-lo should allow for direct patch between access seeker's equipment and the CLS owner's ODF. The apportionment method should be made transparent
6	ODF costs should be allocated on a per fibre link basis. Need to make transparent the allocation method. Cost per fibre connection = cost of ODF divided by maximum number of fibre pairs.
7	Disagree. Total capital cost = annualized cost of ODF per fibre link.
8	Not clear what transmission link is included. Should only include cost to install fibre link from ODF to meet-me-room in CLS.
9	Disagree. This cost is recovered in OPEX – see item 25
10	Disagree. The cost to install should be included in item 8 & 9. Inclusion of separate category risks double recovery.
11	Disagree. One time set-up fee = 7 + 8. All other costs are recovered from submarine cable charges
12	Redundant calculation. Total cost should already be expressed in 'per link' term.
13	Disagree. Total CAPEX should = 7 + 8
14	Disagree. included in capital cost of equipment
15	Disagree. Should not be included
16	WACC should be included at annualisation process for ODF and TX link (7 + 8)
17	Disagree. Cost should already be apportioned on a per link basis. Capacity of the link is irrelevant.
18	Disagree. See above

Item	Comments
19	Not clear what revenue sharing arrangement is relevant here. If this refers to CLS cost recover from submarine cable owners, then these costs should be excluded.
20	Disagree
21	Disagree
22	Not clear why IRU basis is divided by three to establish lease basis. More information is needed.
(b)	**OPEX Components**
23	Agree. Should be capped at 10% of annualized capital costs
24	Disagree. Cost of CLS should be recovered through submarine access charges. If this refers to yearly O&M of facilities, then agree to inclusion.
25	Agree, only if item 9 is removed. Otherwise, represents double counting.
26	Disagree. Total should = 23 + 25
27	Disagree. Not clear what overheads are relevant for CLS. CLS are distinct network assets, with distinct costs. Only specific CLS costs should be included.
28	Disagree, as overheads need not be included.
29	Not clear what licence fees are applicable. If refer to ILDO license fee, this is applied to interconnected operators too who offer international services.
30	Disagree. License fee should not be added.
31	Annual costs should not be expressed on per STM-1 basis. Should be on per fibre link basis.

FORWARD-LOOKING COST MODEL TO DETERMINE EFFICIENT COST-BASED CABLE LANDING STATION CHARGES

April 2012

VENTURE Consulting

Contents

1 Findings

Venture Consulting has been engaged by Vodafone India to develop a forward-looking cost model to estimate efficient cost-based cable landing station (CLS) charges. The CLS cost model follows cost causation principles, as per international best practice, so only costs that are directly incurred to provide access and co-location services at the CLS are included.

The cost model calculates AFC and CLC as follows:

- The **AFC** reflects the costs incurred to access the submarine cable bandwidth. Access is through the main ODF which distributes the submarine cable to multiple other fibre links. The CLS cost model allocates AFC on a per link basis as per required under cost causation principles.
- The **CLC** reflects the costs incurred to provide space in the meet-me-room for access seeker co-location. The actual active equipment needed for co-location is provided by the access seeker and is therefore not included. The CLC is charged on a per cabinet basis. That is, the meet-me-room has a finite capacity for co-location cabinets. Associated costs, such as air-conditioning and power, are also determined by the number of active cabinets in the room.

The CLS cost model estimates efficient forward-looking costs for a year one year period and a period of three years. The one year model utilises straight line annuity depreciation and the three-year model utilises tilted annuity depreciation, taking into account future asset price trends.

Exhibit 1 below shows the efficient cost-based AFC and CLC for a three year period. This model utilises tilted annuity depreciation, which is the depreciation method most often used for regulatory cost models. This approach reflects the cost recovery profile seen in competitive markets as it reflects the future asset price trends.

Exhibit 1: AFC & CLC (three year model)

	Access Facilitation Charge (per link)		Co-location Charge (per cabinet)	
	US$	Rs.	US$	Rs.
Year 1	$ 963	Rs. 48,142	$ 5,933	Rs. 296,675
Year 2	$ 919	Rs. 45,957	$ 6,696	Rs. 334,784
Year 3	$ 878	Rs. 43,897	$ 7,120	Rs. 356,024

Exhibit 2 below shows the efficient cost-based AFC and CLC for a one year period. This model utilises straight line annuity depreciation.

Exhibit 2: AFC & CLC (one year model)

	Access Facilitation Charge (per link)		Co-location Charge (per cabinet)	
	US $	Rs.	US $	Rs.
Year 1	$ 911	Rs. 45,553	$ 6,001	Rs. 300,030

2 Outline of model

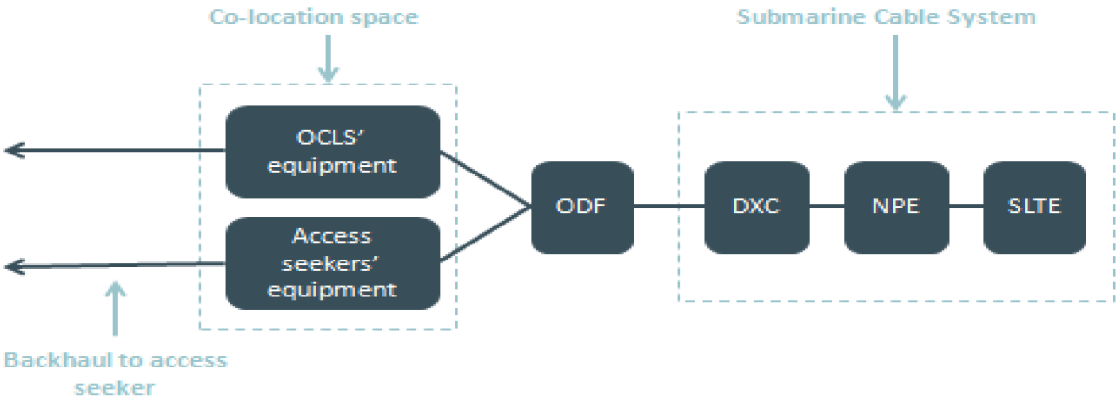
The purpose of the CLS cost model is to estimate the efficient costs associated with the provision of interconnection to international bandwidth. As per cost causation principles, only the costs incurred as a direct result of providing interconnection within the CLS are included in the CLS cost model.

Venture Consulting has developed two versions of the CLS cost model: a year one model; and a three year model.

A simplified network diagram is shown below in exhibit 3. CLSs provide the infrastructure needed to land international submarine cables and connect domestic networks to the capacity provided through the submarine cable. We have identified the following relevant network elements:

- **Submarine cable system**: this includes the active equipment required to send signals over the submarine cable. Elements include the submarine line termination equipment (SLTE), network protection equipment (NPE) and digital cross-connect (DXC) needed to transform high capacity submarine cable signals to capacity required by domestic users.
- **Optical distribution frame**: this is the passive ODF where domestic operators connect with the capacity of the submarine cable. This also includes the transport link between the ODF and the co-location area.
- **Co-location elements**: this includes floorspace and cabinets into which access seekers place their equipment to interconnect with international capacity and backhaul it to their core network nodes.

Exhibit 3: CLS network diagram



The CLS cost model follows cost causation principles – that is, only costs incurred as a direct consequence of providing interconnection to submarine cables are included in the costs for AFC and CLC. Importantly, costs to install, operate and maintain cable landing stations for the purpose of landing the submarine cable are recovered from the owners of the submarine cable – and subsequently recovered through submarine cable usage charges.

We have been informed by Indian operators that there is a two-charging regime for access to international bandwidth. First, domestic operators need to purchase international bandwidth from owners of the submarine cable. Second, domestic operators need to purchase access and co-location at CLS to connect the domestic network with the purchased international bandwidth.

Consequently, CLS costs that are recovered through submarine cable charges are not included in the CLS cost model. The network elements included in AFC and CLC are outlined in more detail below.

The costs of other elements not included in the below lists are captured in general O&M annual charge mark-up – for example, security, fire equipment, on-call technicians.

2.1 Network elements included in access facilitation charges

The AFC reflects the costs incurred to access the submarine cable bandwidth. Access is through the main ODF which distributes the submarine cable to multiple other fibre links. The CLS cost model allocates AFC on a per link basis as per required under cost causation principles.

The number of ODFs required is determined by the number of landside fibre links required. That is, the capacity of an ODF is determined by the number of links supported, e.g. 48 fibre links or 24 fibre pairs. The capacity of the link does not impact on the number of links per ODF.

AFC includes the following elements:

- Optical distribution frame;
- Cabinet into which the ODF is placed;
- CLS floorspace that is occupied by the ODF cabinet;
- ODF to co-location room transmission link;
- cable tray to support the transmission link; and
- capitalised labour costs to install the ODF to co-lo link.

Total AFC per fibre link equals:

$$AFC = \frac{floorspace + cabinet\ share + ODF + ODF\ link + labour\ costs}{Number\ of\ fibre\ pairs\ per\ ODF}$$

The elements in the above equation are explained below:

- ***Floorspace****:* equals the annualised cost of the floorspace occupied by the ODF cabinet. It is calculated by adjusting the floorspace cost per square metre to reflect the floorspace occupied by the ODF cabinet.
- ***Cabinet share***: equals the annualised cost of the ODF cabinet allocated to the number of racks used by an individual ODF. For example, a cabinet may hold a total of 22 racks and the ODF uses 4 racks, therefore cabinet cost is divided by 22 and multiplied by 4.
- ***ODF***: equals the annualised capital cost of the ODF equipment.
- ***ODF link***: equals the annualised cost of the fibre link (determined by the length of fibre required) and annualised cost of the cable tray on which the cable is held. The cost of the cable tray is determined on a per cable basis – so that is the tray could hold 10 cable, the cost of the tray is divided by 10.
- ***Labour costs***: equals the capitalised labour costs incurred to install the ODF to co-location transmission link. This is determined by the hourly labour rate and the number of man hours incurred.
- ***Number of fibre pairs per ODF***: is the maximum number of fibre pairs that one ODF can carry. This includes an allowance for redundancy and link protection.

The AFC also includes a percentage mark-up to account for operating and maintenance (O&M) costs and cost to ensure continuity of service. The O&M mark-up reflects ongoing yearly costs incurred to operate the CLS and to maintain CLS infrastructure. The continuity charge reflects the costs incurred by the CLS owner to guarantee 24 hour service and disruption repairs.

2.2 Network elements included in co-location charges

The CLC reflects the costs incurred to provide for space in the meet-me-room for access seeker co-location. The actual active equipment needed for co-location is provided by the access seeker and is therefore not included. CLC includes the following elements:

- Cabinet into which co-location equipment is placed;
- CLS floorspace that is occupied by the co-lo cabinet;
- power and air-conditioning required to cool active co-lo equipment;
- capitalised labour costs to prepare co-location space within CLS and to install equipment.

The CLC is charged on a per cabinet basis. That is, the meet-me-room has a finite capacity for co-location cabinets. Associated costs, such a air-conditioning and power is also determined by the number of active cabinets in the room.

The CLC per cabinet equals:

$$CFC = floorspace + cabinet + room\ prep + installation + power\&aircon$$

The elements in the above equation are explained below:

- ***Floorspace****:* equals the annualised cost of the floorspace occupied by the co-location cabinet. It is calculated by adjusting the floorspace cost per square metre to reflect the floorspace occupied by the cabinet.
- ***Cabinet cost***: equals the annualised cost of the co-location cabinet We assume that access seeker requires the full cabinet in which to place its co-location equipment.
- ***Room preparation***: equals the annualised capitalised labour costs of preparing the co-location room to hold the co-location cabinet. This is determined by multiplying the average wage rate by the man hours required to prepare the room.
- ***Installation cost***: equals the annualised capitalised labour cost of installing the co-location cabinet and install the equipment.
- ***Power & Air-conditioning***: equals the yearly operating costs incurred to supply power and air-conditioning for each co-location cabinet.

The CLC also includes a percentage mark-up to reflect the ongoing operating and maintenance costs incurred to keep the meet-me-room operational.

2.3 Depreciation method

We have developed two versions of the CLS cost model: a year one model and a three year model. Both these models determine annualised capital costs using annuity depreciation.

The annuity approach is typically used by regulators as the yearly payment allows for both depreciation (return of capital) and a return on capital (WACC). When applied consistently throughout the fixed period over which costs are to be recovered (the 'cost recovery period' — which would ideally be the life of the assets), annuities ensure that the compensation received from annual access charges (in net present value terms) is equal to the initial cost of investing in an asset.

The single year model utilises straight annuity depreciation, which annualises an initial capital investment over the lifetime of the asset allowing for recovery of the initial capital outlay and a return to capital. The return to capital is calculated using the weighted average cost of capital (WACC).

The excel CLS cost model utilised the "PMT" function to calculate the yearly payment due, using the initial capital cost of the asset as the present value of the asset, the WACC as the interest rate payable, and the economic lifetime of the asset as the length of the annuity.

This approach results in a constant yearly payment stream.

The three year model utilises tilted annuity depreciation method. Tilted annuity takes into account expected changes in asset prices. If asset prices are expected to fall, the annuity is 'tilted' so that more cost-recovery is allowed earlier on in the cost recovery period (front-loading). If asset prices are expected to rise, more cost recovery is allowed later in the cost recovery period (back-loading).

Tilted annuity is often used by regulators in telecommunications cost modelling because it better reflects the recovery profile one would expect in competitive markets when prices are changing over time. Allowing for front-loading when asset prices are falling reflects the market reality that later entrants should always be able to undercut existing incumbent investments. The incumbent would therefore only invest if they could recover a higher proportion of costs in early periods, since they know they will have less cost recovery in the later periods. Conversely, where asset prices are rising, later entrants will not be able to undercut the incumbent, rather, they will only be able to enter at a higher price. All else being equal, a current incumbent could therefore compete by lowering its retail prices now, knowing that it can get greater cost recovery later

Tilted annuity is therefore seen as better reflecting the requirement to set efficient forward-looking cost based charges.

The tilted annuity equation used in the CLS cost model is as follows:

$$A_t = P \times \frac{(1+p)^{t-1}(r-p)}{1-\left(\frac{1+p}{1+r}\right)^N}$$

Where:

- A = yearly annuity;
- P = initial asset price;
- p = asset price trend;
- r = WACC;
- t = current time period;
- N = asset lifetime.

Both types of annuities — standard (flat) annuities and tilted annuities – provide for the same net present value of the compensation but the path of cost recovery over time differs.

3 Key assumptions and inputs

In this section we outline the key assumption and inputs used in the submitted version of the CLS cost model. These assumptions are contained in sheet "*Assumptions*" in the CLS cost model excel file.

3.1 AFC inputs

As outlined above, key elements contained in the calculation of AFC are the ODF, ODF cabinet and ODF-co-location fibre link.

The assumptions made to calculate the capacity of the ODF and the ODF cabinet are shown below in exhibit 4. We assume that the ODF holds a maximum of 16 usable fibre pairs. This is derived from a physical maximum of 24 fibre pairs and a 70% maximum utilisation ratio. The size of the ODF is assumed to be 4 racks.

Exhibit 4: ODF assumptions

Max fibre ports	Max fibre pairs	Utilisation ratio	Max usable fibre pairs	Racks per ODF
48	24	70%	16	4

The assumptions used to calculate the capacity of the ODF cabinet and the ODF-colo fibre links are contained in exhibit 5 below. We assume that the ODF cabinet has a floorspace footprint of 0.8 square metres and the ODF cabinet holds a maximum of 22 racks. This assumption reflects standard industry size sourced from vendor documents and websites.

We assume that the length of the ODF-colo link is 200 metres reflecting the distance between the ODF cabinet on the ground floor to the meet-me-room on upper levels of the CLS. The cable tray holds a maximum of 10 fibres. The time to install the fibre link is assumed to be 8 man hours.

Exhibit 5: ODF cabinet and ODF-colo link assumptions

ODF cabinet footprint	ODF cabinet number of racks	ODF-colo link length	Number of links per cable tray	Link installation time
0.8 sq.m	22	200 m	10	8 hours

Finally, we assume a 10% mark-up to account for annual CLS operating and maintenance costs, and an additional 5% mark-up to account for costs incurred to ensure 24 hour support and security to ensure continuity of service.

3.2 CLC inputs

As outlined above, the cabinet in which co-location equipment is housed is the main asset in determining CLC. The assumptions used are contained in exhibit 6 below.

We assume that the co-location cabinet has the same floorspace footprint as the ODF cabinet – that is, 0.8 square metres. We assume that the access seeker requires a full cabinet to house their co-location equipment. We further assume that room preparation (i.e. preparation of the co-location space for the co-location cabinet and equipment) takes a total of 8 man hours and co-location cabinet installation takes a total of 4 man hours. This labour time has been benchmarked against the Bahraini regulators' determination in relation to co-location charges at cable landing stations.[1]

Exhibit 6: Co-location assumptions

Co-location cabinet footprint	Labour for room preparation	Labour for co-location cabinet installation
0.8 sq.m	8 hours	4 hours

3.3 Asset cost assumptions

Exhibit 7 below outlines the asset assumptions in relation to initial asset price, economic lifetime and future price trends. These assumptions have been benchmarked against vendor documents and international regulators' decisions.

Asset prices shown in the source currency – that is, prices shown in USD are sourced from international sources and prices in Rs. are sourced within India. We have confirmed these asset prices with Vodafone India.

Asset price trends are consistent with international assumptions in relation to telecommunications assets. Equipment prices are assumed to experience a negative price trend in the future, consistent with market experience. Indian-specific price trends are used for floorspace, annual power and wage inflation. We use the wholesale price index for power cost and wage inflation from February 2011 to February 2012, sourced from the Reserve Bank of India.

[1] BTRA, Determination issued by the Telecommunications Regulatory Authority to Bahrain Telecommunications Company B.S.C. and Menatelecom pursuant to Article 57(g) of the Telecommunications Law regarding the dispute related to the terms and conditions of Batelco's International Falcon Connection Service, Article 57(g) Determination No. 1 of 2010, Table 9.

Exhibit 7: Asset assumptions

	Price (Rs)	Price (USD)	Lifetime (yrs)	Price Trend (%)
ODF		$ 700	5	-5%
ODF Cabinet		$ 800	5	-5%
Co-lo Cabinet		$ 800	5	-5%
Fibre Link (per metre)		$ 10	5	-5%
Cable Tray		$ 1,700	5	-5%
Floorspace (per sq.m)	Rs. 107,500		20	5%
Annual Power Cost (per cabinet)	Rs. 240,000		5	7%
Average Wage Rate (per hour)	Rs. 625			7%

3.4 WACC inputs

The WACC represents the minimum return on capital (debt and equity) required by the owners of capital to continue to invest in the firm. The WACC is a common used concept in regulatory economics throughout the world. The calculation of a WACC is market-specific and is based on observable metrics – such as the Indian Government bond rate and the equity beta of Indian telecommunications companies.

We note that Vodafone India has previously supplied the TRAI with detailed WACC calculations undertaken by Professor Steve Parsons.[2]

We use the medium WACC calculated by Professor Parsons to be **19.88%**. The detailed components of the WACC calculation are shown below.

[2] Vodafone response to TRAI, 18 May 2011, Annexure B. Available at the TRAI website.

Exhibit 8: Components of Indian WACC

	Value
Nominal risk-free rate	7.58 %
Debt Premium	1.58 %
Cost of Debt	9.16 %
Equity Risk Premium (India)	8.58 %
Equity Beta	1.12
Cost of Equity	17.19 %
Gearing	38.73 %
Tax Rate	35.5 %
Nominal pre-tax WACC	19.88 %

3.5 Licence fees not included

We note that the consultation paper states the international (ILDO) license fee was reduced in 2006 to increase competition in the provision of international telephony to Rs. 2.5 Crore and annual fee of 6% of eligible revenue.

These license fees are for the provision of international telephony – they are not specific to the ownership of CLS. For example, we note there are more ILDOs than there are OCLSs.

As such, these fees are excluded from the CLS cost model as these fees are applicable to all relevant retail income derived from selling international calls to consumers. Where OCLS' receive increased income due to CLS charges, there is no net impact on government fees as it represents pass through from one ILDO to another.

4 Contact information

Venture Consulting is Asia-Pacific's leading independent telecommunications and media consultancy firm. It came into being following local management's buyout of the Sydney office of the global management consultancy Value Partners in January 2009. We are a broad-based consultancy, having worked with Asia-Pacific's leading operators, policy makers, regulators, vendors and financiers to provide strategic, commercial, financial and technical advice. Specifically, we work across corporate and commercial strategy, financial advisory support, bid support, operational improvement and change management, policy and regulation, rights management, strategic technology decisions and strategy implementation.

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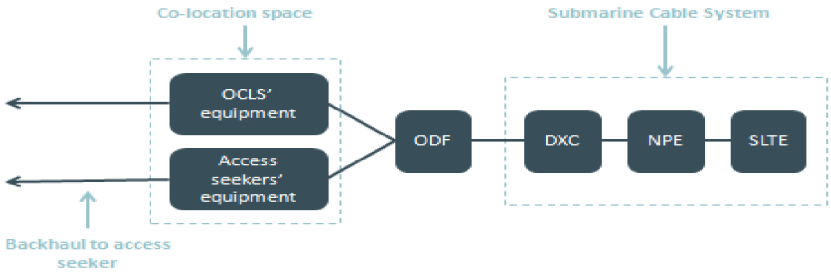
Simplified Network Diagram



Optical Distribution Frame	
Maximum number of ports	48
Utilisation ratio	70%
Fibre Pairs	24
Max usable fibre pairs	16
No. of rack per ODF	4

ODF Cabinet		
Rack footprint	0.8	sq.m
Number of racks	22	
Asset Life	5	

ODF-Colo Link		
Length of fibre link	200	m
Cables per tray	10	
Manpower install	8	hrs

ODF Maintence and continuity	
O&M cost	10%
Continuity cost	5%

Co-location charges		
Colo Cabinet size	0.8	sq.m
Racks per Cabinet	22	
Room preparation	8	hrs
Colo installation	4	hrs

WACC			
Nominal risk-free rate	7.58%	rf	India 10yr bond
Debt premium	1.58%		
Cost of debt	9.16%	rd	
Equity risk premium India	8.58%	ERP	
Equity beta	1.12	β	
Cost of equity	17.19%	re	
Gearing	38.73%	g	
Tax rate	35.50%	t	
Nominal pre-tax WACC	19.88%	**WACCpre-tax = g x rd + [(1-g) x**	

Asset	Price (Rs)	Price (USD)	Lifetime (yrs)	Price Trend %
ODF		700	5	-5%
ODF Cabinet		800	5	-5%
Co-lo Cabinet		800	5	-5%
Fibre link (per m)		10	5	-5%
Cable Tray		1700	5	-5%
Floorspace (per sq.m)	107500	2150	20	5%
Annual Power Cost (per rack)	240000	4800	5	7%
Ave Wage Rate (hr)	625	12.5		7%

WPI	
Feb-11	148.1
Feb-12	158.4
% Change	7%

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Total AFC	*USD*	$	911.07	*per link*
	INR (lakhs)	INR	45,553.43	*per link*

Total CLC	*USD*	$	6,000.61	*per cabinet*
	INR (lakhs)	INR	300,030.38	*per cabinet*

Cost of ODF	Unit		
Annual cabinet floor space cost	*USD*	$	351.23
Annual cabinet cost per ODF	*USD*	$	63.86
Annualised ODF cabinet	*USD*	$	266.78
Annualsied ODF asset cost	*USD*	$	233.43
Total ODF	*USD*	$	564.07
Total cost per fibre pair	*USD*	$	35.25

Cost of Co-lo			
Total cabinet floor space cost	USD	$	351.23
Annual co-lo cabinet cost	USD	$	266.78
Room preparation	USD	$	20.42
Co-lo Installation	USD	$	16.67
Power & Aircon	USD	$	4,800.00
Total Co-lo Cost	USD	$	5,455.10

ODF - Colo link	Unit		
Cost of cable	*USD*	$	666.94
Tray cost per cable	*USD*	$	56.69
Installation cost	*USD*	$	33.35
Total Link Cost	*USD*	$	756.98

Co-lo O&M	Unit		
Annual expense	*USD*	$	545.51

ODF O&M and continuity	Unit		
Annual expense	*USD*	$	118.84

	Year	1	2	3	
Total AFC	*USD*	$ 962.84	$ 919.15	$ 877.94	*per link*
	INR	INR 48,142.06	INR 45,957.31	INR 43,896.91	*per link*

	Year	1	3	4	
Total CLC	*USD*	$ 5,933.49	$ 6,695.69	$ 7,120.47	*per cabinet*
	INR	INR 296,674.69	INR 334,784.37	INR 356,023.56	*per cabinet*

Cost of ODF	Unit	Year 1	Year 2	Year 3
Annualised floor space (sq.m)	*USD*	$ 344.16	$ 361.37	$ 379.43
Cabinet floor space cost	*USD*	$ 275.33	$ 289.09	$ 303.55
Cabinet floor space cost per ODF	*USD*	$ 50.06	$ 52.56	$ 55.19
Annualised ODF cabinet	*USD*	$ 52.64	$ 50.00	$ 47.50
Annualised ODF cost	*USD*	$ 253.31	$ 240.65	$ 228.62
Total ODF	*USD*	$ 356.01	$ 343.22	$ 331.31
Total cost per fibre pair	*USD*	$ 22.25	$ 21.45	$ 20.71

Cost of Co-lo		Year 1	Year 2	Year 3
Total cabinet floor space cost	*USD*	$ 275.33	$ 303.55	$ 318.73
Annual co-lo cabinet cost	*USD*	$ 289.50	$ 261.27	$ 248.21
Room preparation	*USD*	$ 14.39	$ 15.39	$ 16.46
Co-lo Installation	*USD*	$ 14.87	$ 15.90	$ 17.00
Power Feed	*USD*	$ 4,800.00	$ 5,490.87	$ 5,872.75
Total Co-lo Cost	*USD*	$ 5,394.09	$ 6,086.99	$ 6,473.16

ODF - Colo link	Unit	Year 1	Year 2	Year 3
Cost of cable	*USD*	$ 723.75	$ 687.57	$ 653.19
Tray cost per cable	*USD*	$ 61.52	$ 58.44	$ 55.52
Installation cost	*USD*	$ 29.73	$ 31.80	$ 34.01
Total Link Cost	*USD*	$ 815.00	$ 777.81	$ 742.72

Co-lo O&M	Unit	Year 1	Year 2	Year 3
Annual expense	*USD*	$ 539.41	$ 608.70	$ 647.32

ODF Maintence and continuity	Unit	Year 1	Year 2	Year 3
Annual expense	*USD*	$ 125.59	$ 119.89	$ 114.51