

Telecom Regulatory Authority of India

Notification

New Delhi, the 21st April, 2005

No.312-7/2003-Eco. In exercise of the powers conferred upon it under sub-section (2) of section 11 read with section 11(1)(b)(i) of the Telecom Regulatory Authority of India Act, 1997, the Telecom Regulatory Authority of India (TRAI) hereby further amends the Telecommunication Tariff Order, 1999 as under, namely:

1. Short title, extent and commencement:
 - (i) This Order shall be called “The Telecommunication Tariff (Thirty Sixth Amendment) Order, 2005” (3 of 2005).
 - (ii) This Order shall come into force from the date of its publication in the Official Gazette.
2. The existing Schedule IV (Domestic Leased Circuits and Annexure 1 and Annexure 2 attached there to) of the Telecommunication Tariff Order 1999 shall stand deleted and substituted by the following Schedule and Annexures, namely:

Schedule IV

Domestic Leased Circuits

ITEM	TARIFF
(1) Date of implementation	01.05.2005
(2) Coverage	<p>(a) All tariffs specified as ceilings</p> <p>(b) It is mandatory for domestic leased circuits to be provided through utilization of spare capacity when such capacity is available and when not available, on Rent and Guarantee Terms / Special Construction / Contribution basis. All service providers shall report to the Authority the commercial and economic basis of their terms and conditions with respect to Rent and Guarantee / Special Construction / Contribution basis etc. schemes, under the provisions of TTO relating to reporting requirement.</p>

	(c) Service providers may offer discounts on the ceiling tariffs. Discounts, if offered, shall be transparent and non-discriminatory based on laid down criteria and subject to reporting requirement.										
(3) Ready reckoner tariff for domestic leased circuits (a) 64 Kbps, 128 Kbps and 256 Kbps (b) 2 Mbps (E1) (c) 45 Mbps (DS-3) (d) 155 Mbps (STM-1) (e) For Speed / Capacities above 256 kbps and below 2 Mbps (f) Chargeable distance (g) Tariff for intermediate distances	As specified in Annexure 1 to this Schedule As specified in Annexure 2 to this Schedule As specified in Annexure 3 to this Schedule As specified in Annexure 4 to this Schedule Forbearance The radial distance may be converted into chargeable distance by multiplying the radial distance by a factor not exceeding 1.25. For distances lying in between the distances specified in Annexures 1 to 4 of Schedule IV, the tariffs shall be charged on pro-rata basis.										
(4) Local leads or end links	Tariff for local lead (or end links) to be charged as: (i) Charge for leasing these local leads shall be as per the ceilings specified in Annexure 1 to 4 of this Order, or (ii) If such leasing is technically not possible then on Rent and Guarantee Basis / Special Construction / Contribution basis.										
(5) E1/R2 Links for ISPs	Tariffs for E1/R2 links for ISPs shall contain the following components, namely, Port Charges and Tariffs for Leased Line and / or Local Leads / End Links (each component shall be specified separately in the bill): (i) Port charges as per the following table: <u>No. of E1/R2 ports</u> <u>Port charges in Rs.</u> <table> <tbody> <tr> <td>1 – 16</td> <td>N* 55,000</td> </tr> <tr> <td>17 – 32</td> <td>8,80,000+(N-16)* 30,000</td> </tr> <tr> <td>33 – 64</td> <td>13,60,000+(N-32)*20,000</td> </tr> <tr> <td>65 – 128</td> <td>20,00,000+(N-64)*15,000</td> </tr> <tr> <td>129 – 256</td> <td>29,60,000+(N-128)*14,000</td> </tr> </tbody> </table>	1 – 16	N* 55,000	17 – 32	8,80,000+(N-16)* 30,000	33 – 64	13,60,000+(N-32)*20,000	65 – 128	20,00,000+(N-64)*15,000	129 – 256	29,60,000+(N-128)*14,000
1 – 16	N* 55,000										
17 – 32	8,80,000+(N-16)* 30,000										
33 – 64	13,60,000+(N-32)*20,000										
65 – 128	20,00,000+(N-64)*15,000										
129 – 256	29,60,000+(N-128)*14,000										

	<p>Notes:</p> <p>(a) N refers to the number of E1/R2 ports demanded by ISP and accepted by the Service Providers.</p> <p>(b) The above rates are ceilings and the service provider may have alternative lower port charges.</p> <p>(ii) Tariffs for Leased Line, as per clause (3) and/or Tariffs for Local leads or end links as per clause (4) of Schedule IV of this Order.</p>
(6) Other matters relevant to Domestic Leased Circuits not specified in this Schedule	Forbearance

Annexure 1 to Schedule IV**READY-RECKONER CEILING TARIFF (in Rs./Annum) FOR 64 Kbps,****128 Kbps and 256 Kbps DOMESTIC LEASED CIRCUITS**

Distance (km)	Tariff for 64 Kbps Circuits	Tariff for 128 Kbps Circuits	Tariff for 256 Kbps Circuits
5	10,207	18,372	31,640
10	10,533	18,959	32,651
15	10,859	19,546	33,662
20	11,185	20,133	34,673
25	11,511	20,720	35,684
30	11,837	21,307	36,695
35	12,163	21,894	37,706
40	12,489	22,481	38,717
45	12,815	23,068	39,728
50	13,214	23,785	40,964
55	13,540	24,372	41,975
60	13,866	24,959	42,986
65	14,192	25,546	43,997
70	14,519	26,133	45,008
75	14,845	26,720	46,019
80	15,171	27,307	47,029
85	15,497	27,894	48,040
90	15,823	28,481	49,051
95	16,149	29,069	50,062
100	16,548	29,786	51,298
105	16,874	30,373	52,309
110	17,200	30,960	53,320
115	17,526	31,547	54,331
120	17,852	32,134	55,342
125	18,178	32,721	56,353
130	18,504	33,308	57,364
135	18,831	33,895	58,375
140	19,157	34,482	59,386
145	19,483	35,069	60,397
150	19,881	35,787	61,632
155	20,208	36,374	62,643
160	20,534	36,961	63,654
165	20,860	37,548	64,665
170	21,186	38,135	65,676
175	21,512	38,722	66,687

Distance (km)	Tariff for 64 Kbps circuits	Tariff for 128 Kbps Circuits	Tariff for 256 Kbps Circuits
180	21,838	39,309	67,698
185	22,164	39,896	68,709
190	22,490	40,483	69,720
195	22,817	41,070	70,731
200	23,215	41,787	71,967
205	23,541	42,374	72,978
210	23,867	42,961	73,989
215	24,193	43,548	75,000
220	24,520	44,135	76,011
225	24,846	44,722	77,022
230	25,172	45,309	78,033
235	25,498	45,896	79,044
240	25,824	46,483	80,055
245	26,150	47,070	81,066
250	26,549	47,788	82,301
255	26,875	48,375	83,312
260	27,201	48,962	84,323
265	27,527	49,549	85,334
270	27,853	50,136	86,345
275	28,179	50,723	87,356
280	28,505	51,310	88,367
285	28,832	51,897	89,378
290	29,158	52,484	90,389
295	29,484	53,071	91,400
300	29,882	53,788	92,636
305	30,209	54,375	93,647
310	30,535	54,962	94,657
315	30,861	55,549	95,668
320	31,187	56,136	96,679
325	31,513	56,723	97,690
330	31,839	57,310	98,701
335	32,165	57,898	99,712
340	32,491	58,485	100,723
345	32,818	59,072	101,734
350	33,216	59,789	102,970

Distance (km)	Tariff for 64 Kbps circuits	Tariff for 128 Kbps circuits	Tariff for 256 Kbps circuits
355	33,542	60,376	103,981
360	33,868	60,963	104,992
365	34,194	61,550	106,003
370	34,521	62,137	107,014
375	34,847	62,724	108,025
380	35,173	63,311	109,036
385	35,499	63,898	110,047
390	35,825	64,485	111,058
395	36,151	65,072	112,069
400	36,550	65,790	113,304
405	36,876	66,377	114,315
410	37,202	66,964	115,326
415	37,528	67,551	116,337
420	37,854	68,138	117,348
425	38,180	68,725	118,359
430	38,507	69,312	119,370
435	38,833	69,899	120,381
440	39,159	70,486	121,392
445	39,485	71,073	122,403
450	39,883	71,790	123,639
455	40,210	72,377	124,650
460	40,536	72,964	125,661
465	40,862	73,551	126,672
470	41,188	74,138	127,683
475	41,514	74,725	128,694
480	41,840	75,312	129,705
485	42,166	75,899	130,716
490	42,492	76,486	131,726
495	42,819	77,073	132,737
500	43,217	77,791	133,973
>500	44,000	79,200	136,400

Annexure 2 to Schedule IV**READY-RECKONER CEILING TARIFF (in Rs./Annum) FOR****2 Mbps (E-1) DOMESTIC LEASED CIRCUITS**

Distance (km)	Tariff for 2 Mbps Circuit	Distance (km)	Tariff for 2 Mbps Circuit
5	17,016	180	309,282
10	25,180	185	317,446
15	33,344	190	325,610
20	41,509	195	333,774
25	49,673	200	344,112
30	57,837	205	352,276
35	66,001	210	360,440
40	74,165	215	368,605
45	82,329	220	376,769
50	92,667	225	384,933
55	100,831	230	393,097
60	108,995	235	401,261
65	117,159	240	409,425
70	125,324	245	417,590
75	133,488	250	427,927
80	141,652	255	436,091
85	149,816	260	444,256
90	157,980	265	452,420
95	166,144	270	460,584
100	176,482	275	468,748
105	184,646	280	476,912
110	192,810	285	485,076
115	200,975	290	493,240
120	209,139	295	501,405
125	217,303	300	511,742
130	225,467	305	519,906
135	233,631	310	528,071
140	241,795	315	536,235
145	249,959	320	544,399
150	260,297	325	552,563
155	268,461	330	560,727
160	276,625	335	568,891
165	284,790	340	577,055
170	292,954	345	585,220
175	301,118	350	595,557

Distance (km)	Tariff for 2 Mbps Circuit
355	603,721
360	611,886
365	620,050
370	628,214
375	636,378
380	644,542
385	652,706
390	660,870
395	669,035
400	679,372
405	687,536
410	695,701
415	703,865
420	712,029
425	720,193
430	728,357
435	736,521
440	744,686
445	752,850
450	763,187
455	771,352
460	779,516
465	787,680
470	795,844
475	804,008
480	812,172
485	820,336
490	828,501
495	836,665
500	847,002
>500	850,000

Annexure 3 to Schedule IV**READY-RECKONER CEILING TARIFF (in Rs./Annum) FOR****45 Mbps (DS-3) DOMESTIC LEASED CIRCUITS**

Distance (km)	Tariff for 45 Mbps Circuit	Distance (km)	Tariff for 45 Mbps Circuit
<50	666,798	220	2,755,219
50	709,301	225	2,812,657
55	766,738	230	2,870,094
60	824,176	235	2,927,531
65	881,613	240	2,984,969
70	939,050	245	3,042,406
75	996,488	250	3,130,859
80	1,053,925	255	3,188,297
85	1,111,362	260	3,245,734
90	1,168,800	265	3,303,171
95	1,226,237	270	3,360,609
100	1,314,690	275	3,418,046
105	1,372,128	280	3,475,484
110	1,429,565	285	3,532,921
115	1,487,003	290	3,590,358
120	1,544,440	295	3,647,796
125	1,601,877	300	3,736,249
130	1,659,315	305	3,793,686
135	1,716,752	310	3,851,124
140	1,774,189	315	3,908,561
145	1,831,627	320	3,965,998
150	1,920,080	325	4,023,436
155	1,977,517	330	4,080,873
160	2,034,955	335	4,138,311
165	2,092,392	340	4,195,748
170	2,149,830	345	4,253,185
175	2,207,267	350	4,341,639
180	2,264,704	355	4,399,076
185	2,322,142	360	4,456,513
190	2,379,579	365	4,513,951
195	2,437,016	370	4,571,388
200	2,525,470	375	4,628,825
205	2,582,907	380	4,686,263
210	2,640,344	385	4,743,700
215	2,697,782	390	4,801,138

Distance (km)	Tariff for 45 Mbps Circuit
395	4,858,575
400	4,947,028
405	5,004,466
410	5,061,903
415	5,119,340
420	5,176,778
425	5,234,215
430	5,291,652
435	5,349,090
440	5,406,527
445	5,463,965
450	5,552,418
455	5,609,855
460	5,667,293
465	5,724,730
470	5,782,167
475	5,839,605
480	5,897,042
485	5,954,479
490	6,011,917
495	6,069,354
500	6,157,807
>500	6,159,000

Annexure 4 to Schedule IV**READY-RECKONER CEILING TARIFF (in Rs./Annum) FOR****155 Mbps (STM-1) DOMESTIC LEASED CIRCUITS**

Distance (km)	Tariff for 155 Mbps Circuit	Distance (km)	Tariff for 155 Mbps Circuit
<50	1,787,528	220	7,388,719
50	1,901,152	225	7,542,811
55	2,055,245	230	7,696,904
60	2,209,337	235	7,850,996
65	2,363,430	240	8,005,089
70	2,517,523	245	8,159,182
75	2,671,615	250	8,396,080
80	2,825,708	255	8,550,173
85	2,979,801	260	8,704,265
90	3,133,893	265	8,858,358
95	3,287,986	270	9,012,451
100	3,524,884	275	9,166,543
105	3,678,977	280	9,320,636
110	3,833,069	285	9,474,728
115	3,987,162	290	9,628,821
120	4,141,255	295	9,782,914
125	4,295,347	300	10,019,812
130	4,449,440	305	10,173,905
135	4,603,533	310	10,327,997
140	4,757,625	315	10,482,090
145	4,911,718	320	10,636,182
150	5,148,616	325	10,790,275
155	5,302,709	330	10,944,368
160	5,456,801	335	11,098,460
165	5,610,894	340	11,252,553
170	5,764,987	345	11,406,646
175	5,919,079	350	11,643,544
180	6,073,172	355	11,797,637
185	6,227,265	360	11,951,729
190	6,381,357	365	12,105,822
195	6,535,450	370	12,259,914
200	6,772,348	375	12,414,007
205	6,926,441	380	12,568,100
210	7,080,533	385	12,722,192
215	7,234,626	390	12,876,285

Distance (km)	Tariff for 155 Mbps Circuit
395	13,030,378
400	13,267,276
405	13,421,368
410	13,575,461
415	13,729,554
420	13,883,646
425	14,037,739
430	14,191,832
435	14,345,924
440	14,500,017
445	14,654,110
450	14,891,008
455	15,045,100
460	15,199,193
465	15,353,286
470	15,507,378
475	15,661,471
480	15,815,564
485	15,969,656
490	16,123,749
495	16,277,842
500	16,514,740
>500	16,520,000

This Order contains at Annexure A an Explanatory Memorandum, which explains the reasons for this amendment to the Telecommunication Tariff Order, 1999.

By Order,

(M. Kannan)
Advisor(Economic)

Annexure - A

Explanatory Memorandum

Section 1. Introduction and Background

1.1 While formulating the Telecommunication Tariff Order (TTO), 1999, the Authority specified cost based tariff for Domestic Leased Circuits (DLC) as the regime applicable in this segment. These tariffs were in the nature of price caps and the service providers were free to offer discounts to their customers. Since it is widely recognized that leased circuits are an input in facilitating competition, the objective of the tariff regime was to ensure that benefits of competition become available to not only the telecom sector, but also to other sectors of the economy. Tariff caps were fixed for leased lines with 64 Kbps and 2 Mbps capacity and for capacities below 64 Kbps the tariffs were forborne.

1.2 Significant developments have taken place since TTO 1999 was notified, including entry of private National Long Distance Operators (NLDOs) and Infrastructure Providers (under IP-I &IP-II categories), thereby increasing the number of players in the market for provision of DLCs. Although the number of players has increased, ‘competition’ is restricted to the areas where the new entrants have built their networks. Even in areas where there are multiple service providers, tariff analysis reveals that new entrants simply follow the pricing of the incumbent operator. In this context it is relevant to quote the findings of a study conducted by OFTA (Study of Local Leased Circuit Market in Hong Kong, Office of Telecommunications Authority, 16, September, 2004.):

“Competition in LLC markets is generally slower to pick up compared to other segments because it is affected by the pace at which new entrants build up their networks.”

1.3 Price stability even in the presence of new entrants in the market gave support to the hypothesis that competition was not effective in the provision of DLCs. Further, rapid technological advances have sharply reduced the unit cost of long-haul bandwidth. There is a significant decline in the cost of transmission equipment including Optical Fibre cable coupled with a sharp increase in capacity that can be carried over these same cables. Reflecting these realities, worldwide, the transmission circuit prices have fallen by about 90% since 1999 (Primetrica, Inc. 2004, Terrestrial Networks). While tariff for leased

circuits in India have generally come down during the last five years, the reduction is not commensurate with the reduction witnessed in the cost of providing the services. The reduction in tariff for leased circuits is limited to E-1 capacities, in trunk routes, and varies by service provider. The reported discount offered is about 60% less than the prevailing ceiling tariff specified by TRAI in 1999. In addition, the extent of reduction even in these routes and capacities is not commensurate with the decline in the leased circuit prices witnessed elsewhere in the world.

1.4 The Authority in its document, “Broadband India: Recommendations of Accelerating Growth of Internet and Broadband Penetration” (April, 2004) identified high prices of DLCs as one of the major impediments to the growth of Internet and broadband services. The reduction in tariffs notified in this Order will not only spur growth, as witnessed in mobile telephony, but also enhance capacity utilization of networks and relax one of the constraints in improving Broadband penetration in India.

1.5 The state of competition in the DLC market in India has been succinctly summarized in a recent report by Gartner (22 February 2005, ID Number G00126348), an independent international research agency that also covers the India telecom market:

“A limited number of players compete, and only incumbent carrier BSNL can provide comprehensive national coverage. However, there is measured competition in key routes. As a result, prices have decreased, but prices are still high compared with competitive markets, including a comparable developing market such as China.”

1.6 In view of the above, the Authority considers it appropriate to continue with the tariff regulation until such time that competition becomes adequate and effective in the DLC market. The ceiling tariffs have thus been revised taking into account the developments of the last few years including the reduction in the cost base. The Authority also received several representations from user industries and others recommending a review of DLC tariffs to make them in step with tariff declines witnessed in this sector across the world and also to reflect the general tariff declines that have occurred in India since the notification of TTO 1999. The consultation paper on “Revision of Ceiling Tariff for DLC” (Consultation Paper No.12/2004) was issued on 22nd June 2004. Various stakeholders, including service providers, user industries, consumer organizations and associations of service providers sent written responses to the consultation paper.

Subsequently, Open House Discussions were also held on 20.07.2004 and 22.07.2004 in Delhi and Bangalore, respectively.

Section 2. Summary of Main Comments

2.1 The key comments of various stakeholders on the issues raised in the consultation paper are given below.

2.2 ***On the Need for Tariff Regulation for DLCs***

2.2.1 COAI is of the opinion that the review of tariffs for DLC by the Authority is appropriate and timely in view of the significant decline in the cost of transmission equipment coupled with the rapid advances in technology. According to them, reduced tariffs would go a long way in driving the growth of broadband services in the country.

2.2.2 One of the ISPs commented that in the absence of effective competition, regulatory intervention was necessary to drive prices of DLC to their economically rational levels.

2.2.3 On the other hand, the incumbent operator believes that there is sufficient competition in the leased line segment and therefore tariff for all types of leased circuits should be forborne. If the Authority however, decided to prescribe a tariff, it should be specified as a ceiling with built in flexibility for operator driven reduction on high density/high routes where provisioning may be cheaper as compared to other routes where it is expensive.

2.2.4 One of the NLDOs feels that effective competition has emerged in the provision of DLC and access to the DLC is no longer a ‘bottleneck’.

2.2.5 ISPAI submitted that the competition is not yet effective and hence, the Authority has justly embarked upon revision of the tariff regime based on cost.

2.2.6 AT&T Communication Services India Private Ltd. has submitted that IDA in Singapore has mandated SingTel to establish a wholesale tariff for local leased line, and Ofcom in UK has mandated reductions of BT’s access circuit prices during its leased line market review. Similarly, provision of domestic leased line services in a timely, non-discriminatory and cost oriented manner can make a positive contribution to the health

of the overall Indian knowledge-based economy and the proposal of the Authority would certainly make rates in India competitive with rates in other leading Asia-Pacific and OECD countries.

2.2.7 VSNL has submitted that the Authority should simultaneously issue regulations / guidelines regarding the terms and conditions governing leasing of local leads and these guidelines must also cover all aspects relating to local leads like (a) tariff, (b) Rent and Guarantee, and (c) Contribution.

2.3 *On the Methodology and Related Issues*

2.3.1 The COAI has submitted that instead of a normated approach to derive the annual rental value it would have been appropriate for the Authority to follow international practices and adopt the cost of the most efficient operator. In fact, a large number of Regulators are adopting Long Range Forward Looking Cost while determining cost based tariffs.

2.3.2 The COAI has also stated that there is no need to consider both a capacity utilization factor of 80% and a redundancy factor of 25%. It would be sufficient to take a capacity utilization factor of 75% as this will also take care of the provision for redundancy. This should provide the guarantee of 25% redundancy for each capacity hired. One of the mobile operators has submitted to the Authority that the fill factor of 75% would be adequate to take care of both redundancy and capacity utilization and there was no further need to provide for redundancy separately.

2.3.3 An NLDO has commented in its response to the consultation paper, that as the capacity utilization is intrinsically linked with the requirement of network uptime or redundancy, an efficient network that guarantees 99.99% network uptime is forced to work at 50% of capacity utilization in order to meet the uptime requirement levels. One of the BSOs has stated that for the major trunk routes, utilization could be taken at 80% even on STM-4 circuits, but it would be difficult to achieve a utilization of even 50% in most mid-sized towns. According to another operator, capacity utilization of 80 percent is on the higher side particularly in DWDM network wherein capacity available is huge.

2.3.4 The incumbent has submitted that the license fee of 15% should be used for calculating the cost based rental for leased circuits as BSNL and other NLD operators are paying license fee at the rate of 15% of their revenues for long distance leased line services.

2.3.5 The incumbent has further submitted that, while the transmission network of BSNL has been regularly upgraded and built on SDH system, in case of SDCC to LDCC links, majority of the circuits are either 34 Mb or below. A redundancy factor of 50% is, therefore, conservative; making it even lower is not justified except on routes connecting major cities.

2.3.6 The Authority should specify the ceiling tariff for circuits beyond 500 kms since there is a proportionate extra variable cost for every additional meter of the fibre laid.

2.3.7 The Infrastructure Providers Association has stated that for long distance circuits, STM-4 and above or DWDM equipment is needed. Further, to provide a capacity of STM-1 at least 2 STM-1s are needed including protection. In certain cases an STM-4 link is required to provide STM-1 capacity. Hence the cost for STM-4 should be taken as a base cost and accordingly the dividing factor for 2 Mbps (E-1) shall remain 63 as per the existing practice.

2.3.8 One submission states that 25% allowance for redundancy seems quite high. Proper foresight and planning should enable the service provider to foresee redundancy to avoid such high loading factor. Therefore, a redundancy factor of more than 10% would appear to be rather high and not justifiable.

2.3.9 Tata Power Broadband Company Ltd. has submitted to the Authority that they appreciate the concept of “second lowest operators cost” for arriving at the assessment of the cost.

2.3.10 RailTel Corporation of India Ltd. has in its comments on the consultation paper stated that it will not be fair to estimate 80% utilization of capacity on overall basis, instead it should be taken as 40%.

2.4 *Analysis of the Comments*

2.4.1 The above summary of the responses clearly reveals the conflicting views expressed by stakeholders both on the need for tariff regulation as well as on the methodology related issues. Consumers of DLCs prefer higher capacity utilization (as much as 80%) and low or nil redundancy, while suppliers prefer low capacity utilization (as low as 40%) and high redundancy. Section 4 explains the methodology adopted by the Authority in deriving the tariff ceilings taking in to account the various comments documented above and received from operators during open house discussions and meetings. In addition, certain other issues not related specifically to the cost calculations are addressed in Section 5.

Section 3. Review of Existing Tariffs and International Practices

3.1 Review of Existing Tariffs for DLCs

3.1.1 The Authority reviewed existing tariffs offered in the market by operators for various capacities and for various distances. Salient features of the existing tariff structure are given below:

- Leased circuit tariffs for high capacities i.e. E-1 and above are being provided at discounts of about 60 per cent of the ceiling tariffs. The discount policies of the incumbent operator and a few other providers of leased circuits show that large discounts on high capacities are primarily applicable to trunk routes / inter-city routes.
- Operators in general do not discount leased circuit tariffs for lower capacities i.e. below 2 Mbps. In one or two cases where discount rates are offered, these discounts are much lower than those applicable to high capacities (for details see Annexure A - Appendix 1).
- The Authority noted that the incumbent (BSNL) has offered 90% discount on the tariffs applicable for E-1 circuits to be used for providing connectivity for purposes of e-governance through State Wide Area Network (SWAN) projects. This offer of 90% discount on the present ceiling tariff of TRAI is on the main bandwidth portion for one 2 mbps link from State Capital to District Headquarters (DHQ) and DHQ to Block Headquarters (BHQ). The above offer is applicable only for e-governance projects undertaken by the State Governments and these are also subject to certain conditions like free right of way /and waiver of reinstatement charge, etc. for cable laying.
- The Authority also noted the various e-governance initiatives and broadband projects of State Governments in the country. One such project aims at accelerating the deployment of broadband to provide high quality, affordable and equitable broadband access and information devices and services for citizens, businesses and public institutions using the latest generation Hybrid Technology Solutions. Interestingly, the cost estimates for such network using the latest technology are a

fraction of the annual lease rental payable even at the discounted tariff of BSNL meant for e-governance projects.

3.1.2 These developments indicate that unless bandwidth is made available at prices that are cost-based, not only will the capacity set up with OFC media remain under-utilized but also the developmental initiatives of the Government in an emerging digital economy will be hindered.

3.2 *Review of International Practices Governing DLC Regulation*

3.2.1 The Authority reviewed international practices in the regulation of DLC segment. Recognized international experts with vast experience in studying regulations of various telecom jurisdictions relevant for DLC were consulted for details of the regulatory environment in respect of DLC in various countries (please see Annexure A - Appendix 2 for more details). The following major conclusions emerged from the above review:

- Regulation, including regulation of tariff exists in many countries, particularly for the dominant operator.
- In a number of countries where there is no official cap on price for DLC, the National Regulatory Authority reviews/approves the tariffs.
- The cost standard adopted for regulation of tariffs of DLC in general is that of Long Run Incremental Cost (either top-down or bottom-up).
- It is common practice for tariffs to be regulated until competition in the market has developed to a level where the regulator can safely withdraw and allow forces of competition to impose effective market discipline on prices. This appears to be the approach adopted by most overseas regulatory authorities prior to competition getting established in those markets.

Section 4. Methodology for Arriving at Tariffs

4.1 The methodology for determination of cost based tariffs for various capacities of DLCs is the ‘Bottom-Up’ approach, using costs of disaggregated network elements submitted by operators to derive annual rental value. This is similar to the methodology adopted by the Authority in TTO 1999 while fixing ceiling tariffs for DLCs. This methodology was also detailed in the consultation paper and except for minor variations, has largely been retained for the purpose of specifying the tariffs. The changes in the methodology and the corresponding rationale are discussed in this section.

4.2 The underlying cost base has been developed using an Optical Fibre Cable (OFC) system. This is a widely used system, and therefore its cost provides a rational justification for deriving the ceiling tariff. The data was collected from operators in September 2003.

4.3 The methodological differences from TTO 1999 are few, as mentioned above. The first is that since BSNL was the only operator when the analysis was conducted in 1999, its cost elements were the sole source of data considered. In this exercise, since a number of operators have entered the market, the data of private BSOs / UASLs, NLDOs and IP-II operators were also considered when calculating the tariff. The second difference is that capacity utilization and redundancy figures were also adjusted to reflect the current environment. The third difference is that while tariffs of higher bandwidth circuits above E-1 were set as simple linear multiples in TTO 1999, the Authority has decided to set cost-based tariffs for DS-3 and STM-1 circuits in this exercise. This decision is based on specific feedback received by the Authority during the consultation process to specify tariff ceilings for leased circuits of capacities above E-1. The Authority noted that higher capacities, particularly DS-3 and STM-1 would have significant demand in future, as they do already in matured markets internationally. This increased demand would capture the economies of scale and lower the cost in selling circuits of higher capacity. Finally, the last difference comes in the treatment of variable costs. It was considered in TTO 1999 that 50 km of every circuit would be considered as bituminous soil for costing the laying of cable, and the remainder of the circuit would be considered to be in soft soil. In the current exercise, instead of fixing a cap of 50 km for bituminous soil, the costing has been taken on a ratio of 15:85 for bituminous soil to soft soil. Furthermore, it has been assumed that there will be on average more than one system operating on each route laid by an operator, and

therefore the variable cost has been adjusted to capture this phenomenon. These changes to the treatment of variable cost are discussed in more detail below in Section 4.6.

4.4 In general, following the practice set in TTO 1999, a higher capacity system was used in calculating the cost of a circuit derived from that system. Therefore, to derive the cost of E-1 and 64 kbps circuits, an STM-1 system has been considered as the base. To derive the cost of STM-1 and DS-3 circuits, an STM-4 system has been taken as the base. The Authority in its cost calculations has considered the entire cost of setting up a new cable system and provided for the recovery of these costs. This analysis is equivalent to calculating full replacement cost of the system. The Authority has kept in view two considerations while proposing the revision of the ceiling tariff. One is that the revision of tariff should be cost based, and the other is that there should be a continued incentive for investment in this segment.

4.5 The Authority fully recognizes that in most mature markets, regulators fix prices based on Forward Looking Long Run Incremental Costs (FLLRIC). This would inter-alia involve estimation of costs based on most recent high capacity equipment and technology which in turn would imply major reduction in costs as compared to current cost based on equipment / technology presently in use. If however, this approach is used to fix the lease rental for DLCs in India, the market would be unable to bear the rapid adjustment that it would necessitate. It was, nonetheless, noted that the incumbent is already deploying the latest technology and using lower cost equipment in its expansion program. Therefore, while the Authority is emphasizing a reduction in prices towards costs, it is also emphasizing sustaining this process so that a transition to FLLRIC-based prices may take place overtime either through competition developing in the market or through usage of FLLRIC in setting new tariffs in case competition does not develop later. Relying mainly or fully on FLLRIC at present would give a much greater shock to the market, and is also likely to make transition to competition, especially in smaller capacities such as 64 kbps, much more difficult.

4.6 Key Cost Drivers

4.6.1 Four categories are considered for assessing costs: fixed, semi-variable, variable, and operating expenditure and maintenance. Fixed costs are those that are independent of

distance, semi-variable are those costs which change after a specified distance is covered (50 km. in this case) but remain unchanged within the distance interval, and variable cost items are directly linked to each kilometer covered. The costs that have been considered include cost of the equipment, cost of cable and laying the cable, cost on account of termination of cables, repeater stations, other supporting equipment, operating and maintenance (O&M) expenditure, etc. The various elements of costs considered for determination of tariff are given in Appendix 3 to this Annexure.

4.6.2 For calculating variable costs, it is relevant to note that for end-to-end connectivity, leased circuits have to pass through both the city / town area, which is predominantly bituminous soil area, and highways that are predominantly soft soil area. The cost of laying cables in these types of areas obviously differs on account of differential charges for right of way, labour cost, laying cost, etc. Therefore, a proportion of the two soil types has to be assigned when costing the complete leased circuit. In this regard, specific suggestions were sought from the service providers as to the proportion that could be considered for bituminous soil and soft soil. As discussed above, the practice followed in TTO 1999 was to assign 50 km in any circuit to be in bituminous soil and the remaining in soft soil. Based on submissions from industry, this allocation method was changed to using a ratio of 15:85 for bituminous and soft soil, respectively, and applied to the length of the circuit in deriving the cost based tariff.

4.6.3 Furthermore, variable costs have been traditionally allocated completely to one system on that route for which the variable expense was incurred. In actuality, since all operators have reported using cables that contain 18 fibers or more, operators are able to light multiple pairs of fiber in the same cable. On each pair, operators can run different systems, e.g., STM-1 on one pair while running STM-4 on another. This would therefore amortize the complete variable cost over more than one system. The Authority has considered that on many routes which are between major cities including state capitals, LDCAs, and other such major points, operators already have two or more pairs in use. As demand increases, this will also increase dramatically with fairly simple equipment and repeater commissioning. On the other hand, a number of routes still do exist where only one pair of fiber is lit, supporting only one system. The Authority has therefore taken a weighted average of 1.5 systems per cable and allocated variable cost across 1.5 systems. Furthermore, in many instances, operators lay more than one cable when creating a new

route, thereby amortizing the cost of digging and cable laying across more than one cable. This is prudent economically since the cost of the cable itself is a small proportion of the total variable cost per km. But today, those additional cables are typically lying idle and therefore are not considered in this calculation.

4.6.4 O&M cost, among other things, includes the following: facility maintenance and repair, fibre maintenance and repair, utilities, and labour. A network's physical infrastructure has a greater impact on O&M costs than does the capacity carried. Facility maintenance and repair, and fibre maintenance and repair cost are generally unaffected by operating higher capacity systems. Consequently, O&M costs per unit of capacity drops substantially as capacities increase. Technological advancements in the field of fault detection and repair have also resulted in lower cost of maintenance and repair. This item is taken as a percentage of total capital expenditure from all categories.

4.6.5 In addition to the four main cost components, there is a fifth component of additional cost which only applies to 64 kbps circuits. Since these circuits are created by stepping down an E-1 circuit, the cost is related to the equipment required for demultiplexing at both ends of the 64 kbps circuit.

4.7 Data Consistency and Verification

4.7.1 The bottom-up cost calculations of DLCs are based on the cost data provided by operators. Examination of this data shows significant variation across operators. One reason for the variation is that operators are at various stages of maturity and market penetration, and thus their network and operations have reached different levels in their product cycle. Choosing any one operator's costs as the basis for tariff calculations would therefore not be justified. Furthermore, since this cost was collected with the operators having full knowledge of the purpose for which the data would be used, they had very high incentive to inflate their submissions by accounting for costs of items that may also be allocated to other services and operations. An example of the large variance of data received from operators is indicated below in Table 4-1. The Equipment Cost category is an element in Fixed Costs, while Cost of Cable is a Variable Cost, taken on a per km basis. Considering the above, a normated model of cost has thus been considered.

Table 4-1 – Element Costs Submitted by Various Operators (Rs.)

Operator	Equipment Cost	Cost of Cable*
A	820,000	140,000
B	555,000	59,000
C	500,000	65,000
D	2,000,000	44,000
E	360,000	60,000
F	1,791,000	189,000
G	276,000	40,000

* This cost category is part of Variable Costs, but has been indicated here as submitted by the operators.

Note: Values above are rounded and are therefore not the exact submissions.

4.7.2 The goals of the normative process are to yield cost estimates that provide continued incentive to new entrants for achieving greater efficiency and cost reduction, while also ensuring the feasibility of deploying such a system in the market. This would also ensure that the dominant operator does not have the opportunity to skew the market in his favor. Additionally, decreasing cost due to achieving economies of scale also has to be considered.

4.7.3 It must also be borne in mind that the cost of inputs continues to decrease at a rapid pace. An international report on terrestrial networks has confirmed the impact of technical progress on the cost of inputs by stating: “Rapid technological advances have sharply reduced the unit cost (in terms of dollar per km.) of long-haul bandwidth. Indeed, the more recently built the network, the lower the unit costs tend to be.” (Primetrica, 2004: Terrestrial Networks).

4.7.4 To normalize the cost on inputs for all cost categories (fixed, semi-variable, variable and additional cost for 64 Kbps), the second lowest value for each individual cost item was used. In particular, fixed and semi-variable cost categories are also likely to see significant impact due to technological advances and achieving economies of scale. The process of normalizing costs and taking the second lowest operator had been followed in earlier exercises, i.e. the 22nd Amendment to TTO dated 4th July 2002. It is important for the Authority to balance the twin (and conflicting) objectives of creating incentives for investment (and efficiency) while promoting downstream competition. To have taken the lowest cost for each category at this stage would not have achieved the first objective of the

Authority. Likewise, choosing the third lowest cost would provide too much buffer and would be unlikely to promote efficiency in operations.

4.7.5 To further support the above reasoning, a recent submission by a State Government pursuing an e-governance project has indicated the costs for their network build-out. While not all categories were comparable, those that were are significantly cheaper than those submitted by operators for this exercise. One such example is the Cost of Laying Cable, which is more than 45% lower than the normated cost considered by the Authority for the current costing exercise. This indicates that newer more efficient operators can indeed achieve these cost levels.

4.7.6 For deciding the level of Operations and Maintenance (O&M) Expenditure that could be considered for purposes of deriving cost estimates, the Authority examined the cost data provided by the operators and noticed that it generally ranged from 1% to 10% of the capital expenditure. There was one outlier at 26%. In the past the Authority has assumed 10% as opex recovery in the Recommendations on Universal Service Obligation (USO), 3rd October 2001, costing framework. Therefore, O&M cost in this model has been applied at 10% of capital expenditure on equipment, cable, and all other capital outlays. This is the highest level amongst all operators (except for the one outlier), therefore allowing for comfortable recovery.

4.8 *Mechanism for Capital Expenditure Recovery*

4.8.1 Two factors have to be considered when calculating the required annual return to an operator, above and beyond the opex cost that have already been discussed: recovery of depreciation on assets, and return on capital employed (ROCE), which is also known as weighted average cost of capital (WACC).

4.8.2 Since cable and equipment are long-lived assets, there is a need to devise a mechanism for recovery of the capital expenditure (capex) over a period of time, besides providing for opex stemming from it, as discussed above. Towards this end, annual depreciation rates of 5.28% and 11.88% have been assumed for capex recovery of cable and equipment, respectively. This is derived from straight-line depreciation calculations on a cable life of 18 years and for other assets a life of 8 years. These values for life of cable

and equipment and other assets are the same as the values used in TTO 1999 for arriving at annual leased rental for domestic circuits. This percentage is applied to the total capital expenditure in each of the above discussed cost categories: fixed, semi-variable, variable, and additional costs for 64 kbps circuits. Suggestions by industry sources indicate that the depreciation periods for cable and equipment could be longer than considered above, thereby reducing the annual return required. However, in general the rates indicated above for depreciation could be taken as a reasonable basis for calculation.

4.8.3 The second part of capex recovery is setting a value for ROCE, which will be applied to the total capital expenditure amount, and is treated as the required annual return on the capital invested and employed. A WACC of 13.93% has been adopted for this exercise based on the data submitted by the operators. This is the same WACC as what was adopted by the Authority in other determinations, i.e. The Telecommunications Interconnection Usage Charges Regulation, 2003 dated 29th October, 2003.

4.9 Capacity Utilization and Redundancy

4.9.1 When pricing the individual circuits, i.e. 64 kbps, E-1, DS-3, STM-1, the capacity utilization of the parent system, i.e. STM-1 or STM-4, has to be considered along with provision of redundancy. Allowing for this is necessary since for full cost recovery the capital expenditure employed in building these networks and the related equipment has to be recovered across the capacity that is sold.

4.9.2 Based on the above, capacity utilization does not apply to the operational expenditure portion of expenses since opex is already derived based on the full capital expenditure amount. Similarly, since network redundancy is the provisioning of multiple links on different routes (route diversity) to avoid disruption of data and processes of end-user enterprises, the provision for redundancy applies only to the capital expenditure on items in variable costs category. Different factors were considered when calculating the capacity utilization and redundancy of the various individual circuit types for which tariffs are being fixed. However, to the extent that cable systems are installed with commercial considerations in view, there is a deliberate recognition amongst operators of its likely use over time.

4.9.3 In the 1999 tariff determination for leased circuits, the Authority had considered 80% capacity utilization based partially on the fact that the only provider of leased circuits was the incumbent. Since then, capacity build-out has taken place on account of entry of new classes of players i.e. infrastructure providers, NLDOs, BSO / UASLs and other new entrants. This means that utilization levels of capacity in general would now be less than 80%. In this regard, the Authority reviewed the various submissions of operators to the consultation paper. The Authority also considered the available data, *albeit* very limited, on the sales of various capacities and links. A substantial proportion of the capacities sold by operators is in the category of E-1 followed by capacities below E-1. The submissions of the industry to the consultation paper suggest that higher capacities i.e. DS-3, STM-1 and even STM-4 would be in great demand in the near future. However, as of now, the capacities sold in these higher categories are low. Available information / data with the Authority indicates that the capacity build up has been substantial in the recent past.

4.9.4 In fact, even though pricing has been calculated based on STM-1 and STM-4 systems, operators almost universally have deployed much higher capacity systems such as STM-64, Wave Division Multiplexing (WDM) and Dense Wave Division Multiplexing (DWDM). The cost of equipment to carry these higher capacities is proportionately less than for the equipment to carry STM-1 or STM-4 systems. Because of this, while each fiber pair laid can carry many times the capacity of an STM-1 or STM-4, the full cost of that fiber is being allocated only based on STM-1 or STM-4 systems for purposes of the cost calculation. Furthermore, capacity utilization when taken as a percentage of total capacity laid (but not lit) is significantly lower than those values adopted by the Authority for each type of circuit. This is related to the earlier discussion on distribution of variable costs. Since multiple fibers are included in each cable, the dark capacity presents a huge opportunity for operators to, with only marginal additional expenditure, introduce tremendous capacity, especially given the higher bandwidth systems that can be installed. Therefore, the current poor performance of operators in terms of lighting and selling more capacity to distribute the cost base is loaded on to the end customer. Though operators have already deployed fairly extensive systems of this sort with high capacity, high bandwidth prices will cause capacity utilization to remain low and laid fibers to remain dark.

4.9.5 Another source of variation in capacity utilization is the route of the particular system deployed by the operator. For instance, in the major trunk routes linking major

cities / towns and state capitals, the demand for capacities appears to be substantially more and thus the utilization levels of the capacities set up in these routes are also significantly higher. Other routes, though, still experience lower capacity utilization levels, but these routes typically also have installed lower capacity systems and most of the time do not have more than one operator. Therefore, this scenario had to be considered and a weighted average adopted when setting capacity utilization for the circuit types, especially the lower capacity ones.

4.9.6 Another point to note is that for each system, i.e. STM-1 and STM-4, that has been used to calculate the cost of derived circuits, i.e. 64 kbps, E-1, DS-3 and STM-1, the parent system has been assumed to be used only for a single circuit type. In essence this means that for calculating capacity utilization, an STM-4 system has been taken as being populated only by one type of circuit, i.e. DS-3 or STM-1. This is an underestimation of actual capacity utilization because operators typically sell multiple circuit types from the same system. Therefore, in actuality capacity utilization would be a statistical combination of the independent utilization levels derived by the Authority for each circuit type.

4.9.7 There was also considerable feedback during the consultation process about how to account for redundancy given the prevailing architecture of fiber systems. Typically, fiber is laid in a ring system and these are already widely in place. Since ring architecture provides for route diversity, it also serves the function of providing redundancy. These ring networks are used for all higher capacity systems such as E-1 and above. Thus, the presence of excess capacity itself provides for redundancy. Therefore, accounting for redundancy is best done by considering it with capacity utilization. For example, a capacity utilization of 50% would imply a redundancy of 100%. In actuality, due to gains from aggregating traffic from multiple customers and locations, the requirement to provide complete redundancy would be substantially less than 50% of total bandwidth, and capacity utilization could still be taken at more than 50%. With excess capacity being available, provisioning of redundancy in addition to such available capacity in the cost estimate would amount to double provisioning.

4.10 License Fee for DLC

4.10.1 In considering the license fee to load on to the cost base for calculating the tariffs for the various circuits, the Authority considered a number of different factors. The first of these factors is that while NLDOs pay 15% of their adjusted gross revenue (AGR) as license fee, they are the only type of operator who provides DLC services that pay license fees at that level. Of the remaining types of operators, IP-II operators pay 6% based on the recent change in policy resulting from recommendation by the Authority, and BSOs / UASLs pay a range of 6% - 10%, depending on which circle they operate in.

4.10.2 The second factor to consider is that when a DLC is provided, a combination of various operators is required to be involved in the process. Since NLDOs and IP-II operators are not allowed to directly provide bandwidth to an end-customer, a BSO / UASL must be involved in the provision of the circuit. Furthermore, when considering revenue allocation for a leased circuit by converged operators who possess both NLD and BSO / UASL licenses, the revenue allocation is significantly weighted more towards the BSO / UASL, thereby paying fees at the lower license level. The data available with the Authority supports this fact. Thus the main providers of leased circuit would have an applicable license fee which is less than 10%

4.10.3 Based on the weighted average of the various license fee levels discussed above and the data available with the Authority the average license fee estimates is less than 10%. The license fee for this exercise has been set to 10% for purposes of setting the tariffs of DLC. Using 15% or any other higher value would distort the market and allow operators return beyond what is required.

4.11 Cost Estimates for 64 Kbps and E-1 Circuits

4.11.1 As mentioned above, to arrive at the cost of E-1 and 64 kbps circuits, an STM-1 system was considered as the base. Cost components from all operators who submitted data were examined. Since there is significant variance in the data received, a normative process was adopted to determine the relevant data to use for the costing. Capex recovery requirements were derived based on industry standard and prior application by Authority in other costing exercises. The cost arrived at based on the inputs were then applied to arrive at the final normated raw cost per STM-1 system. This raw cost was then used for arriving

at both the final costs for E-1 and 64 kbps circuits by loading on capacity utilization, license fee, and the distance-based pricing structure.

4.11.2 Redundancy and Capacity Utilization for E-1 Circuits

4.11.2.1 The raw cost of setting up an STM-1 system, as calculated based on the above inputs, divided by a factor of 63 gives the raw cost estimates of an E-1 circuit. For capacity utilization and redundancy of E-1 circuits, the various factors discussed above in Section 4.9 were evaluated and are discussed in the following paragraph.

4.11.2.2 For capacity utilization, the Authority considered keeping the value the same as in TTO 1999, but a number of changes in the industry, which have been discussed above, justify a decrease. Not employing a decrease would have put the operators at a disadvantage vis-à-vis the current market scenario. The Authority used inputs from the industry and based on its judgment assigned capacity utilization values to the various factors affecting the final product. This included the different utilization levels on urban and trunk routes versus other routes, as well as the requirements for redundancy. Based on this, the capacity utilization was calculated to be 50%. This level is overall equivalent to allowing 100% redundancy for all links that are sold, leaving operators with more than enough margin in their networks and costs. In the present ring configuration, capacity levels deployed are much higher than the STM-1 that has been used for deriving the cost estimates. To that extent, a capacity utilization of 50% with STM-1 would amount to much smaller capacity utilization for a system with higher speed. This would itself mean that we would in fact have a redundancy level of much more than 100% in a system with higher speed.

4.11.3 Distance-Based Pricing for E-1 Circuits

4.11.3.1 For E-1 circuits, the tariff ceilings have been specified by the Authority for distances in the interval of 5 km starting with the first tariff at the 5 km mark. This format is consistent with the method adopted in TTO 1999, and continues to be applicable for E-1 circuits.

4.11.3.2 The accounting of costs when calculating distance-based pricing differs for the various cost categories. For Fixed Cost, the cost is applied on a per circuit basis regardless

of the length of that circuit. The Variable Cost is applied on a per kilometer basis, while the Semi-Variable Cost is applied only once every 50 km. Semi-Variable Cost is associated with the cost of the repeater, and therefore is only required to be incurred when crossing distance marks in multiples of 50 km.

4.11.3.3 The Authority noted that capacities serving key routes covering longer distances, typically > 500 km, are of very high capacities like WDM and DWDM, and thus to that extent the cost estimates calculated in this exercise on the basis of STM-1 systems (in respect to E-1 and 64 kbps circuits) would be higher than actual costs. It is further noted that these higher capacities are deployed in key trunk routes that are much intensively used. This implies substantially lower unit costs than those derived from an STM-1 system. Given the large reduction in unit costs for such high capacity equipments, cost based price for leased circuits for distances beyond 500 kms with this capacity are in fact lower than the cost based tariff for 500 kms using STM-1. Therefore, it would be appropriate to keep the fixation of ceiling tariff at 500 km and apply that to distances higher than 500 km. This again is consistent with the methodology adopted in TTO 1999.

4.11.4 Tariffs for E-1 Circuits

4.11.4.1 Below in Table 4-2 is a sample of the resulting ceiling tariffs for E-1 circuits and comparison to existing market rates at maximum available discounts.

Table 4-2 – E-1 Ceiling Tariffs per Annum for Select Distance Slabs and Comparison with Current Market Rates

Distance (km.)	Existing Ceiling Tariff (Rs.)	Existing Market Rate (Rs.)	Revised Ceiling Tariff (Rs.)	Reduction with Respect to Market Rate (%)
5	55,820	22,328	17,016	-23.79%
10	88,056	35,222	25,180	-28.51%
25	184,763	73,905	49,673	-32.79%
35	249,235	99,694	66,001	-33.80%
50	348,642	139,457	92,667	-33.55%
70	413,482	165,393	125,324	-24.23%
100	538,454	215,381	176,482	-18.06%
150	744,943	297,977	260,297	-12.65%
200	951,431	380,572	344,112	-9.58%
500	2,190,360	876,144	847,002	-3.33%
>500	2,200,000	880,000	850,000	-3.41%

4.11.4.2 The complete set of ceiling tariffs for E-1 circuits is available in Annexure 2 to Schedule IV.

4.11.5 Additional Costs for 64 Kbps Circuits

4.11.5.1 The raw cost of setting up an STM-1 system, as calculated based on the above inputs, divided by a factor of 63 gives the raw cost estimates of an E-1 circuit. This value further divided by 30 gives the raw cost of a 64 kbps circuit. Further to the costs derived from this calculation, 64 kbps circuits require usage of demultiplexers on both ends of an end-to-end 64 kbps link. This additional cost is considered as part of the Fixed Cost category since it is only applied once per circuit. Further, this cost is applied on a per E-1 basis, since this is how the 30 circuits are derived from the E-1.

4.11.6 Redundancy and Capacity Utilization for 64 Kbps Circuits

4.11.6.1 For capacity utilization and redundancy of 64 kbps circuits, similar factors were considered as for determining the capacity utilization for E-1 circuits, as discussed above in Section 4.11.2.

4.11.6.2 Feedback received from the operators suggest that capacity utilization to be assumed for deriving cost estimates in respect of 64 kbps needs to be lower than the fill factor in respect of higher capacities. For 64 kbps circuits there are two segments of the complete link, the back-haul and the radial portion. Since the back-haul is part of a larger system which is deployed in a ring network, the redundancy allowance is accounted for based on similar parameters as what was used in calculating the capacity utilization for E-1 circuits. While in the radial portion ring circuits are not deployed, operators are not providing redundancy via route diversity for all of their customers who take sub-E-1 circuits. When route diversity is employed, it is found to typically cover major areas with multiple customers. Keeping these factors in view, the Authority has set effective capacity utilization at 40%.

4.11.6.3 In comparison to the capacity utilization considered for E-1 circuits, this is equivalent to the excess capacity being 25% higher in the case of 64 kbps circuits. The excess capacity available would now be 150% of the capacity used.

4.11.7 Distance-Based Pricing for 64 Kbps Circuits

4.11.7.1 For capacities below E-1, the tariff ceilings have been specified by the Authority in the same format as for E-1 circuits, and is consistent with the method adopted in TTO 1999.

4.11.8 Tariffs for 64 Kbps Circuits

4.11.8.1 Below in Table 4-3 is a sample of the resulting ceiling tariffs for 64 kbps circuits and comparison to existing market rates at maximum available discounts.

Table 4-3 – 64 Kbps Ceiling Tariffs per Annum for Select Distance Slabs and Comparison with Current Market Rates

Distance (km.)	Existing Ceiling Tariff (Rs.)	Existing Market Rate (Rs.)	Revised Ceiling Tariff (Rs.)	Reduction with Respect to Market Rate (%)
5	24,558	24,558	10,207	-58.44%
10	25,632	25,632	10,533	-58.91%
25	28,856	28,856	11,511	-60.11%
35	31,005	31,005	12,163	-60.77%
50	34,319	34,319	13,214	-61.50%
70	36,480	36,480	14,519	-60.20%
100	40,646	40,646	16,548	-59.29%
150	47,529	47,529	19,881	-58.17%
200	54,412	54,412	23,215	-57.33%
500	95,710	95,710	43,217	-54.85%
>500	96,000	96,000	44,000	-54.17%

4.11.8.2 The complete set of ceiling tariffs for 64 kbps circuits is available in Annexure 1 of Schedule IV. The ceiling tariffs for capacities above 64 kbps are set in TTO 1999 based on the coefficient multiples recommended by the ITU (Recommendation D.8 of the International Telecommunications Union) for capacities of 128 kbps to 960 kbps. These multiples have been modified in the current Tariff Order to only give specifications for multiples at 128 kbps and 256 kbps where the bulk of demand is present. These multiples are 1.8 for 128 kbps and 3.1 for 256 kbps. For capacities higher than 256 Kbps and below 2 Mbps, the Authority is putting the tariffs under forbearance which implies that service providers are given the flexibility to decide the tariffs for these capacities. In this regard, the Authority is of the view that fixation of ceiling tariffs for each of the smaller capacities beyond 256 kbps and below E-1 would only lead to further rigidity in the system of tariffs

and does not serve a useful purpose. It is confirmed by data available with the Authority that the demand for capacities in this range is very insignificant. Just as the Authority is not fixing tariffs for capacities between E-1 and DS-3, so it also believes that based on similar justification those capacities between 256 kbps and E-1 do not need to be fixed.

4.12 Cost Estimates for DS-3 and STM-1 Circuits

4.12.1 To arrive at the cost of STM-1 and DS-3 circuits, an STM-4 system was considered as the base. Since there are economies of scale in offering services through higher capacities, the final tariffs for these capacities will be substantially lower than the technical coefficient. Performing a bottom-up cost-based exercise in similar fashion to what was done for E-1 circuits will yield an accurate result of the cost of provisioning these higher capacity circuits. Cost components for STM-4 systems from all operators who submitted data were examined. The Variable Cost components remain the same in both STM-4 and STM-1 systems since the same cable and cable laying can be used for either of those systems. There was a change in Fixed and Semi-Variable Costs because of the upgraded equipment that is required for the higher capacity STM-4 system.

4.12.2 Similar to the process for E-1 circuits, since there was significant variance in the data received, the same normative process was adopted to determine the relevant data to use for the costing. Furthermore, the same capex recovery requirements were derived. The cost arrived at based on the inputs were then applied to arrive at the final normated raw cost per STM-4 system. This raw cost was then used for arriving at both the final costs for STM-1 and DS-3 circuits by loading on capacity utilization, license fee, and the distance-based pricing structure.

4.12.3 Redundancy and Capacity Utilization for STM-1 Circuits

4.12.3.1 The raw cost of setting up an STM-4 system, as calculated based on the above inputs, divided by a factor of 4 gives the raw cost estimates of an STM-1 circuit. For capacity utilization and redundancy of STM-1 circuits, the various factors discussed above in Section 4.9 were considered.

4.12.3.2 The capacity utilization, was calculated based on different considerations given prevailing market behavior for STM-1 circuits. As mentioned above, there are a total of 4

STM-1 circuits that will fit in an STM-4 system. For an STM-1 taken on lease, in an STM-4 system, the capacity sold will by definition be in units of STM-1. In such a system, if just a single STM-1 system is leased, capacity utilization is 25 % or if two STM-1 circuits are leased, it will be 50%. Since these high capacity circuits are typically taken on major routes with relatively higher levels of overall demand, the appropriate capacity utilization to be considered would be well above 50%.

4.12.3.3 The Authority used the above considerations and inputs from the industry to apply weights to the various factors affecting the final product, as it had done for E-1 circuits. Based on this weighted average calculation, the Authority set capacity utilization at 40% in an STM-4 system for purposes of deriving cost estimates in respect of STM-1 circuits. This is likely to provide considerable buffer in the cost based ceiling tariff. Further, as discussed for E-1 pricing, each fiber pair laid can carry many times the capacity of even an STM-4 system, but for this exercise the full cost of that fiber is being allocated only based on STM-4 systems (as discussed in Section 4.6), therefore loading higher levels of cost on the end customer. Though operators have already deployed higher capacity systems, if prices remain high, capacity utilization will remain low and laid fibers will remain dark.

4.12.4 Distance-Based Pricing for STM-1 Circuits

4.12.4.1 For STM-1 circuits, the tariff ceilings have been specified by the Authority for distances in the interval of 5 km starting with the first tariff at the <50 km mark. As discussed before, the accounting of costs when calculating distance-based pricing differs for the various cost categories. For Fixed Cost, the cost is applied on a per circuit basis regardless of the length of that circuit. The Variable Cost is applied on a per kilometer basis, while the Semi-Variable Cost is applied only once every 50 km. This treatment of Semi-Variable Cost, which is associated with the cost of the repeater, is required to be incurred only when crossing distance marks in multiples of 50 km.

4.12.4.2 The basis for changing the lower distance pricing bands for STM-1 circuits is based on following factors. It is seen that higher capacities are usually taken for longer distances. Additionally, the higher Fixed Cost components of STM-4 systems make STM-1 links below 50 km less practical in terms of cost recovery. This also applies to the Semi-Variable cost category. Therefore, the first slab was fixed at below 50 km, to reflect

the distance slab prior to the first repeater. The intervals of 5 km thereafter remain as in E-1 circuits up through the final slab of beyond 500 km. The Authority noted that capacities serving key routes covering longer distances, typically > 500 km, are of very high capacities including WDM and DWDM, and thus to that extent the cost estimates calculated in this exercise on the basis of STM-4 systems (in respect to STM-1 and DS-3 circuits) would be higher than actual costs. Therefore, it would be appropriate to keep the fixation of ceiling tariff at 500 km and apply that to distances higher than 500 km.

4.12.5 Tariffs for STM-1 Circuits

4.12.5.1 Below in Table 4-4 is a sample of the resulting ceiling tariffs for STM-1 circuits and comparison to existing market rates at maximum available discounts.

Table 4-4 – STM-1 Ceiling Tariffs per Annum for Select Distance Slabs and Comparison with Current Market Rates

Distance (km.)	Existing Ceiling Tariff (Rs.)	Existing Market Rate (Rs.)	Revised Ceiling Tariff (Rs.)	Reduction with Respect to Market Rate (%)
<50	21,964,446	8,555,249	1,787,528	-79.10%
50	21,964,446	8,785,791	1,901,152	-78.36%
70	26,049,366	10,419,759	2,517,523	-75.84%
100	33,922,602	13,569,003	3,524,884	-74.02%
150	46,931,409	18,772,551	5,148,616	-72.57%
200	59,940,153	23,976,036	6,772,348	-71.75%
500	137,992,680	55,197,072	16,514,740	-70.08%
>500	138,600,000	55,440,000	16,520,000	-70.20%

4.12.5.2 The complete set of ceiling tariffs for STM-1 circuits is available in Annexure 4 of Schedule IV.

4.12.6 Redundancy and Capacity Utilization for DS-3 Circuits

4.12.6.1 The raw cost of setting up an STM-4 system, as calculated based on the above inputs, divided by a factor of 4 gives the raw cost estimates of an STM-1 circuit. Further dividing that raw cost by 3 (since there are 3 DS-3 circuits in an STM-1) yields the raw cost per DS-3 circuit based on an STM-4 system. For capacity utilization and redundancy of

DS-3 circuits, as before, the various factors discussed above in Section 4.9 were considered.

4.12.6.2 In an STM-4 system, if one DS-3 circuit is sold capacity utilization would be 33%. Further, if two DS-3 circuits are sold, the capacity utilization increases to 67%. As in each of the prior evaluations of capacity utilization, the Authority applied weights to the different factors discussed above based on its judgment and inputs from the industry. The Authority also has decided to provide a buffer in the cost and use a capacity utilization very close to that corresponding to using a single DS-3. Thus, the Authority has used capacity utilization of only 35%.

4.12.6.3 Again, as discussed for STM-1 pricing, each fiber pair laid can carry many times the capacity of even an STM-4 system, but for this exercise the full cost of that fiber is being allocated only based on STM-4 systems (as discussed in Section 4.6). In practice, the likely capacity utilization would be higher and the cost-based tariffs lower than that estimated by the Authority. However, the Authority is being conservative so as to avoid shock to the system.

4.12.7 Distance-Based Pricing for DS-3 Circuits

4.12.7.1 For DS-3 circuits, the distance-based factors used to set the tariff ceilings have been specified by the Authority in the same format as for STM-1 circuits. This is based on the fact that the tariffs for DS-3 circuits have also been derived from the same STM-4 system as used for STM-1 circuits.

4.12.8 Tariffs for DS-3 Circuits

4.12.8.1 Below in Table 4-5 is sample of the resulting ceiling tariffs for DS-3 circuits and comparison to existing market rates at maximum available discounts.

Table 4-5 – DS-3 Tariffs per Annum for Select Distance Slabs and Comparison with Current Market Rates

Distance (Km.)	Existing Ceiling Tariff (Rs.)	Existing Market Rate (Rs.)	Revised Ceiling Tariff (Rs.)	Reduction with Respect to Market Rate (%)
<50	7,129,374	2,851,749	666,798	-76.62%
50	7,321,482	2,928,597	709,301	-75.78%
70	8,683,122	3,473,253	939,050	-72.96%
100	11,307,534	4,523,001	1,314,690	-70.93%
150	15,643,803	6,257,517	1,920,080	-69.32%
200	19,980,051	7,992,012	2,525,470	-68.40%
500	45,997,560	18,399,024	6,157,807	-66.53%
>500	46,200,000	18,480,000	6,159,000	-66.67%

4.12.8.2 The complete set of ceiling tariffs for DS-3 circuits is available in Annexure 3 of Schedule IV of this Order.

4.12.9 It is noteworthy to mention that the resulting ratio of tariffs for E-1:DS-3:STM-1 circuits for the distance segment >500 km is 1.0:7.2:19.4. When the Authority set tariffs for International Private Leased Circuits (IPLC), the price multiples for these capacities was derived to be 1:8:23, whereas the cost-based process discussed in this section for DLCs has yielded a lower ratio in addition to a lower base tariff for E-1 circuits.

4.12.10 Another point noted by the Authority was that based on the data submitted by operators, revenue from providing DLCs is a very small portion of their total revenue realized. Further, it is relevant to note that cost data that has been used in the setting of tariffs in the present exercise had been collected in the year 2003 and since then there has been significant reduction in the cost of providing services, this also contributes to the buffer contained in the revised ceiling tariffs.

4.13 Tariff for Intermediate Distances

4.13.1 The tariff ceilings are provided in the ready reckoner annexed to Schedule-IV for distances in the interval of 5 km. For distances lying in between distances specified in the ready reckoner, the tariff shall be charged on pro-rata basis, taking for this purpose the tariff ceilings for the two distances of the ready reckoner between which the relevant distance

lies. Multiplying the radial distance by a factor not exceeding 1.25 shall be used to arrive at the chargeable distance for purposes of leased circuits pricing. This is consistent with the formula that already exists in TTO 1999, and stakeholders were of the view that there was no reason to change it.

4.14 *Mandatory Provision of Leased Circuits*

4.14.1 The Authority has specified that leased circuits must be provided wherever capacity is available, and when such capacity is not available then on Rent and Guarantee Basis / Special Construction / Contribution Basis.

4.15 *Charging for Local Leads*

4.15.1 The majority of service providers are of the view that the local lead is the circuit between subscriber premises to nearest SDCC (Short Distance Charging Centre). The Authority after considering various views has decided that the leased circuit between the subscriber's premises to the nearest SDCC is a Local Lead. Similar to the specification for the charging for leased circuits, the Authority has specified that for local lead tariffs, the first option for charging for local leads should be to provide them on lease as per ready reckoner. If this is not possible, then tariffs could be either on Rent and Guarantee terms / Special Construction / Contribution Basis i.e. on the basis of mutual agreement between the parties concerned about the extent of contribution to costs that will be made by the party leasing the circuits.

4.15.2 User industries including service providers have pointed out that the commercial conditions governing Rent and Guarantee (R&G) schemes, special construction and contribution schemes resorted to by the leased circuit providers turn out to be onerous and the basis for conditions in these schemes lack transparency and any firm economic criteria. As a result of which, the users end-up paying higher charges including locking-in of the customers for a longer duration. Therefore, Authority is of the view that the conditions governing these contracts need to be fair, just, reasonable and transparent. The Authority has specified that when capacity is sought to be provided under these schemes, the terms should be invariably based upon costs. Further, the Authority has specified that the providers of leased circuit shall submit to the Authority the commercial and economic basis

of various terms and conditions of the above-mentioned schemes including but not limited to the cost of capital, life of assets used, depreciation norms adopted with respect to their agreement with the customers as part of the reporting requirement envisaged under the TTO 1999. The reporting requirement requires the service providers to report their tariff to the Authority within seven days of implementation. Besides, the leased circuit service providers shall also make these terms and conditions known to the customers in a transparent manner.

4.16 Tariffs for E1/R2 Links for ISPs

4.16.1 Tariffs for E1/R2 ports for ISPs remain unchanged and incorporated as clause 5 of this Order. However, applicable tariffs for leased line / local leads / end-links shall be as per the revised rates notified in this order.

4.16.2 As regards port charges, these have been specified in the Telecommunication Interconnection (Port Charges) Regulation, 2001 dated 28th December 2001. These port charges are relevant in case of E1/R2 links also, as the same direct costs are involved in this situation. The charges for end links are the same as those for leased circuit as applicable in terms of capacity and distance. The overall charge will be a combination of these different components as applicable.

4.17 Application of Tariffs Specified in Schedule IV

4.17.1 The ceiling tariffs specified by the Authority will replace the existing ceiling tariffs from the date of implementation, which is 1st May, 2005. Pro rata corrections wherever applicable, must be made to any advance payments that might have been made for leased circuits on the basis of the prevailing tariffs.

Section 5. Further Examination of Outstanding Issues

5.1 The Authority has noted the point of view of the incumbent operator that their existing discount of 60% etc. offered on leased line tariff cannot be a trigger for TRAI to reduce leased line tariff because discounts are given due to competitive pressures of the market. While not disagreeing with the phenomenon of competitive decline in leased circuit prices, the Authority found evidence in data that suggested substantial cost declines in various elements including optical fiber cable. In fact, the discounts on lease line tariff that exist today could be more so attributed to the decline in the cost of various elements including the optical fiber cable resulting from technological progress rather than competition. This is not only evident from the data submitted by the operators to the Authority but has also been declared by a major operator in their tariff circular announcing tariff reduction for leased circuits. Further the benefits of technology led cost declines ought to be available across the board by regulatory intervention if competition (or the lack thereof) does not provide for the decline.

5.2 One concern that was raised during the consultation process related to activation / increase of grey market operations in long distance calls following a reduction in leased circuit prices. It was pointed out that the average revenue from a 64 kbps circuit is around Rs. 3.5 lakhs per annum if the circuit is used for domestic long distance calls. Further, reduction in annual lease rental for 64 kbps will provide an arbitrage opportunity encouraging gray market operation. The Authority examined this point and does not find it to be valid. The Authority has already held vide its Directive No.1-2/2000-CN 11 September 2001 that apprehension of illegal usage is not a rational ground to deprive benefits / facilities to bona fide users. Further, increasing the leased circuit tariffs to address the grey market would not be an appropriate pricing instrument keeping in view the objectives of promoting competition and reduced tariffs. In this context, the Authority has already held that “there are enforcement mechanisms to prevent such a misuse.”

5.3 Since the Authority has based its ceiling tariffs of E-1 on STM-1 system, it has therefore provided some buffer because operators are using higher capacity. Separately the Authority has verified the cost estimates using STM-4, STM-16 and a weighted average of STM-1, 4 and 16 systems and has found that the cost based tariffs derived from higher

benchmark capacities would be much lower than the current one that is specified using STM-1 as the benchmark capacity.

5.4 One of the issues raised in the Consultation Paper relates to fixation of ceiling tariff in respect of capacities between E-1 and DS-3 circuits, and between DS-3 and STM-1 circuits. Generally, stakeholders were of the view that such fixation of ceiling tariffs at every point between two definite capacities would lead to anomalies and complexities may arise in billing the customers. This argument is further strengthened by the fact that bandwidth is usually purchased in definite capacities like E-1, DS-3, STM-1, etc. The Authority has therefore not fixed tariffs for capacities in between E-1 and DS-3, and DS-3 and STM-1.

5.5 Another issue raised in the Consultation Paper is with respect to specification of ceiling tariff on a ‘per kilometer’ basis for the first 5 km and in slabs of 5 km thereafter. It is seen that the incumbent operator already has per kilometer range of tariffs for local circuits below 5 km in respect of lower capacities like 64 kbps. Further, responses received from some of the service providers indicate that the cost of connectivity on shorter distances is high. Keeping these in view and taking into account the fact that the Authority is fixing a ceiling tariff which is applicable for distances even beyond 500 km it is not considered necessary to introduce a regime in which per kilometer tariff is available for the first 5 km.

5.6 Measures to Promote Competition

5.6.1 The long-term goals of the Authority are to establish effective competition in the sector such that regulation of tariffs is not required. Until such a market scenario prevails, cost-based tariff pricing is required. As stated in the consultation paper, the DLC market has witnessed an increase in the number of players but competition is still not effective in the majority of cases. This is mainly on account of the fact that new entrants have not matched the incumbent in rolling out networks both in terms of quantum and in terms of reach. Further, new entrants perceive a significant risk in building out new high capacity networks since the capacity is bought over time and capital recovery is dependent on how quickly utilization levels can be increased. Thus the choice of service providers to the consumers is limited. This coupled with the absence of interconnect regulations for leased lines results in end-users to rely solely on what is offered by the operators nearest to his

premises. The Authority intends to release consultation papers on measures that could be taken so that competition in this space is further promoted. These measures include:

- Inter-connect of operators for provisioning of multi-operator leased circuits
- Introduction of reselling of bandwidth
- Introduction of wholesale and retail pricing

5.7 *Promoting Growth of Rural Networks*

5.7.1 The Authority recognizes that without focus on rural areas, sizeable growth in the telecom sector would not be possible. One of the major initiatives of the Authority and that of the government is to drive growth of telecom infrastructure in rural areas considering the fact that this infrastructure has a multiplier effect on economic and social activities. It has been discussed in the context of both the broadband initiatives and the Authority's Consultation Paper on "Growth in Telecom Services in Rural India" that significant potential for industry growth and the attendant economic growth exist in this market.

5.7.2 Universal Service Objectives (USO) have been sought to be achieved through a combination of initiatives that include Government funding, Access Deficit Charge, roll-out obligation, tariff policy, direct USO subsidy, etc. The Authority has also come across initiatives of the State Governments seeking to provide broadband connectivity for rural development as part of their e-Governance plans. Needless to say, the availability of broadband services and Internet connectivity has to be at affordable prices levels. In these endeavors it is seen that modern technologies providing high-speed networks using fiber and wireless are sought to be used. A number of other private initiatives by corporations and other voluntary agencies all-aiming to take ICT (Information Communication Technology) services to rural areas have also been noticed. All these point to the need for making available the services of leased circuit in areas beyond the commercially attractive zones of availability.

5.7.3 In this context, it is relevant to quote the statement of the Authority in the consultation paper on "Growth in Telecom Services in Rural India" dated 27.10.2004:

"We are in a fortunate situation where the optic fibre structure has already been extended to the extent that on an average optic fibre termination is available in 4-5 locations in each Block. This implies that we can reach within 15 to 20 kms. of most

villages with large bandwidth through lighting up of dark fibres which would, in turn, imply that the total investment needed for achieving this objective could be one-fourth to one-fifth of that needed in case we had to lay the entire optic fibre backhaul infrastructure. And in this regard, India is in a far more advanced and fortunate situation than most of the similarly placed countries. One approach could be that capital funding required and the maintenance effort needed for creating this bandwidth from district headquarters down to all such locations in a Block could be provided from the USO Fund.”

5.7.4 The Authority examined whether an incentive mechanism could be built in the pricing policy for DLC, so that DLC with rural links could get the benefit of an in-built subsidy. Analysis of the extent of competition in non-rural areas indicates that a cross-subsidy mechanism in the pricing policy would not be appropriate. Therefore, an alternative mechanism needs to be evolved in the matter of providing affordable bandwidth services to areas that are considered uneconomical by service providers and that mechanism has to be outside the tariff policy regime. USO is said to arise from requirements imposed as a result of inter-alia regulation for providing telecommunication services as may be specified in geographic areas / locations that can only be met under cost conditions that fall outside normal commercial standards. Taking all these factors into account, the Authority would consider making Recommendations to Government on the issues of providing direct support from USO fund to bandwidth providers in rural / remote areas. Needless to say, the extent of such support would depend upon the price at which bandwidth services are to be made available to consumers in such areas as against the ceiling tariff specified in this Order. These and other related issues for operationalising the scheme would form part of Recommendations of the Authority to the Government.

5.8 Review of the Tariffs

5.8.1 The Authority is of the view that the reduction effected in the tariff for DLC would give rise to a very strong demand for them, resulting in a surge in revenues from leased circuits and in a strong impetus for related economic activity in addition to providing increased capacity utilization. This viewpoint was strongly endorsed by several commentators. The increase in capacity utilization of laid down circuits will increase the revenues of operators leading to higher profits / reduced losses, as was seen in mobile telephony during the last 2 – 3 years. The Authority will revisit this ceiling tariff after a

year based on prevailing market trends and data prevailing at that time. Furthermore, if license fees imposed by the Government are decreased in the interim period, as recommended by the Authority, tariffs would be adjusted accordingly.

Annexure A - Appendix 1.

Current Annual Tariff of Domestic Leased Line

Current Annual Tariff of Domestic Leased Line

(As at the end of December 2004)

Rs. in Lakhs

Operator	Capacity (For distance >500kms)			
	64Kbps	2Mbps	DS3	STM1
Existing Ceiling tariff	0.96	22	462*	1386*
BSNL	0.96	8.8	185	554
MTNL	0.96	8.8	185	554
VSNL	0.48	11	231	693
Reliance Infocomm Ltd.	0.96	8.8	185	554
Bharti Infotel Ltd.	0.77	12.8	248	617
Tata Teleservices Ltd.	0.96	13.2	254	624
HFCL	0.86	17.6	370	1109
Shyam Telelink Ltd.	0.96	22	-	-
Power Grid Corpn. of India Ltd.	0.96	7.7	162	416
RailTel Corpn. of India Ltd.	0.96	13.2	231	624
GAIL(India) Ltd.	0.58	9.9	139	416

* 'N' times the ceiling tariff of E1

Source: Tariff reports of service providers

Annexure A - Appendix 2.

International Regulatory Practice

Country Overview of Regulation of Domestic Leased Circuit Market

Internationally, the regulatory and competitive environment for Domestic Leased Circuit products is as follows:

Country	Regulation	Cost Standard
Australia	<p>ACCC currently applies a cost orientation requirement on the sale of local access leased lines.</p> <p>National and International leased lines were under a CPI-X% price cap control between 1992 and 2001.</p>	Bottom Up (BU) - Long Run Incremental Cost (LRIC)
China	All leased line rates set by the Government.	
France	<p>The ART considers France Telecom to have SMP in the domestic leased line market. The following obligations currently apply:</p> <ul style="list-style-type: none"> • Publish technical characteristics and tariffs for an interconnection offer - France Telecom must offer part leased lines (PPCs) in addition to wholesale DPLCs. • Cost orientation (LRIC) • Comply with interconnection requests. • Obligation to ensure access to network. • Align access provision with costs - cost orientation. • Price control - FT must publish tariffs, must seek approval from the ART to change tariffs, and customised pricing offers must be on a non discriminatory basis. 	Top Down (TD) - LRIC

Country	Regulation	Cost Standard
Ireland	<p>For DPLC ComReg is currently conducting a consultation exercise on both the wholesale market and Retail market for leased lines.</p> <p>ComReg is likely to find that Eircom has SMP in both markets, and has proposed the following remedies:</p> <p>Wholesale</p> <ul style="list-style-type: none"> • Access to and use of specific network facilities - the provision of Wholesale leased lines and access to Eircom's network facilities for interconnection with PPCs. • Non discrimination. • Price control and cost accounting - PPCs to be subject to LRIC at CCA prices, Wholesale leased lines to be provided at Retail-8%. • Accounting separation. <p>Retail leased lines <2Mbps</p> <ul style="list-style-type: none"> • Non discrimination • Cost orientation - Fully Distributed Historic Costs • Cost accounting - Accounting Separation • Transparency <p>ComReg believes that this market is competitive and proposes to remove all regulation in this market.</p>	<p>Top Down LRIC for PPCs.</p> <p>Retail - 8% for wholesale leased lines.</p> <p>FAC for Retail LL <2Mbps.</p>
Japan	<p>Japan defines operators as Type I or Type II. Type I operators were subject to price ceilings, and any tariff changes needed to be approved by the regulator before implementation.</p> <p>All regulations were abolished in April 2004 as the regulator determined that the market for DPLCs was now competitive.</p>	

Country	Regulation	Cost Standard
Malaysia	<p>The Malaysian Communications and Multimedia Commission published a report on 8th December 2004 entitled "A report on a Public Inquiry: Assessment of Dominance in Communications market"</p> <ul style="list-style-type: none"> • This considered the market for leased lines and concluded that competition in the provision of leased line services may not be as effective as it might and that Telecom Malaysia faced few constraints in the provision of leased line services over a number of routes, and that it is likely to enjoy a number of competitive advantages over other providers of leased line services. • The characteristics of competition in the provision of leased lines services vary on a route-by-route basis. <p>The Commission therefore has decided that competition needs to be assessed on a case-by-case basis, taking into consideration the specific characteristics of the given leased line route, and propose to conduct a review.</p> <p>The Commission is also reviewing the cost model for Access and Retail services and will undertake a costing study on leased lines.</p>	

Country	Regulation	Cost Standard
Singapore	<p>The Info-communications Development Authority (IDA) conducted a consultation exercise in 2003 and as a result published a paper on 16 December 2003 entitled "Designation of Singapore Telecommunication Limited's Local Leased Circuits as a Mandated Wholesale Service"</p> <p>The IDA concluded that competition did not exist in the Wholesale and Retail markets for Local Leased Lines and decided to intervene.</p> <p>The IDA defined two markets - a retail market and a wholesale market and concluded that SingTel was dominant in both markets.</p> <p>The IDA considered that facilities based competition was the best method of achieving its objectives of ensuring sustainable and effective competition.</p> <p>The IDA therefore determined that LLC tail circuits (ie PPCs) should be made available for interconnection purposes, and should be cost based.</p> <p>As an interim measure it proposed that SingTel should provide wholesale circuits at Retail-30%, or Retail-50% if only a tail circuit was requested.</p>	
South Korea	<p>The MIC has typically encouraged facilities based competition.</p> <p>In the Domestic Leased line market, KT and Dacom (originally part of KT) dominated until 1994 but since the entry of Thrunet in 1996 there has been significant market entry, there are now 12 license holders.</p> <p>Facilities based providers have interconnection requirements placed upon them - originally calculated at historic FAC, there was a move towards LRIC in 2003.</p>	FAC, LRIC for interconnection requirements

Country	Regulation	Cost Standard
UK	<p>Ofcom published a market review into leased lines in July 2004 entitled "Review of the retail leased lines, symmetric broadband origination and wholesale trunk segments markets"</p> <p>In this market review Ofcom made the following decisions:</p> <p>Retail low bandwidth <8Mbps - circuits are subject to the following regulations:</p> <ul style="list-style-type: none"> • Obligation to supply on reasonable request the minimum set of retail leased lines; • Requirement not to unduly discriminate; • Cost orientation and a cost accounting system to take effect only if BT breaches its voluntary undertaking not to raise the combined prices of a basket or these services by more than RPI before June 2006 • Requirement to publish a reference offer (obligation to publish current prices, terms and conditions; and same day price notification); and • Requirement to publish information concerning delivery and repair times. <p>Retail High bandwidth >8Mbps - not regulated</p> <p>Wholesale all bandwidths - are subject to the following regulations:</p> <ul style="list-style-type: none"> • A general obligation to provide access on reasonable request; • Requirement not to unduly discriminate; • Basis of charges obligations (cost orientation and a cost accounting system); • Price control (not for trunk market); • Accounting separation obligations; • Requirement to publish a reference offer; • Obligations to give notice of changes to prices, terms and conditions. • Obligations relating to requests for new network access. 	Top down LRIC + mark up for common costs.

Country	Regulation	Cost Standard
UK (cont'd)	<ul style="list-style-type: none"> • A direction under the general access condition to provide Partial Private Circuits (PPCs) at a range of bandwidths, Radio Base Station (RBS) backhaul link products, and Local Loop Unbundling (LLU) backhaul products, subject to specific terms and conditions; • A direction under the cost orientation condition covering pricing matters relating to PPCs and LLU backhaul; and • A direction under the quality of service condition to require specific information in respect of PPCs. 	
USA	<ul style="list-style-type: none"> • There are broadly two types of carrier - local carriers like Verizon and BellSouth who typically provide private lines within their network footprints and long distance carriers like AT&T, and Sprint who provide long distance and international services. • Each State sets its own regulation; some States have deregulated local private circuits, which allows carriers and customers to negotiate prices. In other States private circuits are only deregulated in Metropolitan areas. • Capacities of T1 (1544 Kbps) and above are considered competitive and wholesale customers negotiate their own contracts for prices. • T1s primarily used for data traffic are considered non-regulated at wholesale levels as well. • T1s largely used for voice traffic were required to be unbundled by the ILECs - though this is currently being contested in the courts. 	Bottom up TELRIC CCA (Total Element LRIC as opposed to Total Service LRIC).

Source: *ERNST & YOUNG*

Annexure A - Appendix 3.

Cost Elements

Fixed Cost Category

- a) Equipment cost: Two terminals required, one at each end equipped with the tributary cards up to E1 (2Mbps) level
- b) 30 channel demultiplexer along with channel cards of 64 kbps level (for both ends)
- c) Line control terminal
- d) Network manager
- e) Digital Distribution Frame
- f) Power plant
- g) Battery
- h) Engine alternator
- i) Electrical items
- j) Test instruments
- k) Earthing
- l) Accommodation, electricity and air conditioning
- m) Installation and commissioning charge including project management cost
- n) Others not anywhere specified

Semi-Variable Cost Category

- a) Repeater station inclusive of all equipment/accessories: Separation of repeater stations in kms (average) 50

Variable Cost Category

- 1. Various cost elements in cabling
 - a) OFC Cable
 - b) Cost of trenching (Brick bedding, back filling, cable pulling in ducts etc.) Trench 0.4 m x 1.6 m
 - c) Supply and laying of HDPE subduct : 50mm one way with all necessary fittings
 - d) Charges for supply of installation jointing box and materials, testing equipment, splicing machine charges etc.

- e) Charges for project management and coordination charges paid to statutory agencies including Right of Way (ROW) charges
 - f) Others not anywhere specified
2. Extra cost on account of each termination of 24 fibre cables
- a) Termination of 24 fibres inclusive of termination box
 - b) Supply of 24 pig tails/24 patch tails
 - c) Supply of installation of fibre distribution frame for 24 fibres