Consultation Paper no. 08/2012

Telecom Regulatory Authority of India

Consultation Paper
on
Access Facilitation Charges and Co-location Charges at Cable Landing Stations

New Delhi: 22.03.2012

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Preface

Submarine cables provide vital international telecommunication links between countries across the world. There is no effective substitute for submarine cables. Submarine cables terminate in the country through cable landing stations. Access to submarine cable landing stations is an essential input for telecommunication services including broadband requiring international connectivity. Provision of access at cable landing station involves costs for which owners of the cable landing station need to be fairly compensated. Cost based access facilitation charges and collocation charges would compensate owners of the cable landing stations for the costs incurred by them for providing access facilitation and other resources to other operators at the cable landing stations.

The present consultation paper aims to obtain comments of the stakeholders on access facilitation charges, collocation charges and related issues. The stakeholders are requested to furnish their comments by 5th April, 2012. Counter-comments, if any, may be sent by 12th April, 2012.

Dr. J. S. Sarma
Chairman, TRAI

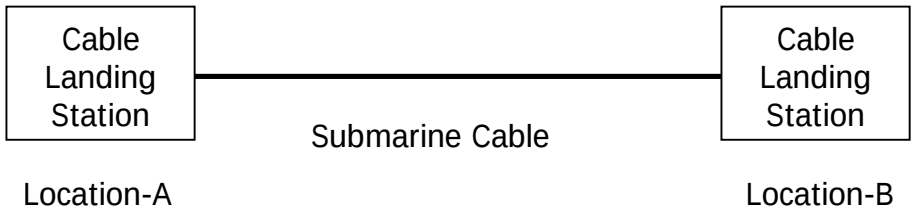
Stakeholders are requested to furnish their written comments to the Advisor (I&FN), TRAI by 5th April, 2012. Counter-comments, if any, may be sent by 12th April 2012. Comments and counter-comments would be posted on TRAI's website www.trai.gov.in. The comments and counter-comments may also be sent by e-mail to jafn@trai.gov.in or trai.gov@gmail.com. For any clarification/ information, Shri Arvind Kumar, Advisor (I&FN) may be contacted at Tel. No. +91-11-23220209 Fax: +91-11-23230056.

Chapter-I
Introduction and Background

A- Submarine Cable Systems and Cable Landing Stations

1.1. A submarine cable system consists of a communication cable laid on the sea bed between cable landing stations (CLS) on the land to carry telecommunication signals across stretches of ocean. A block diagram of a submarine cable system is as follows:

Figure 1.1
Block Diagram of a Submarine Cable System



1.2. Submarine cable systems generally use optical fiber cables to carry international traffic. Owing to a huge transmission capacity of optical fiber cables, such systems have become the backbone of International Long Distance (ILD) service.

B - The International Long Distance (ILD) Service

1.3. The international long distance (ILD) service is basically a network carriage service (also called bearer) providing International connectivity to the networks operated by foreign carriers. The international long distance operators (ILDOs) provide bearer services so that end-to-end tele-services such as voice, data, fax, video and multi-media etc. can be provided by the access providers to the customers.

C- Opening of ILD Service And Competition in the ILD Sector in India

1.4. On 12.11.2001, TRAI recommended open competition in the international long distance (ILD) service. Vide Department of Telecommunication's guidelines dated 15.01.2002, the Indian Government decided to open the international long distance (ILD) service since 01.04.2002 to the private operators without any restriction on the number of operators.

1.5. At the time of opening up the ILD sector for competition, Videsh Sanchar Nigam Ltd (VSNL), the incumbent operator was the only operator in the international long distance (ILD) market. The enabling provision for access to bottleneck facility for international bandwidth for new entrants was incorporated in clause 2.2 (b) of the ILD licenses, which states as below:

> *"Equal access to bottleneck facilities for international bandwidth owned by national and international bandwidth providers shall be permitted for a period of five years from the date of issue of the guidelines for grant of license for ILD service or three years from the date of issue of first license for ILD service, whichever is earlier, on the terms and conditions to be mutually agreed".*

1.6. Soon after opening of the ILD services, Bharti Airtel Ltd, Reliance Communications, Bharat Sanchar Nigam Ltd (BSNL) and Data Access Ltd. acquired ILDO licenses in India.

1.7. In June, 2005, TRAI initiated a consultation on measures to promote competition in IPLC in India under which one of the issues was whether the submarine cable landing stations could still be considered a bottleneck facility in India.

1.8. Based on the consultation, TRAI sent the following recommendation to the Central Government on 16.12.2005:

"...equal access to bottleneck facility at the CLS, including landing facilities for submarine cables by licensed operators on the basis of non discrimination, without any sunset clause, should be mandated. ... The ILDO owning the Cable Landing Station should also be mandated to publish, with prior approval of the Regulator, the terms and conditions for all such Access provision. Regulator may also determine and specify cost-based access charges through its regulation."

TRAI also recommended that the ILD license should be suitably amended for this purpose.

1.9. On 23.11.2006, the Central Government accepted the recommendations of TRAI and amended the relevant clauses in international long distance (ILD) service license vide amendment dated 15.01.2007 to ensure efficient, transparent and non-discriminatory access facilities for submarine cables at cable landing stations. The amended clause of the ILD service license is given below:

"Equal access to bottleneck facilities at the Cable Landing Stations (CLS) including landing facilities for submarine cables for licensed operators on the basis of non discrimination shall be mandatory. The terms and conditions for such access provision shall be published with prior approval of the TRAI, by the Licensee owning the cable landing station. The charges for such access provision shall be governed by the regulations/ orders as may be made by the TRAI/DoT from time to time".

1.10. Meanwhile, Department of Telecommunications (DoT) also revised the entry fee for new ILDO license from Rs. 25 Crore to Rs. 2.5 Crore and annual revenue share to 6% from existing 15% both for existing and new ILDOs to be effective from 01.01.2006.

1.11. As a result of the various policy and regulatory interventions, the competition amongst the ILDOs grew as six new ILDOs viz. M/s i2i Enterprises Ltd. (BT Global Communications India Pvt. Ltd.), M/s AT&T Global Network Services India Pvt. Ltd., M/s Vodafone Essar South Ltd., M/s Sify Communications Ltd., M/s Dishnet Wireless Ltd., M/s BT Telecom India Pvt. Ltd. acquired new licenses in the F.Y. 2006-07, thereby increasing the total number of ILDOs to 11, as on 31.03.2007.

D- Regulatory intervention for Access to Essential facilities at CLS

1.12. TRAI observed that the competition in IPLC segment may be further enhanced if the ILD licensees entering the market have adequate access to necessary facilities at cable landing stations. In order to ensure this access, TRAI realized the need of a regulation which may allow the ILD licensees to

(a) have access to the cable landing stations;

(b) physically collocate their own equipment necessary for connection in the cable landing stations;

(c) interconnect at the cable landing station to any operator's equipment in the cable landing station at any technically feasible point and

(d) access backhaul circuits of all types in a timely fashion, under terms and conditions and rates that are cost oriented, transparent and non-discriminatory.

1.13. In order to deliberate on the various aspects of the afore-mentioned issues, TRAI initiated a consultation process on 'Access to Essential Facilities (including Landing Facilities for Submarine Cables) at Cable Landing Stations' in April 2007.

1.14. Based on the inputs received in the consultation process and further analysis thereof, TRAI issued 'International Telecommunication Access to Essential facilities at Cable Landing Stations Regulation, 2007' on 07.06.2007. The salient points of the Regulation are as below:

(a) The owner of cable landing station (OCLS) shall provide access to any eligible Indian International Telecommunication Entity, on fair and non-discriminatory terms and conditions, at its cable landing stations.

(b) OCLS shall submit a 'Cable landing Station Reference Interconnect Offer (CLS RIO)' to TRAI, in a specified format, containing the terms and conditions of access facilities and co-location facilities including landing facilities for sub-marine cables at its cable landing stations for its approval.

(c) On getting approval from TRAI, OCLS shall publish the RIO.

1.15. Subsequently, the owners of cables landing stations submitted CLS-RIO for their CLSs, which were approved by TRAI on 26.10.2007 after several discussions with them. Later, M/s BSNL submitted their CLS-RIO for the cable landing station at Tuticorin, Tamilnadu, which was approved by the Authority on 22.05.2009.

1.16. The Regulation has paved way towards debottlenecking the essential facility at cable landing stations, which resulted in a significant competition in international bandwidth segment. The enhanced competition has helped in reduction of the prices of international bandwidth substantially in India during the past four years.

E- Need for review

1.17. In the year 2010, some of the service providers represented to the TRAI that the access facilitation charges and co-location charges at cable landing station need a review as the cost of telecom equipment has gone down while the capacity utilization of cable landing station has gone up over a period of the previous three years.

1.18. With a view to align Access Facilitation Charges, Annual O&M Charges and Co-location Charges with the current costs and utilization, TRAI sent letters to

the owners of cable landing stations (OCLSs) on 06.10.2010 to resubmit the revised Access Facilitation Charges, Annual O&M Charges, Co-location Charges for all of their cable landing stations (CLSs), including the new CLSs commissioned after October 2007. In response, the OCLSs submitted the requisite details to TRAI.

1.19. In the meantime, TRAI received representation from some of the service providers and their association requesting formal broad based consultation with all industry players on review of Access Facilitation Charges. They submitted that there has been a dramatic change in the international bandwidth market both in terms of a significant drop in the prices of IPLC as well as an exponential rise in capacity utilization of submarine cable systems since 2007. They further submitted that international capacity utilization at the major cable landing stations in India has gone up by at least 10 times since 2007. They argued that the increased capacity utilization should have translated in proportionately reduced Access Facilitation Charges and Operation and Maintenance (O&M) Charges. The service providers further submitted that these charges have remained virtually unchanged since 2007, as a result, CLS facility continues to remain a bottleneck facility and, therefore, there is no effective competition possible in the sector for the ILDOs, who do not own cable landing stations.

1.20. The service providers pointed out that CLS access charges now constitute 45-55% of total charges on international capacity whereas the remaining 55-45% cost includes undersea fiber transport, CLS charges and IP port charges at the foreign end. They argued that this clearly reflects a very high and disproportionate CLS access charges in India. Further, they submitted that owing to very high Access Facilitation Charges, the advantage of availability of international bandwidth at competitive prices is not passing on to the customers, which is adversely affecting the proliferation of broadband services in the country.

1.21. The service providers emphasized that there is an urgent need for review of access facilitation charges in order to enable growth of the ILDO sector and to promote growth of broadband penetration in India. They also requested that the access charges should be determined on the basis of incremental cost and that the stakeholders should also be involved during the finalization of Access Charges of CLS.

1.22. In view of the various representations from the ILD service providers and their industry association, TRAI issued a letter dated 22.06.2011 wherein the ILD service providers and their industry associations were requested to furnish their comments on the following issues pertaining to 'International Telecommunication Access to Essential facilities at Cable Landing Stations'.

(a) What are the prevalent regulatory practices in other countries for providing access to other service providers at cable landing stations by owners of the cable landing stations?

(b) Whether access facilitation charges/collocation charges for cable landing station are specified/ approved by the regulator in other countries? If yes, what is the approach/ methodology being followed by the regulator in determining these charges?

(c) In case access facilitation charges/co-location charges are not being specified/ approved by the regulator in other countries, what is the other mechanism prevalent for these charges?

(d) What elements are being taken into consideration by other regulators/ operators for determining access facilitation charges/co-location charges? Please explain with the detailed note, justification and diagram starting from man-hole to "meet-me-room" for each submarine cable landing in India, clearly indicating cost recovery mechanism for each element involved in providing access facilitation/co-location. In case, costs of some of the network elements

are being taken care by the consortium, please submit relevant portion of the consortium agreement in support of your answer.

(e) Are access facilitation charges in other countries dependent on the capacity (i.e. STM-1, STM-4 or STM-16) activated?

(f) Are access facilitation charges, backhaul charges (i.e. from cable landing station to meet-me-room) and collocation charges are clubbed together or applied separately in other countries?

(g) Whether access facilitation charges are dependent on the submarine cable system/ cable landing station?

(h) According to published data/ reports or your own estimates, how much International bandwidth is being consumed in India at present? What would be the requirement of international bandwidth for India for coming three years, five years and ten years?

(i) Any other relevant information related to subject along with all necessary details.

1.23. Apart from the above information, International Long Distance Operators (ILDOs) and Internet Service Providers (ISPs) with international gateway permission were requested to furnish the information in respect of international bandwidth owned/acquired and international bandwidth utilization.

1.24. Association of Competitive Telecom Operators (ACTO) vide their letter dated 28.06.2011 requested for extension of one month for submission of requisite information, due to enormity of task involved. The Authority extended the last date of submission up to 16.08.2011. Responses have been received from 14 service providers and 2 service providers associations. The inputs provided by these service providers and associations have been taken into consideration while drafting this consultation paper.

1.25. In this background, the present consultation paper begins with the analysis of impact of access to essential facilities at cable landing stations on the ILD sector in India. It then explores various approaches of regulating Access Facilitation Charges and Co-location Charges and outlines the issues for consultation wherein the questionnaire for consultation is presented to the stakeholders for their comments.

1.26. The next chapter describes various aspects of sub-marine cable systems and presents an analysis of the impact of access to essential facilities at cable landing station on the ILD sector in India.

Chapter-II
Access to Essential Facilities at Cable Landing Station and its Impact on ILD Sector in India

2.1. This chapter begins with a description of various aspects of sub-marine cable systems. It then discusses about the present status of ILD sector in India. Thereafter, it presents an analysis of impact of access to essential facilities at cable landing station on the ILD sector in India.

A- Submarine Cable Systems

2.2. Submarine cables are laid on the sea bed between land-based stations to carry telecommunication signals. They offer highly secure, greatly reliable and very high capacity telecommunication links between countries across the world. The transmission quality of a sub-marine cable is significantly better than a typical satellite media. Submarine cables are only a few inches thick and they carry only a few optical fibers. Yet they have transmission capacities of the order of terra bits per second (Tbps). However, a typical multi-terabit, trans-oceanic submarine cable system costs several hundred million dollars to construct.

2.3. There are 12 submarine cable systems, which connect India to the world. A submarine cable used for providing international telecommunication links stretches across many countries. In each country, it lands in a land based facility called cable landing station (CLS). Thus, a typical submarine cable system consists of (i) a submarine cable in the sea-bed and (ii) cable landing stations at lands.

B- Cable Landing Station (CLS)

2.4. A cable landing station is a location at which:

(a) The international submarine cable capacity is connectable to the backhaul circuit;

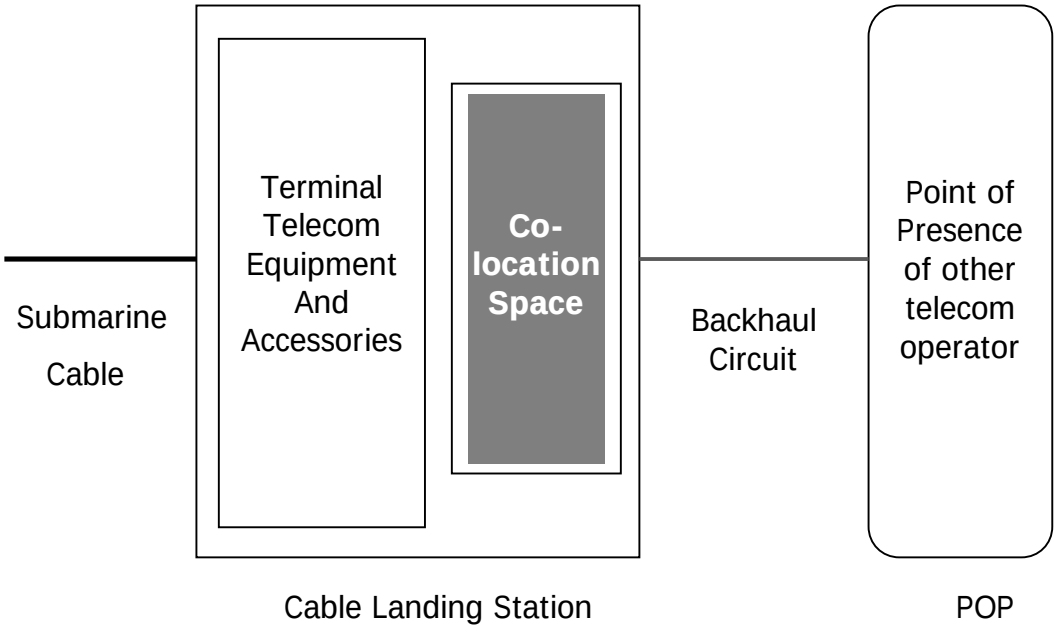
(b) The international submarine cables are available on shore, for accessing international submarine cable capacity;

and such location includes buildings containing the onshore end of the submarine cable and equipment for connecting to backhaul circuits.

2.5. The block diagram of a typical cable landing station (CLS) is as follows:

Figure 2.1

Block Diagram of a Cable Landing Station



2.6. The various terms used with reference to CLS as defined in 'International Telecommunication Access to Essential Facilities at Cable Landing Stations Regulations 2007' are reproduced below:

(a) '**Owner of cable landing station**' means a service provider who owns and manages submarine cable landing station in India and has been granted license to provide international long distance service or internet service provider.

(b) **'Eligible Indian International telecommunication Entity**' means

(i) an International Long Distance Operator, holding license to act as such, and, who has been allowed under the license to seek access to the international submarine cable capacity in submarine cable system landing at the cable landing stations in India; or

(ii) an Internet Service Provider (ISP), holding valid international gateway permission or license to act such, and, who has been allowed under the license to seek access to the international submarine cable capacity in submarine cable system landing at the cable landing stations in India.

(c) '**Access Facilitation**' means access or interconnection, as the case may be, to the essential facilities (including landing facilities for submarine cable) at cable landing station.

(d) '**Co-location Facilities**' means the facilities at a submarine cable landing station (including building space, power, environment services, security and site maintenance) which may be offered by the owner of cable landing station (OCLS) to the eligible Indian International Telecommunication Entity to facilitate access to the cable landing station of such owner (including installation of co-location equipment).

(e) '**Virtual Co-location**' means a location:

(i) of the eligible Indian International Telecommunication Entity, being outside the cable landing station, whether adjacent or at a distant from such station;

(ii) at which the eligible Indian International Telecommunication Entity may install its equipment so as to access the sub-marine cable capacity from the cable landing station.

(f) '**Backhaul circuit**' means a domestic telecom circuit which connects a cable landing station to the infrastructure or equipment of the eligible Indian International Telecommunication Entity at its premises, also termed as point of presence (POP).

(g) '**Cable Landing Station-Reference Interconnect Offer (CLS-RIO)**' means an offer made by the owner of cable landing station containing the terms and conditions of Access Facilitation and Co-location of equipment (including landing facilities for submarine cables at cable landing stations for connectable system of International submarine cable) published after the approval of TRAI.

(h) '**Access Facilitation Charges**' means charges payable by the eligible Indian International Telecommunication Entity (ITE) to the owner of the cable landing station (OCLS) to interconnect or access the capacity acquired on Indefeasible Right of Use basis or on short-term lease basis from an owner of the submarine cable capacity or a member of consortium owning submarine cable capacity.

(i) '**Co-location charges**' means the charges payable by the eligible Indian International Telecommunication Entity (ITE) based on the type of facilities used, for the purpose of housing the equipment of such eligible Indian International Telecommunication Entity (ITE), at the premises of owner of cable landing station (OCLS) which provides the access to its cable landing station, and such charges include charges for providing space, power supply, accessing physical facilities, operation and maintenance of co-location site for the said purpose.

(j) '**Operation and Maintenance Charges**' means the annual charges:

(i) payable to the owner of cable landing station (OCLS) by the eligible Indian International Telecommunication Entity (ITE)

(ii) for operation and maintenance of facilities for accessing the capacity of the cable landing station of such owner.

(k) '**International Long Distance Operator (ILDO)**' means a service provider or operator who has been granted license to act as such to provide international long distance service.

(l) '**Reference Capacity**' means the international submarine cable capacity,

(i) in the submarine cable system landing at the cable landing station in India;

(ii) acquired whether on ownership basis or lease basis by the eligible Indian International Telecommunication Entity (ITE);

(iii) activated by the owner of the submarine cable system or a member or members of consortium of submarine cable system.

(m) '**Capacity owner**' means an International Telecom Carrier or Foreign Carrier or Indian International Long Distance Operator who owns capacity on the international submarine cable landing at the cable landing station in India.

(n) '**Indefeasible Right of Use (IRU)**' means the right to use the Reference Capacity,

(i) on long term lease for the period for which the submarine cable remains in effective use;

(ii) acquired (including equipment, fibers or capacity) under an agreement entered into between the Capacity owner and an eligible Indian International Telecommunication Entity;

(iii) in respect of which maintenance cost incurred becomes payable in any circumstances during the period of validity of the agreement.

C- Business Models for providing Submarine Cable Systems

(1) The Consortium Model

2.7. In a consortium model, operators form a closed club to construct, operate and maintain a submarine cable system and thereby they secure more favorable terms for submarine cable capacity than non consortium members. Construction, operation and maintenance (O&M) and other terms of a sub-marine cable system are governed by a Construction and Maintenance Agreement (C&MA), entered among the consortium members. A typical consortium has the following operating mechanism:

(a) The members of consortium raise the funds for constructing the sub-marine cable system, which includes the laying of cable in the sea-bed and construction of cable landing stations on the shore ends.

(b) The members of the consortium build cable landing stations in their home countries and lay cable in the oceans/seas as per the terms of C&MA.

(c) In the consortium-owned cable systems, capacity of the submarine cables system is divided into Minimum Investment Units (MIU), which reflect each individual operator's cumulative stake in financing and operating the system.

(d) The consortium may offer international capacity on the submarine cable to other willing telecom operators (i) through an Indefeasible Right of Use (IRU), which gives the telecom operator an exclusive right to use a dedicated amount of capacity on the cable but with no rights to control or manage the cable and (ii) by leasing out the capacity to the telecom operator for a certain period.

2.8. A variant of the consortium model is **Co-build and hybrid model**. The co-build model is where two or more operators build a cable, but each operator manages and markets the capacity individually. Under the hybrid model the

cable is built by one or more operators but its management is delegated to a third-party.

(2) The Private Ownership Model

2.9. In this model, the submarine cable is constructed and managed by a single entity who then sells the international capacity to the other telecom operators according to their own commercial objectives.

(3) Private/public partnership model

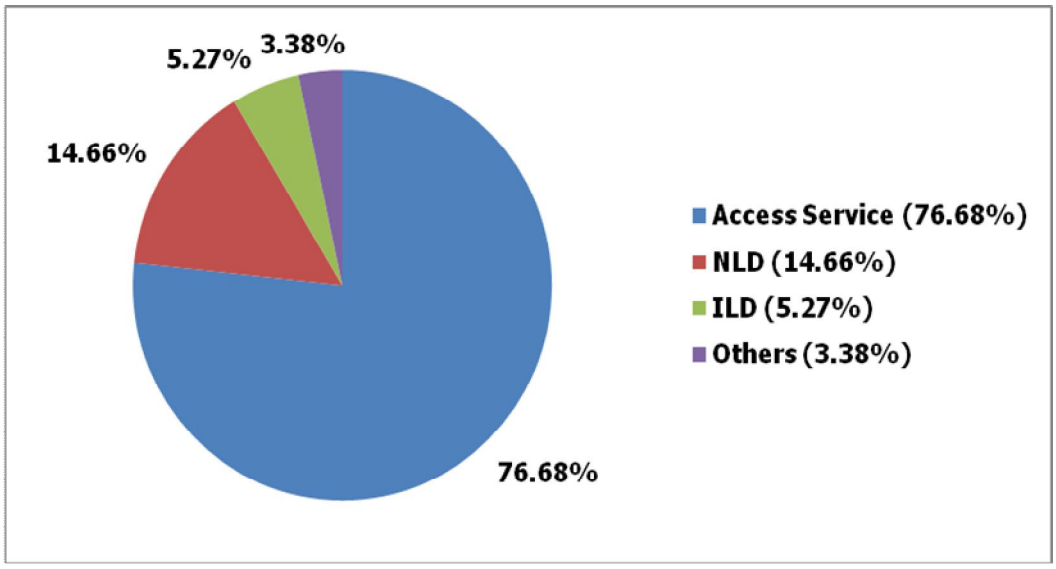
2.10. This model involves a partnership between public and private sectors. The best example is the 'stakeholder' approach applied to constructing the Eastern Africa Submarine Cable System (EASSy).

D- ILD Sector in India

2.11. The Gross Revenue (GR) from ILD segment in India was Rs. 9054.45 Crores in the F.Y. 2010-11 up by 2.55% from Rs. 8829.13 Crores in F.Y. 2009-10. In F.Y. 2010-11, the ILD services contributed 5.27% of the total revenue of telecom services, which stood at Rs. 171718.56 Crores. The composition of gross revenue of telecom services in India in F.Y. 2010-11 is presented in the following figure:

Figure 2.2

Composition of Gross Revenue of Telecom Services in India in F.Y. 2010-11



Source: TRAI reports on The Indian Telecom Services Performance Indicators

2.12. At present, there are 27 ILD service providers in India[1]. A list of ILD licensees as on 14.07.2009 is enclosed as Annexure-I.

2.13. Twelve (12) submarine cables connect India to the world. Out of these twelve submarine cable systems, six cables are owned by consortia while the remaining cables are privately owned. A brief description of these submarine cables is given below:

(a) **Bharat Lanka Cable System:** It is a consortium owned submarine cable system connecting India and Sri Lanka. In India, the Cable Landing Station for the cable system at Tuticorin is owned by BSNL.

(b) **Europe India Gateway (EIG):** It is a consortium cable system connecting U.K., Portugal, Gibraltar, Monaco, France, Libya, Egypt, Saudi Arabia, Djibouti, Oman, United Arab Emirates, and India. In India, the Cable Landing Station for the cable system at Mumbai is owned by Bharti Airtel Limited.

[1] Source: http://www.dot.gov.in/osp/Brochure/Brochure.htm

(c) **FLAG Europe Asia (FEA):** Fiber Optic Link Around the Globe (FLAG) Europe Asia cable system connects UK, Middle East and Mumbai (India). The FLAG cable system consists of several undersea cable segments and two terrestrial crossings. From Mumbai the cable goes to South East Asia. The cable system is owned by FLAG Telecom, a fully owned subsidiary of Reliance Communications. In India, the Cable Landing Station for the cable system at Mumbai is owned by Tata Communications Limited.

(d) **FALCON-1:** One of the segments of the FLAG cable system, described above, is FLAG Alcatel-Lucent Optical Network (FALCON). It connects India to the Gulf. In India, the Cable Landing Station for the cable system at Mumbai is owned by Reliance Communications Limited.

(e) **FALCON-2:** Keeping other things same as FALCON-1, the cable system FALCON-2 is going to East of India. In India, the Cable Landing Station for the cable system at Trivendrum is owned by Reliance Communications Limited.

(f) **i2i:** It is a privately owned cable system owned by a joint venture of Singtel and Bharti Airtel Limited connecting India to Singapore. In India, the Cable Landing Station for the cable system at Chennai is owned by Bharti Airtel Limited.

(g) **India-Middle East-Western Europe (IMEWE):** It is a consortium cable connecting India and Europe via Middle East. This cable system is owned by a consortium of nine telecom carriers from eight countries. It has nine terminal stations. In India, this cable system lands at Mumbai at two cable landing stations. While one cable landing station is owned by Tata Communications Limited, the other is owned by Bharti Airtel.

(h) **SAT3/WACS/SAFE:** Southern Africa - Western Africa (SAT3/WASC) submarine cable links Europe with South Africa and a number of

countries on the West African coastline. South Africa - Far East (SAFE) continues the connection from South Africa to Malaysia with a landing that brings India into the system. In India, the Cable Landing Station for the cable system at Cochin is owned by Tata communications limited.

(i) **SEA Cable:** It is a privately owned cable system owned by Tata Communications Limited and Neotel (South Africa) connecting African continent to Europe, Asia and India. In India, the Cable Landing Station for the cable system at Mumbai is owned by Tata Communications Limited.

(j) **South East Asia – Middle East – Western Europe-3 (SEA- ME-WE 3):** It is a consortium cable connecting Western Europe, Middle East and South East Asia. In India, this cable system lands at two cable landing stations in Mumbai and Cochin, both owned by Tata Communications Limited.

(k) **South East Asia – Middle East – Western Europe-4 (SEA- ME-WE 4):** It is a consortium cable linking South East Asia to Europe via the Indian sub-continent and Middle East. In India, there are two Cable Landing Stations for the cable system; one at Mumbai is owned by Tata Communications Limited while the other at Chennai is owned by Bharti Airtel Limited.

(l) **Tata Indicom Cable (TIC):** It is a privately owned cable system owned by Tata communications limited. It connects India and Singapore. In India, the Cable Landing Station for the cable system at Chennai is owned by Tata communications limited.

2.14. The following table provides a summary of various Cable Landing Stations in India:

Table 2.1

Cable Landing Stations in India

S. No	Location of CLS	Name of OCLS	Name of the cables Landing at the CLS
1	Bharti Towers, Chennai	Bharti Airtel	i2i, SEA-ME-WE 4
2	VSB, Chennai	Tata Communications Ltd.	TIC
3	Ernakulum	Tata Communications Ltd.	SAT3/WASC/SAFE, SEA-ME-WE 3
4	Santacruz, Mumbai	Bharti Airtel	IMEWE, EIG
5	Versova, Mumbai	Reliance	FALCON-1
6	VSB, Mumbai	Tata Communications Ltd.	SEA-ME-WE 3, SEACOM
7	LVSB, Mumbai	Tata Communications Ltd.	SEA-ME-WE 4, FLAG
8	Bandra (E), Mumbai	Tata Communications Ltd.	IMEWE
9	Tuticorin, Tamilnadu	BSNL	Bharat Lanka Cable System
10	Trivandrum	Reliance	FALCON-2

2.15. The following table provides a summary of the availability of international bandwidth in India, based on the information received from the ILD service providers:

Table: 2.2

International Bandwidth in India (as on 31.03.2011)

S. No	Name of Cable System	Type of Cable System		CLS Owned by	Location of CLS	Designed Capacity (In Gbps)	LIT Capacity (In Gbps)	Activated Capacity		Capacity Activated for other ILDOs (In Gbps)	Total Activated Capacity (In Gbps)
		Consortium/ Private	Protected/ Unprotected					As an ILDO (In Gbps)	As an ISP (In Gbps)		
1	Bharat Lanka Cable System	Consortium	Unprotected	BSNL	Tuticorin (India)	960	10	10	0	0	10
2	EIG	Consortium	Unprotected	Bharti Airtel	Santacruz, Mumbai	3840	500	0.3	0	0.00	0.3
3	FALCON-1	Private	Unprotected	Reliance	Varsova, Mumbai	2560	90	20.16	25.63	5	50.78
4	FALCON-2	Private	Unprotected	Reliance	Trivandrum	1280	20	3.28	0	0	3.28
5	FLAG	Private	Un protected	TCL	LVSB, Mumbai	50	50	0.8	0.0	42.94	43.8
6	I2I	Private	Unprotected	Bharti Airtel	Chennai	8400	310	93	120	0.00	213.0
7	IMEWE	Consortium	Unprotected	Bharti Airtel	Santacruz, Mumbai	3840	350	17	7.5	0.00	24.5
				TCL	BKC, Mumbai		260	11.8	13.7	0	25.4
				Sub Total (IMEWE)			610	28.76	21.16	0	49.9
8	SAT3/WACS/SAFE	Consortium	Protected through ring network	TCL	Cochin	130	440	4.57	0.72	0	5.3
9	SEA Cable	Private	Unprotected	TCL	Fort, Mumbai	3840	70	0.31	0.93	0	1.2
10	SEA ME WE 3	Consortium	Unprotected	TCL	Fort, Mumbai	40	362.5	24.6	3.2	0	27.8
				TCL	Cochin		250	0.79	2.64	0.0	3.4
				Sub Total (SEA-ME-WE 3)			612.5	25.4	5.8	0.0	31.2
11	SEA-ME-WE 4	Consortium	Unprotected	Bharti Airtel	Chennai	3840	1780	57	62	56.27	175.3
				TCL	LVSB, Mumbai	1280	1156	53.3	152.5	65.1	270.9
				Sub Total (SEA-ME-WE 4)			2936	110.3	214.5	121.4	446.2
12	TIISC	Private	Unprotected	TCL	Chennai	5120	360	102.6	131.1	21.1	254.7
Total						**33900**	**6009**	**399**	**520**	**190**	**1110**

Source: Information furnished by the OCLSs

E- Regulatory Framework for Facilitating Access to Essential Facilities at CLS

2.16. TRAI issued 'International Telecommunication Access to Essential facilities at Cable Landing Stations Regulation, 2007' on 07.06.2007. The salient points of the Regulation are as below:

(a) The owner of cable landing station (OCLS) shall provide access to any eligible Indian International Telecommunication Entity, on fair and non-discriminatory terms and conditions, at its cable landing stations.

(b) OCLS shall submit a 'Cable landing Station Reference Interconnect Offer (CLS RIO)' to TRAI, in a specified format, containing the terms and conditions of Access Facilities and Co-location facilities including landing facilities for sub-marine cables at its cable landing stations for its approval.

(c) On getting approval from TRAI, OCLS shall publish the RIO.

2.17. The international experience in the field of regulating the access to essential facilities at cable landing station is enclosed as Annexure-II.

F- Impact of International Telecommunication Access to the Cable landing Stations on the ILD sector in India

2.18. As per the existing policy and regulatory framework in India, an ILD Service provider or an Internet Service Provider (ISP) with valid International Gateway permission can own and operate cable landing stations (CLS) in India. However, only the following four ILD Service providers own their cable landing stations in India:

(i) Bharti Airtel Limited.

(ii) Bharat Sanchar Nigam Limited

(iii) Reliance Communications Limited

(iv) Tata Communications Ltd

Sify Communications Ltd, another ILDO, is building its cable landing station at Mumbai for landing Gulf Bridge International (GBI) cable system in India.

2.19. In reply to the TRAI's letter dated 06.10.2010, an ILD service provider has submitted a report to TRAI titled 'Future regulation of cable landing station charges in India' prepared by Plum consulting, London. The report emphasizes that the cable landing station market in India is highly concentrated. While Tata Communication Ltd. (TCL) has a market share of over 60%, TCL and Bharti Airtel Ltd. together have a 93% market share. The report further argues that the data suggests that the competition between international cables is likely to be limited by the lack of competition at the cable landing stations.

2.20. Out of the 12 submarine cables landing in India, six are consortium cables viz. Bharat Lanka cable System, EIG, IMEWE, SEA-ME-WE 3,SEA-ME-WE4, and SAT3/WACS/SAFE, while the remaining cables are privately owned.

2.21. TeleGeography, a telecommunications market research and consulting firm, expects that demand of international bandwidth in India will grow at a compounded annual growth rate (CAGR) of 83 percent between 2009 and 2015. [2]

2.22. Thus the present international bandwidth market may be characterized by four factors:

(a) High growth rate of demand of international bandwidth
(b) A large number of ILDO licensees; presently there are 27 ILDO licensees.
(c) Moderate number of consortium cables; presently there are six consortium cables.
(d) Low competition in CLS market; The CLS market is highly concentrated where two major players command a significant market share

[2] http://www.prnewswire.com/news-releases/pacnet-to-land-new-cable-system-into-india-to-support-growing-demand-for-international-bandwidth-78752752.html

2.23. Some of the service providers in their comments have highlighted that in the current international bandwidth market in India, while the average cost of submarine cable bandwidth has dropped significantly with increasing competition amongst ILDOs and soaring consumption of international bandwidth, the average Access Facilitation charges at the cable landing station has remained constant during the last four years. Further, they argued that as a result, the Access Facilitation charge at CLS has increasingly become a significant portion of the total bandwidth charges payable by the end user in India.

2.24. According to a research from the MIT Center for Digital Research, digital Information is doubling every 1.2 years and will exceed 1000 Exabytes (1 Exabyte=10^{18} bytes) by 2012. The data tsunami, to which countries like USA and Japan are witnessing in terms of a huge spurt of data usage by wireless subscribers, may become a reality in India if both the data usage and the data enabled subscriber devices are made available to the general public at affordable prices. Therefore, affordable international bandwidth shall be an important driver for bridging the digital divide in India.

2.25. According to 'Information Technology Annual Report 2010-11' released by Department of Information Technology, Government of India, the contribution of Information Technology- Business Process Outsourcing (IT-BPO) industry to the Gross Domestic Product (GDP) of India is estimated to be 6.4% in 2010-11. The IT-BPO Industry has enormous potential to grow in the years to come. By the fiscal year 2015, the industry's aggregate revenue is expected to reach US $ 130 billion, a CAGR of about 14 per cent from the year 2010-11 which would contribute about 7% to the GDP of India.[3]

2.26. The growth prospect of BPO business in Asia Pacific market, where India competes for its share of business in the international BPO segment, is even better. As per a study of Gartner, an information technology research and

[3] Source: Information Technology Annual Report 2010-11, Department of Information Technology, Government of India. Website: http://www.mit.gov.in/sites/upload_files/dit/files/annualreport2010-11.pdf

advisory company, *"…the outlook for Asia-Pacific's BPO market remains positive, with growth in 2011 expected to be 17.9 percent in terms of US dollars."*

2.27. Since, the availability of affordable and reliable international telecommunication connectivity is a significant factor for international BPO segment to flourish in any country, international bandwidth prices may influence the growth of BPO industry in India substantially.

2.28. Thus in order to bridge the digital divide and to further boost Indian economy, it is imperative that the international bandwidth prices are affordable and, therefore, the access facilitation charge at CLS, which presently constitutes a significant portion of it, needs a fresh look. This consultation paper is an attempt in this direction.

2.29. The next chapter explores various approaches for Determination of Access Facilitation Charges and Collocation Charges for CLS.

Chapter-III
Approaches for Determination of Access Facilitation Charges and Co-location Charges at CLS

3.1. This chapter briefly describes the salient features of the 'International Telecommunication Access to Essential Facilities at Cable Landing Stations Regulation 2007'. It then explores various possible approaches for determination of Access Facilitation and Collocation charges for CLS.

A- Salient features of International Telecommunication Access to Essential Facilities at Cable Landing Stations Regulation 2007

3.2. TRAI issued International Telecommunication Access to Essential Facilities at Cable Landing Stations Regulation 2007 on 07.06.2007. The salient features of this regulation are as below:

(1) Provision of access to CLS and related international submarine cable capacity by OCLS

3.3. This regulation mandates provision of access to CLS and related international submarine cable capacity by OCLS, on fair and non-discriminatory terms and conditions, to any eligible Indian International Telecommunication Entity (ITE) requesting for accessing international submarine cable capacity on any submarine cable systems.

3.4. As per the regulation, every OCLS is mandated to submit 'Cable Landing Station-Reference Interconnect Offer (CLS-RIO)' for approval of the Authority. CLS-RIO is a document containing the terms and conditions of Access Facilitation and Co-location facilities including landing facilities for submarine cables at cable landing stations for specified international submarine cable capacity.

3.5. Upon approval of CLS-RIO by the Authority, the OCLS is require to publish Cable Landing Station-Reference Interconnect Offer (CLS-RIO) on its website. In case TRAI is of the opinion that the CLS-RIO requires modifications so as to protect the interests of service providers or consumers of the telecom sector, or to promote or ensure orderly growth of the telecom sector or CLS-RIO offer has not been prepared in accordance with the provisions of the regulation, it may, after giving an opportunity of being heard, ask the OCLS to submit a modified CLS-RIO for the approval of the Authority.

(2) Access Facilitation Charges

3.6. As per this regulation, Access Facilitation charges, determined on the basis of the cost of network elements involved in the provision of access and distributed over the complete capacity of the system, shall be payable by the eligible Indian International Telecommunication Entity (ITE) to the OCLS for the purpose of accessing the landing facilities at a CLS.

(3) Co-location Charges

3.7. This Regulation mandates that the OCLS shall provide Co-location space at the CLS to the eligible Indian International Telecommunication Entity (ITE), if such Co-location space is required by it for accessing international submarine cable capacity on any submarine cable system from the OCLS. In case, the OCLS is unable to offer, due to space limitations or any other valid reason, the physical Co-location requested for by the eligible Indian International Telecommunication Entity, the OCLS shall take reasonable measures to give an option of virtual Co-location to enable such eligible Indian International Telecommunication Entity (ITE) to have access facilitation.

3.8. As per the Regulation, Co-location charges shall be payable to the OCLS by the eligible Indian International Telecommunication Entity (ITE), who has been provided Co-location by the OCLS.

B. Approaches for Fixing of Access Facilitation Charges and Co-location Charges

3.9. In response to the Consultation Paper on 'Access to Essential Facilities (including Landing Facilities for Submarine Cables) at Cable Landing Stations dated 13.04.2007, majority of the stakeholders were of the opinion that access facilitation and collocation charges should be determined by the cable landing station owner based on the relevant costs and should be submitted to the TRAI for approval with information concerning the underlying cost components and the costs submitted by the OCLS can be scrutinized by TRAI for reasonability.

3.10. After deliberating on the issue, the Authority made the following observations regarding the approach of fixing the Access Facilitation and Co-location charges:

> *"The Authority examined the principle that whether the cost based charges for access facilitation and collocation charges are required to be prescribed in the regulations or OCLS are mandated to publish non-discriminatory and transparent charges for access facilitation and co-location etc. The Authority observed that in most of the countries, the charges are published by the OCLS with the prior approval of the regulator. The Authority is also of the view that to have reasonable and fair charges, the need is to have such charges on cost-oriented basis and also to provide first opportunity to the owner of cable landing station. … Prior approval of the TRAI will ensure transparency, fairness and reasonability and also OCLS will not tend to adopt an arbitrary approach in prescribing various charges."*

3.11. Regarding the matter pertaining to 'the need of comment of other parties on CLS-RIO submitted by OCLS to TRAI for approval', divergent inputs were received in response to the consultation paper dated 13.04.2007. While some

stakeholders were of the opinion that The OCLS may be asked to declare the various cost elements of CLS to TRAI in confidence, the others stated that there are likely to be other interested parties who may wish to comment on the proposed CLS-RIO terms.

3.12. After deliberating on the matter, the Authority observed the following regarding seeking comments from the stakeholders on the CLS-RIO submitted by the OCLS:

> "*…the Authority is of the opinion that seeking comments again from stakeholders may unnecessarily delay the whole process and at the same adequate opportunity has already been given to stakeholders."*

3.13. In view of the afore-mentioned points, in the International Telecommunication Access to Essential Facilities at Cable Landing Stations Regulation 2007, TRAI mandated that OCLSs should submit a 'Cable landing Station Reference Interconnect Offer (CLS RIO)' to TRAI, for approval.

3.14. However, many service providers in their recent representations to TRAI have submitted that TRAI should no longer follow the present procedure under which it approves individual party submissions of cost data that are never publicly disclosed unless approved. They have further submitted that the submission of cost data by the OCLS to TRAI must be shared with all the stakeholders.

3.15. On the other hand, Owners of Cable Landing Stations (OCLS) have submitted that Cable Landing Station is not a bottleneck facility and there is no need to continue regulating access facilitation/ collocation charges. They have argued that since 2005, cable owners, by and large, continued to prefer establishing new CLS for their upcoming/planned cables in-spite of the availability of choice of landing at existing CLS and not a single international cable

operator/consortium/carrier or Indian ILDO has complained that it has been denied the landing facilities by any of the OCLSs in India.

Issue 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.

B- Need for issuing Guidelines to OCLS for calculating AFC & CLC

3.16. As per the 'International Telecommunication Access to Essential Facilities at Cable Landing Stations Regulation 2007', Access Facilitation Charge is to be determined on the basis of the cost of network elements involved in the provision of access and distributed over the complete capacity of the system. However, it does not mandate any algorithm or a methodology to calculate AFC & CLC. While scrutinizing the CLS-RIO submitted by the various OCLSs in

2007, TRAI observed that the method of calculation of AFC & CLC varies for different OCLSs, which yields variation in AFC & CLC for different CLSs.

Issue for Consultation:

Q 2: 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?

3.17. The owners of cable landing stations (OCLSs), in their submission of calculation of Access Facilitation Charges and Co-location Charges (AFC & CLC) at their Cable landing Stations along-with the CLS-RIO to TRAI in 2007, claimed for a return on capital employed (RoCE) for providing AFC&CLC to the eligible Indian International Telecommunication Entity (ITE). TRAI in its earlier tariff and costing exercises has allowed RoCE/ WACC @ 13-15%. As per a report of AVENDUS, while RoCEs for some of the listed companies in the telecom sector are presently in the range of 7-8%, they are likely to be in the range of 10-14% in FYs 2012-2014. Further, regulators in other sectors in India have also been adopting RoCE in the range of 12-15% in their regulatory exercises.

3.18. Another important element of cost claimed by the owners of cable landing stations (OCLSs), in their submission of calculation of Access Facilitation Charges and Co-location Charges (AFC & CLC) at their Cable landing Stations along-with the CLS-RIO to TRAI in 2007 is the depreciation of assets.

3.19. Depreciation is the allocation of the cost of assets over its useful life. The most commonly used methods to charge deprecation on the useful life of assets are Straight Line Method (SLM) and Written Down Value (WDV) Method. In the Straight Line Method (SLM), depreciation is calculated by taking an equal amount of the asset's cost as an expense for each year of the

asset's useful life. On the other hand, in the Written Down Value (WDV) Method, a certain percentage of the remaining value of the fixed asset is charged as depreciation every year.

3.20. TRAI in its earlier tariff and costing exercises has allowed depreciation @ 10% per annum based on Straight Line Method. During the scrutiny of the calculations of Access Facilitation Charges and Co-location Charges (AFC & CLC) at Cable landing Stations submitted by the OCLSs along-with the CLS-RIO in 2007, TRAI observed that the OCLSs used different rates of pre-tax weighted average cost of capital (Pre-tax WACC) and depreciation of CAPEX items for calculating AFC & CLC at the CLSs.

Issue for Consultation:

Q 3: 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.

C- Cost Heads/ Network Elements to be included while calculating Access Facilitation and Co-location charges

3.21. In the Explanatory Memorandum to the International Telecommunication Access to Essential Facilities at Cable Landing Stations Regulation 2007, the Authority observed the following:

> "...*It is appropriate that OCLS determine the charges on the basis of cost oriented principles taking into account the cost involved in access facilitation, operation and maintenance, cancellation and in provisioning of co-location facilities including Co-location space and submit to the Authority....".*

3.22. In order to ascertain the authenticity of the costs submitted by OCLSs in CLS-RIO in July 2007, TRAI sought detailed calculation sheets from OCLSs indicating only those cost items which were not being reimbursed by consortiums. The OCLSs submitted that the costs included in their calculations are not being reimbursed from consortiums. Generic descriptions of the items considered for arriving at Access Facilitation charges, O&M Charges and Co-location charges by the OCLS for the various possible scenarios i.e. (i) access facilitation at CLS (ii) access facilitation at alternate co-location and (iii) access facilitation at virtual co-location along with the schematic diagrams of respective CLSs are enclosed as Annexure-II, Annexure-III and Annexure-IV.

3.23. However, in the recent representations received by TRAI from the service providers, some of the service providers have submitted that the Access Facilitation charges payable to the OCLS are not cost based. They have emphasized that CLS access charges in India are extremely high when compared with similar competitive telecom markets in other jurisdictions. For example the RIO access charges for SMW4 in India is high by 251 times for 10G/ STM 64 when compared with South East Asian Countries (India's SMW4 Access charges = US$ 6,28,100 vs South east Asian Countries SMW4 Access charges = US$2500).

3.24. One of the service providers has presented the following statement of comparative pricing data of Access Facilitation Charges as prevalent in other competitive economies along with prevailing Access Facilitation Charges in India. The statement of comparative data is presented in the tables 3.1 and 3.2 below:

Table 3.1

Statement of Present Cable Landing Station Charges (Lease + O&M Charges) in India on Yearly Basis

S. No	Name of the OCLS	Name of CLS	Name of Sub-marine Cable	Band-width	Price of CLS Access Charges (Lease + O&M Charges) on yearly basis (in US Dollar per annum)
1	Tata Communications	VSB, Chennai	TIC	10G/ STM64	276,200
2	Bharti Airtel	Chennai	SMW4	10G/ STM64	450,600
3	Tata Communications	LVSB, Mumbai	SMW4	10G/ STM64	628,100
4	Reliance	DAKC, Mumbai	Falcon	10G/ STM64	150,600
5	BSNL	Tuticorin	BLCS	10G/ STM64	256,900
6	Bharti Airtel	Mumbai	EIG	10G/ STM64	687,200

Table 3.2

Statement of Similar Charges (Access / Cross Connect / Connection Service Charges) at Other International Cable Landing Stations

S. No	Particulars	Name of CLS	Name of Sub-marine Cable	Band-width	Price of Access / Cross Connect / Connection Service (in US Dollar per annum)
1	South East Asian Countries	Tuas, Singapore	SMW4	10Gbps or any SDH	Less than 1210
2		Changi, Singapore	AAG	10Gbps or any SDH	Less than 3875
3		Lantau, HK	APCN2/AAG	10Gbps or any SDH	Less than 2500
4		Lantau, HK	APCN2/AAG	Any SDH	Less than 5000
5	Far Eastern Countries	Chikura, Japan	APCN2	Any SDH	Less than 5000
6	Europe	Marseille, France	SMW4	10 Gbps	Less than 7500
7		Marseille, France	SMW4	Any SDH	Less than 13200

3.25. Another service provider has emphasized that the prevailing charges for access to CLS for SMW4 cable in other countries are lot less than the prevalent Access Facilitation Charges in India as per the following table:

Table 3.3

Statement of Charges for Access to CLS for SMW4 Cable in Various Countries

Place	Consortium	Bandwidth	CLS Access Charges
Europe, Marseille	SMW4	10 Gbps	<US$ 7500 p.a.
SE Asia, Tuas	SMW4	10Gbps	< US$ 700 p.a
India, Chennai (Bharti Airtel)	SMW4	10Gbps/ STM64	US$ 4,50,600 p.a
India, Mumbai (Tata Comm)	SMW4	10 Gbps/ STM64	US$ 6,28,100 p.a

3.26. Many service providers have submitted that CLS access charges need to be re-determined in view of manifold increase in capacity utilization and the fact that the costs (OPEX + Capex) incurred by OCLS for setting up a CLS is reimbursed by consortium members under the C&M Agreement. Some service providers have stated that the Access Facilitation Charges for CLS should be in line with the international trends and TRAI must take into account the agreement between consortiums and OCLS so that they are not overcompensated for the same.

Issue for Consultation:

Q 4: Which cost heads/ network elements should be included/ excluded while calculating Access Facilitation and Co-location charges? Please enumerate the items with specific reasons.

D- Periodicity of review of AFC & CLC

3.27. After the release of 'International Telecommunication Access to Essential Facilities at Cable Landing Stations Regulation 2007' in June 2007, The owners of cables landing stations (OCLSs) submitted the Cable landing Station –Reference Interconnect Offer (CLS-RIO) for their CLSs to TRAI. After the scrutiny of the calculations of AFC & CLS submitted by the OCLSs and discussions with them, TRAI approved the CLS-RIO on 26.10.2007. Realizing a need to align access facilitation charges, annual operation & maintenance charges and collocation charges with current cost and utilization of CLSs, TRAI issued a letter dated 06.10.2010 to the owners of cable landing stations (OCLSs) to submit the revised access facilitation charges and collocation charges for cable landing station in respect of their cable landing stations. Meanwhile, TRAI received representations from some of the ILD service providers and their association to initiate formal broad based consultation with all industry players on review of access facilitation charges. They submitted that while capacity utilization has increased many-fold at CLSs, the AFC & CLC, which were calculated on the basis of capacity utilization, have not been reduced by the OCLS; those have remained unchanged. Some service providers submitted that the RIO pricing should be reviewed and regulated by TRAI on quarterly or six monthly basis to ensure that the prices remain in tune with international prices.

Issue for Consultation:

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

E- Costing methodologies to compute Access Facilitation and Co-location charges

3.28. Some of the service providers have requested TRAI to adopt 'Forward looking approach' when it revises CLS access charges emphasizing that the CLS operators charge exorbitantly high Access Facilitation charges and Annual O&M Charges to access seekers, despite getting reimbursed by their consortia and, therefore, TRAI should determine these charges based on the long-run incremental cost (LRIC) methodology. They are of the opinion that the charges should be determined on causation principle.

3.29. Internationally, several costing methodologies are used to determine interconnection and cross connect charges viz.

(i) Fully Allocated Cost (FAC)

(ii) Long Run Incremental Cost (LRIC)

3.30. While FAC method uses historical costs of the existing network for calculating the charges and therefore is auditable, the LRIC method uses current costs for an efficient network and, therefore, it is closer to reality.

(1) Fully Allocated Cost (FAC) Method

3.31. In this method, all the costs are identified separately for each service/ network element. The idea of the FAC approach is to simply divide the total cost that the service provider incurs amongst the services it provides. Both fixed and variable costs are used in providing the services and, therefore, both contribute to the revenue generated by these products or services. Its simplicity in directly relating prices to information that is available in the accounting system makes the model auditable. FAC is based on historic costs because accounting data reflect the firm's actual costs. The cost allocation principles indicate how various costs should be treated and allocated/apportioned to different services/network elements.

(2) Long Run Incremental Cost (LRIC) Method

3.32. In this method, all costs become variable since the model takes a 'long run' view such that all factors of production become variable. It is used for estimating the cost of a total service increment based on a hypothetical model of the actual network. In the model, the network may be 're-optimized' based on current demand, capital equipment prices and operating costs with certain 'benchmarks'. Here, actual current costs are used as inputs to modeling.

Issue for Consultation:

Q 6: 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.

F- Dependence of capacity on Access Facilitation charges and Operation and Maintenance (O&M) charges

3.33. Regarding dependence of capacity on Access Facilitation charges and Operation and Maintenance (O&M) charges, the majority of service providers have stated that TRAI should not allow OCLS from levying access facilitation charges on a capacity dependent basis, to ensure that these charges are cost oriented. Some of the service providers have commented that a 'per link' charge is consistent with the cost causality principle because the costs associated with the CLS are driven by the number of cables landed and the number of links backhauled.

3.34. While evaluating the merit of dependence of capacity on Access Facilitation and Operation and Maintenance charges, one of the service provider has made the following observations:

"It depends on the bandwidth but for higher bandwidth the price may decrease as there will be investment in backhauling equipment to enable activation of lower bandwidth. The new submarine cables come only with high capacity interfaces e.g. EIG and IMEWE come only with STM-16 and STM-64 interfaces so if anybody wants to access sub-rates like STM-I and STM-4, they have to buy additional de-muxing services from CLS owner…"

Issues for Consultation:

Q 7: 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.

Q 8: 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?

G- Need for Fixing Access Facilitation charges and Co-location charges at CLS for all types of Submarine Cables

3.35. As discussed in Chapter 2, there are three types of business models for providing submarine cable systems viz.

(a) Consortium Model

(b) Private Model

(c) Private/ Public Partnership Model

3.36. In case of privately owned cable systems, unlike other types of cable systems mentioned above, there is only one seller of the submarine cable capacity, who generally owns the CLS also. In such a scenario, an eligible Indian International Telecommunication Entity (ITE) takes both international bandwidth and access to CLS from the same party.

3.37. The recent representations received by TRAI from the service providers regarding CLS access charges pertain to the consortium submarine cables. However, the CLS access charges for private submarine cables may also require deliberation especially for those submarine cables which are owned by an entity while the CLS in India is owned by a different entity.

Issue for Consultation:

Q 9: 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?

H- Other Issues

3.38. 'International Telecommunication Access to Essential Facilities at Cable Landing Stations Regulation 2007' was issued in June 2007. In view of the changing ILDO industry dynamics in India and ever evolving international best practices, some of the clauses of the regulation may need to be modified or pruned while some other provisions may need to be introduced.

Issues for Consultation:

Q 10: 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?

Chapter – IV
Issues for Consultation

It may please be noted that answers/ comments to the issues given below should be provided with justification. The stakeholders may also comment on any other issue related to Access Facilitation Charges and Co-location charges along with all necessary details.

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.

Q 2: 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?

Q 3: 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.

Q 4: Which cost heads/ network elements should be included/ excluded while calculating Access Facilitation and Co-location charges? Please enumerate the items with specific reasons.

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

Q 6: 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.

Q 7: 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.

Q 8: 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?

Q 9: 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?

Q 10: 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?

List of Figures and Tables

List of Acronyms

Acronym	Expansion
AFC	Access Facilitation Charges
BSNL	Bharat Sanchar Nigam Limited
C&MA	Construction and Maintenance Agreement
CAGR	Compounded Annual Growth Rate
CLC	Co-Location Charges
CLS	Cable Landing Station
CLS-RIO	Cable Landing Station - Reference Interconnect Offer
CAPEX	Capital Expenditure
DoT	Department of Telecommunications
EASSy	Eastern Africa Submarine Cable System
EIG	Europe India Gateway
FALCON	FLAG Alcatel-Lucent Optical Network
FEA	Flag Europe Asia
FLAG	Fiber Optic Link Around the Globe
FAC	Fully Allocated Cost
LRIC	Long Run Incremental Cost
GBI	Gulf Bridge International
GDP	Gross Domestic Product
GR	Gross Revenue
IITE	Indian International Telecommunication Entity
ILD	International Long Distance
ILDO	International Long Distance Operator
IMEWE	India-Middle East-Western Europe
IPLC	International Private Leased Circuit
IRU	Indefeasible Right of Use
ISPs	Internet Service Providers
IT-BPO	Information Technology - Business Process Outsourcing
ITE	International Telecommunication Entity
LRIC	Long-Run Incremental Cost
NLD	National Long Distance
NLDOs	National Long Distance Operators
O&M	Operational & Maintenance
OCLS	Owner of Cable Landing Station
OPEX	Operating Expenditure
POP	Point of Presence

Acronym	Expansion
SEA-ME-WE-3	South East Asia – Middle East – Western Europe-3 (SMW3)
SEA-ME-WE-4	South East Asia – Middle East – Western Europe-4 (SMW4)
Tbps	Terra bits per second
TIC	Tata Indicom Cable
TRAI	Telecom Regulatory Authority of India
WACC	Weighted Average Cost of Capital

Annexure-I

List of ILD Licensees (As on 22.02.2012)

Sl. No.	Name of the ILD Operator	Effective Date of Licensee
1	M/s Reliance Communications Limited	25.02.02
2	M/s Bharti Airtel Limited	14.03.02
3	M/s Data Access Limited *(Licence under suspension)*	27.03.02
4	M/s Bharat Sanchar Nigam Ltd	29.01.03
5	M/s Videsh Sanchar Nigam Ltd.(Tata Communications Ltd.) *(Effective from 01.04.02)*	05.02.04
6	M/s i2i Enterprises Ltd. (BT Global Communications Pvt. Ltd.)	11.07.06
7	M/s AT&T Global Network Services Pvt. Ltd.	09.10.06
8	M/s Vodafone Essar South Ltd.	13.11.06
9	M/s Sify Communications Ltd.	21.11.06
10	M/s Dishnet Wireless ltd.	13.12.06
11	M/s BT Telecom India Pvt. Ltd.	20.02.07
12	M/s Tulip IT Services Ltd.	06.07.07
13	M/s Spice Communications Ltd.	08.08.07
14.	M/s Verizon Communications India Private Limited	03.01.08
15.	M/s Cable & Wireless Networks India Private Limited	15.02.2008
16.	M/s P3 Technologies Private Limited	28.02.2008
17.	M/s Mahanagar Telephone Nigam Limited	18.06.2008
18.	M/s Equant Network Services India Private Limited	20.06.2008
19.	M/s Swan Connect Communications Private Limited	12.08.2008 (Surrendered on 22.08.2009)
20.	M/s Citicom Networks Private Limited	03.10.2008
21	M/s Swan Telecom Private Limited (M/s Etisalat DB Telecom Private Limited)	06.10.2008
22.	M/s SingTel Global (India) Private Limited	05.03.2009
23.	M/s Datacom Solutions Private Limited	18.03.2009
24.	M/s Unitech Long Distance Communication Services Limited	28.04.2009
25.	M/s Pacific Internet India Private Limited	22.01.2010
26.	M/s Telstra Telecommunications Pvt. Limited	11.10.2011
27.	M/s Infotel Telecom Limited	14.02.2012

Source: Website of DoT (www.dot.gov.in)

Annexure-II

International Experience

The international experience has been compiled on the basis of (i) the information available on the web-sites of the regulators and (ii) the inputs provided by the service providers on the matter.

A- Australia

1. There are four OCLSs owning five cable landing stations (CLSs) in Australia on which seven international submarine cables are getting terminated. The CLS access is not regulated in Australia.

B- Bahrain

2. In 2010, Bahrain introduced regulation for access to submarine cable landing station, after the Telecommunications Regulatory Authority (TRA) issued a determination to resolve a dispute between Batelco, owner of the Falcon cable landing station, and Menatelcom, an access seeker. Batelco's proposed charges to Menatelcom and the TRA's determination are set out in Table 4-1. The TRA's intervention lowered charges by 80%.

TRA's Determination of Falcon Cable Landing Station Access Charges

S. No.	Item	Batelco's proposed charge (in US$ 000)	TRA's determination (in US$ 000)
1	IFC link annual rental	56	4.4
2	Co-location space annual charge	62	10.9
3	Riser room and riser access charge		2.2
4	Duct annual rental charge		7.7
5	**Total**	**118**	**25.2**

Source: Inputs provided by an ILD service provider

C- France

3. The France metropolitan cable landing station charges are not regulated but there is some limited regulation of one of France Telecom's oversea landing stations. In 1998, France Telecom proposed a 'commercial offer' which is regulated with a collocation service and backhaul service from the cable landing station to a point of presence of the other party to this commercial offer.

D- Hong Kong

4. In 2000, the Telecommunications Authority (OFTA), the Hong Kong regulator resorted to the regulation of access to the CLS for the dominant operator 'Reach'. However, by March 2002, OFTA formed the view that Reach was no longer in a dominant position within the meaning of its license in the external bandwidth market. Thus as of this date, charges imposed by CLS owners are not subject to regulation in Hong Kong. The Hong Kong regulator, finding that its initial regulation of access was no longer needed due to the evolution of a competitive market, moved to a private commercial negotiation model.

E- Mauritius

5. Mauritius is connected to the SAT3/WASC/SAFE cable. In 2006 the regulator, the Information and Communications Technology Authority (ICTA), regulated the price of IPLCs on a cost-oriented basis. In this case, regulation is applied to both the cable landing station and the submarine cable. The charge for IPLCs was determined on the basis of a fully allocated historic costing methodology with an allowance for a reasonable rate of return.[4]

F- Oman

6. The Oman regulator, the Telecommunications Regulatory Authority (TRA), issued a consultation paper in 2008 which identified that access to cable

[4] Steve Esselaar, Alison Gillward and Ewan Sutherland, April 2007, *The regulation of undersea cables and landing stations*, International Development Research Centre.

landing stations is an important regulatory issue. The TRA noted the need for licensing policy to ensure transparent, efficient and non-discriminatory access to submarine cable at cable landing stations. It stated that charges for access and co-location at landing stations should be cost-based[5]. However, the TRA has not yet implemented any regulations for cable landing stations.

F- Philippines

7. The charges for access to CLS that are charged by the Cable Landing Station owners to competing carriers are not regulated by the NTC. The Public Telecommunications Policy Act of the Philippines (PTA Act) mandates the promotion of competition in the telecommunications market, specifically "one in which telecommunications carriers are free to make business decisions and interact with one another in providing telecommunications services, with the end in view of encouraging their financial viability while maintaining affordable rates." Thus, unless the terms of the agreement are anti-competitive in nature, the NTC treats the interconnection agreement between the cable landing station owner and the backhaul network operators for connectivity as a privately negotiated agreement between the parties. The said agreement is submitted to the NTC for approval. The NTC reviews these agreements to ensure compliance with the MC rules on mandatory interconnection and other pertinent laws and regulations. The commercial terms are not reviewed and the parties are free to negotiate the types of fees to be charged which may be in the form of co-location charges (which may consist of one-time set-up charges or monthly service charges), additional recurring charges and non-recurring charges for set-up reconfigurations and utilities charges.

G- Singapore

8. Singapore regulates access to cable landing stations owned by the dominant operator, Singtel, via the Telecom Competition Code. The Code requires

[5]TRA, February 2008, *Consultation paper on international submarine cable infrastructure and landing station facility licenses.*

Singtel to offer co-location access and connections to submarine cables at cable landing stations to holders of international capacity (ownership, IRU or lease) on a fair, reasonable and non-discriminatory basis. The Singaporean regulator is now consulting on a proposal to extend co-location rights to providers of backhaul capacity.[6] Prices for co-location access and connection to submarine cables are to be set on a cost -orientated basis using a forward looking economic cost (FLEC).[7]

9. Recently, IDA has approved Singtel's RIO, incorporating directed amendments.[8] As per the RIO, there are two types of Cable Systems: (i) Group A Cable Systems and (ii) Group B Cable Systems. The charges payable by the Requesting Licensee for the Submarine Cable Connection Service to Singtel are as follows[9]:

DESCRIPTION	CHARGES (S$)
Application Charge per Request	
- Link Activation	407.3
- Capacity Activation	407.3
- Link and Capacity Activation	554.02
- Link Deactivation	407.3
- Capacity Deactivation	407.3
- Link and Capacity Deactivation	554.02
Activation Charge	
- Link Activation per link activated (for each service or protection link)	2,536.23
- Capacity Activation per capacity activated	2,075.10
- Link and Capacity Activation per link and capacity activated	4,150.20

[6]IDA, 21 January 2011, "Public consultation on the second review of Singapore Telecommunications Limited's reference interconnection offer" http://www.ida.gov.sg/doc/Policies%20and%20Regulation/Policies_and_Regulation_Level3/TCC/TCC2010.pdf

[7]IDA, 21 January 2011, *Public consultation on the second review of Singapore Telecommunications Limited's reference interconnection offer*, Appendix

[8]http://www.ida.gov.sg/doc/Policies%20and%20Regulation/Policies_and_Regulation_Level3/20060613111018/Approved_RIO/Schedule4B_20120202.pdf

[9]http://www.ida.gov.sg/doc/Policies%20and%20Regulation/Policies_and_Regulation_Level3/20060613111018/Approved_RIO/Schedule9_20120202.pdf

DESCRIPTION	CHARGES (S$)
Deactivation Charge - Link Deactivation per link deactivated (for each service or protection link)	922.27
- Capacity Deactivation per capacity deactivated	775.54
- Link and Capacity Deactivation per link and capacity deactivated	1,697.81
Annual Charge for Group A Cable Systems - Per link activated (for each service or protection link)	194.84
Annual Charge for Group B Cable Systems - STM1 or VC4 (per Input Port) - STM1 or VC4 (per Output Port) - VC3 (per Output Port) - VC12 (per Output Port)	 4,650.36 4,650.36 2,325.18 110.72

H. South Africa

10. There are two CLS owners in South Africa – Telekom SA (TSA) and Neotel. TSA owns CLSs located in Mtunzini, Yserfontein and Melkbosstrand. Neotel's only CLS is located in Mtunzini.

11. The Electronic Communications Act of 2005 requires the regulator, the Independent Communications Authority of South Africa (ICASA), to prescribe submarine cables and satellite landing stations as an essential facility[10]. The Minister has issued a policy direction to ICASA, to consider prioritizing and prescribing a list of essential facilities to include facilities connected to the SAT-3/WASC/SAFE marine cable[11]. ICASA has proposed to declare as essential facilities international facilities such as submarine cables and satellite earth stations, including backhaul circuits, cable landing stations, co-location space, earth stations, international gateways, land based fiber optic cables,

[10] http://www.ida.gov.sg/doc/Policies%20and%20Regulation/Policies_and_Regulation_Level3/TCC/TCC2010.pdf

[11] Global Legal Group, "The International Comparative Legal Guide to Telecommunication Laws and Regulations 2009

main distribution frames and undersea fibre optic cables[12]. However, the regulations do not appear to have been implemented yet. As on date the access to Cable Landing Stations is not regulated in South Africa.

I- South Korea

12. The KCC is the regulatory authority in the telecommunications and broadcasting service areas, with the authority to grant licenses/ authorization to the SPs, impose sanctions for violation of applicable laws, promulgate subordinate regulations/decrees/guidelines and make various systematic arrangements for the protection of user interests. Under the Framework Act, submarine cables are considered "major telecommunications facilities," the installation of which requires a report to the KCC. Thus a Facility based Telecom Service Provider (FSP) planning to land a submarine cable in Korea must report its plan to the KCC prior to the cable landing.

13. Concerning the landing of a foreign-owned submarine cable in Korea, the foreign submarine cable operator may consider: (1) entering into the Cross-border Supply Contract with a licensed FSP in Korea and implement the cable landing through the FSP or (2) obtaining a FSP license and handle the cable landing on its own as a licensed FSP in Korea.

14. The charges for access to Cable Landing Stations in South Korea are not regulated. Presently there are four CLS which are owned by three OCLSs and eleven submarine cables are landing in South Korea on these CLSs. Nine submarine cables land on two CLSs owned by Korea Telecom whereas one submarine cable each is landing on CLSs owned by Dacom Crossing and Sejong Telecom.

[12] Draft Essential Facilities Regulation, 2007, http://www.icasa.org.za/tabid/242/Default.aspx

H- Thailand

15. Although a number of cables land in Thailand only Communications Authority of Thailand (CAT), a fully state owned entity, is authorized to operate the Cable Landing Stations. Currently the charges for access to the Cable Landing Stations are not specifically regulated in Thailand.

I- United Kingdom (UK)

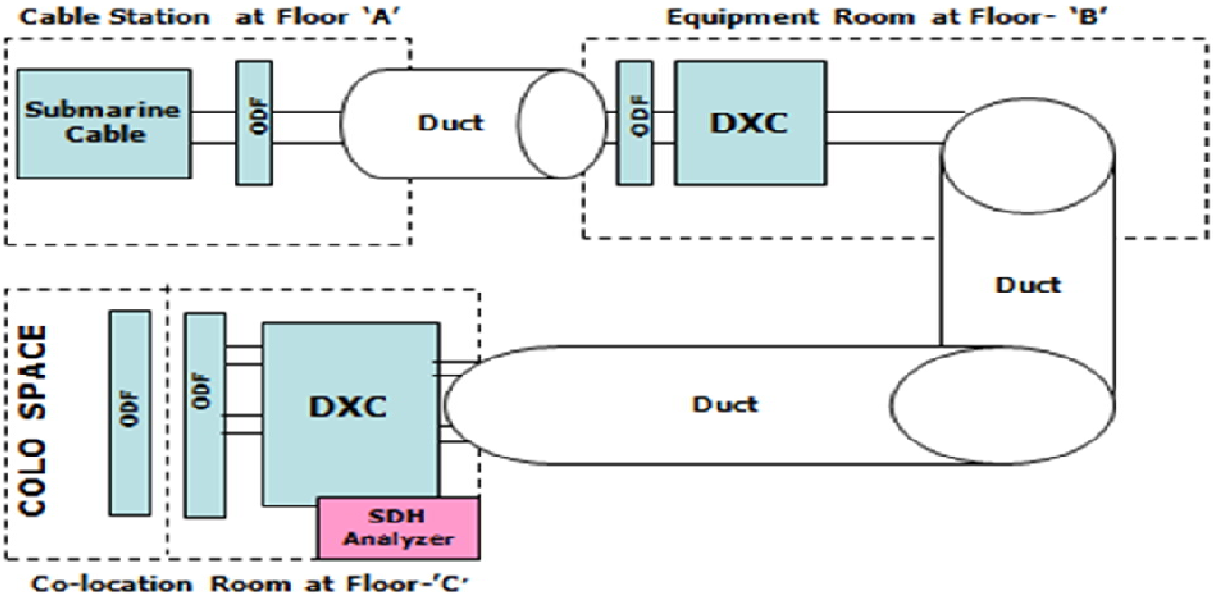
16. The access to CLS has been left unregulated by OFTEL (now OFCOM) since November 2003 when OFTEL reviewed the existing regulation in relation to CLSs. This was done due to availability of adequate number of Operators in the field, liberal entry threshold in the market for new players leading to market forces taking over pricing of services.

J- USA

17. In USA, the CLS access has not been regulated since 1985. This was when the FCC concluded that there were no dominant operators in the market and that competition would prevail.

Annexure-III

Generic Description of Items Considered by OCLSs for Calculating Access Facilitation Charges and Co-location Charges at CLS Location

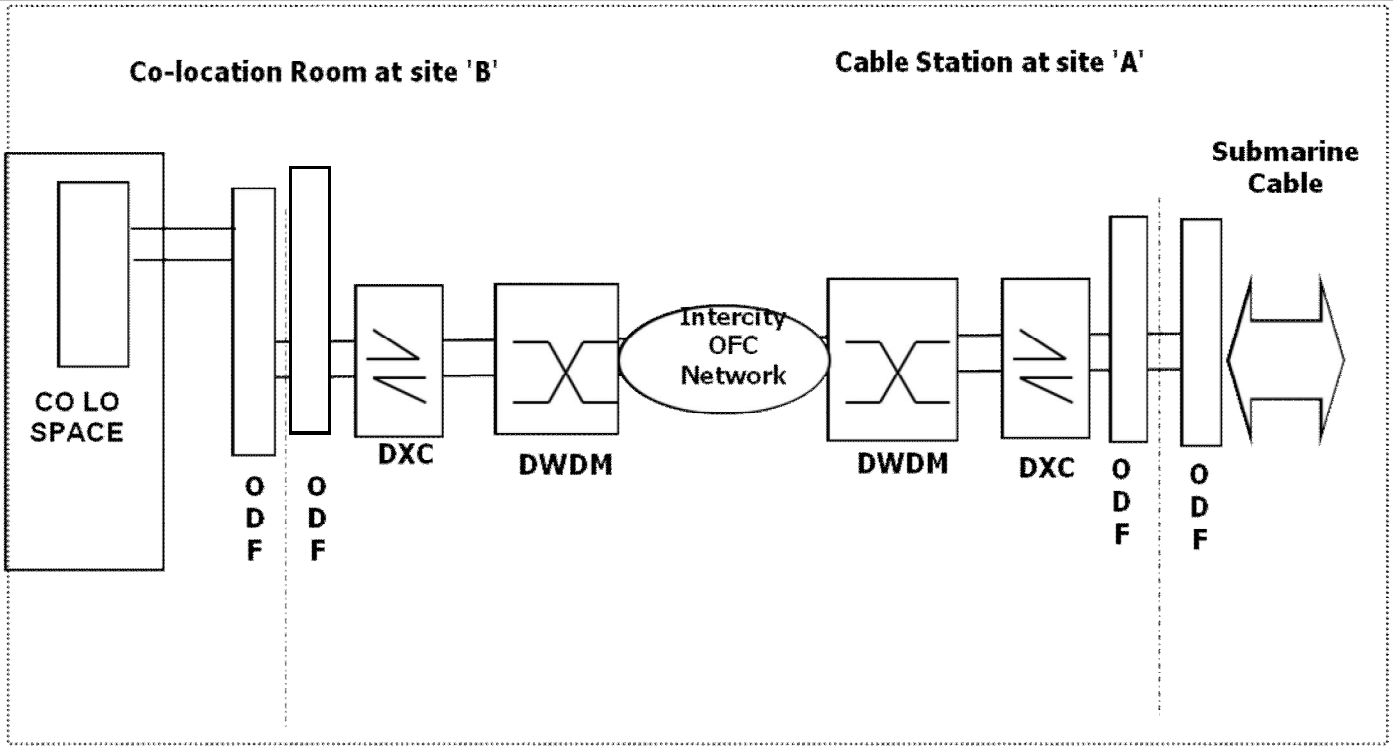


A.	Access Facilitation Charges on IRU basis/ Annual Lease basis	
(a)	**CAPEX components**	
1	Total cost of DXC	a
2	Equipped number of ports in DXC	b
3	Ports dedicated for access facilitation in DXC	c
4	Apportioned cost for access facilitation =Line item 1* item 3 / item 2	d=a*c/b
5	Apportioned cost of DXC at co-location space (A% dedicated for Access Facilitation)	e
6	Apportioned cost of ODF/Test equipment (A% dedicated for access facilitation)	f
7	Total equipment cost = line item 4 + item 5 + item 6	g=d+e+f
8	Transmission link cost (Cost of duct, fiber and services)	h
9	Manpower cost for planning, installation, testing & commissioning (Cost of engineers and support staff)	i
10	Miscellaneous cost (cost of cable, tools, hardware, materials)	j
11	One time set-up cost = line item 9 + item 10	k=i+j
12	Apportioned one-time set-up cost = line item 11*item 3/ item 2	l=k*c/b
13	Total CAPEX cost = line item 7 + item 8 + item 12	m=g+h+l

14	Project Management Cost	n
15	Total cost including Project management cost = line item 13 + item 14	o=m+n
16	Cost including pre-tax WACC @B% = line item 15*(1+B%)	p=o*(1+B%)
17	Total number of STM-1s	q
18	Cost per STM-1 = line item 16/ item 17	r=p/q
19	Revenue sharing rate	s%
20	Price with revenue sharing per STM-1 = line item 18/ (1-line item 19)	t=r/(1-s%)
21	**Access Facilitation Charges per STM-I on IRU basis**	u=t
22	**Access Facilitation Charges on leased basis** (1/3 of IRU price)	v=u/3
(b)	**OPEX Components**	
23	AMC cost of equipment and transmission Link	w
24	Cost of space and support infrastructure for equipment	x
25	Cost of manpower at CLS based on actual manning (dedicated and shared)	y
26	Total opex (direct) = Line item 23 + item 24 + item 25	z=w+x+y
27	Overhead charges = C% of line item 26	aa= z *C%
28	Total = line item 26 + item 27	ab=z+aa
29	License fee	ac%
30	**Total =line item 28/ (1-ac%)**	ad= ab/(1-ac%)
30	**Annual O&M Charges per STM-1**	ae=ad/q
B.	**Co-location Charges**	
1	Power cost (basic) per rack per annum	a
2	O&M (AMC for AC, fire-fighting equipment, UPS, infra related items etc.) per rack per annum	b
3	Rental (space occupied) per rack per annum	c
4	Manpower (to assist in installation & fault repair etc.) per rack per annum	d
5	Security Service Charges per rack per annum	e
6	Depreciation per rack per annum	f
7	**Co-location charges per rack per annum** = line item 1 + item 2+item 3+item 4+item 5+item 6	g=a+b+c+d+e+f

Annexure-IV

Generic Description of Items Considered by OCLSs for Calculating Access Facilitation Charges and Co-location charges at Alternate Location

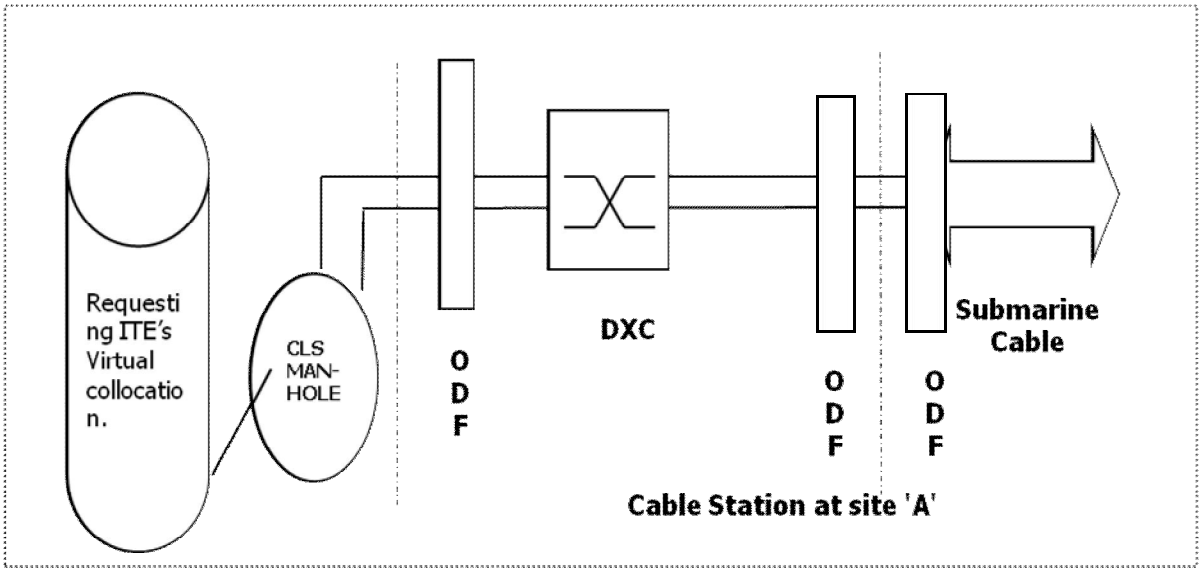


A.	Access Facilitation Charges per STM-1 on IRU basis / annual lease basis	
(a)	**CAPEX Components**	
1	Apportioned digital cross connect equipment DXC (at cable landing station and Co-location room) for 128 STM-1s	a
2	Apportioned DWDM equipment for 128 STMs-1s	b
3	Apportioned link cost between cable station and co-location center for 128 STM-1s	c
4	Apportioned Miscellaneous Equipment (Optical distribution frame cable ducts and other installation material) for 128 STM-1s	d
5	Apportioned fibre distribution frame and accessories, patch cords etc. for 128 STM-1s	e
6	Apportioned Test Equipment for 128 STM-1s	f
7	Total =line item 1 + item 2 + item 3 + item 4 + item 5 + item 6	g=a+b+c+d+e+f
8	**Basic Rate Per STM-1 IRU** (Cost attributed to 128 STM-1s with 70% utilization factor)	h= g/(128*70%)
9	Project Management Fee (A% of Line item 8)	i = h*A%
10	Weighted Average Cost of Capital @ B% of (Line Item 8+item 9)	j= (h+i)*B%
11	Total = line item 8+ item 9 + item 10	k= h+i+j
12	Rate of license fee	l %
13	Profit margin (taken as Zero)	m=0
14	**Access Facilitation Charges per STM-I on IRU basis** = line item11/ (1- item 12)	n= k/(1-l%)

15	**Access Facilitation Charges on leased basis** (1/3 of IRU price)	o=n/3
(b)	**OPEX Components**	
15	Apportioned network operating charges for space (C number of rack space for equipment and D number of rack space for other NMS equipment), power etc	p
16	Annual maintenance charges (equipment)	q
17	Repair maintenance fiber pair	r
18	Shared resource cost for engineers and supervisors	s
19	Total = line item 15 + item 16 + item 17 + item 18	t= p+q+r+s
20	**Basic rate per STM-1 (attributed to 128 STM-1s with utilization factor 70%)**	u=t/(128*70%)
21	Overheads (E% of Line Item 20)	v = u*E%
22	Total =line item 20+ item 21	w=u+v
23	Rate of license fee	x%
24	**Total O&M Price=**line item 22/(1-item 23)	y=w/(1-x%)
B.	**Co-location charges**	
1	Rent/ lease charges	a
2	Infrastructure maintenance cost	b
3	Shared resource cost for engineers and supervisors	c
4	Fuel expenses	d
5	AMC charges	e
6	Security and housekeeping	f
7	Total cost = line item 1 + item 2+ item 3 + item 4 + item 5+ item 6	g=a+b+c+d+e+f
8	Apportioned cost for co-location = F% of line item 7	h=g*F%
9	Number of racks for which space is available	i
10	Cost per rack (70% occupancy) = line item 8/ (70%*item 9)	j=h/(i*70%)
11	Power charges per rack	k
12	Basic cost per rack = line item 10+ item 11	l= j+k
13	Overheads =G% of Line Item 12	m= l*G%
14	Total= Line item 12 + item 13	n=l+m
15	Rate of license fee	o%
16	**Annual Co-location Charges per rack** = line item 14/(1- item 15)	p=n/(1-o%)

Annexure-V

Generic description of items considered by OCLSs for calculating Access Facilitation Charges in case of Virtual Co-location



A.	Access Facilitation Charges per STM-1 on IRU basis / annual lease basis	
(a)	**CAPEX COMPONENTS**	
1	Apportioned cost of Digital cross connect equipment - DXC for 128 STM-1s	a
2	In building ducting and cabling - One time setup cost	b
3	2 Pair fibre cable from Manhole to Cable landing station - Ducting and cabling charge	c
4	Miscellaneous Equipment (Optical distribution frame, patch cords and other installation material)	d
5	Fibre Distribution frame and accessories, patch cords etc	e
6	Test equipment	f
7	Total = line item 1 + item 2 + item 3+ item 4+ item 5+ item 6	g=a+b+c+d+e+f
8	**Basic rate Per STM-1 on IRU basis** (Total amount attributed to 128 STM1 with 70% utilization)	h=g/(128*70%)
9	Project Management Fee (A% of Line item 8)	i=h*A%
10	Weighted average cost of capital (WACC) @B% of (Line Item 8+item 9)	j=(h+i)*B%
11	Total =line item 8+item 9+ item 10	k=h+i+j
12	Rate of license fee	l%
13	**Access Facilitation on IRU basis=** line item 11/ (1- item 12)	m=k/(1-l%)
14	**Access Facilitation on annual Lease Price**= 1/3 of IRU price	n=m/3
(b)	**OPEX Components**	
15	Apportioned Network Operating Charges for power, rack space for equipment other NMS equipment etc.	o
16	Annual maintenance charges of equipment	p

17	Repair maintenance fiber pair	q
18	Shared resource cost of engineers and supervisors	r
19	Total =line item 15+ item 16+ item 17+item 18	s=o+p+q+r
20	**OPEX cost (basic) per STM-1** (cost attributed to 128 STM-1s with 70% utilization factor)	t=s/(128*70%)
21	Overheads =D% of line item 20	u=t*D%
22	Total= Line item 20+ item 21	v=t+u
23	Rate of license fee	w%
24	**Annual O&M charges per rack** = line item 22/(1-item 23)	x=v/(1-w%)