

**THE CHANGING INTERNATIONAL TELECOMMUNICATIONS
ENVIRONMENT**

INDIA

CASE STUDY PREPARED BY PHILLIPS TARIFICA LTD FOR THE ITU

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AUTHOR'S NOTE

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Notes to the Report:

All the yearly figures (such as revenues and traffic volumes) refer to the years ending 31 March.

Where applicable consistent exchange rates have been used throughout the report as follows:

US\$1 = Rs.31.60,

US\$1 = SDR0.75,

SDR1 = GFC3.061

¹ This version of the reported has been edited for the purposes of the case study project. For a copy of the full report, please contact Jahangir Raina at consult@tarifica.com.

CHAPTER 1: GENERAL ECONOMIC SITUATION IN INDIA

1.1 A Brief Review of the Macro-Economic Status of India

Currency	Indian Rupee
Exchange Rate	US \$1 = Rs.31.60
GDP Growth	6.6%
Income per capita	US\$368 est.
Exports	US\$32 billion (95-96)
Imports	US\$41 billion (95-96)

India has a mixed economy with both a large public sector and extensive regulation of the private sector. Whilst in the past, Indian central and state governments have imposed severe restrictions on the capacity of private sector enterprises to expand, the last decade has seen a significant trend in policies to liberalise the economy. The recent announcement of the budget for the financial year ending 31 March 1998 continues the Government's policy of economic liberalisation and incorporates significant reductions in personal and corporate income taxes.

The Indian export market has increased significantly in diversity in the last few years, with manufactured goods constituting an increased portion of the total. At the end of the financial year March 1996, gems, textiles and ready-made garments accounted for more than 52 per cent of total manufactured exports. In the financial year ending March 1991, exports were equivalent to 6.2 per cent of GDP. In 1996 the figure had risen to 9.6 per cent of GDP.

At the end of the 1996 financial year, petroleum and petroleum products constituted the single largest import, 20.8 per cent of the total value.

In the last few years, there has been a huge increase in foreign direct foreign investment in India, amounting to US\$4.47 billion at the end of March 1996. During the same period, foreign portfolio institutional investment stood at US\$2.02 billion, the highest ever cumulative net investment by foreign portfolio institutional investors.

As a result of increased capital inflows over the past four years, there has been a substantial increase in foreign exchange reserves.

1.2 Value of Net Settlement Payments to the Indian Economy

India's foreign exchange reserves stood at US \$ 26 billion as of end of August 1997. Net settlement payments accounted for 2.3% of the foreign exchange reserves in 1996 up from just 1% in 1994 (see Tables 1.1 and 1.2). Some part of the foreign exchange earned through settlement rates may be needed to import telecommunications equipment. However, as can be observed from the Table 1.3, imports constitute only a small portion of total communication equipment requirement of the country. Table 1.3 below gives the production, import, and export figures for telecommunications equipment.

Table 1.1: The foreign exchange position of India (US \$ million)

	1991	1992	1993	1994	1995	1996
Exports	18'477	18'266	18'869	22'683	26'857	32'467
Imports	27'915	21'064	23'237	25'069	31'840	41'412
Current Account Balance	(9'680)	(2'798)	(4'368)	(2'386)	(4'983)	(8'945)
Foreign Direct Investment		150	341	586	1'314	2'133
Foreign Portfolio Investment		8	92	3'649	3'581	2'214
Reserves	2'236	5'631	6'434	15'068	20'809	17'044

Source: Economic Survey, 1996-97

Table 1.2: Net settlement payments as a percentage of foreign exchange

<i>US \$ million</i>	1994	1995	1996
Foreign exchange reserves	15'068	20'809	17'044
Foreign exchange earned from net settlement payments	149	267	389
Proportion of foreign exchange generated by net settlement payments	1%	1.3%	2.3%

Source: Case Study, Economic Survey, 1996-97

Table 1.3: Production, import and export figures for telecommunications equipment, 1981-1994

In US\$ million

	<i>Production</i>	<i>Imports</i>	<i>Export</i>
1981	48	19	1
1985	111	51	n.a.
1990	471	16	6
1991	580	15	4
1992	765	48	5
1993	968	60	11
1994	1090	73	14

Source: CMIE, Infrastructure in India, August 1995 (page 143).

2: TELECOMMUNICATION POLICY AND NETWORK DEVELOPMENT

2.1 Telecommunications Market Information

Telecommunications in India were, until recently, regulated by the Ministry of Communications. Since India's independence in 1947, the Department of Telecoms (DoT) held a monopoly on all domestic telephone services, except in the cities of Bombay and Delhi where another carrier, Mahanagar Telephone Nigam Limited (MTNL) has a monopoly. Videsh Sanchar Nigam Limited (VSNL) has monopoly in the international calls market (Table 2.1).

Table 2.1: Fixed Network Operators

<i>Operator</i>	<i>Service</i>
Department of Telecommunications (DoT)	Domestic
Mahanagar Telephone Nigam Limited (MTNL)	Bombay and Delhi
Videsh Sanchar Nigam Limited (VSNL)	International

Source: Case Study.

In 1994 the Government of India put in place a liberalization and license-bidding process to end DoT's country-wide monopoly on basic telephone and cellular services. As a result of this India was divided into 21 "Telecom Circles". Each circle is categorized as either "A", "B" or "C" according to its importance, with each corresponding approximately to a particular state. Category A includes the heaviest volume areas such as Delhi, Uttar Pradesh, Maharashtra, Gujarat, Andhra, Karnataka and Tamil Nadu.

In 1994 the Government of India announced plans for private sector entry into basic telecoms services as part of a new national telecommunications policy to improve infrastructure. So far DoT has selected 12 successful bidders for licences out of the 21 circles. Foreign ownership of each new licence is restricted to a maximum of 49 per cent, and each licence carries with it commitments for the end of the second and third year of operation. The 12 successful bidders have committed to provide an aggregate of 3.9 million new lines by the end of the third year following the issue of the licence.

All new licence holders will have access to VSNL's international network through DoT only.

All telecommunications companies operating in India are subject to extensive regulation and supervision by the Ministry of Communications through the Telecom Commission and the Department of Telecommunications. The Government department's act on the provisions laid down in the Indian Telegraph Act of 1885 sets the legal framework for regulation of the telecommunications sector.

Any company in which India retains a 51 per cent share, is deemed to be an Indian Government Company and is subject to laws and regulations applicable to public sector enterprises in India. These laws and regulations include personnel matters such as the appointment of key management personnel and the hiring, dismissal and compensation of employees, in addition to budgeting and capital expenditures.

In January 1997 the Government established the Telecom Regulatory Authority of India TRAI, an autonomous body with quasi-judicial powers to regulate telecommunications services in India. The primary responsibility of TRAI is to regulate revenue sharing and settle differences, between telecommunications service providers. Any differences arising between public sector entities such as DoT and VSNL must however be referred to a Committee of Secretaries of the Government for mediation before any legal action may commence. In the event of non-resolution of a dispute, it is likely that a public body would need to seek approval from the government controlled Board of Directors before a claim may be brought before the courts.

In February 1997 India made commitments under the WTO basic telecommunications agreement. As part of this agreement the Government of India has reaffirmed its commitment to further liberalise the Indian Telecommunications sector through the licensing of new local fixed line and cellular service providers. The Government of India has also agreed to review the possibility of allowing competition in the area of domestic long-distance telephone services in 1999 and international telephone services in 2004

In line with the WTO agreement, moves have been made by the government to open the Indian economy to foreign investment. The government has introduced tax concessions for the telecom sector and flexibility on external commercial borrowings. The securities market has also been opened up to foreign institutional investment.

Treating the telecommunications market as “infrastructure” has meant that the industry has become eligible to fiscal benefits such as concessional import duties and tax exemptions. The DoT and other financial institutions have also finalised agreements that will facilitate funding of cellular and basic telecom projects by allowing the value of the license to be used as collateral.

2.2 Brief Description of the Telecommunication Network in India

2.2.1 Fixed Network

India’s fixed line network has a direct exchange line capacity of 14.53 million with a present teledensity rate of 1.3 per cent. The growth in Indian domestic telecommunications network is shown in Table 2.2. The number of lines in service have grown at a compound annual rate of almost 20% since 1992. However despite this growth the waiting list has remained high.

Table 2.2: Network development, 1992-96

<i>Indicator</i>	<i>1992</i>	<i>1993</i>	<i>1994</i>	<i>1995</i>	<i>1996</i>
Telephones in service (thousands)	6'706	7'713	8'877	10'588	12'892
Telephones lines per 100 inhabitants	0.77	0.88	0.99	1.15	1.38
New lines installed (thousands)	735	987	1'229	1'770	2'183
Lines in service (thousands)	5'810	6'797	8'026	9'795	11'978
Lines in service per 100 inhabitants	0.67	0.77	0.89	1.07	1.28
Long-distance route kilometres	94'476	107'462	122'957	142'113	168'633
Number of village public telephones	74'404	104'476	137'477	185'136	216'632
Local call pulses (billions)	29.8	40.1	46.7	58.6	78.5
Registered waiting list for telephones (thousands)	2'289	2'845	2'497	2'153	2'277

Source: DoT

Estimates suggest that demand for basic services will be in the region of 64 million lines by the year 2006, requiring a capital expenditure of US\$ 47.5 billion (Rs 1,700 billion or Rs.26 thousand per line) in total.

VSNL

At the end of 1996 VSNL operated 13'395 effective international voice circuits of which 9'057 were satellite circuits and 4'338 cable circuits. Satellite capacity is obtained from INTELSAT and INMARSAT. At the end of 1996 a total of 9'057 satellite voice circuits and 370 satellite non-voice circuits were operated through ten earth stations at the four major gateways. In the same year, VSNL operated a total of 4'296 effective voice circuits and 77 non-voice circuits on undersea cables landing in India.

Switching capacity at VSNL is 100 per cent digital, using digital switches provided at the four major gateways. At the end of 1996 the company had total switching capacity of 15'465 international telephone, 3'560 telex and 256 telegraph terminations

VSNL Gateways

VSNL currently operates through four main gateways at Mumbai, Calcutta, Delhi and Chennai. These gateways provide all of the connections for the company’s services to the international telecommunications networks.

Each gateway is linked to the other three gateways via dedicated digital lines leased from DoT, which permits multiple routing options for each call and provides the system with a backup capability in case of equipment failure or congestion.

International traffic is carried via international satellites linked to earth stations and by undersea cables and microwave systems. Table 2.3 sets out the major facilities, links and circuits at each gateway as of 30 September 1996.

Table 2.3: International gateways and facilities

<i>Gateway</i>	<i>Facilities</i>	<i>Voice Circuits</i>	<i>Non-Voice Circuits</i>
Mumbai	5 Satellite Earth Stations	4'423	150
	2 Undersea Cables	3'920	67
Delhi	2 Satellite Earth Stations	2'415	96
	1 Coaxial Cable	42	-
Chennai	2 Satellite Earth Stations	1'374	53
	1 Undersea Cable	376	10
Calcutta	2 Satellite Earth Stations	845	14
Total		13'395	390

Source: VSNL Global Depository Receipt Offer document

VSNL's Future Plans

In moves of progressive liberalisation, VSNL is planning to turn India into a regional telecommunications "hub". The project aims to create a telecoms superhighway linking Asia and Middle Eastern neighbours through a high speed fibre optic network. The "hub" will replace current bilateral telecoms agreements offering a cheaper faster network for routing regional calls.

As part of its Ninth Plan, VSNL is planning investment in additional facilities and equipment within India for transmission. Expenditure will also be made to increase switching capacity, for securing rights to use additional circuits on the INTELSAT and INMARSAT systems and also on cables in the Atlantic and Pacific regions. Increased switching capacity will also assist participation in various satellite mobile telecommunications systems.

VSNL's Ninth Plan covering the period from April 1997 to March 2002 provides for total capital expenditures of approximately Rs.50 billion (US\$ 1.4 billion). The company intends to fund the above capital expenditure through cash flow from operations, as well as through its share of the net proceeds of the Global Depository Receipts (GDR) Offering, which were issued in March 1997 raising US\$448 million. This involved Indian government's sale of 14% of shares in VSNL reducing the government's holding in the company from 82% to 67%. It has been India's largest privatisation so far.

VSNL may also consider debt financing, additional equity financing and leasing arrangements in order to raise additional funds.

In an effort to expand transmission capacity, VSNL plans to construct an undersea optical fibre cable running from north of Mumbai around the coast to Calcutta, with 23 intermediate landing points at a cost of Rs10 billion (US\$280 million).

VSNL has also entered into a Construction and Maintenance Agreement with other carriers for the construction of SEA-ME-WE 3, a high capacity undersea optical fibre cable extending from Germany to Japan and Australia that is set to land in a total of 33 countries. In addition the company has entered into an agreement relating to the Fibre optic Link Around the Globe (FLAG) system, a high capacity undersea optical fibre cable with 14 landings that connects Europe and the Far East through the Indian Ocean.

2.2.2 Mobile Network

Cellular telephones have become a visible symbol of India's liberalisation programme. At the end of March 1997 India's cellular subscriber base stood at 374'350 with projections of 0.8 million by the end of the year, expanding to 4.9 million by 2005.

The availability of cellular services began with awards of licences in the four major metro towns in 1995. Services have since spread across the country with the award of 33 licences throughout the 18 circles. In addition, 13 cellular operators with international collaboration are competing for market share in these areas.

Table 2.4: Cellular licensees

<i>Operator</i>	<i>Location</i>
BPL Systems & Projects Limited	Mumbai
Hutchison Max Telecom	Mumbai
Bharti Cellular (Airtel)	New Delhi
Sterling Cellular (Essar Cellular)	New Delhi
Modi Telstra	Calcutta
Usha Martin Telecom	Calcutta
Skytel Communications (with Bell South)	Madras
RPG - Airtouch	Madras

Source: Case Study.

The government is planning to introduce satellite mobilephone services using the Indian National Satellite System (INSAT) S-band transponder.

The expansion of the pager industry has also increased considerably following the tender to licence services in 27 major cities. The subscriber base currently stands at 500,000. Some 262 licences have further been issued to 38 companies covering 86 towns for public mobile radio trunking services. The service has been implemented in stages throughout 1997 and is to be continued during the first half of 1998.

Other value added services such as e-mail, voice mail, audiotex, 64K/bits datalinks using VSATs have been opened up to private sector investment.

The ICO Global Communications (Holdings) Limited consortium, of which VSNL was a founding member in 1995, holding (to date) a 7.17 per cent interest, is in the process of building and operating a satellite based mobile telecommunications system. The programme is scheduled to become operational by the end of 1999 and is expected to offer worldwide digital voice, data, facsimile and message services primarily through hand held mobile terminals on land, sea or air. VSNL was successful in its bid for the location of the ICO's Satellite Access N(SAN)ode to be stationed in India. The award of the SAN contract to India positions it as a hub of the region for handling international and domestic traffic originating from the ICO system. VSNL plans to operate a gateway facility, currently under construction, located in Delhi for uplinking traffic to the ICO system. In addition it plans to operate a gateway system at Pune for the Iridium system and gateway facilities at Dehradun, Halishar and Chennai for the Globalstar system, in order to compete with the ICO system.

2.3 Tariffs

Table 2.5: Connection and rental charges

Application: Charges for the PSTN service. Effective from 1 December 1986, verified 14 April 1997

	<i>Connection (in Rupees)</i>
Exchange with <500 lines	300
Exchange with >500 lines	800
Rural exchange with > 10'000 lines (1)	500

Notes: (1) Reduced rates are available for subscribers in rural areas:

Table 2.6: Monthly subscription charges (digital)

Charges for Measured Rate System (digital). Effective from 1 May 1995, verified 14 April 1997

<i>Exchange capacity (lines)</i>	<i>Rental (in Rupees)</i>
<100	50.00
100-999	75.00
1'000-29'999	100.00
30'000-99'999	137.50
100'000-299'999	180.00
>300'000	190.00

Notes:

1. 150 free calls are included bi-monthly in the rental.
2. Rental quoted is monthly, though charged bi-monthly.
3. There is a 25% discount for schools, universities, non-commercial research organisations, organisations for the aged, handicapped, and tribal welfare. There is a 50% discount for Freedom fighters.
4. Reduced rates are available for subscribers in rural areas:

Exchange capacity (lines)	Rental (in Rupees)
101-999	50.00

Table 2.7: Monthly subscription charges (analogue, manual exchange)

Charges for Flat Rate System (analogue) Effective from 1 March 1982, verified 14 April 1997

<i>Exchange providing:</i>	<i>Rental (in Rupees)</i>
<100 lines and 24 hr service	62.5
>100 lines and 24 hr service	75.00
Restricted number of hours service	50.00

Notes:

1. 150 free calls are included bi-monthly in the rental.
2. Rental quoted is monthly, though charged bi-monthly.
3. There is a 25% discount for schools, universities, non-commercial research organisations, organisations for the aged, handicapped, and tribal welfare. There is a 50% discount for Freedom fighters.

Source: Tarifica.

Table 2.8: National call charges

National STD pulses in seconds per unit. Rate based on average rate of Rs. 1.25/pulse and excludes 5% service tax.

<i>Radial distance between two exchanges (in Kms.)</i>	<i>Periodicity of the pulse in seconds (peak rate)</i>	<i>Price per minute in Rupees</i>
0 - 20	180	0.4
21 - 35	90	0.8
36 - 50	36	2
51 - 100	12	6.25
101 - 200	8	9.4
201 - 500	4	18.75
501 - 1000	3	25
Above 1000	2	37.5

Source: DoT

Table 2.9: International Call Tariffs from India

In US\$ per minute

	<i>Normal Hours (0600-2300)</i>		<i>Concessional Hours (2300-0600)</i>	
	<i>Pulse Rate</i>	<i>Rate/min US\$</i>	<i>Pulse Rate</i>	<i>Rate/min US\$</i>
Neighbouring countries such as Pakistan and Bangladesh	2 sec	1.19	2.6 sec	0.91
Countries in Asia, Gulf, Europe, Africa and Oceania	1.2 sec	1.97	1.6 sec	1.48
Countries in Western Hemisphere such as US, Canada	1 sec	2.37	1.2 sec	1.97

Note: Concessional tariffs have been effective since June 1, 1995.

Source: VSNL

3: EVOLUTION OF INTERNATIONAL TELECOMMUNICATIONS ENVIRONMENT

3.1 Traffic Analysis

3.1.1 Trends in international traffic

VSNL international traffic volume with each particular country is believed to be determined by the level of business with that country and the number of Indian expatriates resident there. There are approximately 15 million Indian expatriates resident overseas. Indians resident overseas have in certain cases been responsible for a significant foreign investment in India since the country reforms began in 1991. Estimates suggest that a third of the total foreign investment has been facilitated by Indian expatriates.

Since 1990, the total international call volume (incoming plus outgoing) has grown at an average rate of 25%. Table 3.1 below gives the combined volume of traffic handled by VSNL.

Table 3.1: Combined traffic volume (incoming plus outgoing) handled by VSNL in millions of minutes

	1991	1992	1993	1994	1995	1996	1997
Traffic (Millions)	369	473	614	742	942	1'147	1'384
Growth		28%	29%	21%	27%	22%	21%

Source: VSNL

Incoming and outgoing traffic volumes have grown at markedly different rates. Table 3.2 below gives the traffic volumes on the top five destinations for VSNL (traffic figures for the top 20 destinations are given in Appendix 1). As can be observed in Tables 3.2c, VSNL is a net receiver of the traffic on four out of the top five routes.

It seems that until the year 1993, outgoing traffic had been increasing at more or less the same rate as incoming traffic. However the rate of increase in incoming traffic thereafter outpaces that of the outgoing traffic. This phenomenon can be attributed—among other factors—to the introduction of call-back services in the US around this time, which is further highlighted by the comparison of incoming and outgoing traffic on India-US route depicted in Figure 3.1 (right). Notice the decline in the outgoing US-India traffic after 1993. This is an evidence of the call-back effect.

Combined traffic with US accounted for 36% of VSNL's total traffic. The reason for the high level of traffic from the US to India is discussed below. Outgoing traffic to the US declined from 63 million minutes in 1992-93 to 50 million minutes in 1996-97, and fell from 40% to 10% as a share of total traffic on the US-India route during the same period.

Table 3.2a: India's outgoing international traffic, 1991-1997

Top five routes plus other traffic, in millions of minutes

Outgoing	1991	1992	1993	1994	1995	1996	1997	CAGR, 91-97
USA	37.4	41.8	63.3	53.0	48.7	49.9	50.0	5.0%
UAE	14.4	19.3	28.3	32.0	32.3	32.7	33.1	14.9%
Saudi Arabia	13.0	27.9	31.1	53.3	65.0	69.8	77.1	34.5%
UK	17.5	18.8	24.8	27.5	30.1	25.5	35.8	12.7%
Singapore	5.8	4.4	9.2	9.7	11.3	14.3	17.3	19.9%
Other	58.6	72.8	102.3	112.4	141.7	149.2	171.7	19.6%
Total	146.7	185.0	259.0	287.8	329.0	341.4	384.9	17.4%

Source: VSNL

Table 3.2b: India's incoming international traffic, 1991-1997

Top five routes plus other traffic, in millions of minutes

Incoming	1991	1992	1993	1994	1995	1996	1997	CAGR, 91-97
USA	58.8	71.3	97.9	143.2	210.1	315.7	445.5	40.1%
UAE	32.0	36.0	48.4	64.7	91.3	113.0	142.3	28.2%
Saudi Arabia	17.7	22.0	20.8	22.7	36.9	55.4	68.1	25.2%
UK	32.0	43.0	53.0	43.9	50.4	56.1	69.5	13.8%
Singapore	7.0	9.0	14.0	14.0	18.5	25.0	26.4	24.8%
Other	75.2	107.6	121.1	166.6	205.8	241.0	248.4	22.0%
Total	222.7	288.9	355.2	455.0	613.0	806.2	1'000.0	28.4%

Source: VSNL

Table 3.2c: India's balance (incoming minus outgoing) of international traffic, 1991-1997

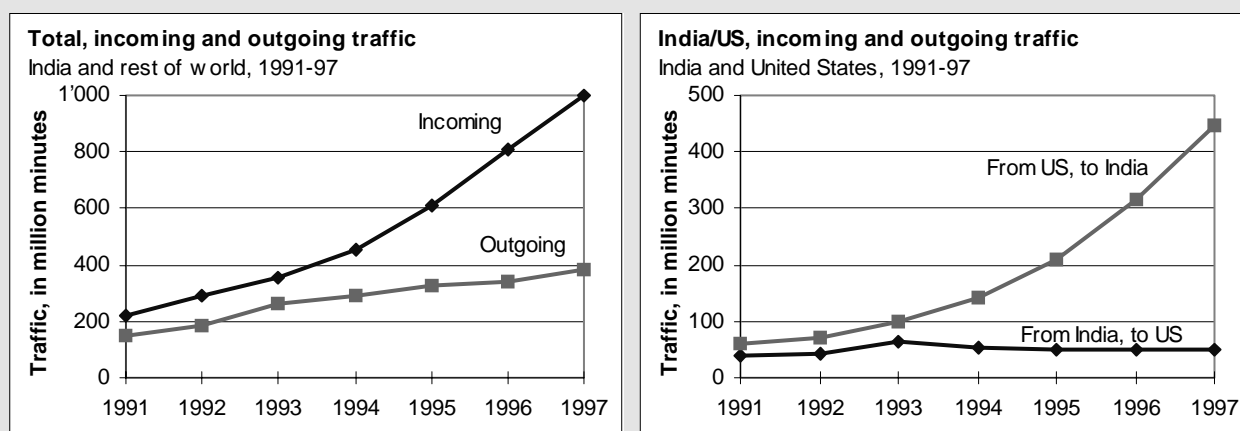
Top five routes plus other traffic, in millions of minutes

Balance	1991	1992	1993	1994	1995	1996	1997	CAGR, 91-97
USA	-21.4	-29.5	-34.6	-90.2	-161.4	-265.8	-395.4	162.6%
UAE	-17.6	-16.7	-20.1	-32.7	-59.1	-80.3	-109.2	135.5%
Saudi Arabia	-4.7	5.9	10.3	30.6	28.1	14.5	9.0	n.a.
UK	-14.5	-24.2	-28.2	-16.4	-20.3	-30.7	-33.7	115.1%
Singapore	-1.2	-4.6	-4.8	-4.3	-7.3	-10.7	-9.1	140.2%
Other	-16.6	-34.8	-18.8	-54.2	-64.1	-91.8	-76.7	129.1%
Total	-76.0	-103.9	-96.2	-167.2	-284.0	-464.8	-615.1	141.7%

Source: VSNL

Figure 3.1: Comparison of outgoing and incoming international traffic

For India and rest of world, and for India and the United States, 1991-97, in millions of minutes



Source: VSNL.

3.1.2 Refile

Refile traffic comes from the resellers in competitive markets such as the UK who employ least cost routing. International Simple Resale traffic originating from the UK – destined for India – may not necessarily all be refilled in the US. PTOs in the UK are starting to offer wholesale rates lower enough to qualify as a least cost option for resellers, especially when the peak period in the US corresponds to the off-peak period in the UK. (Off peak wholesale rates are lower). Our estimate is that of the traffic generated from the resellers in the UK that is destined for India more than 70% is routed via the US. The rest (30%) is handled by the two major operators within the UK (BT and Mercury). The latter proportion is expected to increase as wholesale gains strength in Europe. Other potential 'refile stations' could be Sweden, Canada and Australia. Table 3.3 below compares the wholesale rates offered on calls terminating in India.

Table 3.3: Wholesale rates for calls to India

	<i>Wholesale rate per minute (US Cents)</i>
Lowest rate in the US market	46
British Telecom	68
Cable and Wireless (Mercury)	70

Source: www.spotrates.com, BT, Mercury

(In order to take advantage the low wholesale rate in the US, a reseller in the UK has to lease an International Private Circuit from the UK to the US.).The wholesale rate of 46 cents in the US market falls below the settlement rate of 71 cents with VSNL. This is because of 'leaks and below-settlement agreements'. It may also be also be attributed to the US rule of proportionate return which means that losses on outgoing traffic can be compensated by gaining a larger share of return traffic.

3.1.3 Call-back

As can be observed in Figure 3.1 (right chart) call-back has had a profound effect on the imbalance of traffic on India-US route resulting in an exponential growth in the incoming traffic from the US. Table 3.4 below compares the VSNL tariffs (actually set by DoT) with those of Kallback, a call-back operator in the US.

Table 3.4: Comparison of international call tariffs between VSNL and Kallback

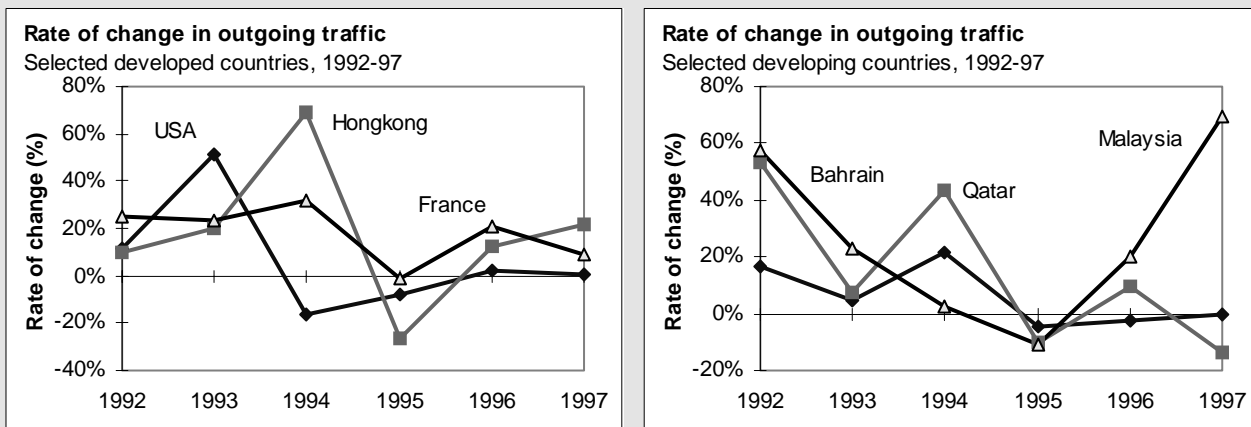
For selected routes, in US\$ per minute

<i>Destination</i>	<i>VSNL Tariff* (US \$)</i>	<i>Kallback Tariff (US \$)</i>
USA	2.37	0.95
Canada	2.37	1.02
Saudi Arabia	1.97	1.85
UK	1.97	1.08
Singapore	1.97	1.21

Note: *VSNL peak rate
Source: Kallback, Tarifica

As can be observed from Table 3.4, a subscriber in India has an incentive to use call-back service not only for the US-bound calls but also to other destinations, though for calls to Saudi Arabia the margin of saving is very small (if the exchange rate dated 15 January 1998 of approximately Rs.40 is used then VSNL tariff for Saudi Arabia works out to be US\$1.55 which is *lower* than Kallback rate on this route). This is one reason why India has maintained a continued growth in outgoing traffic to Saudi Arabia. Figure 3.2 depicts the percentage yearly growth in outgoing traffic on some of the destinations. Growth on all these destinations has been positive previously, but from the year 1994 to 1995 growth rate has fallen on these routes which points at the evidence for the call-back phenomenon. The decrease on the US route takes place a year earlier because the earlier introduction of the call-back service for the US destination.

Figure 3.2: Annual change in outgoing traffic on selected routes
Percentage change, 1992-97



Source: VSNL.

Our estimates of the volume of call-turnaround traffic are presented in the Table 3.5a and b. Call-turnaround estimates on other routes that are not mentioned here were found to negligible. All the outgoing traffic from India that is turned around is below assumed to have migrated to call-back operators. Out of the incoming traffic to India that is bypassed a major proportion is below assumed to be refilled in the United States. The methodology used is the 'Best Fit Curve'.

Table 3.5a: Call-turnaround estimates on individual routes

In millions of minutes, 1994-97

Millions	1994		1995		1996		1997	
	outgoing	incoming	outgoing	incoming	outgoing	incoming	outgoing	incoming
USA	16.66		31.40		46.17		55.67	
UAE			6.11		9.50		13.34	
Saudi Arabia		3.87						
UK		14.42		19.60	7.60	27.82	7.23	22.90
Singapore		2.09		4.03		4.30		8.77
Canada						7.80		22.33
Oman						3.83		5.03
Kuwait					2.17		3.99	
Australia					1.52		1.53	3.02
Hong Kong			3.31		3.96		3.49	5.40
Bahrain			1.46		2.52	2.23	2.82	4.81
Qatar			1.61		2.32	4.53	3.49	5.24
Malaysia			0.98		1.35		0.38	
France			1.52		1.14		1.30	
Total	16.66	20.38	46.39	23.63	78.25	50.51	93.23	77.50

Table 3.5b: Call-back and refile estimates

In millions of minutes, 1994-97

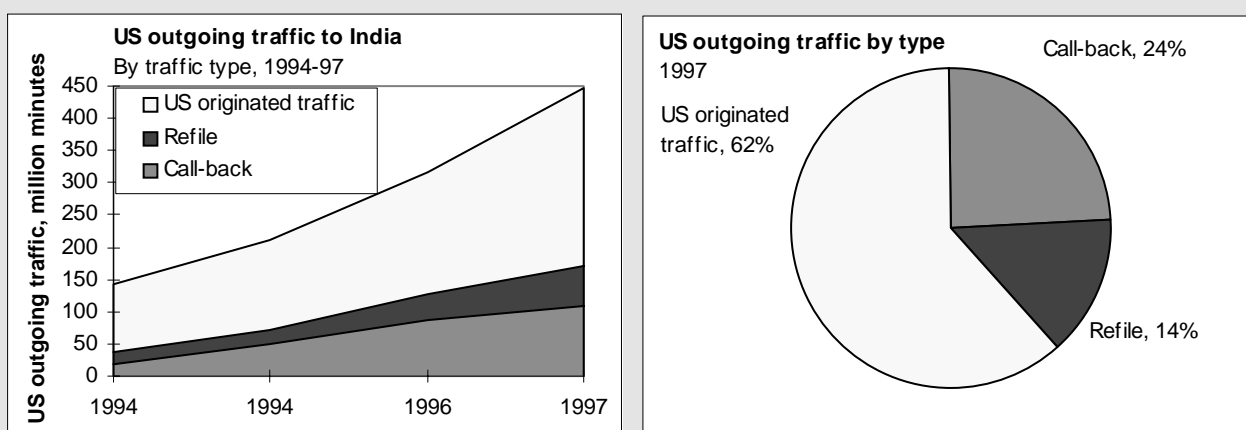
	1994	1995	1996	1997
Total Call-turnaround	37.04	70.02	128.76	170.73
of which				
-- Call-back	19.64	48.41	85.70	109.37
-- Refile	17.40	21.61	43.06	61.36

Source: Case Study.

Using the call-turnaround estimates above we can categorise the incoming traffic from the US. Figure 3.3 shows the categories. Out of the total incoming traffic of 445 million minutes from the US in the year 1997, our estimates show that it includes 14% refile and 25% call-back traffic.

Figure 3.3: Traffic profile United States outgoing traffic to India

In minutes, 1994-97, and in percentages, 1997



Source: Case study.

Call-back services were officially declared illegal by the Ministry of Communications in July 1995. However there exist a number of unauthorised call-back service agents in India who operate without a licence. Analysts speculate that there are between 20 to 30 companies across India acting as agents for call-back use. Government has the authority to impose heavy financial penalties for those who violate this ban.

3.1.4 Profile of US Subscribers Calling India

Traffic from the United States to India comes mainly from the residential customers (Indian expatriates). Residential calls tend to be of a much higher duration than the business calls. Furthermore, in comparison to most other countries, the average international call duration in the US (5.6 minutes) is higher. One of the reasons behind a higher call duration of the US customers is that their local calls are not metered. This affects their international calling pattern. Other reasons include the combination of a higher purchasing power and lower call charges.

Although the recent economic growth in India has increased the purchasing power, it appears that this only extends to renting a telephone line and is not enough to make international calls on a regular basis. On the other hand the increasing penetration of telephone lines enables more Indian expatriates to call home.

3.3 Issues Concerning Growth in the International Calls Market

Opening the market for foreign investment and the privatisation of the fixed and mobile line services in the local calls market should mean more demand for outgoing international calls. VSNL plans for expansion in their infrastructure can be found in section 2.2 above. However, whether the future growth in international traffic can be handled depends not just on the VSNL's capacity bandwidth but also on domestic capacity. The DoT network could prove to be a bottleneck. So far, inadequate capacity in the Indian long-distance transmission network has resulted in lower call completion rates for incoming traffic than for outgoing calls. This is measured by the answer-to-seizure ratio i.e. the likelihood that a call is put through successfully as a percentage of the number of calls attempted. During 1996 this was 51.22% for outgoing calls but only 30.48% for incoming calls.

Table 3.6 : Answer /Seizure Ratio for international calls

<i>Answer/Seizure Ratio</i>	<i>1993</i>	<i>1994</i>	<i>1995</i>	<i>1996</i>
Outgoing calls %	41.34	44.36	45.17	51.22
Incoming calls %	25.65	30.29	30.27	30.48

Source: VSNL

3.4 Forecasting Future Traffic Trends

The main assumptions behind the forecasts that are presented (except in chapter five on scenarios) include:

1. 10% yearly reduction in settlement rates
2. 10% yearly reduction in international call charges in India
3. Future growth rate of traffic on a particular route corresponds to (approximately) the
4. Average growth rate on that particular route over the past seven years
5. Distribution of outgoing traffic volume: 80% peak period, 20% off-peak period.

We estimate that the combined (incoming plus outgoing) international traffic will amount to more than 3.1 billion minutes in the year 2002.

Table 3.7: Forecast combined (bothway) traffic, 1996-2002

In millions of minutes

<i>Millions</i>	<i>1996</i>	<i>1997</i>	<i>1998*</i>	<i>1999*</i>	<i>2000*</i>	<i>2001*</i>	<i>2002*</i>
Combined Traffic	1'147	1'384	1'668	1'975	2'299	2'697	3'114
of which							
Outgoing	341	384	435	493	567	654	762

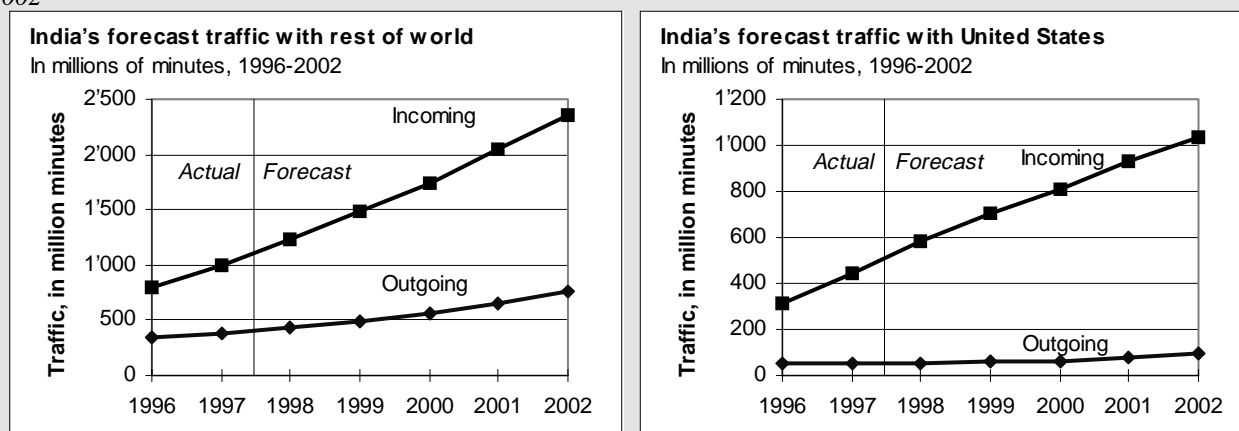
Note: * Estimates.

Source: Case study.

India is likely to remain net receiver of the traffic.

Figure 3.4: Traffic forecasts

In millions of minutes, between India and rest of world and between India and the US, in millions of minutes, 1996-2002



Source: Case study.

Forecasts on individual routes are given in Appendix 3. Growth in the incoming traffic from the US will continue to outweigh the growth of outgoing call volume on this route. Refile and Call-back traffic is also expected to account for an increasing proportion of the incoming traffic from the US.

Table 3.8: Traffic forecasts from the United States

In millions of minutes, 1998-2002

	1998	1999	2000	2001	2002
Traffic from the US	581	700	808	934	1,032
Total Call-turnaround Traffic (Refile + Call-back)	203	229	256	316	385

Source: Case Study.

Call-turnaround traffic presented in Table 3.8 does not imply that all of it will be handled in the US. Growth of refile in the US may decrease as competition intensifies in Europe. Our estimate showed that approximately 81 million minutes of refile traffic destined for India could be handled by carriers in Europe and Asia-Pacific by the year 2002.

3.5 Analysis of Settlement Rate Payments

The current VSNL settlement rates range from US\$0.61 to US\$2.84. The India-US accounting rate has been progressively reduced over the years from \$2.70 in 1985 to \$2.25 in 1990 and \$1.58 in early 1997. However the immediate action following the FCC benchmark order was to negotiate a new settlement rate towards the latter part of 1997. The total accounting rate was re-negotiated from \$1.58 to \$1.42. (with the settlement rate dropping from \$0.79 to \$0.71).

Revenue from international calls has accounted for almost a third of the country's total revenue in telecoms services market over the years, and the contribution from net settlement payment has been increasing. Net settlement payment accounted for approximately 13% of the total revenue from telecoms services in the years 1996 and 1997 up from 8% in 1994.

Table 3.9: Revenue trends, 1992-1997

In US\$ millions

	1992	1993	1994	1995	1996	1997
Total Revenue from Telecom Services*	1'202	1'505	1'928	2'468	3'088	3'881
Revenue from International Calls	414	555	741	909	1'054	1'264
As % of Total Revenue	34%	37%	38%	37%	34%	33%
Net Settlement Payment	105	119	149	267	389	517
As % of Total Revenue	9%	8%	8%	11%	13%	13%

Source: Case Study, * DoT

In the absence of call-turnaround, India might have been less dependent upon the net settlement payment.

The net settlement payment is likely to increase due to a growing imbalance in traffic. However as pressure from the developed countries brings the settlement rates down, the revenue generated as a result will increase at a decreasing rate.

Table 3.10: Net Settlement Payment to India US\$ millions

1996	1997	1998*	1999*	2000*	2001*	2002*
389	517	590	650	694	739	769

Note: * Forecast.

Source: Case study.

4: COST EVALUATION OF INTERNATIONAL TELECOM SERVICE

4.1 The Cost of Delivering Incoming / Outgoing Call

4.1.1 FCC Costing Method

There is no consensus on any particular methodology for working out the cost components for terminating a telephone call. Apart from the lack of consensus on methodology there is limited data available for analysing the cost of an international call. In determining the benchmark rates the FCC would ideally like to use a methodology based on total service long run incremental cost (TSLRIC). A version of this methodology, called the total element long run incremental cost (TELRIC), has been adopted by the FCC as the basis for pricing interconnection and unbundled elements. The methodology is discussed in detail in, *"The First Report and Order in the Matter of Implementation of the Local Competition Provisions in the Telecommunications Act of 1996: Interconnection between Local Exchange Carriers and Commercial Mobile radio Service Providers"*. However, in the absence of detailed data it has adopted a method which is based on using price data as a proxy for costs. We first describe the methodology adopted by the FCC and then discuss the economic rationale for this methodology and the more general TELRIC.

The FCC study calculates the 'price' for the three network elements that are used to provide international telephone service - international transmission facilities; international switching facilities; and national extension (domestic transport and termination).

International transmission facilities consist of international terrestrial transmission or submarine cables, international satellite transmission, or a combination of these facilities. This network element also includes the links between the earth stations and cable landing stations. This cost component has been estimated on the basis of the rates charged by telephone administration for dedicated private line service. The monthly private line rates have been converted to a charge per minute by assuming that 120 equivalent voice grade circuits can be derived from a 2.048 Mbit/s half-channel and by assuming each voice grade circuit has a usage level of 8,000 minutes per month. A different number of voice grade channels are assumed for circuits with different bandwidth. In the case of India for a 2.048 Mbit/s half channel the monthly tariff is taken as US\$77'328. With the above assumptions the cost works out to $US\$77'328 / (120 * 8,000) = 8.1$ cents per minute approximately. The corresponding figure for other countries ranges from 2.4 cents (United Kingdom) to 25.5 cents (Kenya) per minute.

International switching facilities consist of international switching centres, including their associated transmission and signalling equipment. For this component the study uses the rates used by TEUREM (Tariff Group for Europe and the Mediterranean Basin) countries for telephone settlements among them. The rates are based on the level of digitization capability. The accounting rate share declines as the digitization capability rises to reflect the greater efficiency of digital equipment. The FCC study assumes that telephone administrations providing service in developing countries are more likely to have telecommunications networks that are less technologically advanced and, therefore have lower levels of digital equipment than those in developed countries. Accordingly, TEUREM's highest accounting rate share for the international exchange component is used for the least developed countries; the lowest figure for the most developed countries; and the middle figure for all other countries. Since India falls in the low income category, a cost of 4.8 cents is used for the international exchange component. Table 4.1 shows the international switching costs by category of development.

Table 4.1: International switching costs by category of development

<i>Digitization category</i>	<i>Rate share (cents)</i>	<i>FCC category</i>
0-30%	4.8	low income (India)
31-60%	3.4	lower and upper middle income
61-100%	1.9	high income

Source: FCC NPRM 96-484 Released December 19, 1996

The national extension element includes that part of the national exchanges, national transmission facilities, and the local loop that is used to terminate international telephone services. The manner in which the cost of this component is calculated for India is described on page 14 of the report:

“India has a complicated tariff rate schedule for service within the country and international service from the US is more widely distributed throughout the country than is the case with Argentina. ... In addition, there are four international gateway switches that serve the entire country. This last factor means that, in order to estimate India's national extension TCP, it is necessary to locate each city calling code in relation to the nearest gateway switch. The seven mileage rate bands for domestic service in India are plotted around each international gateway switch and the appropriate city calling code is assigned to the proper rate band based on the distance from the nearest gateway switch. The percentage of tariff in each rate band is determined by combining the appropriate city code and international gateway switch. International traffic from the US is grouped by the seven mileage rate bands with time-of-day weighted prices. The results range from 2 cents per minute to 78.9 cents per minute. Finally, the weighted average rates for each mileage band are weighted by the percentage of US traffic terminating in the rate band. The result is an estimated national extension TCP for India of 18.3 cents.”

In this case the main problem is the subsidization of local rates by long distance rates. Since a large portion of the calls are likely to be terminated in the metropolitan cities where the VSNL Gateways are located the above method would tend to use the local rates as national extension cost for a large portion of the traffic. This would tend to underestimate the national extension component of the cost.

The three component rates are added to arrive at the settlement rate benchmark for India. Table 4.2 shows the Tariffed Component prices for India.

Table 4.2: Tariffed Component Prices (TCP) for India

<i>Component</i>	<i>Rate (US cents)</i>
International Transmission	8.1
International Switching	4.8
National Extension	18.3
Total	31.2

Source: FCC NPRM 96-484 Released December 19, 1996

The FCC proposes an alternative to using country specific TCPs as the benchmark settlement rate. They prefer to categorize countries by level of economic development and to establish separate benchmark ranges for each category. The upper end of the benchmark range is the simple average of the TCP in each economic development category. The lower end of the range is to be based on incremental costs as they become available. Based on AT&T's estimate of 7.5 cents per minute for "average network cost" for termination of inbound international calls the FCC believes that the incremental cost will be in the range of 6-9 cents per minute. For low income countries such as India the proposed benchmark rate is 23 cents, to be achieved by 1 January 2002.

4.1.2 Alternative Cost Estimates

The only cost estimate of the FCC that can be cross-checked with some degree of accuracy are the costs of international transmission and international switching, the two functions of VSNL. Since VSNL is a separate entity it is possible to work out an estimate of these costs using VSNL's published financial reports.

The cost to VSNL for international transmission and switching works out to approximately 20 cents per minute and is declining by around 2 cents per minute since 1994 (see the table below). To this an estimate of domestic network costs need to be added to arrive at the overall cost of traffic termination. We have included an assumed cost of 25% on the total capital - equity plus debt - of VSNL. Taxes have not been included in the cost estimate. Not surprisingly, the cost to VSNL of Rs.6.50 (equal to 20 cents) is close to its net realization of Rs.10 per minute less (approximately) Rs.3 license fee to DoT. The FCC cost estimate for these two elements is about 13 cents.

Table 4.3: Cost estimates for VSNL*In millions of Rupees, 1994-96*

	1994	1995	1996
Rent			
Land lines	810	881	846
Satellite channels	725	767	949
Operating costs			
Depreciation	410	573	745
Staff costs	300	384	470
Energy costs	53	68	84
Maintenance etc	392	392	840
Total	2'690	3'065	3'934
Cost of Capital			
Equity	7'190	9'747	12'946
Loans	3'777	2'250	1'116
Total capital	10'967	11'997	14'062
Cost @ 25%	2'742	2'999	3'516
Total cost	5'432	6'064	7'450
Traffic (million minutes)	746	938	1'148
Cost per min (Rs.)	7.28	6.47	6.49
Rs/\$	31.33	31.36	33.43
Cost per min (\$)	0.23	0.21	0.19

Source: Aggregate cost information from VSNL.

4.2 Cross-Subsidy from International to Domestic Services

According to DoT just 10 per cent of its customers pay 90 per cent of its revenues. It estimates that average telephone revenue per line has to exceed Rs.9,000 (US\$285) per annum in order to make the provision of service economical. Net settlement payment is one of the sources that could subsidise the investment in domestic infrastructure. Net settlement payments accounted for 17% of telecom expenditure in the year 1997 in India.

Table 4.4: Net settlement payments as a percentage of telecommunications expenditure*In US\$ million and percentages, 1992-97*

<i>US\$ millions</i>	1993	1994	1995	1996	1997
Telecom Expenditure	1'424	1'860	2'211	2'920	2'970
Net Settlement Payment	119	149	267	389	517
As % of Telecom Expenditure	8	8	12	13	17

Source: VSNL. Additional Source: CMIE Monthly Review of the Indian Economy, February 1997.

A significant proportion of telecommunication expenditure is therefore generated through the settlement rates, which could be used to upgrade the telecoms infrastructure, particularly the domestic part that demands a considerable subsidy. A clearer picture of how much of net settlement revenue can be used to subsidise the domestic market can be obtained by analysing revenue sharing arrangements between VSNL and DoT.

4.2.1 History of Revenue Sharing Arrangement

VSNL and DoT share the revenue generated from subscribers in India for outgoing international calls originated on DoT's network and the revenue from settlement payments on incoming international calls that are terminated using DoT's domestic network.

VSNL does not receive any payments directly from the customers in India for placing international calls. In addition DoT sets the international tariffs for outgoing calls.

Previous Revenue Sharing Arrangement

Agreed in February 1994, this arrangement covered the period from April 1993 to 31 March 1997. The assumption underlying this arrangement was an average settlement rate of US\$1.00 and an exchange value of Rs. 31.60 to one US dollar. Under this arrangement VSNL was required to pay DoT Rs. 21.60 per minute for terminating an incoming call. Assuming that VSNL settles at US\$ 1.00 (Rs. 31.60) it would earn Rs. 10 per minute (31.60 - 21.60) for an incoming call. In turn DoT paid VSNL Rs. 41.60 per minute for outgoing international calls. Again assuming that VSNL pays the foreign carrier a settlement rate of US\$ 1.00 (Rs. 31.60) it would earn Rs. 10 per minute (41.60 - 31.60) for an outgoing call. Our cost evaluation in the previous section (4.1.2) showed that an average gross earning per call minute of Rs.10 just about covers VSNL's costs and licence fees.

The revenue share of VSNL was dependent upon the exchange rate of the Rupee to the US dollar and the average settlement rate. However, there was provision for revision of the revenue sharing arrangement if the exchange rate of the average settlement rate varied by more than ten percent. Nevertheless, no such revisions were made even when there was evidence of such variations.

Under this arrangement VSNL was also required to pay a licence fee of approximately Rs. 3 per minute and a surcharge of 15 percent on rentals for capacity leased from DoT.

Table 4.5 outlines the revenue movement between DoT and VSNL on the international traffic from the year 1994-95 to 1996-97.

Table 4.5: Revenue sharing up to 1997

In US\$ million

<i>Year ending March 31</i>	<i>1995</i>	<i>1996</i>	<i>1997</i>
Outgoing			
DoT pays VSNL	433	449	507
DoT keeps	208	215	240
Incoming			
VSNL pays DoT	419	551	683
VSNL keeps	158	161	173

Source: Case study.

Current Revenue Sharing Arrangement

Agreed in February 1997, this arrangement covers the period from 1 April 1997 to 31 March 2002. This arrangement is intended to take into account the imbalance of incoming and outgoing traffic. Instead of assuming an average settlement rate of US\$ 1.00 per minute for both incoming and outgoing calls, it uses "weighted average incoming settlement rate" and "weighted average outgoing settlement rate" - weighted for the levels of traffic on different routes. Any possible instability of the Rupee against the US\$ is also dealt with to an extent. Exchange rates prevailing at the beginning of each financial year will be used and converted into Rupees.

Under the current revenue sharing arrangement VSNL will pay DoT a charge per minute equal to "weighted average incoming settlement rate" minus Rs.10 on incoming calls. In turn DoT will pay VSNL a per minute charge of "weighted average outgoing settlement rate" plus Rs.10 on outgoing calls. It is intended to provide VSNL a gross earning of Rs.10 per paid minute as in the previous revenue sharing arrangement.

Revenue per call minute of the combined international call volume will decrease with the increase in the imbalance of the traffic. This is because the revenue earned on the incoming calls is lesser than that on the outgoing calls, which implies that if VSNL is guaranteed Rs.10 per call minute, DoT will have to bear the brunt of reduction in revenues from international calls thus affecting the cross-subsidy. However the current revenue sharing arrangement also takes into consideration the possibility of decrease in combined revenue from international calls (mainly due to the combination of perceived increasing imbalance of traffic and reduction in settlement rates).

The only other sources for DoT to compensate the revenue loss are the license fee and surcharge on leased lines. However, the 15 percent surcharge on leased lines in the previous revenue sharing arrangement has been eliminated under the current arrangement. In addition, the basis for VSNL licence fee has been changed to capacity commissioned rather than the retail paid minutes. The licence fee now payable to DoT is Rs.250,000 per commissioned circuit. The revenue sharing arrangements (which have so far secured an earning of approximately Rs.10 per minute for VSNL irrespective of the changes in domestic network costs and the agreements with the foreign carriers) assume that Rs.10 covers the international switching and transmission costs plus the licence fee payments of VSNL.

5: SCENARIOS FOR CHANGES IN THE INTERNATIONAL ACCOUNTING SYSTEM

This section deals with the impact on India due to changes in the settlement rates under different possible options. We will analyse seven different scenarios and present the main results. It should be noted at the outset that for all the scenarios we have assumed a yearly reduction of 10% on the tariffs for outgoing international calls in India. Price elasticity assumptions are the same as that used in section 3.4.

5.1 Scenario 1: A system of 'benchmarks' as proposed by the US regulator, the FCC.

The current settlement rate with the United States is US\$0.71. FCC proposes a benchmark rate of US\$0.23 by 1 January 2002 for India. For the purposes of analysing the impact under this scenario, we have used this benchmark figure as an assumed settlement rate between India and all other countries by this time.

5.1.1 Impact on Traffic

The overall traffic will increase as the benefits of lower settlement rates are passed on to the customers in the developed world. However, tariffs are expected to remain higher in India resulting in a greater imbalance of traffic. Imbalance on the US-India route will further escalate due to call-back effect.

This scenario could produce an estimated combined international traffic volume of approximately 3.5 billion minutes by the year 2002. Carriers in developed countries are expected to pass on the benefits of reduction in settlement rates to their customers more than the carriers in developing countries. As such the incoming traffic will continue to far outweigh the outgoing.

Table 5.1: Traffic forecasts, with and without FCC benchmarks

In millions of minutes

<i>Millions</i>	<i>1998</i>	<i>1999</i>	<i>2000</i>	<i>2001</i>	<i>2002</i>
Without FCC Benchmarks					
Combined Traffic	1'668	1'975	2'299	2'697	3'114
Outgoing	435	493	567	654	762
With FCC Benchmarks					
Combined Traffic	1'668	2'013	2'421	2'903	3'498
Outgoing	435	475	519	566	619

Source: Case study.

Incoming traffic from the US could reach as high as 1.5 billion minutes by the year 2002. See Table 5.2.

5.1.2 Impact on call-turnaround

Refile and call-back could reach well over half a billion minutes by the year 2002. However not all that traffic is likely to be handled by US carriers alone. We estimate that under this scenario refile and call-back market share of India-bound traffic for European carriers could be up to 180 million minutes by the year 2002.

One could argue that refile being largely a result of different settlement rates with different countries, will be eliminated if India settles with all the foreign carriers at the same rate of 23 cents. However this is the scenario in the year 2002. In the interim period the settlement rates are unlikely to be same with all the countries. This is because there is a large disparity in current settlement rates with foreign carriers. For instance, the settlement rate with Germany is almost twice as that with the US. In the interim period prior to the year 2002, the rate with Germany is unlikely to reduce to the level of the rate with the US. As such countries such as Germany will have a strong incentive to refile the India-bound traffic in the US.

Table 5.2: Traffic forecasts for traffic from the United States, with and without FCC benchmarks*In millions of minutes*

<i>Millions</i>	<i>1998</i>	<i>1999</i>	<i>2000</i>	<i>2001</i>	<i>2002</i>
<u>Without FCC Benchmarks</u>					
Traffic from the US	581	700	808	934	1'032
Total Call-turnaround Traffic (Refile + Call-back)	203	229	256	316	385
<u>With FCC Benchmarks</u>					
Traffic from the US	581	759	990	1'242	1'559
Total Call-turnaround Traffic (Refile + Call-back)	203	234	307	420	575

Source: Case Study.

By the year 2002 carriers in the US could be handling the volume of call-turnaround traffic large enough to achieve such economies of scale that are hard to match for other countries. VSNL monopoly expires in 2004. So effectively it has only two years to earn back its call-turnaround traffic, which is truly an uphill task given the costs of calling in India. An extreme – but not impossible – result of the FCC Benchmarks scenario could be that there is very little outgoing traffic in India combined with an overwhelming volume of incoming traffic from the US to such an extent that VSNL is required only to deliver the calls in India. And once the foreign carriers enter the Indian market in 2004 they may put their own facilities to terminate the incoming traffic. In that case only DoT's domestic network will fetch some revenue. VSNL's infrastructure could be altogether bypassed at this stage.

5.1.3 Impact on Net Settlement Payments

Reduction in settlement rates could over time decrease, outweighing the increase that would have occurred due to a higher imbalance of traffic.

Table 5.3: Net Settlement Payments, with and without FCC benchmarks*In US\$ millions*

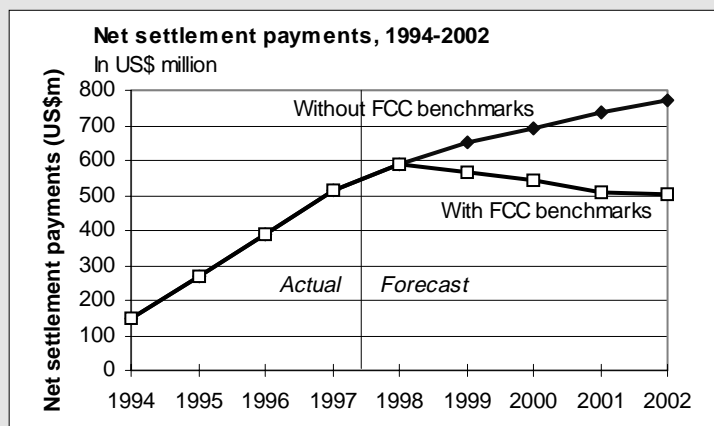
	<i>1998</i>	<i>1999</i>	<i>2000</i>	<i>2001</i>	<i>2002</i>
Without FCC Benchmarks	590	650	694	739	769
With FCC Benchmarks	590	568	544	509	504

Source: Case study.

Figure 5.1 shows the estimated decrease in net settlement payment if the FCC benchmarks are implemented.

Figure 5.1: Impact of FCC benchmarks on net settlement payments

Net settlement payments in US\$ million, actual 1994-97 and forecast, 1998-2002



Source: Case Study.

5.1.4 Impact on DoT Share of Revenues

If FCC benchmarks are implemented, the current revenue sharing arrangement could result in DoT's share falling below that of VSNL's by as early as year 2001. VSNL is also slightly worse off under this scenario after the year 1999. In fact at this rate DoT's share works out to be mere US\$97 million in 2003 from international revenues compared to VSNL's share of approximately US\$1.1 billion. As such the implementation of FCC benchmarks could prompt an earlier review of the revenue sharing arrangement between DoT and VSNL even though VSNL's gross earning per call minute does not fall under the Rs.9 mark.

Table 5.4: Impact of revenue sharing on VSNL's gross income per minute

	1998	1999	2000	2001	2002
VSNL gross earning per minute after sharing decrease in international revenues (in Rupees)	10	10.00	9.16	9.06	9.06

Source: Case study.

5.2 Scenario 2: A staged reduction in accounting rates as foreseen in ITU-T Recommendation D.140.

This scenario was identified as the most likely one. As such our forecasts presented in chapter three represent the possible impact under this scenario. A staged yearly reduction of 10% in the settlement rates was assumed.

Table 5.5 compares the impact on India under the two main scenarios covered so far. The better of the two results under the scenarios is shaded. It can be observed that the only attraction for situation under FCC benchmarks is a higher combined traffic. However the traffic in this case is not high enough to guarantee a higher corresponding revenue. Therefore, it has to be concluded that the implementation of the FCC benchmarks are less favourable for India than the ITU-T Recommendation D.140.

Table 5.5: Situation in the year 2002 under different assumptions

	<i>ITU-T Recommendation D.140 (staged reductions)</i>	<i>FCC Benchmarks</i>
Overall Combined Traffic (MiTT millions)	3'114	3'498
Call-turnaround Traffic (MiTT millions)	385	575
Net Settlement Payment (US\$m)	769	504
DoT's Share of International Revenues (US\$m)	801	298
VSNL's Share of International Revenues (US\$m)	854	792

Source: Case study.

5.3 Scenario 3: End-to-End service provision.

Carriers will lease end-to-end bandwidth under this scenario and will only pay for the interconnection to the domestic operator. The revenue sharing arrangement between DoT and VSNL could be replaced by cost based interconnection charges paid by VSNL to DoT. This is because, apart from the existing gateways, VSNL has plans to put more earth stations in Jallundhar, Ahmedabad and Ernakulam. As the number of VSNL nodes increases, the amount paid to DoT in form of interconnection charges will decrease. Unless there is a transparent cross subsidy involved, DoT's share of revenue from the incoming traffic will substantially decline. Revenue earned by VSNL will depend on whether it is granted to maintain its monopoly. In absence of VSNL monopoly, foreign carriers may directly interact with DoT, which jeopardises VSNL's interests.

This scenario also breeds the phenomenon of refile and hubbing. It is not feasible for small carriers to lease end-to-end circuits to more than 230 countries in the world. For the incoming traffic to India, the potential hubs could be the US (for the Gulf and African traffic), the UK (for European traffic) and Australia for (the Far Eastern traffic). In that case profile of the majority of incoming traffic could look as shown in Table 5.6.

Table 5.6: Incoming traffic forecasts under an end-to-end service provision scenario

In minutes of millions of minutes of traffic

	<u>1998</u>	<u>1999</u>	<u>2000</u>	<u>2001</u>	<u>2002</u>
Incoming traffic from:					
US	927	1'104	1'283	1'490	1'692
UK	124	153	189	233	289
Australia	102	129	162	205	259

Source: Case study.

The revenue from the incoming calls will depend on the interconnection fee charged by India. If the national extension estimates of the FCC in the case of India (18.3 cents) are used, the revenue earned from purely interconnection charges on incoming calls could be as shown in Table 5.7.

Table 5.7: Interconnection revenues gained under end-to-end service provision scenario

In US\$ million

<i>Revenue from incoming calls</i>	<i>1998</i>	<i>1999</i>	<i>2000</i>	<i>2001</i>	<i>2002</i>
In absence of this scenario *	947	1'024	1'079	1'147	1'192
Under this scenario **	229	275	322	380	437

Note: * These figures are the settlement payment estimates on incoming calls (not the net settlement payment).

** Forecasts of traffic volumes presented in section 3.5 are used here.

Source: Case study.

Provided that VSNL has a continuing monopoly to carry outgoing calls, it will be required to lease end-to-end circuits to at least the main destinations. Table 5.8 below gives the number of VSNL half-circuits (source: VSNL) with its top ten partners. If the same number of half-circuits are leased at the other ends on these ten destinations, a yearly rental of approximately US\$67 million will be required, which is equal to approximately 5% of the company's revenue in the financial year 1995-96.

Table: 5.8: Number of circuits and funding required to different destinations

<i>Country</i>	<i>No. of circuits</i>	<i>Yearly amount required to lease the same number of circuits at the other end (US\$m)</i>
USA	4,367	25
UAE	1,646	9.2
UK	1,429	11
Saudi Arabia	929	10.1
Singapore	608	2.31
Canada	572	2.08
Germany	464	2.36
Australia	333	2.18
Japan	319	1.98
Hong Kong	269	1.04
Total		US\$ 67.25 million

Notes: Retail rates of half circuits in other countries are taken from Tarifica databases.

We have considered 2.048 Mbit/s half channels each comprising of 120 equivalent voice grade circuits. Amount required excludes connection charges.

Source: Case study, VSNL.

Provided India is able to secure its own outgoing traffic from the bypass phenomenon, under this scenario it is expected to act promptly on plans for becoming a traffic hub in the region. However, the focus may shift from domestic network development to handling as much regional traffic as possible in its hub.

5.4 Scenario 4: Asymmetric costs in form of a single charge applied to all incoming traffic under a traditional half-circuit regime applied in a cost-oriented non-discriminatory and transparent manner.

In section 4.1.2 we estimated VSNL cost per call minute at 20 US cents on average. Adding the FCC estimate of 18.3 US cents as the national extension cost in India we have a total cost of 38.3 US cents for terminating a call in India. However, the estimate for the national extension takes into account all possible distances from international gateways within the country. A call terminating, say, in one of the four big cities where the international gateways are present will cost significantly lesser than a call that is terminated in a rural area far off from the gateways. This could encourage a reverse call-back phenomenon. Those customers in the US whose calls terminate in the big four cities (Bombay, Calcutta, Madras and Delhi) in India could be targeted by a possible call-back operator in India.

The 38.3 US cents to be paid to VSNL per call minute puts a price limit below which it would be economically unsound for the US carriers to offer services on India route (unless proportionate return is maintained and continues to remain attractive to these carriers). On the other hand if the call is terminated in a major city in India (with a gateway), it will cost a call-back operator in India less than 38.3 US cents to terminate the US customers' calls. Therefore if the asymmetric costs are applied, bypass traffic could shift from the US to some of the major developing countries. One advantage of this phenomenon could be that these developing countries might achieve economies of scale earlier.

For the purposes of estimating the revenue figures under this scenario, it is assumed that India is paid 38.3 US cents per call minute for an incoming call reduced by 3 US cents yearly. For an outgoing call the amount paid by India to the foreign operators is assumed to be in line with the FCC benchmarks i.e. 15 US cents for high income countries, 19 US cents for middle income countries etc. Applying these assumptions to our traffic forecasts in chapter three (although the outgoing call volume would be expected to be higher than the forecasts presented in chapter three, this is only possible if DoT passes on the benefits of lower costs for outgoing calls to its customers) we have the following revenue estimates (Table 5.9).

Table 5.9: Forecast revenue and costs under half-circuit based termination charge scenario

In US\$ million, 1998-2002

<i>US\$m</i>	<i>1998</i>	<i>1999</i>	<i>2000</i>	<i>2001</i>	<i>2002</i>
Cost paid for outgoing calls	67	76	88	101	118
Revenue from incoming calls	472	523	560	599	619

Source: Case study.

If the difference between the revenue from incoming calls and the cost paid for outgoing calls is taken as a measure of 'net settlement payment' here, India may be able to secure most of the 'net settlement payment' revenue.

Table 5.10: Net settlement payments under staged reductions and termination charge scenarios

In US\$ million, 1998-2002

<i>Net Settlement Payment:</i>	<i>1998</i>	<i>1999</i>	<i>2000</i>	<i>2001</i>	<i>2002</i>
ITU scenario (10% yearly TAR reduction)	590	650	694	739	769
Asymmetric costs scenario	405	447	472	498	501

Source: Case study.

5.5 Scenario 5: A Total Accounting Rate of SDR 1 by the year 1998, plus revenue stabilisation measures.

Having SDR1 by the year 1998 produces almost the same results as having 23 cents by the year 2002 (assuming the yearly rate of reduction in the settlement rates until 2002 is maintained at the rate of reduction required to reduce the current settlement rates to SDR 1 by 1998). See section 5.1 above.

For the revenue stabilisation question, we ought to consider the following:

If the reduction rates in TAR remain as they have been over the last few years, India will continue to experience a heavy imbalance of traffic, and as such become increasingly dependent on the net settlement payment. The situation is further exacerbated due to increasing bypass. However, both the bypass phenomenon as well as a heavy imbalance is a result of high tariffs for the outgoing international calls in India. An obvious solution to the problem lies in the reduction of these tariffs. But this will take place at the cost of risking cross subsidies.

Any revenue stabilisation measure should recognise that the problem lies in the high tariffs for the outgoing international calls, and not the reduction in the settlement rates. We propose a revenue stabilisation measure whereby India commits to lower down its tariffs and is in turn assured to be stabilised the resultant fall in revenue from international calls. This stabilisation amount may then be channelled into those areas that require subsidies.

As mentioned above, the scenario of SDR1 by the year 1998 produces almost the same results as that of the FCC scenario. Revenue estimates from the international calls under this and (the FCC) scenario are as under:

Table 5.11: Revenue from international calls under 1 SDR scenario

In US\$ million, 1998-2002

<i>US\$m</i>	<i>1998</i>	<i>1999</i>	<i>2000</i>	<i>2001</i>	<i>2002</i>
Revenue from international calls*	1'433	1'408	1'368	1'321	1'299

Note: * Revenue from international calls = DoT collection charges on international calls + Net settlement payment.

Source: Case study.

In order to work out the stabilisation amount, this scenario should be compared with the most likely scenario (which in our view is represented by the scenario in section 5.2) that had earlier produced the following results:

Table 5.12: Revenue from international calls under “most likely” scenario

In US\$ million, 1998-2002

<i>US\$m</i>	<i>1998</i>	<i>1999</i>	<i>2000</i>	<i>2001</i>	<i>2002</i>
Revenue from international calls	1'435	1'518	1'586	1'672	1'742

Source: Case study.

The stabilisation amount should be the reduction in the international call revenues, which means the difference in the two sets of results in the tables above.

Table 5.13: Revenue stabilisation amount

In US\$ million, 1998-2002

	1998	1999	2000	2001	2002
Revenue stabilisation amount	2	110	218	351	443

Source: Case study.

5.6 Summary of Results from Different Scenarios

Table 5.14: Possible Scenes in 1998

Five scenarios examined, In US\$ million

<i>Scenario</i>	<i>Description</i>	<i>International Call Revenue (US\$m)</i>	<i>Net Settlement Payment (US\$m)</i>
1	FCC benchmarks	1,433	590
2	ITU recommendation	1,435	590
3	End-to-End service provision	1,071	229*
4	Asymmetric costs	1,247	405*
5	TAR of SDR 1 by 1998	1,377	532

Source: Case study.

Table 5.14: Possible Scenes in 2002

Five scenarios examined, In US\$ million

<i>Scenario</i>	<i>Description</i>	<i>International Call Revenue (US\$m)</i>	<i>Net Settlement Payment (US\$m)</i>
1	FCC benchmarks	1'299	504
2	ITU recommendation	1'742	769
3	End-to-End service provision	1'397	437*
4	Asymmetric costs	1'461	501*
5	TAR of SDR 1 by 1998	1'299	504

Note: * Not quite applicable. The figure quoted is a proxy estimate.

Source: Case study.

6. CONCLUSIONS

Net settlement payment accounts for approximately 13% of total telecommunication revenue in India. Even within a reasonable range of price reduction for the international calls at home, India will continue to remain a net receiver of traffic. This is because most of the incoming traffic volume to India comes from the expatriates who usually have a higher purchasing power than those they are calling in India. Higher levels of call-turnaround are expected, which will contribute towards the greater traffic imbalance, particularly on the main US-India route.

The implementation of FCC benchmarks is unlikely to trigger a higher volume of traffic originating from India. If the settlement rates (and in turn the collection rates in the US) are lowered, it will result in higher traffic flows from the US to India than in the other direction creating even greater imbalance. A staged reduction, of say 10%, in the settlement rates would favour India more than the implementation of the FCC benchmarks. Nevertheless, the net settlement payment for India will be significantly reduced over time.

Both, the imbalance of traffic and call-turnaround, however, are largely a result of high tariffs for the outgoing international calls in India.

There is a growing understanding in India of the need to rebalance tariffs. Rebalancing will make tariffs more cost-oriented, but that is feasible only in a market with adequate competition. In line with the WTO agreement, India has reaffirmed its commitment to further liberalise the Indian telecommunications sector through licensing of new local fixed line and cellular service providers. The government of India has also agreed to review the possibility of allowing competition in the domestic long-distance market in 1999 and international calls market in 2004. Internet service market has been fully liberalised with licence fee waiver for the next five years. However, generally speaking, competition in India is limited only to certain sectors. DoT and VSNL still hold monopolies in the long-distance and international markets respectively. With inadequate competition, India requires price regulation. In its recently issued consultation paper on telecom pricing, *'Telecom Pricing: Consultation Paper on Concepts, Principles and Methodologies'* the Telecom Regulatory Authority of India (TRAI) introduced various concepts, principles and methodologies for determining telecom tariffs and interconnection charges. The paper is intended to serve as basis for comments and suggestions from interested parties and the public. TRAI plans to set tariffs such that it promotes technological innovation and stimulates demand. It seeks universal service at reasonable rates. The focus has shifted from a price based on a pre-set rate of return to a price based on cost and demand, with due consideration to the service areas that require subsidies.

Cross-subsidies will come under increasing pressure as India opens its telecoms market to further competition. Subsidy details will have to be made transparent, which implies greater transparency in the costs and revenue streams of the operators, and possibly the licensing of a separate company for the purposes of overseeing that funds are pooled and spent on those areas that require subsidies. Reduction in the net settlement payment will also add to the pressure on cross-subsidies. Far from creating an alternative revenue source, value added services need adequate subsidy. As such rebalancing should also address the subsidy of these services. If value added services are ignored it may result in a significant brain drain and risk a reduction in foreign investment among other socio-economic costs.

Telecom spending of customers in India is highly disproportionate. Customers in rural areas produce almost no return on investment, and might need to be regarded as a universal service obligation. Rebalancing has better prospects in the cities where there is large proportion of business users.

Cities generally have residents with higher purchasing power and concentration of business users. Customers can be provided volume discounts to stimulate demand instead of increasing tariffs as the number of calls increase (which is the current practice). Demand-based pricing is feasible with possibly higher prices during peak hours or higher rentals. Operators can provide a flexible option: – as has been offered in other countries – a higher rental together with lower usage fee, or a lower rental combined with a higher usage fee. Other options include putting up the licence fee of operators to fund the subsidies. In those cases where a high licence fee deters a potential service provider to enter the market, licence fee can be made a certain percentage of the revenue of the operator as is the arrangement between DoT and MTNL.

For international calls, time-difference with other countries may be considered before specifying off-peak period and prices. Off-peak period may also be chosen according to the volumes of outgoing traffic on

different routes, so that a combination of time difference and the traffic volumes on top destinations are used as criteria.

The current revenue-sharing arrangement for international calls between VSNL and DoT is such that DoT will continue to bear a bigger brunt of any reduction in international revenues caused by decrease in settlement rates (or by the outgoing international call tariffs). Although there is provision in the arrangement to jointly share the overall reduction, this excludes any assumption of a reduction in international tariffs, which leaves DoT with less flexibility to fix tariffs. Rebalancing plans could therefore be thwarted.

In order to mitigate the impact on rebalancing, DoT should either review the revenue sharing arrangement by including the provision for the reduction of DoT tariffs as part of the process for working out the share of reduction in international revenue or work out a transparent cross-subsidy policy as required by the WTO Regulatory Reference Paper. In the latter case, revenue sharing between DoT and VSNL can be a transparent interconnection-based agreement with a formula behind mutually agreed cross-subsidy for domestic market. If the reduction of DoT tariffs is made part of the revenue sharing arrangement, VSNL's gross earning per call minute is very likely to fall under the Rs.9 mark. In the absence of competition, tariffs for the international calls may need to be jointly set by VSNL, DoT and TRAI.

VSNL, as an independent entity, has been assigned to deal with the international traffic that is expected to be the highest growth area in terms of volume in the coming years in telecoms services market. Any move that risks its independence will result in VSNL losing the flexibility in responding to the international telecom trends. And in the process it could fail to perform as is required, given the pace at which the international telecoms environment is changing.

On the contrary, VSNL should explore the possibility of creating a presence in local or domestic long distance market. In the long run, as the growth rate in revenues from international services decreases, a local presence may become essential to balance revenue streams.

In its recent evaluation of VSNL's plans for a regional hub, DoT expressed its reservations citing the possibility of the project infringing its monopoly on domestic long-distance services, which the government has promised to maintain until 1999. The hub will connect some of the coastal cities in India, thus effectively creating a transmission network within the country. Basic service companies hoping to bid for long-distance franchises after 1999 are believed to be campaigning against the hub project as well. However, if the idea of regional hub is not implemented soon, VSNL may not achieve economies of scale quickly and sufficient enough to take a respectable share of the regional traffic. If the current market trend for wholesale prices in telecoms continues, there is every chance of even DoT long-distance calls migrating to call-back operators as has happened in the case of Argentina. In that case VSNL will earn even on domestic long-distance traffic thanks to incoming settlement rates. It will have a 'presence without presence'!

One plausible option would be to allow VSNL to build the hub and even let it operate in the long-distance market after 1999 in return for sharing the reduction in revenue from collection charges on the international calls. If the expected revenue gain in the long-distance market more than compensates for the loss by sharing reduction in collection rates, VSNL's monopoly could be reviewed and possible compensation paid for the premature end to its monopoly, as was done in cases of Singapore Telecom and Hong Kong Telecom. Reverse call-back service should also be looked into at the earliest possible opportunity in order to achieve economies of scale on the bandwidth as early as possible.

APPENDIX 1: TRAFFIC HISTORY

Traffic	1991		1992		1993		1994		1995		1996		1997	
	Outgoing	Incoming	Outgoing	Incoming	Outgoing	Incoming	Outgoing	Incoming	Outgoing	Incoming	Outgoing	Incoming	Outgoing	Incoming
MITT														
USA	37.40	58.80	41.80	71.30	63.30	97.90	52.97	143.15	48.67	210.10	49.92	315.70	50.03	445.47
UAE	14.40	32.00	19.30	36.00	28.30	48.40	31.98	64.71	32.27	91.32	32.71	112.98	33.09	142.25
Saudi Arabia	13.00	17.70	27.90	22.00	31.10	20.80	53.27	22.70	65.02	36.90	69.83	55.37	77.10	68.06
UK	17.50	32.00	18.80	43.00	24.80	53.00	27.45	43.88	30.07	50.36	25.48	56.13	35.77	69.45
Singapore	5.80	7.00	4.40	9.00	9.20	14.00	9.72	14.01	11.25	18.51	14.27	25.00	17.26	26.39
Germany	4.70	n.a.	5.50	6.86	8.20	8.94	9.70	13.65	11.50	16.73	13.23	18.83	13.91	19.49
Canada	5.70	11.60	5.80	14.10	6.40	17.50	6.70	20.73	7.24	27.14	8.66	28.84	11.42	21.74
Oman	3.30	n.a.	4.20	5.04	3.20	7.38	5.68	9.95	6.27	12.86	7.85	13.53	9.08	18.41
Kuwait	1.00	4.10	3.10	4.90	3.10	5.90	8.36	9.12	9.60	12.26	9.35	14.07	9.83	15.58
Australia	2.60	4.00	2.60	4.60	4.40	5.60	5.05	9.22	6.22	11.82	5.63	14.51	6.70	15.41
Hong Kong	4.10	4.50	4.50	4.90	5.40	7.70	9.11	9.52	6.71	11.65	7.56	13.33	9.19	11.26
Bahrain	1.80	n.a.	2.10	8.54	2.20	10.81	2.67	13.33	2.55	15.66	2.49	16.56	2.49	17.74
Qatar	1.70	n.a.	2.60	4.41	2.80	5.96	4.01	7.20	3.60	11.97	3.94	11.03	3.39	14.99
Japan	2.70	n.a.	2.80	4.63	4.40	6.12	4.96	7.42	5.21	8.49	6.86	9.41	7.74	11.07
Malaysia	1.40	2.60	2.20	3.40	2.70	4.50	2.76	6.95	2.47	7.67	2.96	9.74	5.01	10.85
France	2.40	n.a.	3.00	2.87	3.70	3.38	4.88	4.55	4.82	5.65	5.84	6.86	6.38	7.71
Italy	1.40	n.a.	1.80	1.53	2.30	2.79	3.46	3.76	4.10	4.63	5.13	5.33	5.65	4.75
Sri Lanka	1.10	n.a.	1.60	1.78	1.90	1.88	2.83	2.33	3.80	2.42	4.57	4.49	5.44	4.93
Thailand	1.46	1.10	1.78	1.70	1.52	2.30	2.30	3.09	2.42	4.12	2.94	5.17	3.41	6.06
Switzerland	1.30	n.a.	1.40	2.78	1.00	2.89	2.36	3.47	2.60	4.11	3.15	4.73	3.78	5.18
TOTAL top 20	124.76		157.18	253.34	209.92	327.75	250.22	412.74	266.39	564.37	282.37	741.61	316.67	936.79
TOTAL	146.70	222.70	185.00	288.90	259.00	355.20	287.80	455.02	329.00	613.00	341.40	806.16	384.93	1000.00

Source: VSNL.

APPENDIX 2 ADDITIONAL TELECOMMUNICATIONS REVENUE DATA

Telecoms Revenue by source, in US\$m

	<i>Total</i>	<i>Rental</i>	<i>Call Charges*</i>
1991-92	1'843	310	1'533
1992-93	1'784	351	1'432
1993-94	2'388	434	1'954
1994-95	2'935	544	2'390
1995-96	3'619	631	2'988
1996-97	4'276	751	3'524

Note: * includes local, STD, ISD and trunk calls.

Source: VSNL, DoT.

APPENDIX 3: TRAFFIC FORECASTS (ITU) SCENARIO)

Traffic	1998		1999		2000		2001		2002	
	Outgoing	Incoming	Outgoing	Incoming	Outgoing	Incoming	Outgoing	Incoming	Outgoing	Incoming
MITT										
USA	53.49	581.28	58.27	700.37	64.64	808.84	74.28	934.10	91.31	1032.06
UAE	38.44	154.43	44.67	175.38	51.89	199.17	60.29	216.23	70.05	234.75
Saudi Arabia	84.45	79.80	92.51	93.57	105.96	109.71	121.37	134.12	139.02	170.66
UK	40.82	79.91	46.58	99.94	53.16	124.99	60.66	156.31	69.22	195.49
Singapore	21.69	33.29	27.27	42.00	34.27	52.99	43.08	66.85	54.14	84.33
Germany	16.76	23.44	20.21	28.19	24.35	33.91	29.35	40.78	35.38	49.05
Canada	12.87	26.69	14.51	34.11	16.36	45.29	18.44	60.14	20.78	79.85
Oman	11.08	23.07	13.52	28.90	16.50	36.21	20.14	45.37	24.58	56.85
Kuwait	11.42	19.59	13.84	24.63	17.46	30.97	20.28	38.94	23.56	48.96
Australia	8.00	19.48	9.56	24.63	11.42	31.14	13.64	39.37	16.29	49.77
Hong Kong	10.82	14.47	12.74	18.59	14.99	23.89	17.65	30.69	20.78	39.43
Bahrain	2.64	18.34	2.80	18.96	2.96	20.54	3.14	22.27	3.33	23.02
Qatar	3.89	17.54	4.47	20.53	5.14	23.83	5.90	27.89	6.77	32.64
Japan	9.33	12.85	11.24	14.91	13.55	17.30	16.33	20.08	19.68	23.30
Malaysia	6.35	13.86	8.05	17.70	10.21	22.60	12.94	28.87	16.41	36.87
France	7.54	9.13	8.92	10.81	10.55	12.80	12.47	15.15	14.74	17.94
Italy	7.16	5.89	9.08	7.31	11.51	9.07	14.59	11.26	18.49	13.97
Sri Lanka	7.13	5.99	9.35	7.27	12.26	8.83	16.08	10.73	21.08	13.03
Thailand	3.99	8.08	4.66	10.78	5.45	14.38	6.37	19.17	7.44	25.57
Switzerland	4.83	5.70	5.69	6.55	6.41	7.86	7.23	9.83	8.15	12.78
TOTAL top 20	362.73	1152.84	417.93	1385.14	489.03	1634.32	574.22	1928.15	681.21	2240.34
TOTAL	435.28	1233.54	493.15	1482.10	567.28	1732.38	654.61	2043.84	762.95	2352.36

Source: Case study.

APPENDIX 4: TRAFFIC FORECASTS (FCC SCENARIO)

Traffic	1998		1999		2000		2001		2002	
	Outgoing	Incoming	Outgoing	Incoming	Outgoing	Incoming	Outgoing	Incoming	Outgoing	Incoming
MITT										
USA	53.49	581.28	57.20	758.50	59.84	989.74	62.60	1242.00	65.49	1558.55
UAE	38.44	154.43	44.10	183.10	50.05	198.79	56.80	205.87	64.46	213.21
Saudi Arabia	84.45	79.80	88.29	89.58	92.30	100.55	96.49	117.89	100.87	150.02
UK	40.82	79.91	46.06	107.93	51.97	156.57	58.64	227.12	65.53	329.47
Singapore	21.69	33.29	27.27	40.55	34.27	48.71	43.08	57.20	54.14	67.18
Germany	16.76	23.44	19.63	26.61	22.99	30.20	26.92	34.29	31.53	38.92
Canada	12.87	26.69	14.24	30.10	15.63	33.95	17.05	38.29	18.50	43.19
Oman	11.08	23.07	12.96	27.23	15.00	32.16	17.20	37.97	19.57	44.83
Kuwait	11.42	19.59	13.27	22.95	15.41	26.89	16.36	31.50	17.37	36.91
Australia	8.00	19.48	9.20	27.20	10.48	37.99	11.84	58.06	13.37	88.74
Hong Kong	10.82	14.47	12.10	17.14	13.53	20.31	15.12	22.04	16.91	23.91
Bahrain	2.64	18.34	2.72	18.96	2.80	20.54	2.88	22.27	2.97	23.02
Qatar	3.89	17.54	4.28	19.04	4.70	20.57	5.05	22.32	5.43	24.22
Japan	9.33	12.85	10.29	13.88	11.34	14.99	12.50	16.20	13.79	17.50
Malaysia	5.68	13.86	6.44	15.78	7.30	17.96	8.28	20.45	9.39	23.29
France	6.96	9.13	7.60	9.97	8.29	10.88	9.04	11.89	9.87	12.98
Italy	7.16	5.89	9.08	7.31	11.51	9.07	14.59	11.26	18.49	13.97
Sri Lanka	7.13	5.99	8.24	6.63	9.53	7.34	11.01	8.13	12.72	9.00
Thailand	3.99	8.08	4.32	9.43	4.69	11.00	5.08	12.84	5.51	14.98
Switzerland	4.83	5.70	5.26	6.13	5.59	6.74	5.95	7.58	6.33	8.72
TOTAL top 20	361.48	1152.84	402.53	1438.02	447.21	1794.97	496.49	2205.17	552.24	2742.60
TOTAL	433.78	1233.54	474.98	1538.69	518.76	1902.66	566.00	2337.48	618.51	2879.73

Source: Case study.

APPENDIX 5: ESTIMATES OF TRAFFIC THAT WOULD HAVE RESULTED IN ABSENCE OF CALL-TURNAROUND

	1991		1992		1993		1994		1995		1996		1997	
	Outgoing	Incoming	Outgoing	Incoming	Outgoing	Incoming	Outgoing	Incoming	Outgoing	Incoming	Outgoing	Incoming	Outgoing	Incoming
MITT														
USA	37.40	58.80	41.80	71.30	63.30	92.69	69.63	106.59	80.07	138.57	96.09	180.14	105.70	225.18
UAE	14.40	32.00	19.30	36.00	28.30	48.40	31.98	64.71	38.38	91.32	42.21	112.98	46.43	142.25
Saudi Arabia	13.00	17.70	27.90	22.00	31.10	25.30	53.27	26.57	65.02	36.90	69.83	55.37	77.10	68.06
UK	17.50	32.00	18.80	43.00	24.80	53.00	27.45	58.30	30.07	69.96	33.08	83.95	43.00	92.35
Singapore	5.80	7.00	4.40	9.00	9.20	14.00	9.72	16.10	11.25	22.54	14.27	29.30	17.26	35.16
Germany	4.70	n.a.	5.50	6.86	8.20	8.94	9.70	13.65	11.50	16.73	13.23	18.83	13.91	19.49
Canada	5.70	11.60	5.80	14.10	6.40	17.50	6.70	20.73	7.24	27.14	8.66	36.64	11.42	43.97
Oman	3.30	n.a.	4.20	5.04	3.20	7.38	5.68	9.95	6.27	12.86	7.85	17.36	9.08	23.44
Kuwait	1.00	4.10	3.10	4.90	3.10	5.90	8.36	9.12	9.60	12.26	11.52	14.07	13.82	15.58
Australia	2.60	4.00	2.60	4.60	4.40	5.60	5.05	9.22	6.22	11.82	7.15	14.51	8.23	18.43
Hong Kong	4.10	4.50	4.50	4.90	5.40	7.70	9.11	9.52	10.02	11.65	11.52	13.33	12.68	16.66
Bahrain	1.80	n.a.	2.10	8.54	2.20	10.81	2.67	13.33	4.01	15.66	5.01	18.79	5.31	22.55
Qatar	1.70	n.a.	2.60	4.41	2.80	5.96	4.01	7.20	5.21	11.97	6.26	15.56	6.88	20.23
Japan	2.70	n.a.	2.80	4.63	4.40	6.12	4.96	7.42	5.21	8.49	6.86	9.41	7.74	11.07
Malaysia	1.40	2.60	2.20	3.40	2.70	4.50	2.76	6.95	3.45	7.67	4.31	9.74	5.39	10.85
France	2.40	n.a.	3.00	2.87	3.70	3.38	4.88	4.55	6.34	5.65	6.98	6.86	7.68	7.71
Italy	1.40	n.a.	1.80	1.53	2.30	2.79	3.46	3.76	4.10	4.63	5.13	5.33	5.65	4.75
Sri Lanka	1.10	n.a.	1.60	1.78	1.90	1.88	2.83	2.33	3.80	2.42	4.57	4.49	5.44	4.93
Thailand	1.46	1.10	1.78	1.70	1.52	2.30	2.30	3.09	2.42	4.12	2.94	5.17	3.41	6.06
Switzerland	1.30	n.a.	1.40	2.78	1.00	2.89	2.36	3.47	2.60	4.11	3.15	4.73	3.78	5.18
Total top 20	124.76	n.a.	157.18	253.34	209.92	327.04	266.88	396.56	312.78	516.47	360.62	656.57	409.90	793.89
Total	146.70	222.70	185.00	288.90	259.00	352.55	308.97	423.64	389.97	534.27	439.78	679.43	502.68	820.68

Source: Case study.
