



**REPORT OF THE WORKING GROUP
ON THE TELECOM SECTOR FOR THE
ELEVENTH FIVE YEAR PLAN
(2007-2012)**

**GOVERNMENT OF INDIA
DEPARTMENT OF TELECOMMUNICATIONS
MINISTRY OF COMMUNICATIONS & INFORMATION
TECHNOLOGY
(October, 2006)**

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Chapter-1

Introduction

Planning Commission constituted a Working Group on the Telecom Sector to make recommendations on the various policy matters for the preparation of the Eleventh Five Year Plan for Communication and Information Sector vide their O.M. No. 13040/3/2006-C&I dated 30.5.2006. The composition of the committee and terms of reference of the working group are as given below:

Composition:

S.No. Name & Designation

1.	Shri D.S. Mathur, Secretary, Department of Telecom	Chairman
2.	Shri M. Sahu, Joint Secretary, Department of Telecom	Convener
3.	Member (Finance), Telecom Commission	Member
4.	Administrator (USOF) Department of Telecom	Member
5.	Sr. DDG (TEC), Department of Telecom	Member
6.	Representative, Department of IT	Member
7.	Representative, Ministry of Finance	Member
8.	Representative, Ministry of Defence	Member
9.	Representative, Department of Space	Member
10.	Representative, Ministry Commerce & Industry	Member
11.	CMD, BSNL	Member
12.	CMD, MTNL	Member
13.	Secretary (IT), Govt. of West Bengal	Member
14.	Secretary (IT) Govt. of Assam	Member
15.	Dr. C. Murali Krishna Kumar, Adviser (C&I), Planning Commission	Member

Non Official Members

16.	Prof. Rekha Jain, IIM, Ahmedabad	Member
17.	Shri T.V. Ramachandran, Dir.General, COAI	Member
18.	Shri S.C. Khanna, Secretary General, AUSPI	Member
19.	Representative, CII	Member
20.	Representative FICCI	Member
21.	Representative, ASSOCHAM	Member
22.	Chairman, TEMA	Member

Terms of Reference

1. To evolve a strategy on telecom sector for the 11th Plan with the basic objective of development of world class infrastructure for supporting accelerated growth of IT and other sectors of the economy with special focus on technological changes in access parameters, convergence of services and markets, international scenario vis-à-vis WTO/IPR regimes and other relevant factors linked to growth like introduction of a comparative tariff structure etc;
2. To review existing schemes/programmes in this sector and suggest the type of scheme those need to be retained /included for the Eleventh Plan period;
3. To make recommendations for improving rural connectivity which should not only be affordable but also self financing and capable of supporting a multi media system of communications;
4. To make recommendations on further restructuring/reforms required in the post-convergence scenario including availability of spectrum, expansion of broad band and promotion and strengthening of R&D;
5. To suggest measures for promotion of private sector investments including Foreign Direct Investment (FDI) in the light of the experience gained so far;
6. To review the performance of telecom equipment manufacturing sector with identification of constraints and make recommendations for evolving an appropriate policy to ensure value addition during the indigenous manufacturing phase including quality control, product standardization, provision of maintenance and other services;
7. Set up a high powered group with all stake holders for efficient spectrum management and identify spectrum requirements for implementing new technologies and services such as DTV, DTT, 3G and the like. Also make recommendations for creation of Spectrum Management Fund for funding new initiatives in niche areas;
8. Any other issue of importance to policy formulation for the telecom sector including creation of a consolidated database.

The first meeting of the Working Group was held on 23.06.06 and was presided by Chairman (TC). It was decided in the meeting to constitute following Sub Groups:-

1. Network Expansion
2. Broad Band

3. Telecom Equipment Manufacturing
4. Technology and R&D
5. Taxes/ levies in Telecom Sector

Sub- Group on Network Expansion

The Sub - Group on Network Expansion had following Members:-

1.	Administrator, USOF	Chairman
2.	Wireless Advisor, DOT	Member
3.	DDG(VAS), DOT	Convener
4.	DDG(BS), DOT	Member
5.	Representative of Department of IT	Member
6.	Representative of Planning Commission	Member
7.	Representative of DOS	Member
8.	Representative of AUSPI	Member
9.	Representative of TEMA	Member
10.	Representative of FICCI	Member
11.	Representative of CII	Member
12.	Representative of ASSOCHAM	Member
13.	Representative of Association of V-SAT	Member
14.	Representative of Indian Cellular Association	Member
15.	Representative of Reliance Infocomm Ltd.	Member
16.	Representative of BSNL	Member
17.	Representative of Hutchison Group	Member
18.	Dr. Rekha Jain, IIM, Ahmedabad	Member
19.	Representative of GTL	Member
20.	Representative of QUALCOMM	Member

Terms of reference of Sub-Group on Network Expansion

- (i) To evolve strategies for development of world class telecom infrastructure in India;
- (ii) To evolve a strategy on telecom sector for the 11th Plan with the basic objective of development of world class infrastructure for supporting accelerated growth of IT and other sectors of the economy with special focus on technological changes in access parameters, convergence of services and markets, international scenario vis-à-vis WTO/IPR regimes and other relevant factors linked to growth like introduction of a comparative tariff structure etc;

- (iii) To review existing schemes/programmes in this sector and suggest the type of schemes those need to be retained/included for the Eleventh Plan period;
- (iv) To make recommendations for further improvement in rural connectivity;
- (v) To make recommendations on further restructuring /reforms for availability of spectrum required in view of growth of new wireless technologies;
- (vi) To suggest measures for promotion of private sector investments including Foreign Direct Investment (FDI) in the light of the experience gained so far;
- (vii) To identify spectrum requirement for implementing new technologies and services such as DTV, DTT, 3G and the like. Examination of possibility of creation of Spectrum Management Fund for funding new initiatives in niche areas;
- (viii) To recommend best practices for efficient spectrum management;
- (ix) Any other issue of importance to policy formulation for the network expansion, spectrum management and rural telephony; and
- (x) The Sub-Group may co-opt any person whose knowledge or expertise is considered to be useful by the Sub-Group and may invite such persons to attend the meeting.

Sub- Group on Broadband

The Sub-Group on Broadband was composed of the following members:-

1.	Shri T.V. Ramachandran, Director General COAI	Chairman
2.	DDG(LR), DOT	Convener
3.	Joint Administrator, USOF	Member
4.	Representative of Department of IT	Member
5.	Representative of M/o Health	Member
6.	Representative of M/o HRD	Member
7.	Representative of M/o I&B	Member
8.	Representative of Planning Commission	Member
9.	Representative of DOS	Member
10.	Representative of BSNL	Member
11.	Representative of MTNL	Member
12.	Representative of ISPAI	Member
13.	Representative of NASSCOM	Member
14.	Representative of AUSPI	Member
15.	Representative of Bharti Televentures Ltd.	Member
16.	Representative of Tata Tele Services Ltd.	Member

Terms of reference of Sub-Group on Broadband

- (i) To evolve strategies to become world leaders in telecom sector;
- (ii) To make recommendations for providing Broadband in rural areas which should be affordable and self-sustaining;
- (iii) Identifying areas of economy where Broadband coverage to be provided on priority such as schools, public health facilities, etc;
- (iv) To make recommendations on further restructuring/reforms for expansion of broadband required in the post-convergence scenario;
- (v) Any other issue of importance to policy formulation for Broadband.
- (vi) The Sub-Group may co-opt any person whose knowledge or expertise is considered to be useful by the sub-group and may invite such persons to attend the meeting

Sub-Group on Telecom Equipment Manufacturing

The Sub-Group on Telecom Equipment Manufacturing had following members:-

1.	Shri P. Balaji, President TEMA	Chairman
2.	DDG(IP), DOT	Convener
3.	Representative of DIPP	Member
4.	Representative of CII	Member
5.	Representative of FICCI	Member
6.	Representative of ASSOCHAM	Member
7.	Representative of AUSPI	Member
8.	Representative of COAI	Member

Terms of reference of Sub-Group on Telecom Equipment Manufacturing

- (i) To review the performance of telecom equipment manufacturing sector with identification of constraints and make recommendations for evolving an appropriate policy to ensure value addition during the indigenous manufacturing phase including quality control, product standardization, provision of maintenance and other services;
- (ii) To suggest measures for promotion of private sector investments including Foreign Direct Investment (FDI) in the light of the experience gained so far;

- (iii) To evolve strategies to make India a hub for telecom equipment manufacturing and for giving thrust to exports;
- (iv) Any other issue of importance to policy formulation for the telecom equipment manufacturing;
- (v) The Sub-Group may co-opt any person whose knowledge or expertise is considered to be useful by the sub-group and may invite such persons to attend the meeting.

Sub-Group on Technology and Research & Development

The Sub-Group on Technology and Research & Development consists of the following members:-

1.	Prof. N. Balakrishnan, Associate Director IISC	Chairman
2.	Shri Vijay Madan, ED C-DOT	Convener
3.	Sr. DDFG (TEC), DOT	Member
4.	Representative of Department of IT	Member
5.	Representative of DOS	Member
6.	Representative of IIT, Delhi	Member
7.	Representative of IIT, Madras	Member
8.	Representative of CSIR	Member
9.	Representative of BSNL	Member
10.	Representative of COAI	Member

Terms of reference of Sub-Group on Technology and Research & Development

- (i) To make recommendations on further restructuring / reforms required for promotion and strengthening of R & D in view of rapidly evolving technologies in telecom sector;
- (ii) To evolve strategies to make India a significant player in R&D activity of telecom sector;
- (iii) Any other issue of importance to policy formulation for R&D in telecom sector.
- (iv) The Sub-Group may co-opt any person whose knowledge or expertise is considered to be useful by the sub-group and may invite such persons to attend the meeting.

Sub-Group on Taxation/Levies in Telecom Sector

The Sub-Group on Taxation/Levies in Telecom Sector had the following members:-

1.	Shri Y.S.Bhave, Special Secretary ,DoT	Chairman
2.	DDG(FEB)	Convener
3.	Representative of M/o Commerce and Industry	Member
4.	Representative of DEA	Member
5.	Representative of AUSPI	Member
6.	Representative of COAI	Member
7.	Representative of TEMA	Member
8.	Representative of CII	Member
9.	Representative of BSNL	Member
10.	Representative of Tata Tele services	Member
11.	Representative of Bharti Televentures	Member
12.	Representative of ASSOCHAM	Member

Terms of reference of Sub-Group on Taxes/Levies in Telecom Sector

- (i) To review the present structure of taxes and levies across telecom sector;
- (ii) Formulation of strategies for reduction in number of taxes/levies and harmonization/rationalization of rate of taxes/levies with a view to balance revenue growth with growth of telecom sector;
- (iii) To suggest measures for promotion of private sector investments including Foreign Direct Investment (FDI) in the services sector;
- (iv) Any other issue of importance to policy formulation for the telecom sector including creation of a consolidated database.

The 2nd meeting of the Working Group was held on 18th August 2006. The five sub-groups presented their reports in the meeting and discussions were held on the same. The Chairman (TC) constituted a drafting group for preparing the final draft of the report. The Drafting Group consisted of Shri Sahu, JS (T), Ms. Moraes, DDG (FEB) and Shri Nikhade, Economic Advisor, DoT. Based on the discussions held in the final meeting of the working group on 22nd August 2006 the final report of the working group has been prepared.

The report contains 10 chapters. Chapter 10 summarizes the observations and recommendations of the working group.

Chapter-2

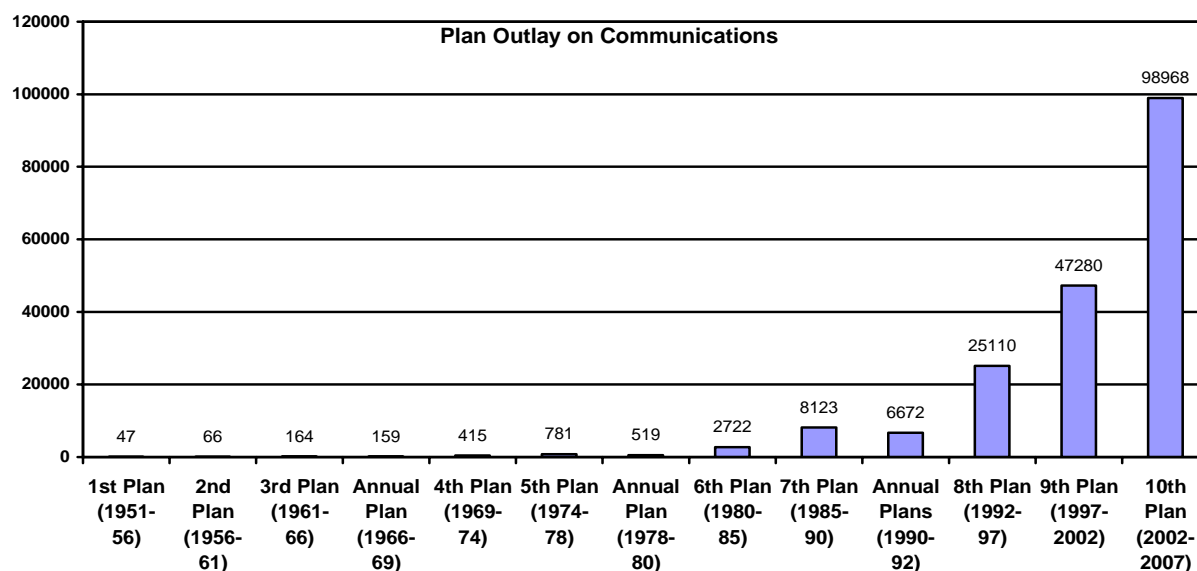
Current Status of the Telecom Sector

2.1 Introduction

The development of world class telecommunication infrastructure is the key to rapid economic growth and to bring social change of the country. Indian telecommunication sector has undergone a major process of transformation through significant policy reforms, particularly beginning with the announcement of NTP 1994 and was subsequently re-emphasized and carried forward under NTP 1999. Driven by various policy initiatives, the Indian telecom sector witnessed a complete transformation in the last decade. It has achieved a phenomenal growth during the last few years and is poised to take a big leap in the future also. Such rapid growth in the communication sector has become necessary for further modernization of Indian economy through rapid development in IT.

2.2 Plan Outlays on Communications

Keeping in view the importance of the sector, an increasing provision of outlays has been made in the successive Plans. During the Ninth Plan and Tenth Plan, an outlay of Rs.47280 crore and Rs.98968 crore were allocated for the communication sector. As seen in the subsequent paras, plan allocations have helped develop and expand the telecom infrastructure, improving the tele-density in the country over the period. The trend in the outlays since the First Plan can be seen from the following chart:



2.3 Expansion of the network

The telecom sector has shown robust growth during the past few years. It has also undergone a substantial change in terms of mobile versus fixed phones and public versus private participation. The following table will show the growth of telecom sector since 2003:

Item	Subscribers' base (in Million)				
	March,'03	March,'04	March,'05	March,'06	As on 30.09.06
Fixed lines	41.33	40.92	41.42	40.23	40.48
CDMA	0.61	9.46	15.92	32.67	38.51
GSM	12.69	26.15	41.03	69.19	91.01
Wireless (CDMA & GSM)	13.30	35.61	56.95	101.86	129.52
Gross Total	54.63	76.53	98.37	142.09	170.00
Internet subscribers	3.64	4.55	5.55	7.05	7.20 (as on 31.8.06)
Broadband subscribers	-	-	0.18	1.32	1.64 (as on 31.8.06)

Thus, the number of telephones has increased from 54.63 million as on 31.03.03 to 142.09 million as on 31.03.06, exhibiting a CAGR of 37%. Wireless subscribers increased from 13.3 million as on 31.03.03 to 101.86 as on 31.03.06, exhibiting a CAGR of 97%.

During 2005-06, the wireless connections grew at 78%, whereas landlines registered a negative growth. The number of Internet subscribers grew at 25%, while the broadband subscribers grew from a meager 0.18 million to 1.32 million during the year 2005-06.

2.4 Present status of Telephone network

India's 164 million robust telephone network, including mobile phones, is one of the largest in the world and 2nd largest among emerging economies (after China) with a wide range of services like basic, cellular, internet, paging, V-SAT etc. The status of the network is as shown below:

Telecom Network Status in India as on 31.08.2006	
Number of telephone connections	170 million (as on 30.9.06)
Number of telephone exchanges	37979 (PSU)
Switching capacity (Public)	83 million (PSU)
Village public telephones	5,51,064
Wireless (CDMA&GSM) subscribers	123.45 million
Broadband subscribers	1.64 million
Optical fibre route length (Public)	502008 KM
Microwave route length (BSNL)	64036 KM

Further, National Internet Exchange of India (NIXI) has been set up by DIT to ensure that Internet traffic, originating and destined for India is routed within India. This will substantially bring down the cost of Internet usage. It is expected that NIXI will take appropriate steps for increasing the utilization of such facilities.

2.5 Change in composition of sector

2.5.1 Public vs. Private: Government has taken several steps to encourage participation of private players to create a competitive environment in the sector. Consequently, the private sector is now playing an important role in expansion of telecom sector. This is also confirmed by the number of licensees from the private sector in telecommunications as shown below

Private Sector Participation (As on 31-03-2006) (Registrations/Licenses issued)	
Purpose/ Area	No. of Licenses/ LOIs/ Registration
Unified Access/ Cellular Mobile	78
Basic Services	2
National Long Distance	4
Infrastructure Provider-I	105
International Long Distance	5
Internet Service	399
Voice Mail & Audiotex Service	15
Public Mobile Radio Trunk Service	37
VSAT Service	11

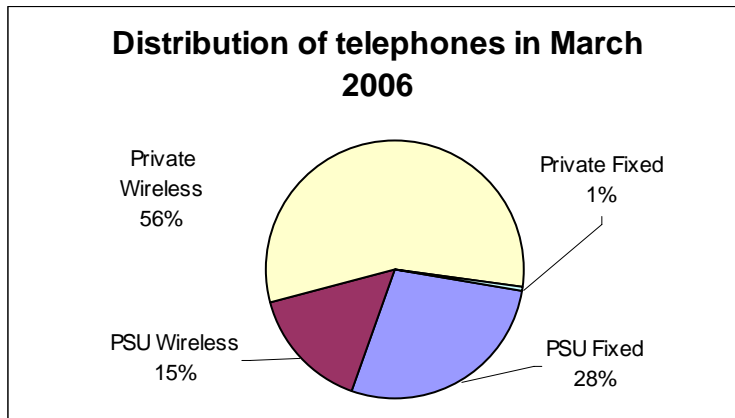
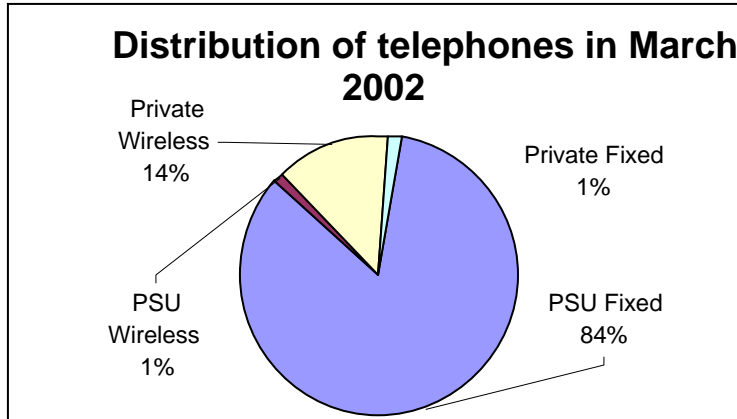
With the opening of telecom sector to the private operators, their share in the number of subscribers has been steadily increasing which is evident from the following table:

Number of Telephones (in million)								
Year	PSU Fixed	PSU Wireless	Total PSU	Private Fixed	Private Wireless	Total Private	Grand Total	%age share of PSUs
2002	37.70	0.47	38.17	0.59	6.21	6.80	44.97	84.88
2003	40.02	3.16	43.18	1.31	10.14	11.45	54.63	79.04
2004	39.77	6.71	46.48	1.15	28.90	30.05	76.53	60.73
2005	39.87	12.21	42.08	1.55	44.74	46.29	88.37	47.62
2006	39.25	21.83	61.08	0.98	80.03	81.01	142.09	42.99

The share of private sector in the number of telephones has increased from 15.12% (6.80 million telephones) in March 2002 to 57.01% (81.01 million telephones) in March 2006.

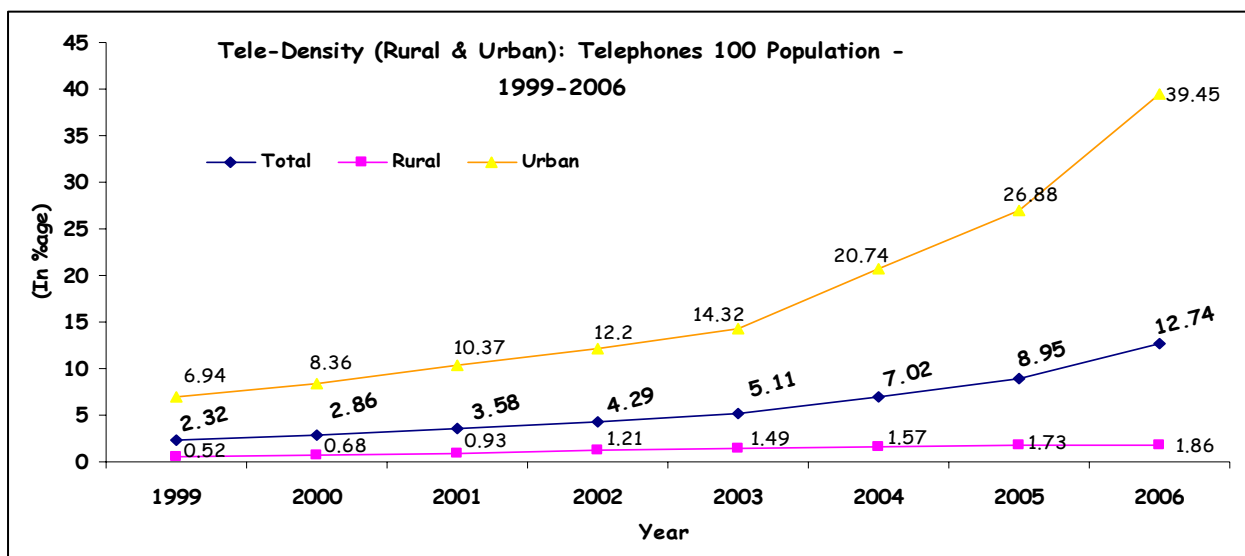
2.5.2 Mobile vs. Fixed

The preference for use of wireless phones has also been predominant in the sector. This is confirmed from the rising share of wireless phones, which increased from 14.85% (6.68 million telephones) in March 2002 to 76.18% (129.52 million telephones) in September 2006.



2.6 Trend in teledensity

Tele density in the country is steadily increasing from 5.11% as on 31.3.03 to 12.74% as on 31.3.06 and currently stand at 15.12% as on 30-09-2006. However, there is a wide gap between urban tele density (47.58%) and rural tele density (1.84%). The rural telephony has not kept pace with the impressive growth in urban connectivity.



2.7 Rural Telephony

Apart from the 14.79 million fixed and WLL connections provided in the rural areas, 551064 VPTs¹ have been provided. Thus, 90% of the villages in India have been covered by the VPTs. More than 2 lakh PCOs² are also providing community access in the rural areas. Further, Mobile Gramin Sanchar Sewak Scheme (GSS) – a mobile Public Call Office (PCO) service is provided at the doorstep of villagers. At present, 2772 GSSs are covering 12043 villages. Also, to provide Internet service, Sanchar Dhabas (Internet Kiosks) have been provided in more than 3500 Block Headquarters out of the total 6337 Blocks in the country.

2.8 Tariff Changes

The Indian Telecommunication sector has witnessed major changes in the tariff structure. The telecommunication tariff order (TTO) 1999, issued by the Regulator (TRAI), had begun the process of tariff rebalancing with a view to bringing them closer to the costs. This, supplemented by the increased competition, has resulted in a dramatic fall in the tariffs. For example, the peak long distance tariff between Delhi and Mumbai has come down from Rs. 30 per minute in 2000 to less than Rs. 2.40 per minute in 2004 for above 1000 Km. In the same fashion, ILD charges have also come down drastically from Rs. 61.20 per minute in 2000 to Rs. 7.20 per minute in 2004 for American Continent and other places in Western Hemisphere. Similarly, the cellular tariff for local call has reduced from Rs. 16 per minute to Re. 1 to Rs. 2 per minute. Under the One

¹ Village Public Telephones

² Public Call Offices

India Tariff Plan, BSNL and MTNL have reduced the STD rates to rupee one per minute for any distance w.e.f. 1st March 2006.

2.9 Performance of telecom equipment manufacturing sector:

As a result of Government policy, progress has been achieved in the manufacturing of telecom equipment in the country. There is a significant telecom equipment manufacturing base in the country and there has been steady growth of the manufacturing sector in the Tenth Five Year Plan. The figures for production and export of telecom equipment are shown in tabular form given below:

(Rs. in crore)

Year	Production	Export
2002-03	14400	402
2003-04	14000	250
2004-05	16090	400
2005-06	17833	1500

2.10 Telecom Development - International comparison

Telecommunication has grown very rapidly in India. However, viewed in the context of global growth pattern and indicators, it needs to achieve more in terms of tele density. As compared to China at 49.74% in December 2004, the teledensity in India was only 12.74% as on 31.3.06. There is a positive co-relation between the teledensity and the GDP³ of a country as the growth in the telecommunication sector has linkages to the other sectors of the economy. It is therefore, imperative that the telecommunication sector in the country grows at a rapid rate so that the access is available in all parts of the country including rural and remote areas. The status of tele density along with other indicators like per capita income, internet users etc. at an international level are given in the table below:

³ Gross Domestic Product

Status of telecom indicators in some countries as on December, 2005

Country	Population (Million)	GDP (per capita) US\$ 2004	Telephones (thousands)	Tele density (% age)	Internet Users (thousands)
USA	298.21	36273	360347	122.71	185000
UK	59.67	26369	94791	158.51	37600
Australia	20.16	25436	29880	148.25	14190
Brazil	186.41	3338	107987	59.78	22000
Mexico	107.03	6328	66974	62.58	18622
Sri Lanka	20.74	1031	4606	22.20	280
Korea (Rep)	48.29	14136	62087	128.56	33010
Japan	128.08	31324	153525	119.86	64160
Indonesia	222.87	1156	59682	26.79	16000
China	1315.84	1268	743861	56.53	111000
Pakistan	153.96	614	18049	11.72	10500
India *	1115.59	634	142092	12.74	60000
World	6728.08	5944	3309379	49.45	964272

* As on March 31, 2006.

Source: International Telecommunication Union

2.11 Policy reform

For a dynamic sector, reforms are necessitated by dynamics of changes including technological innovations. The telecom sector in India has been witnessing a continuous process of reforms since 1991. During the recent years, various policy initiatives have been carried out to give boost to the sector. Some of them are as under:

- National Long Distance service was opened to operators' w.e.f. 13.8.02.
- National Frequency Allocation Policy 2002 evolved.
- The monopoly of VSNL in ILD terminated from March 31st 2002.
- National Internet Backbone (NIB) covering all states has been commissioned.
- Instruction issued to all state Governments to provide expeditious approval for Right of way.
- Guidelines for Unified Access Service Licence regime was issued on 11.11.03.
- Calling Party Pump (CPP) regime was implemented w.e.f. 1st May, 2003.
- Indian Telegraph Act was amended for establishment of USO Fund. Non-lapsable USO Fund created on April 2002.
- IUC regime introduced.

- Several directives/regulations have been issued by TRAI regarding different telecom services, their tariffs, quality and internet services, which have contributed positively towards the growth of telecommunication sector.
- ISPs allowed setting up submarine cable landing stations for international gateways for internet.
- Radio frequency spectrum management has been modernized and automated to efficiently address dynamic needs of the liberalized user.
- Broadband policy was announced on October 14, 2004.
- ISPs have been permitted to use underground copper cables for establishing last mile linkages.
- FDI ceiling has been raised to 74% for various telecomm services.
- The operation of Automated spectrum management was commenced in January 2005.
- Access service provider can provide internet telephony internet services and broadband services. They can use the network of NLD/ILD service.
- Prior experience in telecomm sector no more a pre-requisite for grant of telecom service licenses.
- Annual license fee for National Long Distance, International Long Distance, Infrastructure Providers, VSAT Commercial and ISP has been reduced to 6% of Adjusted Gross Revenue (AGR) with effect from 01-01-2006.
- IPRPN Service permitted to ISPs.
- Delicensing of 2.40 - 2.4835 GHZ for indoor and outdoor use, 5.15 - 5.13 GHZ for indoor use.

Moreover, exemption/concessions have been given on the customs duty for importing equipment as well as components etc; besides excise duty exemptions and benefit under indirect taxes. All these reforms and policy initiatives have certainly had positive effect on the growth of Telecom sector.

Chapter 3

Tenth Five Year Plan (2002-2007) - A review

3.1 Introduction

During the Tenth plan, phenomenal growth rate of telecom services was achieved in the country. The Tenth plan had envisaged teledensity of 9.91 by March 2007. In order to achieve this target about 65.0 million additional connections needed to be provided during Tenth Plan. However, during 2002-06 itself, the total telephone connections increased by 113.08 million exhibiting the achievement of 173.91%.. The wireless phone network has grown from 13.30 million connections on 31.3.2003 to 101.86 million connections as on 31.3.2006. The teledensity of 12.74% by March 2006 was achieved, surpassing the target of Tenth plan (Annexure-I). With the same growth, the achievement may reach 2500 lakh telephone connections translating into a teledensity of 22% by 2007.

The performance of public sector units i.e. BSNL and MTNL has been impressive in GSM segment, whereas in fixed line segment it faced declining growth during the period. Against the target of 255 lakh, the addition by private sector was 892 lakh connections. Switching capacity has increased from 47.43 million as on 31.3.02 to 83 million lines including mobile as on 31.8.06 for the public sector units. Number of village public telephones increased from 468862 to 5, 51,064 during this period.

Given the low telephone density at 14 per hundred populations, which is below the global average, India offers vast scope for growth. It is therefore, not surprising that India has one of the fastest growing telecommunication system in the world with an average annual growth of about 40%. Recognizing that the telecom sector is one of the prime movers of the economy, the Government's regulatory and policy initiatives during the tenth plan have been directed towards establishing a world class telecommunications infrastructure in the country which has led to the positive result in the sector.

Thus, the major objectives envisaged in the tenth plan could be achieved to a great extent. Affordable and effective communication services could be offered as tariff declined substantially due to intense competition among the operators. Government has taken several steps to encourage the participation of private players to create competitive environment in telecom sector. About Rs.3582 crore have been already utilized for provision of universal services as per the objectives of the plan.

3.2 Growth of telephone connections

The total demand for new telephone connections (Fixed and Mobile) in the country as envisaged in the Tenth Plan period was 81.71 million telephones, out of this 50.16 million of Fixed Phones and 31.55 million of Mobile.

The target for the telephone connections during the Tenth Plan period were 65.023 million lines. The number of DELs⁴ (Fixed Lines+WLL) increased from 38.53 million (at the beginning of 10th Plan) to 72.90 million in 2005-2006 (as on 31-03-2006). By the end of Tenth Plan, this is expected to go up to 110.00 million. The telephone subscribers during the same period increased from 44.96 million to 142.09 million (as on 31-03-2006). The tele-density was estimated to increase from 4.29 as on March 31, 2002 to 13.27 per 100 populations by the end of Tenth Plan.

The number of Internet users has reached 7.05 million at the end of March 2006. The total production of the telecom equipments has reached a level of Rs. 17,833 crore at the end of 2005-06 and exports were to the tune of Rs.1500 crore. The details of the target and the progress made during the plan period are given in Annexure-II.

GROWTH OF FIXED LINES, CELLULAR MOBILE TELEPHONES AND INTERNET DURING TENTH PLAN 2002-2007

Item	Year				
	2002-2003	2003-2004	2004-2005	2005-2006	2006-2007
Fixed Lines (in millions)	41.62 (3.40)	42.84 (1.22)	46.19 (3.35)	48.98 (2.79)	40.64 (-8.34)
Wireless (in million)	13.00 (6.26)	33.70 (20.70)	52.18 (18.48)	93.11 (40.93)	123.45 (30.34)
Total	54.62 (9.66)	76.54 (21.92)	98.37 (21.83)	142.09 (43.72)	160.09 (22.00)
Tele-density per 100 persons	5.11	7.02	8.95	12.74	14.62
Internet Subscribers (in Million)	3.64	4.55	5.73	8.12	
Production of Telecom Equipment (in Rs. crore)	14400	14000	16090	17833	

NOTE: 1. The figures in brackets indicate additional telephones added during the year.

Source: ERU, DOT

⁴ Direct Exchange Lines

3.3 Rural Telephony

The telecom network in the rural areas expanded at fast pace during Tenth Plan (2002-2007). The number of DELs in the rural area increased from 9.14 million in March, 2002 to 14.77 million by March, 2006. The rural teledensity increased from 1.44 percent in 2002-03 to 1.86 per cent in March, 2006. The bulk of the investment in rural telecom has been made by the public sector operator viz. BSNL. The private operators have provided only 12665 VPTs by the end of March 2006.

Status of Rural telephones and Tele-density during 10th Plan (2002-2007)

Year	2002-2003	2003-2004	2004-2005	2005-2006	2006-2007 (as on 30-09-2006)
Telephone (in million)	11.41	12.27	13.57	14.77	15.12
Tele-density (per 100)	1.44	1.58	1.73	1.86	1.84
Share of Rural Areas in total DELs (including cellular)	21.34	16.03	13.25	10.41	8.99 (as on 31-08-2006)

Source: - ERU, DoT

3.4 Investment:

During this period, the public sector operators' viz. BSNL and MTNL made the major investments. The bulk of the investments in cellular mobile segment were by the private operators. The private basic operators added only 5.58 million DELs (fixed phones) during the period from 2002 to 2006.

The total estimated investments by the public sector operators during the first four years of the Tenth Plan (2002-2007) were Rs. 36753.77 crore. The details are as under.

(Rs. in crore)

Operators	2002-03	2003-04	2004-05	2005-06	2006-07 (up to 6/2006)
BSNL	12057.00	6537.00	7578.00	6838.00	1616.11
MTNL	1053.91	965.91	1038.48	685.47	233.83
Total Investment by the Public Sector Operators	13110.91	7502.91	8616.48	7523.47	1849.94
Foreign Direct Investment	9863.50	10318.40	10412.70	11799.61 (up to 6/06)	

Annexure-1

PERFORMANCE OF TELECOM SECTOR

Sl. No.	Item	As on		As on	As on	As on	As on	As on	
		31.3.1994	31.3.1999	31.3.2002	31.03.2003	31.03.2004	31.03.2005	31.03.2006	
1	Telephones (Million) Basic (Fixed + WLL)	Public	8.03	21.59	37.94	40.62	40.49	41.76	41.98
		Private	-	0.02	0.59	1.31	2.36	15.58	30.92
		Total	8.03	21.61	38.53	41.93	42.85	57.34	72.90
2	Mobile (Public+Pvt)(Million)	-	1.20	6.43	12.69	33.69	41.03	69.19	
Total Phones (Million)		8.03	22.81	44.96	54.61	76.54	98.37	142.09	
3	Teledensity	0.89	2.33	4.29	5.11	7.02	8.95	12.74	
4	Switching Capacity(Incl.CMPs) (Million)	9.80	26.05	47.43	54.56	60.02	66.74	79.21	
5	Village Public Telephones (VPTs)	131334	340640	468862	514287	521468	530778	547111	
6	Public Call Offices (PCOs)	197700	520680	1065130	1400101	1759340	2151044	2385595	
7	Optic Fibre Cables (OFC) RKms	35317	64809	326271	402083	445822	471199	490437	
8	Foreign Direct Invest. (Rs. Million)	161	42211	95621	98635	103184	104127	117996.1*	
9	Rural DELs' (Fixed) (Million)	NA	3.65	9.14	11.41	12.27	13.57	14.77	

*June 06

Annexure-2

APPRAISAL OF TENTH PLAN (2002-07)

Physical Performance of Telecom Sector

Scheme	Units	Ninth Plan Achievement	Tenth Plan Targets	2002-03 Achievement	2003-04 Achievement	2004-05 Achievement	2005-06 Achievement	April-July 2006 Achievement	2002- 06 Achievement	2002- 06 %age Achievement
Total DELs	Lakh Lines	236.01	650.23	96.48	219.23	218.33	437.20	159.56	1130.80	173.91%
Fixed	Lakh Lines	0	96.89	23.32	-2.47	5.05	-11.97	6.04	19.97	20.61%
WLL	Lakh Lines	0	62.93	10.6	87.03	64.57	167.44	24.64	354.28	5.630
GSM	Lakh Lines	0	235.41	62.56	134.67	148.71	281.73	128.88	756.55	321.38%
BSNL	Lakh Lines	218.86	367.67	47.70	34.60	52.86	82.25	7.56	224.97	61.19%
Fixed	Lakh Lines		80.9	22.12	0.19	4.24	-4.36	-9.64	12.55	15.51%
WLL	Lakh Lines		62.93	3.19	4.43	6.69	9.44	1.81	25.56	0.406
GSM	Lakh Lines		223.84	22.39	29.98	41.93	77.17	15.39	186.86	83.48%
MTNL	Lakh Lines	17.15	27.56	2.38	-1.48	3.19	7.70	1.94	13.73	49.82%
Fixed	Lakh Lines		15.99	1.20	-2.66	-3.16	-1.94	-0.84	-7.40	-46.28%
WLL	Lakh Lines		0.00	0.27	0.50	1.14	-0.95	-0.19	0.77	-
GSM	Lakh Lines		11.57	0.91	0.68	5.21	10.59	2.97	20.36	175.97%
Private	Lakh Lines	0	255.00	46.40	186.11	162.28	347.25	150.06	892.10	349.84%
Fixed	Lakh Lines			0.00	0.00	3.97	-5.67	16.52	14.82	-
WLL	Lakh Lines			7.14	82.10	56.74	158.95	23.02	327.95	-
GSM	Lakh Lines			39.26	104.01	101.57	193.97	110.52	549.33	-

[contd..]

Scheme	Units	Ninth Plan Achievement	Tenth Plan Targets	2002-03 Achievement	2003-04 Achievement	2004-05 Achievement	2005-06 Achievement	April-July 2006 Achievement	2002- 06 Achievement	2002- 06 %age Achievement
TAX	Lakh Lines	25.09	0	10.61	11.08	7.97	8.15	1.42	39.23	-
BSNL	Lakh Lines	23.05		10.11	10.58	8.02	8.21	1.42	38.34	-
MTNL	Lakh Lines	2.04		0.50	0.50	-0.05	-0.06	0.00	0.89	-
Microwave	000Kms	87.35		8.08	2.00	1.43	-2.86	0.31	0.31	-
OFC	000RKms	273.83	0	87.55	55.00	-19.24	19.24	11.56	154.11	-
BSNL	000RKms			75.81	35.00	-18.26	18.26	11.37	122.18	-
MTNL	000RKms			11.74	20.00	-0.98	0.98	0.19	31.93	-
VPT	Nos.	218860	18000	3693	2960	9310	16333	3953	36249	201.38%

Chapter 4

Approach to the 11th Five Year Plan Period (2007-2012)

Plan Approach

4.1 Introduction: The Draft Approach Paper circulated by Planning Commission to the 11th Plan enumerated the major challenges which need to be addressed during the 11th Plan as enumerated below:

- (a) Providing essential public services for the poor: The key issues of public services that have been identified are education and health. *Telecommunication can also play a major role in the delivery of these public services through tele-education and tele-health.*
- (b) Regaining agricultural dynamism : The growth rate of agricultural GDP in the 11th Plan is proposed to be increased to 4% as compared to 1% present growth rate of agricultural GDP. *Through the increased broadband availability, telecommunication can play a major role through which the farmers may be in a position to access the markets online, for example, commodity exchange.*
- (c) Increase in manufacturing competitiveness : The growth rate targeted for the manufacturing sector in the 11th Plan is 12%. One of the constraints in achieving a faster growth of manufacturing has been identified as infrastructure including communication. *Therefore, it is important that India is able to provide a world class communication infrastructure so that it can help in removing one of the constraints for achieving manufacturing competitiveness.*
- (d) Developing Human Resources : India has a competitive advantage among the emerging economies on account of its high quality manpower skills which are needed in the knowledge intensive centres. Therefore, in the 11th Plan it has been proposed that the quality and range of training should keep pace with the changing needs of the economy.
- (e) Protecting the environment : A fine balance between environmental sustainability and economic growth is to be recognized and kept in mind while developing the developmental strategy.
- (f) Improving rehabilitation and re-settlement practices : In order to prevent conflict and threat to peace and development, it is necessary to frame a transparent set of policy that address compensation.
- (g) Improving Governance

- (h) Disparities and Divides : With respect to telecommunication sector it is important that efforts are made to bridge the digital divide. The divide between urban and rural India, regional backwardness also needs to be kept in mind while framing the approach for the 11th Plan. Special emphasis is to be paid towards the development of North East region of the country.

4.2 Issues requiring attention during the 11th Plan

The emphases on infrastructure creation under the Telecom policies 1994 and 1999 have resulted in creation of international standard telecom infrastructure in the country. Increasing and sharing infrastructure is imperative for developing country like India to meet ambitious target. Moreover, considering the fact that 70% of the population lives in rural areas in India, for achieving larger telecom base, the focus has to be on telecom services in rural areas. In spite of rapid growth in Telecom sector, there is big gap between urban tele density and rural tele-density. As mobile services is going to be a key driver for increasing tele density in rural areas, there is need to optimize the usage of USO fund fully to roll out services in rural areas.

To accelerate broadband connectivity, equipments need to be made available at the affordable price, by reducing duties on inputs and finished products at par with that of mobile services. The country should also benefit from full range of services that can be offered using the spectrum efficiently.

FDI in Telecom sector has increased in recent years with value of 81.62 billion with share of 10% in total inflow during January 2000 to June 2005. This is mainly in telecom services and not in telecom manufacturing sector. Therefore, it is essential to enhance the prospect for inflow of increased funds. The NTP 1999 sought to promote exports of telecom equipments and services. But till date export of telecom equipment remains minimal. Most of the state-of-the-art telecom equipments including mobile phones are imported from abroad. There is thus immense potential for indigenous manufacturing in India. Certain measures like financial packages, formation of a telecom export promotion council, creation of integrated facilities for telecom equipment through SEZ and encouraging overseas vendors to set up facilities in India, are required for making India a hub for telecom equipment manufacturing and attract FDI.

4.3 Focus of the 11th Plan

The overall focus of the 11th Five Year Plan, therefore, with respect to telecom would be on evolving a strategy for the development of world class infrastructure for supporting accelerated growth of all sectors, bridging the digital divide, an optimum utilization of spectrum, focus on policy recommendations for promotion of private sector investment including FDI and to review the performance of telecom equipment manufacturing sector.

4.4 Thrust Areas for the 11th Plan

In consonance with the above approach, the thrust areas identified by Department of Telecom are:

1. Network expansion

- Provision of 250 million connections by 2007 and 500 million connection by 2010.
- Provision of mobile coverage of 85% geographical area by 2007.
- 45 MHz of additional spectrum from Defence to be made available for the growth of mobile services.

2. Rural Telephony

- One telephone per three households by 2007 (about 50 million rural connections) and one phone per two rural household by 2010 (about 50 million rural connections).
- Mobile access to all village with population of more than 1000 by 2007.

3. Broadband

- Broadband coverage for all secondary and higher secondary schools by 2007
- Broadband coverage of all public health care centres by 2007
- Broadband coverage for all Gram Panchayats by 2010

4. Manufacturing and R&D

- Making India a hub for telecom manufacturing by facilitating more and more telecom specific SEZs.⁵
- Providing platform for export promotion of telephone equipment and services by setting up Export Promotion Council.

4.5 Specific physical targets for the 11th Plan:

1. To reach a telecom subscriber base of 600 million.
2. To provide 200 million rural telephone connections by 2012 i.e. to reach a rural teledensity of 25%.
3. To provide telephone connection on demand across the country at an affordable price.
4. To reach a target of 20 million broadband connections and 40 million internet connections by 2010 as envisaged in Broad policy 2004.

⁵ Special Economic Zones

5. To provide the broadband connection on demand across the country by 2012.
6. To provide 3G services in all cities/town with more than 1 lakh population.
7. To facilitate introduction of mobile TV.
8. To provide broadband connectivity to every secondary school, health centre, Gram Panchayat on demand in two years.
9. To make India a hub for telecom manufacturing by facilitating establishment of telecom specific SEZs.

4.6 Requirement of Telecom Equipment during 11th Plan

4.6.1 It is expected that there will be requirement of telecom equipment worth US \$ 73 billion during the 11th Plan in India based on the projections above.

Domestic Requirement of Telecom Products:

	Year 1 Million US\$	Year 2 Million US\$	Year 3 Million US\$	Year 4 Million US\$	Year 5 Million US\$	Total Million US\$
Wire line Telephone						
CPE	30	40	50	60	70	250
Active Infrastructure	300	400	500	600	700	2500
Mobile Telephone						
Handset (New Connection)	2800	3200	3600	3800	3800	17200
Handset (Replacement)	2000	2800	3600	4800	6000	7200
Active Infrastructure	2250	2550	2850	3000	3000	13650
Wire line Broadband						
CPE (Modems)	2100	2100	2400	2700	2700	12000
Active Infrastructure	1400	1400	1600	1800	1800	8000
Wire less Broadband						
PC Card	300	450	600	750	900	3000
Active Infrastructure	500	750	1000	1250	1500	5000
Optical Fiber Cable	120	140	160	180	200	800
E-Governance initiatives						
Defense - Telecom	400	400	600	800	1000	3200
Total Requirement	12200	14300	16960	19740	21670	72800

4.6.2 Targets for Telecom Equipment Manufacturing: The present production level of telecom equipment is around US\$ 2.8 Billion with a value addition of about US\$ 0.3 Billion. India has to position itself as a 'Regional Hub' for telecom equipment manufacturing as domestic and export volumes offers a tremendous potential for profitable telecom equipment manufacturing. Considering 75% of the Indian demand of telecom equipment & handsets worth US \$ 73 billion to be met through indigenous manufacturing and an export potential of US \$ 12 billion, the total telecom equipment production target could be US\$ 67 billion for 11th five

year plan and 40% value addition in the high value telecom equipment to be achieved at the end of 11th five year plan.

The Asia Pacific region offers a huge export opportunity since it is one of the fastest growing regions for telecom services. The following targets for exports of telecom equipments may be kept:

Year 1 Million US\$	Year 2 Million US\$	Year 3 Million US\$	Year 4 Million US\$	Year 5 Million US\$	Total Million US\$
400	1000	2000	3600	5000	12000

4.8 Public Sector – Fund requirement for 11th Plan

The public sector operators i.e., BSNL and MTNL have the objective to provide world class telecom services including value added services at affordable prices. The fund requirement (estimated) during 11th Plan of the two PSU's is as follows:

(Rs. in crore)

PSU	2007-08	2008-09	2009-10	2010-11	2011-12	Total
BSNL	19203.00	20892.00	22497.00	24319.00	26143.00	113054.00
MTNL	1912.25	1513.98	1895.84	1429.73	1824.51	8576.31
Total	21115.25	22405.98	24392.84	25748.73	27967.51	121630.31

Chapter 5

Rural Network Expansion

5.1 Introduction

The telecom development in rural areas assumes special significance in India as more than 70% of the population lives in villages. Telecommunications constitute the core of, and provide the infrastructure for the information economy as a whole. It results in high social and private returns from telecommunication investment. Therefore, telecommunication is now widely considered a strategic investment to maintain and develop competitive advantage at all levels. Countries & firms that lack access to modern telecommunication systems cannot effectively participate in global economy. A well spread out provision of affordable telecom services in rural areas enhances the ability of people to participate in market economy which, in turn, improves their productivity and contributes to their earnings. The expansion of telecom services is expected to open up huge untapped opportunities such as tele-education, tele-medicine, e-governance, e-commerce etc

5.2 Current status of rural teledensity

Tele density in the country is steadily increasing from 5.11% as on 31.3.03 to 14.10% as on 31.7.06. However, there is a wide gap between urban tele density and rural tele density.

	As on 31.3.05	As on 31.3.06	As on 31.08.06
Urban	26.88	39.45	44.05
Rural	1.73	1.86	1.86
Total	8.95	12.74	14.10

As seen above, the rural telephony has not kept pace with the impressive growth in urban connectivity. This in turn is leading to the widening of the 'digital divide'. The existing Rural lines are 14.77 million (Landline + FWT) and this translates into rural Teledensity* of 1.86 (*without taking into consideration mobile phones provided in the rural areas).

5.3 Vision 2012 for Rural India

1. 200 million rural telephone connections which will translate into a rural teledensity of 25%.

2. Broadband connectivity to be available on demand. Broadband connectivity would have been provided to schools, Health Centres and Panchayat offices. Each village would have at least one broadband enabled kiosk.

The assumptions used for crystallizing the vision are:

- a) Population of India in 2012- 1200 million
- b) Population in Urban Areas in 2012 - 400 million
- c) Rural Population in Rural India will be around 800 millions assuming that urban population will increase from 28% to 33%.
- d) Rural population above poverty line will be around 640 millions assuming that 80% of the rural population will be above poverty line as compared to 74% in the year 2000.
- e) Total number of rural households will be around 160 millions assuming 5 members in one household, out of which 130 millions households will be above poverty line.
- f) Considering one telephone per three households in the year 2010 and one telephone per two households in the year 2012, the number of rural telephones will be around 80 millions, which appears to be on lower side considering the growth of economy and falling telephone tariffs.
- g) Taking into account the lower tariffs and hence affordability, there will be average 1.5 telephones in every rural household above poverty line by the end of 11th Five Year Plan. Therefore, around 195 millions rural telephone connections will be required by the year 2012. It is further expected that one out of 3 household below poverty line will be able to afford the telephone, there will be another requirement of 10 millions rural telephone connections. Thus, there will be a total requirement of 205 millions rural telephone connections.
- h) Considering that the economy of the country grows at the present rate of 7-8% and the rural ARPU remains at the present level of approximately Rs. 300, the affordability of the rural folk will increase considerably. It can be safely assumed that the rural teledensity can go up to 25% vis-à-vis 100% teledensity in the urban areas by the year 2012. Therefore, there will be about 200 million rural telephone connections.
- i) Rural teledensity will increase as telecommunication is going to be a infrastructure/ business tool for carrying out other rural economic/social activities. It is accepted fact that 1% increase in teledensity results into 3% increase in the rate of growth of GDP.

- j) Taking the above noted assumptions, it is expected that rural network will grow to the size of 200 million telephone connections
- k) The year-wise growth by the end of 11th Plan can be predicted as detailed below:

Financial Year	Rural Subscriber Base in Million*
2007-08	30 million
2008-09	55 million
2009-10	95 million
2010-11	140 million
2011-12	200 million

* It is assumed that the rural subscriber base at the end of 2006-07 will be about 20 million.

5.4 Funding

Presently, universal service in telecommunication is funded through universal access levy (currently 5% of the licence fee). The same is used for providing access to public telephones - Village Public Telephones, Rural Community Phones and support landlines and Fixed Wireless Terminal Phones as RDELs⁶. However, it is proposed to support infrastructure for taking mobile telephony & broadband into rural and remote areas.

By and large the amount collected as USO levy should be sufficient to support the rural programme. However, a mechanism needs to be put in place to ensure that the funds are made available to the USOF Administration as and when required to discharge these obligations. If required the provision in the Indian Telegraph Act which envisages support from the Central Government may have to be invoked.

Information regarding fund position for USO is as follows:

(Rupees in crore)

Year	Opening Balance	Funds collected as Universal Service Fund Levy (5%)	Funds allocated and disbursed
2002-03	0.00	1653.61	300.00
2003-04	1353.61	2143.22	200.00
2004-05	3296.83	3457.73	1314.59
2005-06	5439.97	3533.00	1766.85
2006-07	7206.12	3488.00 (Estimated)	1500.00 (allocated against a requirement of Rs. 3500 cr.)

⁶ Rural Direct Exchange Lines

5.5 Recommendations to achieve vision 2012

1. Greater synergy between all the players – all Government Departments, Service Providers, Infrastructure Providers, State Governments. In particular, greater coordination with the Department of Space is necessary.
2. Create a master data base which shows the entire infrastructure available (Exchanges, MSCs, BSC, OFC, Towers, etc.) and which can be used to identify the infrastructure gaps. Support creation of infrastructure to fill up the gaps.
3. Promote sharing of infrastructure so that costs can be kept down – this is essential for rural penetration. Incentivize such sharing.
4. Encourage adoption of modern technology which will reduce costs and improve quality of service.
5. Take hard decisions to sort out problems which come in the way of faster penetration – e.g., interconnection.
6. Pay special attention to the most backward and remote areas like the North East, J&K, tribal belts. Cost should not be a consideration while providing connectivity to these areas.
7. Set up a broad-based “Technology Watch Group” with representatives from the private sector which can constantly review new technologies and recommend measures which will help India to improve delivery and reduce costs in rural areas.
8. Simplify procedures for permissions, registrations, and sanctions so that roll-out can proceed at a faster pace.
9. Plan spectrum allocation in a manner which will enable smooth rural roll-out. Spectrum will have to be reserved for rural broadband.
10. A careful watch would have to be kept on the economic viability of the rural operations. If necessary rural specific concessions may have to be announced.
11. Non-availability of adequate and steady power supply in the rural areas is a major problem. Providing power back-up increases the costs drastically to the detriment of the consumer. This problem would have to be addressed.
12. In order to reduce costs of equipment, promote manufacture by indigenous entrepreneurs.

Spectrum Related

1. Spectrum being a limited resource, with competing and increasing demand, there is needed to have optimum sharing of the resource by all stake-holders.
2. Spectrum planning has to be done for longer periods taking into account the emerging new technologies.
3. It is absolutely essential to do a thorough refarming of the spectrum keeping in view the needs of various sectors. While refarming spectrum care should be taken to meet the genuine needs of the Defence sector in a manner which will not call upon them on frequent intervals

to surrender a part of the spectrum allocated. If required revenues from spectrum charges may be utilized to support users who are compelled to migrate from one set of frequency to another.

4. The spectrum management needs to be strengthened not only in terms of numbers but also in terms of technical competence.
5. There should be total transparency in the allocation of spectrum.
6. A system of spectrum audit should be introduced so that allocated spectrum can be withdrawn from inefficient users.
7. Ways and means of greater sharing between satellite and terrestrial services should be identified and decisions taken and implemented on an urgent basis.
8. While allocating spectrum the international practices should be kept in view so that India can take advantage of the economies of scale of equipment manufactured.

“Fixed-line operators are under enormous pressure as the use of voice over IP (VOIP) on fixed-line networks drives voice pricing close to zero, and as the fixed-to-mobile convergence trend threatens their residential customer base.

Respondents to the Foresight 2020 survey from telecom service providers rated the disruptive potential of new technologies as by far the biggest risk they face over the next 15 years.”

- *Foresight 2020 (The Economist Intelligence Unit 2006)*

To indicate importance of NGN

“Mobile is the largest telecommunication network in many countries, particularly lower income nations. It seems appropriate that it be included in universal access determination.”

“The examples of Uganda, as a developing country and Finland, as a developed one, go to show that mobile can be an effective means of achieving social policy objectives like universal access. To make this happen successfully, policy makers and regulators need to turn their attention from fixed lines to mobile and to gear their policies appropriately.”

- *World Telecommunication Development Report – 2002 (ITU)*

To indicate importance of cellular telephony in bridging digital divide

Chapter 6

Broadband

6.1 Introduction

Recognizing the potential of ubiquitous Broadband service in growth of GDP and enhancement in quality of life through societal applications including tele-education, tele-medicine, e-governance, entertainment as well as employment generation by way of high speed access to information and web based communication; Government has announced Broadband Policy 2004. Well-developed information and communication network infrastructure and applications, adapted to regional, national infrastructure and applications, adapted to regional, national and local conditions, through easily-accessible and affordable broadband can accelerate the social and economic progress of country, and the well-being of all individuals, communities and peoples.

6.2 Targets proposed in the Broadband Policy 2004

The following targets as proposed in the Broadband Policy 2004 may be taken as a benchmark for future growth of broadband and internet in the country.

Year Ending	Internet Subscribers	Broadband Subscribers
2005	6 million	3 million
2007	18 million	9 million
2010	40 million	20 million

6.3 Strategies to enable the growth of Broadband

For the knowledge-based society to grow quickly and for reaping the consequent economic opportunities, the spread of broadband needs to be given top priority. For achieving a desirable growth and greater penetration, three ingredients have to be tackled: core infrastructure, affordable access devices / connectivity and local content. Following are major steps towards achieving faster and equitable growth of broadband in the country:

- (i) Utilization of existing infrastructure (copper loop, fibre, satellite, and radio etc.) in an optimum manner.
- (ii) Encouraging the use of alternative technologies to provide broadband connectivity where OFC is not available. It should, inter-alia, have the following features:
 - interoperability
 - low cost
 - ease of roll-out

- adequate and affordable bandwidth
 - reasonably long “technological” life
- (iii) Allocation of adequate spectrum for facilitating wireless broadband
- (iv) Rationalization of spectrum charges in rural areas
- (v) Ensuring adequate and low-cost availability of international and national bandwidth by ushering a low revenue sharing regime for competitive local and long distance carriers.
- (vi) Active participation of user / implementing Departments/agencies.
- (vii) Higher PC & smart hand held devices penetration for overall growth of Internet and Broadband services.
- (viii) Availability of local content and applications are an important constituent for overall growth of Internet and Broadband services. Following major steps are proposed:
 - Facilitation for creation of multimedia and video content in the country
 - Incentive for development of regional and local language content
 - Thrust to the development of content and application for e-governance, e-education, e-health etc.
 - Common standards in the content creation and delivery systems
 - Benchmarks on quality of content with review and validation
 - Sharing of content delivery setup among telecom service providers
 - Protection of digital content and copyright
- (ix) Upgrading of access and core network in tune with NGN⁷ standards to provide bandwidth on demand and triple play.
- (x) Interconnection should be facilitated and interconnection cost should be brought down. Time for increasing the interconnect capacity should be reduced
- (xi) Government support - The two generic areas are funding/subsidies and liberalized regulation
 - Direct: either for consumer usage or network construction investment. Fast track statutory permissions.
 - Indirect side: the steps are usually to give tax credits and low interest loans for both infrastructure players and consumers.
- (xii) PPP⁸ to be encouraged and citywide wireless networks like Pune should be encouraged in all cities and towns by Municipalities.
- (xiii) An equitable and technology neutral policy of spectrum allocation should be followed.
- (xiv) Optimizing spectrum utilization by vacating those spectra which are not optimally utilized.
- (xv) Promotion of investment in human capital creation / skills development in existing areas of gaps (CDN⁹, billing, payment, content

⁷ Next Generation Network

⁸ Public Private Partnership

aggregation, OSS/BSS¹⁰) for broadband space. Dynamic nature of technology will demand flexible and skilled resources.

- (xvi) Government to mandatory observe ICT in its day to day operations and encourage the usage of Internet for:
 - o Land records and property transactions
 - o Filing of IT/ Tax returns
 - o Vehicle registration
 - o Processing of driving licenses
 - o Processing of passport applications, ration card, etc.
 - o Payment of electricity and water bills, etc.
 - o Education and agricultural consultations
 - o Tele-medicine etc.
 - o Police and law enforcement agencies
 - o Regulatory compliances
 - o Company Law
 - o Educational Qualification
 - o Distance Learning
- (xvii) Keep a track on global standards in technology / services in context of interoperability & standardization.
- (xviii) Review of Encryption standards to bring them in tune with current requirements
- (xix) Synchronization of time stamping with national clock for Internet and Broadband service providers
- (xx) Migration to IPv6 to be given due priority, in order to spread Internet much faster.
- (xxi) Review and implementation of legal provisions in terms of IPR¹¹
- (xxii) The targets as proposed in the Broadband Policy 2004 may be taken as a benchmark for future growth of broadband and internet in the country.

6.4 Recommendations

(A) For increasing the spread of Broadband in rural areas

- (i) As voice telephony objectives in rural and remote areas are being met through various activities being supported by USOF¹², "Broad band connectivity" to rural areas should also get support from USOF.
- (ii) Optimum utilization of existing infrastructure.
- (iii) Maximal utilization of OFC so that bandwidth does not become a constraint in future.
- (iv) The availability of CPE¹³ at an affordable price is a key factor for it to be successful in rural kind of scenario. Import tariff & Excise duties in this space should be brought to zero. A mechanism needs to be created through which the TCO¹⁴ for CPE tends to Zero.

⁹ Content Delivery Network

¹⁰ Operations and Business Support Systems

¹¹ Intellectual Property Rights

¹² Universal Service Obligation Fund

¹³ Customer Premises Equipment

¹⁴ Total Cost of Ownership

- (v) Active involvement of user Departments/ agencies; USOF may support provision of connectivity while user departments may provide CPE and suitable content development.
- (vi) Adequate and reliable power supply for operating the access device and network in the rural areas as existing power supply scenario in rural areas is extremely grim. In this regard, use of suitable non-conventional resources of energy may be given due importance.
- (vii) Allocation of adequate spectrum for facilitating wireless broadband and Rationalization of spectrum charges in rural areas. It is desirable that the spectrum in the frequency band 2.50 to 2.69 and 3.4 to 3.6 GHz be coordinated with DoS¹⁵ for its vacation and further use for the existing and emerging wireless technologies. Further, delicensing of frequency band 5.15 GHz – 5.35 GHz / 5.725 GHz – 5.875 GHz for outdoor usage needs to be expedited.
- (viii) By August, 2006, Broadband services in 400 cities have been introduced and service providers have plans to reach 1000 cities by end of 2007. These cities include 63 cities identified under the National Urban Renewal Mission. Service providers may review including more cities.
- (ix) The real challenge is to connect the remote villages, unconnected so far due to geographical remoteness and lack of telecommunication infrastructure. In such a scenario Wireless appears to be a very relevant solution to the above connectivity challenges, merited with its ease of deployment and its ability to provide connectivity on a point to point and point to multipoint basis, to cover a large geographical area in comparatively less time.
- (x) A number of standards-based wireless products are available for connectivity requirements. Family of products less than 802.11x standard are available in the market and have been field-tested both for indoor and outdoor installations. However, lack of features like NLOS¹⁶ coverage and Point to Multipoint deployment for longer distance with high data rate limits its use in rural scenario.
- (xi) Diversified use of shared rural broad band infrastructure to provide new opportunities, augment income, promote overall development in following area:
 - o Tele-education,
 - o Tele-medicine,
 - o e-gov services and for rendering crucial information in areas like
 - o Agriculture,
 - o Animal husbandry, etc. to the villages.
 - o Micro-finance
- (xii) Promotional roles by User Departments:

¹⁵ Department of Space

¹⁶ Non / Near-Line-Of-Sight

- Education: One-stop education portal for all educational requirements with NIL connectivity / bandwidth cost proposed by M/o HRD.
 - Health
 - Agriculture
 - Rural Development
 - Panchayati Raj
 - DIT
- (xiii) It is important to recognize that there are several agencies and players already involved in the task of providing such connectivity:-
- Space Department (e.g., Edusat, Health & tele-medicine)
 - Department of Information Technology (e.g., CIC¹⁷s, SWAN¹⁸, proposed CSC¹⁹s)
 - Telecom. Service Providers
 - State Governments (e.g. Karnataka - Bhoomi)
 - Mission 2007
 - NGOs (n-logue, Drishti, Grasso, Tara-Haat)
 - Private Sector Companies (ITC's e-choupal)
- (The list is illustrative and not exhaustive).

The work of these agencies / players is highly appreciated and these agencies / players should be encouraged to synchronize their activities for best results.

- (xiv) Provide training and financial assistance to educated unemployed rural youth who could set up broadband kiosks. A scalable and sustainable business model needs to be prepared.

(B) Areas of economy where Broadband coverage to be provided on priority such as schools, public health facilities etc

- (i) Government to act as a primary consumer of the output of ICT development. By connecting and bringing online schools, hospitals, ministries and community government can, in effect, become the largest client of the industry when it starts, giving some comfort to entrepreneurs of a minimum guaranteed market size, especially in less developed areas. Thus, the Government to act as both e-governance service provider and anchor tenant to drive subscriber usage and revenues for the service provider.
- (ii) Thrust to the development of content

¹⁷ Community Information Centre

¹⁸ State Wide Area Network

¹⁹ Common Services Centers

- (iii) E-governance, improved literacy rate, better medical facilities and eradication of poverty, particularly in rural India.
- (iv) Online retail in a broadband environment, online retailers will need to integrate merchandising and marketing by introducing advanced website tools that take advantage of high-speed connectivity and assist product buyers in comparing and selecting products
- (v) The role of other facilitators such as electricity authorities, Department of IT of various state governments, Department of Local self Governments, Panchayat, Department of Agriculture, Department of Health and Family welfare, Department of Education to carry the advantage of Broadband services to users particularly in rural areas.
- (vi) Banking and financial institutions connecting to the rural areas

(C) Recommendations on further restructuring/reforms for expansion of broadband required in the post-convergence scenario.

In the initial stage, narrowband services were promoted by the Internet which used access through the PSTN²⁰ on dialup ports at speeds of up to 56Kbps. Modern switches and transmission systems are all digital, with the latest NGN, provides a more efficient means of transporting all services in a single common digital format thus Broadband service has facilitated the convergence of voice, video, data and image content.

6.5 Challenges:

Restructuring/reforms for expansion of broadband required in the post-convergence scenario raises significant challenges in the following areas:

- (i) IP-based NGNs threaten to undermine the “business model” of traditional telecommunication networks. In the past, these networks derived the great majority of their revenues from voice services. The development of NGNs exposes these telecom service providers to new sources of competition and threatens to deprive them of their principal sources of revenue. This situation is compounded by the fact that the cost of carrying voice on the Internet/NGNs is significantly reduced.
- (ii) The transformation of traditional public telecommunications networks into IP-based NGNs will require significant technical, human as well as financial resources.
- (iii) IP-based NGNs, which will lead to the convergence of formerly distinct networks and services, raises tremendous challenges for policy-makers and regulators. Adapting existing arrangements for helping to build NGN is a very significant challenge.

²⁰ Public Switched Telephone Network

- (iv) VoIP²¹ / Internet Telephony are a pioneering catalytic technology capable of bringing quality voice-telephony at low-cost. The current regulatory provisions are following:
- VoIP
License Agreements for basic, cellular, ILD, NLD and UASL service permits use of VoIP.
 - Internet Telephony
 - a) Restricted Internet Telephony has been permitted to Internet Service Providers since 2002.
 - b) Unrestricted Internet Telephony has been permitted to UASL operators besides Internet services and Broadband services vide notification dated 10th Nov, 2005
- (v) World over, new VoIP technologies are being developed and being implemented. Further liberalization of Internet telephony could be undertaken within the framework of licensing regime.

²¹ Voice over Internet Protocol

Chapter 7

Telecom equipment manufacturing

7.1 Introduction

The telecom network has grown steadily in the country; however, there is a need for further expanding the services of telecom infrastructure and services during the 11th Plan. As per the projections for the 11th plan there is a potential of adding 600 million telecom subscribers in India by March 2012. However, this would require an infusion of funds & the strengthening of domestic telecom manufacturing sector.

7.2 Factors impeding the growth of telecom equipment manufacturing in India

1. Rapid technological changes leading to obsolescence and inadequate focus on R&D.
2. Poor base for electronic component manufacturing (ICs/ASICs/ Semiconductor devices, Memories, PCB Connectors, Magnetic etc.).
3. Poor infrastructure (Transport, power, water etc.)
4. High cost of infrastructure
5. Inflexible Labor Regulation
6. Procedural Delays
7. Government has allowed trading of telecom equipment to foreign companies under 'Cash and carry wholesale trading'. Institutional sale is considered under wholesale trading. Government of India has recently further reviewed the policy on FDI and decided to allow under the automatic route, FDI up to 100%, for cash & carry wholesale trading and export trading.
8. With the rapid growth of wireless access, GSM and CDMA, majority of demand is still being met through import.
9. Private sector service providers have no compulsion to use equipment manufactured by indigenous companies. Their procurement of equipment is dependent of choice of technology, funding mechanism with long-term low interest credits by foreign suppliers.

7.3 Recommendations for India to be the telecom manufacturing hub:

Tremendous growth in telecom services in India has now drawn attention of global players. Elcoteq, Nokia, Ericsson, Alcatel, LG, Motorola etc. are setting up manufacturing facilities for Wireless Equipments and Terminals. Other leading companies are also likely to invest in this sector.

Development of domestic market and integrating the Telecom hardware sector with global stream has to become internationally competitive (especially with respect to China, Taiwan and Korea) and the elimination of duties on this segment as per commitment to WTO, this sector needs a special sectoral treatment rather than being governed by general policy framework. The implementation of the

recommendations as outlined in the following points would be important and timely.

1. Public-private partnership in R&D efforts: There should be a coordinated approach for the R&D activities. Active participation of the private sector in many of the projects would enable the flow of benefits of research to both public as well as private sectors. At least two world class research and development centres in public – private partnership mode may be promoted.

One centre would be exclusively for developing products for rural applications in PPP mode. This centre may be funded by Government and C-DoT may be restructured to perform these functions.

The other centre may be responsible for driving global standards in international bodies such as ITU/ISO etc. suited to Indian industry, collaboration with leading institutions like IISc²², IITs²³, etc. for research, commercial development of future technologies/ applications, etc. and continuous up-gradation of technologies and manufacturing process for the converged telecom services. Premier technical institutions would also be encouraged to undertake R&D activities sponsored by the telecom service providers and equipment manufacturers to develop multi-dimensional technologies in telecom sector. In order to expeditiously convert new product designs to manufacture and launch in domestic and international markets, it is recommended that an Advanced Prototype facility having world class facilities of CAD, CAM, etc may also be set up under a strategic alliance with developed countries. This centre will be funded by all stakeholders like service providers; equipment manufacturers etc. and it will have flexibility for hiring the best talent available in market at attractive remuneration.

2. Formation of Common Product Certification to International Standards & Testing Facility for Global Accreditation: Product Certification to Global Standards would facilitate acceptance of products manufactured in India in the International market and, therefore, enhance the exports. The funding for setting up of this facility should be done by the Government till it achieves a status of internationally accredited autonomous body and later on an autonomous body may be created on self-sustenance basis

3. Setting up of Mega FAB for the manufacture of Integrated Circuits: For achieving higher degree of local value addition and making optimal use India's capabilities in software, design, and system integration, it is essential to have chip manufacturing capabilities within India. Government may have strategic alliance with some of the leading vendors (LG, Samsung, Nokia, etc) and facilitate setting up of FAB by announcing special package of incentives. It is learnt that 20 new FAB would be built up in China between now and 2008. Worldwide silicon shipments have grown to 10% in 2003-04 and 20% to 2004-05.

²² Indian Institute of Science

²³ Indian Institute of Technology

4. Setting up of Mega FAB for the manufacture of other electronic components (Semiconductor devices, Memories, PCB, Connectors, magnetic etc): For achieving higher degree of local value addition and making optimal use India's capabilities in software, design, and system integration, it is essential to have electronic component manufacturing capabilities within India. Government may have strategic alliance with some of the leading vendors and facilitate setting up manufacturing facilities by announcing special package of incentives.

5. Hardware Manufacturing Cluster Parks:

For promotion of telecom equipment manufacturing, Hardware Manufacturing Cluster Parks (HMCP) needs to be set up across the country. The HMCP would be bonded areas with each location having its own focus. Industries promoted in these parks should not be seen in isolation but in relation to each other - forward and backward linkages in the value chain. Industry clusters are an important means of achieving success in the hardware sector.

i) Since the potential customers/investing industries in these zones may include manufacturers with export operations, MNCs²⁴ with alternate choices and their investment decisions would be based on achieving global competitiveness through their operation in such proposed cluster parks, the infrastructure in these parks should be such as to support efficiency and competitiveness with similar zones in other countries.

ii) Most of the new units/investment in telecom sector would be in product specific SEZ²⁵s. The government may consider providing financial support in the development of core common infrastructure in such SEZ for telecom equipment manufacturing. *An amount equivalent to 5% of the total investment by the SEZ developer and units to be located in the respective SEZ subject to a maximum of Rs. 50 crore may be provided by the government.* However, only those product specific SEZs intending to invest at least Rs. 100 crore in an area of 10 hectares should be eligible for such support from the government. *Promotion of Hardware Parks to be encouraged in the Private sector and given the duty free facility as well as income tax benefit as provided to promoters of SEZ.*

6. 24x 7 time frames for custom clearances: In order to reduce the transaction cost, custom clearance for imports and exports should be on self-declaration basis. 24x7 time frames should be adopted for custom clearance and it should be supported by the banking system.

7. Permission for working of women in three shifts: State governments may be requested to allow the women to work round the clock in Electronic industry similar to BPO industry.

²⁴ Multinational Companies

²⁵ Special Economic Zones

8. Fiscal Policy Incentives for Telecom manufacturing:

Manufacturing of telecom equipment in India is not profitable as it involves the payment of excise duties on the value realizable from the end customer which includes manufacturing costs, profit, services cost for installation and commissioning, and maintenance service cost during warranty period. On the other hand, imported goods attract customs duty and CVD on import price which does not include local Indian maintenance cost for warranty period, local value addition in the form of local services viz. installation and commissioning. This anomaly becomes more significant with the splitting of costs of imported material into software and hardware. Thus it is recommended:

i) To provide abatement to Indian manufacturers for products designed in India and manufactured in India as well as products not designed in India but manufactured in India also.

ii) To rationalize the excise duty at 8% from the current level of 16 % on telecom equipments including entire value chain of raw materials.

iii) The percentage of sales tax (CST+ ST+ VAT) charged on locally produced goods in India is much higher and the tax equivalent charged on imported material. Also entry tax is payable in the States where goods are finally sold for locally produced goods. In the case of imported goods only one incidence of tax or its equivalent is payable in the State of its final destination where the goods are sold. Thus it is recommended that:

a) The Central Sales Tax is to be made 0% on telecom equipment including entire value chain of raw materials.

b) State Governments may be requested to exempt octroi, entry tax, local sales tax etc. on the telecom equipment at least up to 2015. Free movement of the equipment/raw materials should be ensured. Single window clearance for all State Government approvals should be provided.

c) Export benefits in India (DEPB) are designed for neutralization of import duties that go into the process of manufacture. At present DEPB takes into account the impact of import duties leviable upon the inputs of the exported products. It does not take into account the other duties, taxes and levies within the domestic tariff area like ST/Octroi/service tax/entry tax etc. India has multiple taxes and neutralization of all must take place before goods are exported. Otherwise, Indian exports from the indigenous manufactured cannot be competitive. Presently, export earnings are given income tax benefits but DEPB is not classified as export earning. *Thus it is worthwhile considering DEPB to be recognized as export earnings as it is seen as a fiscal benefit to motivate trans-national companies to set up base in India.*

d) Removal of tax barriers on transfer of technology: Withholding tax on fee for transfer of technology and software import should be removed. Tax on payment of royalty should be as low as possible. In order to encourage technology transfer, royalty payment up to 5% on domestic sale and 8% on exports should be exempted from income tax.

9. Financing at international competitive rates Domestic telecom equipment manufacturers have to compete with the global players as there is no protection to the domestic industry after implementation of ITA²⁶ under WTO. To make Indian industry competitive, it is essential to make funds available, particularly working capital, at international competitive rates. The following is suggested:

a) Domestic telecom equipment manufacturers may be allowed to have an access to ECB for capital expenditure and working capital requirement.

b) Domestic financial institutions should lend money for capital expenditure and working capital requirement of the telecom equipment manufacturers at rates equivalent to the rates at which the telecom service providers or infrastructure providers are entitled to.

10. Status of deemed import for the equipment supplied to defence forces: At present the equipment imported by the defence forces attracts no duties/taxes. The indigenous telecom equipment supplied to defence forces may be declared as deemed imports by defense forces and no duties/ taxes are to be imposed.

7.4 Recommendations for Export promotion of Telecom Equipment:

1. Funding of Telecom Equipment and Services Export Promotion Council (TESEPC): The Government may create a sizable export promotion fund for "Telecom Equipment and Services Export Promotion Council (TESEPC)". The main objectives of the proposed Council may be enshrined as follows:

- (i) To support, protect, maintain, increase and promote the exports of telecom equipments and related services and promote and develop use of telecom equipments in other products by such methods as may be deemed necessary including:-
 - a) Undertaking, sponsoring market studies in individual foreign countries;
 - b) Sending out study teams to foreign countries;
 - c) Appointing representatives, agents or correspondents in foreign markets for the purpose of continuously and regularly reporting the prices, market performance, reception accorded to actual deliveries of telecom equipments etc.
 - d) Conducting publicity campaigns to bring to the notice of advantages of trade and commerce with India in telecom equipments;

²⁶ International Trade Agreement

- e) Collecting statistics and other information regarding the manufacture, trade or ultimate use of telecom equipments in various countries;
 - f) Propagating information useful to manufactures, traders and shippers of telecom equipments by seminars, lectures, workshops, discussion, books, correspondence or otherwise;
 - g) Maintaining liaison with any agency which has been set up for laying down standards of quality and packing in respect of telecom equipments;
 - h) Deputing officers of the Council to witness the inspection of telecom equipments exported, in foreign countries, where such inspection of being conducted by the authorities in the importing countries;
 - i) Deputing officers of the Council to witness the survey of telecom equipments exported or intended for export in foreign countries or in India, as a result of any dispute or difference between the parties to a contract for sale and purchase of telecom equipments;
 - j) Enquiring and investigating into complaints received from foreign importers of Indian exporters in respect of the quality, description or other particulars of telecom equipments exported from India or the non-performance or non-observance of the terms and condition of contract relating to such exports and other connected matters and advising the manufacturers or exporters of telecom equipments regarding the methods to be adopted to obviate such complaints of a similar nature in future;
 - k) Making such recommendations as may be necessary or expedient to Govt. and Public Bodies like Chambers of Commerce where the Council on investigation of a complaint received by it is satisfied about its genuineness and that the same has been caused by the willful or negligent act or acts of the manufacturers or exporters of telecom equipments, as the case may be;
 - l) Communicating with Chambers of Commerce and other mercantile and public bodies throughout India and concert and promote measures for the promotion and advancement of export of telecom equipments;
 - m) Assist in development of new exportable products and services which involve use of telecom equipments;
 - n) Assess the manpower and training requirement for export development, advise concerned agencies in this regard and evolve training programmes.
- (ii) To keep in constant communication with Chambers of Commerce or other mercantile and public bodies throughout the world with a view of taking appropriate and necessary measures for maintaining or increasing the export of electronic goods and software.

- (iii) To enunciate just and equitable principles to govern the trade in telecom equipments and to set up a code or code of practices for the general guidance of manufacturers, traders and exporters of telecom equipments and further to simplify transactions relating to exports of telecom equipments.
- (iv) To advise or represent to Government, Local Authorities and Public Bodies on :-
 - a) The policies and other measures, including direct and indirect taxation, financing requirements, especially those relating to exports;
 - b) The steps to be taken by them to prevent any contravention of the codes of practices laid down by the Council by any of the persons concerned, where such contravention would affect the exports of electronic goods and software Provided that such advice or representation shall be only so far as such policies or measures have bearing directly or otherwise on the export of electronic goods and software.

2. Global Market Access: The Government may enact a law for free import and export in a special zones near Airports and Seaports (similar to Singapore) for promoting the Global Trading so that the companies are able to export complete package for final destination including equipment manufactured in India.

Chapter 8

Research and Development

8.1 Introduction

Research & Development is the backbone of telecommunication industry in fast changing technology scenario and exponential growth of telecom network & services. In the highly competitive market scenario that would be prevailing during 11th Plan period a new vision & strategy is required to encourage telecom R&D. In view of the thin profit margins of telecom industry for various products & services the industry, is likely to have only a short term objective towards R&D, limited to product development & incremental research. This would require enhanced Government involvement in R&D backed up by a strong telecom R&D policy to enable achievement of national growth targets and other social commitments based on a significant indigenous component. The process of conducting useful telecom research requires sustained involvement of time, money & foresight for a long time to address both basic & application research. Collaborative models of joint public private effort and a resolve to enhance indigenous share is very important for sustenance of this activity.

8.2 Requirement: The Way Ahead

Next five years are going to witness extensive creation of broadband infrastructure with numerous services and applications. The components of the same would evolve around the following

- Broadband Access Network
- Mobile and Wireless Network
- Broadband Transport Network
- CPE & Terminals
- Management of Services and Network
- Multimedia & Content
- Security

Telecom infrastructure would require

- Passive telecom infrastructure
- Active Telecom Infrastructure
- Support Telecom infrastructure

To meet the above requirement the Telecom & IT sector will have following set of challenges:

- End user applications will consume ever increasing amounts of bandwidth pushing existing network out of its limits
- Fast paced integration and management of many different network infrastructures

- Mobile applications would demand access to the latest wireless communication technologies
- Convergence demands of new technologies migrating to TCP/IP such as security, building automation

To meet the above demands of changing telecom & enabling technology focused efforts in R&D through various implementation models will be required.

8.3 Areas of Collaborative Research

8.3.1 While, there is a need to keep adequate focus on basic and skill building research a measured shift towards strategic cooperation between chosen R&D partners is necessary to reap the benefits of pooled strengths and volume economics of telecommunication infrastructure devices, functions, applications and other elements of service delivery to one and all.

8.3.2 Pre-competitive collaborative research in areas like system view, basic technology, service technology, sub-systems and comprehensive security could be some of the prime objectives of the same.

8.4 Areas of National R&D projects of immediate and long term interest

8.4.1 In national interest, research towards information security, avoiding misuse of telecom for criminal purposes, reliability, survivability and protection of networks could be key priority areas of research. There is a specific need to address the issue of research on Telecom related national security. The same has been dealt in detail in Annexure-III.

8.4.1.1 Significant research would be required in phases and continuously to check the misuse of IT & Telecom for fraudulent and criminal purposes without affecting the privacy rights of honest citizens. Innovations are required to build capabilities for doing the analysis of the trails, calling patterns, intentions etc. for use of intelligence and security agencies. This is to be built over and above call intelligence & interception systems to be developed as a central facility for all operators/service providers & intelligence agencies.

8.4.1.2 Traditionally telecom products are certified for their performance against stated or designed specifications. However, when security is a concern, the products need to be tested for many off band performances. There is a need to perform more comprehensive tests in order to assure oneself of a secure network on which will become a critical infrastructure of the nation.

8.4.1.3 It is important to create Security Test centre in the same lines as the CNITSEC (China Information Technology Security Certification Centre). This centre is a Government's authority designed to fulfill national IT security certification responsibilities. In accordance with China laws of product quality certification and IT security management, CNITSEC operates and maintains National Evaluation and certification scheme for IT Security.

8.4.1.4 It is important to create a test-bed in an Indian Government controlled environment that will test every telecom product for its stated and unstated performances, particularly from the point of view of Security, Survivability and availability as well as against external actions of intentional and unintentional nature.

8.5 R&D for network design & its elements

8.5.1 Telecommunication Research also needs to be taken up for maximizing the use of infrastructure resources and investments including techniques for higher network performance, flexible and efficient use of spectrum, rapid evolution of services etc. Spectrum would become the most valuable reusable resource for a country like India. The demands in continuous R &D in coming with protocols and modulation techniques that use the spectrum in a most efficient way will become important.

8.5.2 Methodologies for seamless and ubiquitous wireless connectivity, creation of environment beyond 3G wireless and new approaches for broadband are the other hot areas which require lot of research efforts during and beyond the five year plan period. Such services would be using underlying packet technology layers which would require efficient techniques and enabling technologies for building capabilities and scalable capacities.

8.5.3 Issues relating to interoperability at various levels, Quality of service, cost effective future proof migration strategies to newer networks, affordable & easy to operate integrated customer devices will need sustained attention and collaborative effort.

8.5.4 On the network side, design optimization and performance of packet networks besides signaling and control would be important issues for network design & architecture.

8.5.5 In the coming years, apart from large public domain networks, self configured embedded networks containing large number of small devices for flexible engineering topology may be deployed. It may be required to work in these areas involving academia.

8.5.6 Enterprise networks are expected to assume higher significance due to growth in business & multipurpose market. However, it is presumed that market forces will take care of requirements of telecom in this domain. Yet, the devices developed for these applications can provide good market for indigenous devices.

8.6 Telecom devices & other components

Audio & image coding applications, automated transactions & data mining type of applications, besides video over IP etc. will become topics of interest.

Other areas of R&D include low cost hand sets, low cost infrastructure for rural areas, smart devices, RFIDs, 4G wireless techniques and sensor networks.

8.6.1 The next wave of smart devices is likely to offer the following features – significant processing power to enable cognition (voice recognition, image recognition, gesture recognition) multiple network connectivity with media independent handover, options for the non-English speaking / non-literate user, smart power options, network-centric device options. It is most likely that the future smart phone device will need to provide a full-fledged mobile alternative to the laptop on the move but will not replace the computer on the desk. Our academic institutions can contribute a lot towards these areas with a given time bound mandate of collaborative research.

8.6.2 Software defined Radios and Cognitive Radios would become order of the day. These will become an integral part of military communication along with multiband, multi protocol capabilities, environment aware and secure communication devices. The research world over is still at its infancy and India starting its programme of R & D right now would pay back attractively in the very near future and drive India to become global player in Telecom rather than a globally attractive consumer of telecom revolution.

8.6.3 In the optical fibre domain, techniques for dealing with specialty and passive fibres, active ‘all optical networks elements’ will remain key focus areas both by the industry and academic research institutes. Further, there is a need to look at DWDM capability and optical switching at the packet level. This will call for a multidisciplinary approach to R & D and would involve substantial amount of investments of time and efforts both at the fundamental science research and application R & D.

8.7 Applications & Content

8.7.1 There is clear requirement to work on content and applications of various types for use of individuals, business, governance and communities.

8.7.2 As smart devices emerge, they are likely to be more data-content oriented rather than device or application capability oriented. The user may be more interested in the content he enjoys and less interested in the device he gets it on – thus, devices which allow and facilitate this seamlessness of content, either by co-operating among each other to allow media independent handover or by explicitly coordinating with a content / presence server is more likely to find user acceptance.

8.7.3 It is unlikely that there will be a single ‘killer’ application which will propel the future smart device. Instead, there is a strong possibility that co-operative frameworks for applications will arise – either spontaneously in a device-initiated fashion or in a deliberate user-initiated manner.

8.7.4 Future applications which cooperate with each other are most likely to benefit from the synergies and the correspondingly rich content which arises as a consequence, either fortuitously through service discovery or by design.

8.7.5 There is lot of need for content of commercial and governance applications in all the Indian languages which the market forces will have to define from time to time. Research will be required more in the innovative value added services domain.

8.7.6 Location dependent services have already become very attractive elsewhere in the world. To this end, incorporating the GPS like devices as part of the mobile device or methods of triangulation based techniques such as those successfully applied in navigation would become very important. This is also a boon to security agencies in tracking anti-social elements. The research and development in these areas are of paramount importance and often pose a great challenge.

8.7.7 Delivering contents including video (TV and images) and dynamic web pages on small form factor devices would be the focus of future research for India. In fact, almost like the Y 2K opportunity, one would soon come across opportunities for mass redesigning of the web pages either directly or through intelligent delivery agents, would be an expertise, if developed well, can become extremely useful in the global arena.

8.7.8 In view of the lack of proven security and proper consumer protection laws in India, the E-commerce applications have not picked up as much as one would have wished and predicted. It is important that R & D is carried out in secure mobile applications and also on the policies, practices and laws, to ensure that mobile E-Commerce becomes order of the day.

8.8 Standards

8.8.1 There is a need for research in the country to contribute effectively in the global thought process on telecommunication networks and services. This would require people working on standards of interoperability at various levels of connectivity, QOS, service level agreements, network security features, standardization of devices, elements and protocols, test methods, validation and certification.

8.8.2 The research on technology and techniques enabling reduction of the regulatory requirements, flexible use of resources like spectrum, reduction in power consumption of devices and other elements, possibility of using non-conventional energy for infrastructure, environment friendly shared infrastructure would help healthy and friendly growth of telecom.

8.9 Government Support, funding & public private partnership

8.9.1 The R&D effort in the above said areas require Government support in terms of policy, vision, prioritization of areas and funding. The collaborative Research would require strong participation and pooling of funds by services providers, manufacturers, research organizations & academic institutions. This approach is in addition to work to be done by individual industries and other organizations as part of their R&D programs to support their products & development.

8.9.2 The Government may execute the vision & projects by constituting a central agency for coordinating & monitoring R&D efforts after prioritizing the areas. Centres of Excellence may be identified for coordinating research areas.

8.9.3 Think tank model should evolve; combined forum should be created for discussions and presentations on research.

8.9.4 Institutions like C-DOT may be strengthened to steer public private partnership programs for telecom R&D.

8.9.5 Academic institutions should be identified and should become a hot bed of innovative research, development and human capacity building.

8.9.6 Government may identify priority areas like security and rural connectivity.

8.9.7 Govt. should look at commercialization of IPR²⁷ developed in the country. This should be supported by a policy and industry.

8.9.8 The outlay and the amounts to be set aside for national projects and other groups of areas of research need to be worked out including private contribution.

8.9.9 Entire telecom R&D efforts and investments would thus cover the following major areas:

- Projects of national importance including rural & security systems.
- Enabling technology & futuristic research.
- Mobile E-Commerce
- Studies for policy, regulation and standards.
- Human Resource development and capacity building.
- Creating Centres of Excellence in academic Institutions and forging international collaborations

²⁷ Intellectual Property Right

- Public private partnerships for infrastructure, commercial solutions research, development & technology trials, studies and pre-competitive technology research.
- Strengthening institutions like C-DOT, other academic institutions and centres of excellence for the above said work and other ongoing and future projects/schemes.
- R&D done in the country by private national & international Telco's as part of their development plans. It may be necessary to provide suitable environment for the same.
- Setting aside up to 10 % of the revenues from telecom for R& D.

Research on Telecom Related National Security

There is a need for development of computational approaches using artificial intelligence techniques, biometric devices, crypto analysis, voice recognition technologies, grid surveillance, encryption / decryption, mining data bases etc. for security of the telecom and data networks and to provide useful inputs to the national security agencies. The prolific use of the telecom infrastructure by the undesirable social elements has been their primary means to get their messages across and act in unison. State-of-the-art technologies are being used in varying degrees by the developed countries to take proactive actions against the undesirable elements and minimize the security hazards.

1. Lawful Interception (LI)

The LI system must provide transparent interception of specified traffic only and the subject must not be aware of the intercept. The service provided to other users must not be affected during interception.

2. Need for a Centralized Communication Security and Monitoring

There is lot of duplication with different LEAs²⁸ having their own processes and the present limitation to share the information with other authorities. This result in a major void in tracking undesirable activates. Further, they do not have evolving technologies to satisfactorily monitor and interpret or analyze the information received.

In view of the above, there is an urgent need to start research activity on centralized Communications Security Research and Monitoring and subsequently set up a “Centre” under the aegis of organization like CDOT. The proposed “Centre” will have central connectivity for each service provider and LEAs. It will ensure efficient, secure, transparent and mediation of intercepted information.

The proposed “Centre” could have an autonomous project status under overall control and management of CDOT Board, Steering Committee and Governing Council including the representatives from following institutions:

- 1) Technology Development
 - a. CDOT
 - b. Technology partner
- 2) Technology advisors
 - a. TEC or other standard agencies
 - b. IISc, IITs, etc.
- 3) Users
 - a. LEAs (Home Ministry)
 - b. Ministry of Defence
- 4) Representatives from leading Telecom Operators

²⁸ Law Enforcement Agencies

The research will address following major issues:

- *Multiple communication technology* - Growing crime and terrorism requires sophisticated investigative and intelligence techniques to monitor all traffic types (satellite, wire line, wireless, internet, email, IM, VoIP etc.)
- *Encrypted communication* - De-encryption of cheap encryption methods which are available on Internet and being used by terrorists.
- *Regulatory standard* - Recommendations on regulatory aspects to Government of India like CALEA law in USA, to ensure compliance by telecom operators and equipment vendors
- *System design* - The system will need to process massive amount of information due to multitude of technologies that are presently being deployed and proliferation of data traffic.

3. Roadmap for the proposed research in the 11th five year plan

The focus of research will be to establish a Nationwide Surveillance Grid that uses IT capabilities to see, hear, smell and make sense of all the inputs from various distributed intelligence systems (telecommunications, e-commerce systems, infrastructure systems) to enhance internal and external Security of the country. This can be undertaken in five phases outlined below:

(i) Lawful Interception and End-to-end secure Workflow

Workflow automation that can authenticate digitally Lawful Agency, body empowered to authorize telephony monitoring and the telecom operator. Information will be sent via encrypted tunnels and digitally signed to ensure the integrity of information is preserved.

(ii) Identity Matrix and Social Networking Analysis

Creating a national identity database for all individuals and analysis of call data records using advanced machine learning and AI²⁹ techniques, to build and tune a system that analyzes the CDRs³⁰ and finds specific calling patterns and identifies social networks that could be possibly be involved in anti national activities.

(iii) LBS and GIS Services for Local Crime Control

Location based service (LBS) applications combined with GIS mapping data that can make information about crime available in real time to police and other security personnel on their handheld devices.

(iv) Advanced Call content Analysis and Detection

Use of advanced data mining and AI-based techniques that act on a variety of sources. Accordingly, following capabilities will be included:

- a. Voice spotting of specific targets, irrespective of language used
- b. Topic Analysis in Text and Voice Messages
- c. Concept based search of Text Data within the same source
- d. Context based search of different media inputs (text, voice and data) to make connections between varieties of information sources.

²⁹ Artificial Intelligence

³⁰ Call Detail Records

(v) Video Surveillance and Image Analysis via “Machine vision”

Integrate satellite surveillance and CCTV based surveillance from sensitive areas in an IP based network to feed geo-spatial intelligence in national surveillance grid. Advanced image analysis algorithms can be used for spotting suspicious people or images.

4. Financing model based on Public-Private Partnership (PPP)

To support above activities of research & development, procurement of SW and HW systems, pilot project deployment and implementation the five or more phases mentioned above financing of about Rs. 500 crores may be required over the next five years. Keeping in view the key elements of Research and Development, hardware & software systems procurement, Government usage, national importance and Private sector interface, it is envisaged that the Government may fund Rs. 400 crores as part of the 11th Five Year Plan and there will be participation of Rs. 100 crores from private sector and operators. Subsequently the “Centre” can be operated and maintained by a professional agency and revenue generated on pay-per-use basis to make it self sustaining in terms of operating expenses and carrying out enhancements/up gradations etc. in a given time frame.

Chapter 9

Rationalization of Taxes and Levies

9.1 Introduction

The telecom service is a growth driver for other sectors of the economy. The usage of these services significantly contributes to the productivity and income levels. The available studies suggest that income of business entities and households increase in the range of 5 to 10% by use of the telecom services.

Keeping in view the importance of telecom services in generating Government revenue and also the impact of telecomm services on the economy as a whole, faster expansion of the telecom sector in all urban and rural areas should be the primary objective. In the past, due to positive policies of the Government, faster growth in the sector could be possible. Now for deep penetration of telecom services in rural areas, more positive measures will be required in respect of levies and taxes in the sector.

The present sectoral charges are as follows:

Sector charges	% of revenue
Service tax, GST	12% + GST
License fees	6 to 10%
Spectrum charges	2 to 6%
USOF	Incl. in license fees (@ 5%)
Total:	17% to 26% + GST

9.2 Direct and Indirect Taxes:

There has been no change in the Customs and Excise duties for the telecom sector for the year 2006-07. In the Union Budget (2005-06) several initiatives were announced. Some of the important announcements made are as under:

a) Custom Duty on ITA-I bound items was reduced to zero. With this custom duty on all the telecom equipment including PIJF cables and optical fibre cables covered under ITC HS 854470 reduced to zero. All goods for the manufacture of goods mentioned above were also exempted from customs duty. With this all goods required for the manufacture of telecom equipment could now be imported at zero custom duty.

b) Customs duty exemption on specified telecom network equipments and parts thereof, if imported by telecom service providers, was extended beyond 31.3.2005 without any specific time limit. With this custom duty on such equipment, whether covered under ITA-I or not would continue at zero custom duty. Custom duty on cellular phones reduced to zero with nil CVD. Parts, components and accessories of mobile handsets including cellular phones also continue at zero custom duty with Nil CVD.

c) Additional duty at the rate of 4% was introduced on import of items under ITA. While credit on additional duty is now available to the manufacturers, for set off against excise duty, the same is not allowed for set off against service tax for the service providers. With the imposition of this duty, telecom equipment when imported by the service operators attracts higher custom duty of 4%. Cellular phones also attract this duty of 4%. (4% additional duty has been exempted on parts, components and accessories of mobile handsets including cellular phones)

d) There was no change in Section 80(IA). With this the benefit of Income tax holiday are now not available to those who will start the service after 31st March 2005.

e) Withholding tax on technical services has been reduced from 20% to 10%.

Levies

- a) Annual license fee for NLD and ILD licenses reduced to 6% of AGR w.e.f. 1.1.2006.
- b) Entry fee for NLD licences reduced to Rs.2.5 crores from Rs.100 crores.
- c) Entry fee for ILD reduced to Rs.2.5 crores from Rs.25 crores.
- d) ISP with internet telephony (Rest) charged for licence fee at 6% of AGR.
- e) Annual licence fee for VSAT (commercial) charged at 6% of AGR.

9.3 Contribution of levies to general exchequer - Year on Year

Sl. No.	Year	Licence fee old auctioned high entry fee paid	Licence fee new (post NTP 99 15%)	Licence fee as per 2001 9.12%	Licence fee as per 2003 6-8%	Service Tax ³¹ (estimated) ³²	Licence fee and service tax
1.	1999-00	1603	275	209		110	319
2.	2000-01	2270	619	468		248	716
3.	2001-02	2734	793	602		317	919
4.	2002-03	2455	872	657		349	1006
5.	2003-04	2470	1727	1296		1105	2402
6.	2004-05	2511	2998		1666	2158	3824
7.	2005-06	2591	4586		2831	3669	6500
8.	2006-07	2680	7796		4813	6237	11050
	Total	19314	19366	3234	9304	14193	26736

(Source: TRAI Spectrum Policy Recommendations, 13th May, 2005 & ITU Forum)

³¹ Rate of ST taken as 5% up to 13.5.03; 8% up to 31.3.04 and thereafter 10 % (Presently 12%).

³² Estimated Service Tax (based on estimated gross revenue).

9.4 Recommendations

9.4.1 Rationalization of Taxes and Levies

a) Telecom Levies

The license fee being charged for providing basic, cellular services etc should be charged at a uniform rate of 6% including the Universal Service Levy of 5% at par with NLD, ILD license fee. The rules for the administration of the Universal Service Obligation Fund (USOF) were notified vide Indian Telegraph (Amendment) Rules, 2004. The resources for implementation of USO are raised through a Universal Service Levy which has presently been fixed at 5% of the Adjusted Gross Revenue (AGR). The information regarding fund position of USOF is as follows:

Year	Opening Balance	Funds collected as Universal Service Fund Levy (5%)	Funds allocated and disbursed
2002-03	0.00	1653.61	300.00
2003-04	1353.61	2143.22	200.00
2004-05	3296.83	3457.73	1314.59
2005-06	5439.97	3533.00	1766.85
2006-07	7206.12	3488.00 (Estimated)	1500.00 (allocated against a requirement of Rs.3500 crore)

From the expenditure trend it is evident that the expenditure on the Universal Service activities is increasing annually and it will continue to do so with the proposed expansion of activities under the Universal Service activities. The committee recommends that the industry view of reducing the rate of Universal Service Levy may be addressed at the time of mid term review of the 11th Plan. The same can be revisited depending upon the growth, levy collected, its utilization and the requirement.

There should be rationalization of Spectrum charges being paid by the various operators on a holistic basis including the microwave access, backbone charges etc.

b) Taxes

Indirect Taxes

The reduction in the total indirect taxes on the telecom sector will help in boosting the investments required by the sector and the proposed reductions are as follows:

Customs Duty - There is a need for reducing customs duty on equipment required for telecommunication services. The customs duty for microwave equipment should be zero similar to base transceiver station (BTS) under notification no.7/2004-Customs dated 8th Jan., 2004.

Excise Duty - The excise on locally manufactured equipment should be pegged at the lowest level of 8% to promote the manufacturing and services segment.

Service Tax - The sub-group recommends reduction in the service tax on telecom to 8% from the present level of 12% to help in the spread of telecom services in semi-urban/rural areas(as it would translate into reduction in the tariffs).

Direct Taxes

- (i) A telecom company may continue to be allowed deduction under Section 80 IA and 100% benefit for the 10 years at par with other companies getting 80 IA benefit.
- (ii) The Committee recommends rationalization of taxes to make the tax administration easier and Ministry of Finance is requested to look into the same.

9.4.2 Policy guidelines for Central/State relations regarding development of telecom infrastructure.

The faster roll out of the telecom services in the country is dependent on the development of telecom infrastructure. However, it is seen that the guidelines/policies regarding cell site installation, right of way (ROW) permission etc. vary from state to state. As a result of this, telecom service providers spend a lot of time and resources in overcoming these bottlenecks. There is a need to have close coordination between Center and the State in terms of legal and regulatory framework for faster roll out and the removal of impediments. The ground level work for providing infrastructure is done at the Panchayat level and here the diversity in levy structure between Panchayats poses a problem.

It is, therefore, recommended that each State should identify a focal point for better coordination and grievance redressal of the State and the licensed telecom operator

9.4.3 Measures for promoting private sector investment including foreign direct investment in the sector.

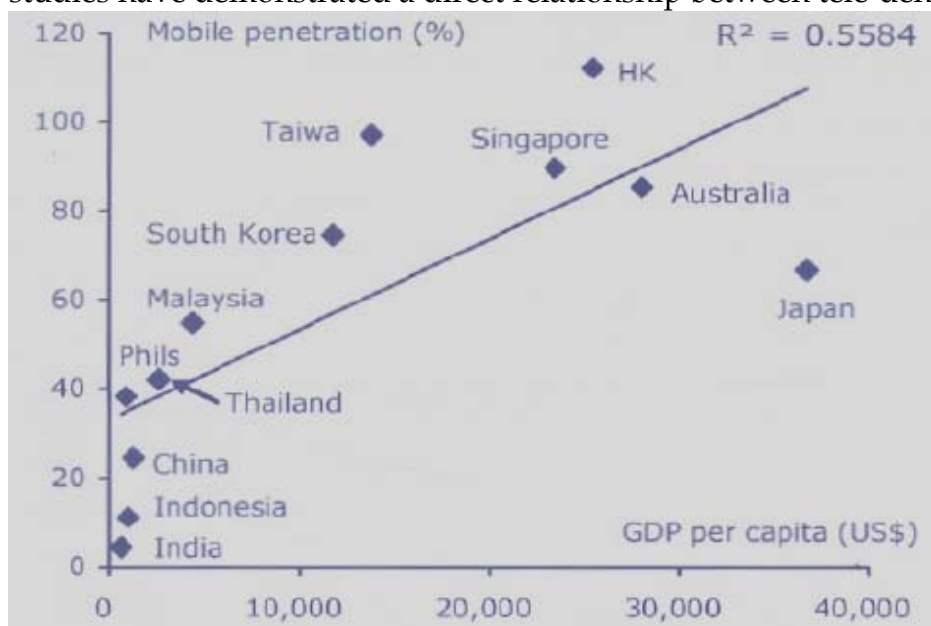
Although numerous initiatives taken by Government by way of policy liberalization and fiscal measures have greatly improved the investment environment, but there is a need to take certain more steps to increase the flow of investments. It is also important that the fiscal policy of the Government is stable without any frequent changes in the tax/levy structure. To encourage indigenous manufacturers of telecom equipment in India, it is important that the tax regime provides them with a level playing field vis-à-vis the global players importing telecom equipment in India.

Chapter 10 Recommendations and Suggestions

Introduction

The Government of India has always recognized that **development of world-class telecommunication infrastructure is the key to rapid economic growth and social development** of the country. This was emphasized by the initial reforms in the sector, which started with the NTP 1994 and were subsequently re-emphasized and carried forward under NTP-99.

Telecom Sector has been viewed as a critical infrastructure and an enabler of growth and wealth creation rather than merely a source of revenue. International studies have demonstrated a direct relationship between tele-density & GDP.



Driven by various policy initiatives, the Indian telecom sector has witnessed a complete transformation in the last decade. The growth of mobile services has been phenomenal with mobile subscribers growing at a CAGR of around 85% p.a. since 1999. Today the mobile subscribers are much higher than the fixed line subscribers in the country and the number of mobile subscribers is also increasing at a much faster pace.

In spite of the rapid expansion of service, even today the 70% of the population is not covered by mobile services and there is a pressing need to expand these services - especially to rural areas.

There is a need to fully tap the benefits of economic growth emanating from telecom sector. Telecom penetration in India is still very low and there exists a huge potential that needs to be tapped; a gap to be filled.

Network expansion will be the focus of the 11th Plan which would be greatly possible by penetrating into rural areas. On the approach to rural telephony during the 11th Five Year Plan, vision of providing 200 million rural telephone

connections is envisaged which will translate into a rural tele density of 25%. Broadband connectivity would be made available on demand. Each village would have at least one broad band enabled KIOSK. Broad band connection would be provided to schools, health centres and Panchayat offices. Explosive growth of mobile net work was possible mainly because of competition, affordability, flexibility and ease of use, lower marginal cost of network roll out. The studies show income wise, there can be market in rural areas. Technology advances are enabling commercial viability even at low ARPUs³³. The cost of mobile hand set has come down drastically and Rs.1000/- handset is about to become reality. The competition has led to introduction of attractive packages. The approach of USOF would be to support infrastructure for taking mobile telephony and also broadband into rural and remote areas. In view of the above factors high rural teledensity can be achieved by expanding mobile telephony in rural areas.

For optimum sharing of spectrum by the stake holders, its planning would be done for short term, medium term and long term keeping in view the emerging new technologies and needs of various sectors. The spectrum management would be strengthened.

Through easily available and affordable broadband, social and economic progress of the country can be accelerated. Therefore, broadband expansion in rural areas and for priority areas of the economy would be encouraged. Its quick growth is necessary for establishing knowledge based society and thereby for reaping consequent economic opportunities. Various strategies for encouraging growth of infrastructure, use of alternative technologies, allocation of adequate spectrum etc., are envisaged for expanding broadband facilities.

The performance of telecom equipment manufacturing would be given boost by evolving an appropriate policy. The private sector investment would be promoted. It is envisaged to make India a hub for telecom equipment manufacturing.

In view of highly competitive market scenario, Government's involvement in R&D backed by a strong R&D policy seems to be necessary to enable achievement of national growth targets and other social commitments. Collaborative models of joint public private efforts will be required. Keeping in view the likely scenario of network technologies and services during 11th plan, focused efforts in R&D through various implementation models will be required. Public Private Partnership would be required for strong participation

³³ Average Revenue Per User

and pooling of funds by service providers, manufacturers, research organization and academic institutions.

The structure of levies and taxes certainly plays an important role in facilitating and boosting the growth of the sector. TRAI study shows that regulatory levies are higher in India compared to those of other countries. Therefore, rationalisation of the system of taxes and levies would be required for deeper penetration of the telecom sector, while fully tapping the economic benefits of growth in the sector.

Keeping the above need in mind, the Working Group, after carefully considering the various ideas and suggestions made by the different stakeholders in the telecom development process, makes the following recommendations:

Recommendations

A. Network Expansion

1. **OFC Network** : In order to achieve the 11th Five Year Plan target the use of existing OFC cable is to be extended and capacity utilization of the same has to be enhanced and available bandwidth has to be doubled.
2. **Mobile Towers**: There is an urgent need to bring an appropriate legislation so that the towers are shared by mobile operators resulting in reduction in cost.
3. **Satellite Services**: To extend the communication network in every nook and corner of the country keeping in view the geographical conditions of these areas, there is need to have a self-reliant satellite based communication network. The space segment should be made available through INSAT satellites by the Department of Space. Also immediate action should be taken to develop hand held telephones which can be used with such space segment.
4. **Use of Multiple Technologies**: A mixture of different technology like wireless broadband, fixed wireless terminals, fixed land line phones, satellite based phones, satellite based mobile phones and any other future technology may be used judiciously to extend coverage to 85% of the country.
5. **Inter Connection**: Setting up of inter connect exchanges may be considered for ensuring proper interconnection between operators.
6. **Next Generation Network**: A major change is taking place, with the ultimate goal to move to NGNs³⁴ that will support a wide range of services (multimedia, text and data, as well as voice) over a wide range of

³⁴ Next Generation Networks

speeds, from bits/second to broadband. The long term NGNs are still being standardized, but transitional, packet based services are being developed and deployed in many countries. India would do well to create a national plan for migration to NGN. Along with NGN, profound changes in the IP networks are being undertaken with the introduction of the next generation Internet Protocol i.e. IPv6.

B. Rural Telecom Development

7. A greater synergy between all players – all Government Departments, Service Providers, Infrastructure Providers, State Governments is required including coordination with Department of Space.
8. The voice telephone objectives in rural and remote areas are being met through various activities being supported Universal Service Obligation Fund (USOF). On similar lines broadband connectivity to rural areas should also get support from USOF. USOF may support provision of connectivity while user Departments like Education, Health, Agriculture, Rural Development, Panchayati Raj, DIT etc may provide Customer Premises Equipment (CPE) and ensure the development of suitable content.
9. Creation of Master database of the infrastructure available (Exchanges, MSCs, BSC, OFC, Towers etc.) to identify the infrastructure gaps.
10. To promote sharing of infrastructure to keep the costs low for the provision of rural telephony. The use of appropriate technology as a cost effective transmission media can be encouraged for increasing the coverage in rural and uncovered areas.
11. To encourage adoption of modern technology to reduce costs and improve quality of service.
12. Special attention needs to be paid to the most backward and remote areas like the North East, J&K, tribal belts and island authorities. Cost should not be a consideration while providing connectivity to these areas.
13. Set up a broad-based “Technology Watch Group” with representatives from the private sector which can constantly review new technologies and recommend measures which will help India to improve delivery and reduce costs in rural areas.
14. Allocation of spectrum to enable smooth rural rollout including priority consideration for rural broadband.
15. The problem of non-availability of adequate and steady power supply in the rural areas needs to be addressed. In this regard, use of suitable non-conventional resources of energy may be encouraged.
16. A mechanism needs to be put in place to ensure that the funds are made available to the USOF Administration as and when required to discharge these obligations. If required the provision in the Indian Telegraph Act

- which envisages support from the Central Government may have to be invoked.
17. Multiple agencies and players are involved in the task of providing connectivity through broadband like Department of Space (EDUSAT), Health and Telemedicine, Department of Information Technology (common information centres, state wide area network, proposed common service centres), State Governments (e.g. Karnataka Bhoomi), NGOs (n-logue, drishti, Tara-Haat). However, there is a need to synchronize the activities of multiple agencies to avoid any duplication.
 18. Training and enabling the educated unemployed rural youth for getting funds for setting up of broadband kiosks. A scalable and sustainable business model needs to be prepared in this regard.

C. Spectrum

RF Spectrum being a limited resource, with competing and increasing demands, there is need to its have optimal and efficient use with greater sharing of this resource by all stake-holders.

19. RF Spectrum planning has to be carried out for short term, medium term and long term, taking into account the emerging new technologies.
20. It is absolutely essential to carry out appropriate re-farming of the RF spectrum keeping in view the needs of various sectors. While re-farming the spectrum, care should be taken to meet the genuine needs of all important national users including those of Space & Defence in a manner which will not call for change/surrender of allotted spectrum at frequent intervals. If required revenues from spectrum charges may be utilized to support users, who are compelled to migrate from one frequency band to another. A system of spectrum audit should be introduced so that allotted spectrum can be withdrawn from inefficient users/usage.
21. Allocation of adequate spectrum for facilitating fast rollout of broadband services. It is desirable that the spectrum in the frequency band 2.50 - 2.69 GHz and 3.4 - 3.6 GHz be coordinated with existing satellite and terrestrial based usages for introduction of other existing and emerging wireless technologies. Further, delicensing of frequency band 5.15 GHz - 5.35 GHz/5.725 GHz - 5.87 GHz for outdoor usage needs to be expedited.
22. The spectrum management needs to be strengthened not only in terms of numbers but also in terms of capacity building.
23. Studies to be carried out to identify appropriate ways and means for greater sharing of spectrum among various satellite and terrestrial services and their results implemented on an urgent basis.
24. While allocating spectrum, the international recommendations and use of globally harmonized frequency bands should be kept in view so that India

can take advantage of interoperability and economies of scale of equipment.

D. Broadband

25. Utilization of existing infrastructure (copper loop, fibre, satellite and radio etc.) in an optimum manner.
26. Encouraging the use of alternative technologies to provide broadband connectivity where OFC is not available.
27. Allocation of adequate spectrum for facilitating wireless broadband.
28. Ensuring adequate and low-cost availability of international and national bandwidth by ushering a low revenue sharing regime for competitive local and long distance carriers.
29. Higher PC & smart hand held devices penetration would facilitate the overall growth of Internet and Broadband services. Industry should be facilitated to make available Personal Computers and smart handheld devices at affordable prices for the masses.
30. Following major steps need to be taken to make available the content and applications for the overall growth of Internet and Broadband services :
 - Facilitation for creation of multimedia and video content in the country.
 - Incentive for development of regional and local language content
 - Thrust to the development of content and application for e-governance, e-education, e-health etc.
 - Common standards in the content creation and delivery systems.
 - Benchmarks on quality of content with review and validation.
 - Sharing of content delivery setup among telecom service providers
 - Protection of digital content and copyright.
31. Upgrading of access and core network in tune with Next Generation Network (NGN) standards to provide bandwidth on demand and triple play.
32. Public Private Partnership (PPP) to be encouraged for the growth of access.
33. Government to mandatorily observe ICT in its day to day operations and encourage the usage of Internet for :
 - Land records and property transactions
 - Filing of IT/Tax returns
 - Vehicle registration
 - Processing of driving licenses
 - Processing of passport applications, ration card, etc.
 - Payment of electricity and water bills, etc.
 - Education and agricultural consultations

- Tele-medicine etc.
 - Police and law enforcement agencies
 - Regulatory compliances
 - Company Law
 - Educational Qualification
 - Distance learning
34. Keep a track of global standards in technology/services in context of interoperability and standardization.
35. Review of Encryption standards to bring them in tune with current requirements.
36. Synchronization of time stamping with national clock for Internet and Broadband service providers.
37. Migration of IPv6 to be given due priority, in order to spread Internet much faster.

E. Telecom Equipment Manufacturing

38. Public-private partnership in R&D efforts: Two world class research and development centres in public – private partnership mode may be promoted to enable the flow of benefits of research to both public as well as private sectors. There should be a mechanism of competitive funding for the research projects which may be overseen by an advisory council consisting of members drawn from government, industry and academic institutions. One centre would be exclusively for developing products for rural applications in PPP mode.
39. The other centre may be responsible for driving global standards in international bodies such as ITU/ISO etc. suited to Indian industry, collaboration with leading institutions like IISc, IITs, etc. for research, commercial development of future technologies/ applications, etc. and continuous up-gradation of technologies and manufacturing process for the converged telecom services. In order to expeditiously convert new product designs to manufacture and launch in domestic and international markets, it is recommended that an Advanced Prototype facility having world class facilities of CAD, CAM, etc may also be set up under a strategic alliance with developed countries. This centre will be funded by all stakeholders like service providers; equipment manufacturers etc. and it will have flexibility for hiring the best talent available in market at attractive remuneration.
40. Formation of Common Product Certification to facilitate acceptance of products manufactured in India in the International market and, therefore, enhance the exports.

41. Setting up of Mega FAB for the manufacture of Integrated Circuits and other electronic components: For achieving higher degree of local value addition and making optimal use India's capabilities in software, design, and system integration, Government may have strategic alliance with some of the leading vendors (LG, Samsung, Nokia, etc) and facilitate setting up of FAB by announcing special package of incentives.
42. Hardware Manufacturing Cluster Parks: For promotion of telecom equipment manufacturing, Hardware Manufacturing Cluster Parks (HMCP) needs to be set up across the country.
43. The government may consider providing financial support in the development of core common infrastructure in such SEZ for telecom equipment manufacturing. An amount equivalent to 5% of the total investment by the SEZ developer and units to be located in the respective SEZ subject to a maximum of Rs. 50 crore may be provided by the government. However, only those product specific SEZs intending to invest at least Rs. 100 crore in an area of 10 hectares should be eligible for such support from the government. Promotion of Hardware Parks to be encouraged in the Private sector and given the duty free facility as well as income tax benefit as provided to promoters of SEZ.
44. 24x7 time frames for custom clearances: In order to reduce the transaction cost, custom clearance for imports and exports should be on self-declaration basis.
45. Permission for working of women in three shifts: State governments may be requested to allow the women to work round the clock in Electronic industry similar to BPO industry.
46. A set of fiscal policy incentives need to be given for telecom manufacturing in the country. It is recommended to provide abatement to Indian manufacturers for products designed in India and manufactured in India as well as products not designed in India but manufactured in India also and to rationalize the excise duty at 8% from the current level of 16 % on telecom equipments including entire value chain of raw materials.
47. The Central Sales Tax to be made 0% on telecom equipment including entire value chain of raw materials. State Governments may be requested to exempt octroi, entry tax, local sales tax etc. on the telecom equipment at least up to 2015.
48. DEPB³⁵ to be recognized as export earnings as it is seen as a fiscal benefit to motivate trans-national companies to set up base in India.
49. In order to encourage technology transfer, royalty payment up to 5% on domestic sale and 8% on exports should be exempted from income tax.

³⁵ Drawback Entitlement Passbook Scheme

50. Domestic telecom equipment manufacturers may be allowed to have an access to External Commercial Borrowings (ECB) for capital expenditure and working capital requirement.
51. Domestic financial institutions should lend money for capital expenditure and working capital requirement of the telecom equipment manufacturers at rates equivalent to the rates at which the telecom service providers or infrastructure providers are entitled to.
52. The indigenous telecom equipment supplied to defence forces may be declared as deemed imports by defense forces and no duties/ taxes are to be imposed.
53. The Government may create an export promotion fund for “Telecom Equipment and Services Export Promotion Council (TESEPC)” to encourage exports. The export council may be created on PPP mode and appropriate funding mechanism may be worked out.

F. Research and Development

54. There is a need to strengthen the collaborative research in areas like system view, basic technology, service technology, sub-systems and comprehensive security could be some of the prime objectives of the same.
55. The research towards information security, avoiding misuse of telecom for criminal purposes, reliability, survivability and protection of networks could be key priority areas of research.
56. Having regard to the critical nature of telecom network with respect to National Security a test and monitoring centre should be set up which could be named as National Communications Security and Monitoring Centre of India to fulfill national IT security certification and testing needs and responsibilities. This is estimated to cost Rs 450-500 crore over the plan period. The decision on the location of the centre should be made after carefully assessing the capabilities available in different institutions in Government, academia, R&D setups and others.
57. The Telecommunication Research also needs to be taken up for maximizing the use of infrastructure resources and investments including techniques for higher network performance, flexible and efficient use of spectrum, rapid evolution of services etc.
58. The areas which would require concerted research effort within next five years are Wireless connectivity, issues relating to inter operability at various levels, design optimization and performance of packet networks.
59. The other areas of R&D which would be crucial in the 11th Plan include low cost handsets, low cost infrastructure for rural areas, smart devices, RFIDs, 4G wireless techniques and sensor networks.
60. There is a need to work on content and applications of various types for use of individual, business, governance and communities. Research will

- be required in the innovative value added services domain also. It is important that research and development is carried out in the field of secure mobile application and also on the policies, practices and laws, to ensure that mobile e-commerce becomes order of the day.
61. There is a need to work on standards of interoperability at various levels of connectivity, QOS, service level agreements, network security features, standardization of devices, elements and protocols, test methods, validation and certification.
 62. India must participate more actively in the various Study Groups and Working Parties under International Telecommunication Union (ITU), to ensure that the decisions of the ITU are influenced to suit the India's policies.
 63. The telecom R&D effort needs to be strengthened and collaborative research by pooling of talent and funds by service providers, manufacturers; research organizations and academic institutions should be encouraged. The centres of excellence may be identified for coordinating research areas. Present institutions like C-DOT may be strengthened to steer public private programmes for R&D. The outlay and amounts to be set aside for national projects and other groups of areas of research need to be worked out including private contribution. 10% of the revenue from telecom services can be set aside for research and development.

G. Rationalization of Taxes and Levies

64. There is a need for rationalization of spectrum charges being paid by the various operators on a holistic basis including the microwave access, backbone charges etc.

Indirect Taxes

65. **Customs and Excise Duty** - There is a need for reducing customs duty on equipment required for telecommunication services. The customs duty for microwave equipment should be zero similar to base transceiver station (BTS) under notification no.7/2004-Customs dated 8th Jan., 2004. The excise on locally manufactured equipment should be pegged at the lowest level of 8% to promote the manufacturing and services segment.
66. **Service Tax** - The reduction in the service tax on telecom to 8% from the present level of 12% to help in the spread of telecom services in semi-urban/rural areas (as it would translate into reduction in the tariffs).

Direct Taxes

67. A telecom company may continue to be allowed deduction under Section 80 IA and 100% benefit for the 10 years at par with other companies getting 80 IA benefit.
68. It is envisaged that IP - 1 infrastructure providers will increasingly invest in, build and roll out the telecom networks to be used by operators on infrastructure sharing model as well for the USO roll out. In order to promote the model roll out effectively, Section 80 IA and 100% benefits to deductions allowed should be extended to the authorized IP - 1 operators engaged in implementing the networks.
69. Identification of a focal point at State level for better coordination and grievance redressal of the State and the licensed telecom operator.
70. To increase the flow of investments in the Telecom sector, it is important that the fiscal policy of the Government is stable without any frequent changes in the tax/levy structure.
71. To encourage indigenous manufacturers of telecom equipment in India, it is important that the tax regime provides them with a level playing field vis-à-vis the global players importing telecom equipment in India.

F.NO.M-13040/3/2006-C&I
Government of India
Planning Commission
(C& I Division)'

Yojana Bhawan, Sansad Marg, New
Delhi-110001 Dated 30-05-2006

OFFICE MEMORANDUM

Subject: Working Group on Telecom Sector for the Eleventh Five Year Plan (2007-2012)

In the context of preparation of Eleventh Five Year Plan (2007-2012) it has been decided to constitute a **Working Group on Telecom Sector** to make recommendations on the various policy matters relevant to the formulation of the Eleventh Five Year Plan for Communication & Information Sector.

II. The Composition of the proposed Working Group will be as follows: -

Name & Designation

1. Dr. J. S. Sarma, Secretary, Department of Telecom	Chairman
2. Member (Services), Telecom Commission	Convener
3. Member (Finance), Telecom Commission	Member
4. Administrator (USOF) Department of Telecom	Member
5. Sr. DDG, TEC, Department of Telecom	Member
6. Representative, Department of IT L	Member
7. Representative, Ministry of Finance v	Member
8. Representative, Ministry of Defence	Member
9. Representative, Department of Space	Member
10. Representative, Ministry Commerce & Industry	Member
11. CMD,BSNL	Member
12. CMD,MTNL	Member
13. Secretary (IT) Govt of West Bengal	Member
14. Secretary (JT) Govt, of Assam	Member
15. Dr. C Muralikrishna Kumar, Adviser (C & I), Planning Commission	Member

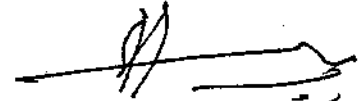
Non Official Members

16. Prof. Rekha Jaicu HM, Ahmedabad	Member
17. Shri T.V. Ramachandran, Dir. General, COAI	Member
18. Shri S. C. Khanna, Secretary General, AUSPI	Member
19. Representative, CII	Member
20. Representative, FICCI	Member
21. Representative, ASSOCHAM	Member
22. Chairman, TEMA	Member

- III. The Terms of Reference to the Working Group will be as follows:
1. To evolve a strategy on telecom sector for the 11th Plan with the basic objective of development of world class infrastructure for supporting accelerated growth of IT and other sectors of the economy with special focus on technological changes in access parameters, convergence of services and markets, international scenario vis-avis WTO/IPR regimes and other relevant factors linked to growth like introduction of a comparative tariff structure etc;
 2. To review existing schemes / programmes in this sector and suggest the type of schemes those need to be retained/included for the Eleventh Plan period.
 3. To make recommendations for improving rural connectivity which should not only be affordable but also self-financing; and capable of supporting a multi-media system" of communications;
 4. To make recommendations on further restructuring/reforms required in the post-convergence scenario including availability of spectrum, expansion of broad band and promotion and strengthening of R & D;
 5. To suggest measures for promotion of private sector investments including Foreign Direct Investment (FDI) in the light of the experience gained so far;
 6. To review the performance of telecom equipment manufacturing sector with identification of constraints and make recommendations for evolving an appropriate policy to ensure value addition during the indigenous manufacturing phase including quality control, product standardization, provision of maintenance and other services;
 7. Set up a high powered group with all stake holders for efficient spectrum management and identify spectrum requirements for implementing new technologies and services such as DTV, DTT, 3G and the like. Also make recommendations for creation of Spectrum Management Fund for funding new initiatives in niche areas.
 8. Any other issue of importance to policy formulation for the telecom sector including creation of a consolidated database.
- IV. The Working Group may set up Sub Groups to go into specific issues/areas in the sector and or for detailed information gathering and analysis. The Chairman of the Working Group may co-opt any person whose knowledge or expertise is considered to be useful to the Working Groups or the Sub Group and may invite any such person to specific meetings.
- V. The non-official members of the Group will be paid TA/DA by Planning Commission as per SR 190 (a) for attending meetings of the Committee.
- VI. The Group shall be serviced by Dept. of Telecom. Member Services, Telecom Commission would be the coordinating Officer for the work relating to the Group and may be contacted:

Member (Services)
Telecom Commission
Sanchar Bhawan
Asoka Road, New Delhi-110001
TeL 011-23714644

VII. *The Group shall submit its report by 31st July, 2006*



(S. A. Hahim)

Under Secretary to the Govt, of India

F.NO.M-J 3040/3/2006-C& I
Government .of India
Planning Commission
(C & I Division)

Annexure - II

Yojana Bhawan, Sansad Marg,
New Delhi-110001
Dated: 5th June, 2006

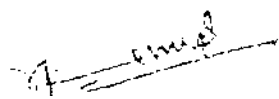
ADDENDUM

In continuation to this office memorandum of even no. dated 30th May, 2006, it has been decided that Member Convenor of the Working Group on the Telecom Sector for the Eleventh Five Year Plan (2007-2012) will be Shri M Sahu. Joint Secretary (X) in place of Member (Services), Telecom Sector.

His contact details are as follows:-

Shri M Sahu, Jt.
Secretary (T), Sanchar
Bhawan, Ashoka Road
New Delhi Tel :
23717411

Member (Services). Telecom Commission will continue to remain as Member of the Working Group.


(V.K. Kulshrestha) Dy.
Adviser (C & I)

LIST OF PARTICIPANTS OF SUB-GROUPS**I. Sub- Group on Network Expansion**

The Sub - Group on Network Expansion had following Members:

1.	Administrator, USOF	Chairman
2.	Wireless Advisor, DOT	Member
3.	DDG(VAS), DOT	Convener
4.	DDG(BS), DOT	Member
5.	Representative of Department of IT	Member
6.	Representative of Planning Commission	Member
7.	Representative of DOS	Member
8.	Representative of AUSPI	Member
9.	Representative of TEMA	Member
10.	Representative of FICCI	Member
11.	Representative of CII	Member
12.	Representative of ASSOCHAM	Member
13.	Representative of Association of V-SAT	Member
14.	Representative of Indian Cellular Association	Member
15.	Representative of Reliance Infocomm Ltd.	Member
16.	Representative of BSNL	Member
17.	Representative of Hutchison Group	Member
18.	Dr. Rekha Jain, IIM, Ahmedabad	Member
19.	Representative of GTL	Member
20.	Representative of QUALCOMM	Member

II. Sub- Group on Broadband

The Sub-Group on Broadband was composed of the following members:-

1.	Shri T.V. Ramachandran, Director General COAI	Chairman
2.	DDG(LR), DOT	Convener
3.	Joint Administrator, USOF	Member
4.	Representative of Department of IT	Member
5.	Representative of M/o Health	Member
6.	Representative of M/o HRD	Member
7.	Representative of M/o I&B	Member
8.	Representative of Planning Commission	Member
9.	Representative of DOS	Member
10.	Representative of BSNL	Member
11.	Representative of MTNL	Member
12.	Representative of ISPAI	Member
13.	Representative of NASSCOM	Member
14.	Representative of AUSPI	Member
15.	Representative of Bharti Televentures Ltd.	Member
16.	Representative of Tata Tele Services Ltd.	Member

III. Sub-Group on Telecom Equipment Manufacturing

The Sub-Group on Telecom Equipment Manufacturing had following members:-

1.	Shri P. Balaji, President TEMA	Chairman
2.	DDG(IP),DOT	Convener
3.	Representative of DIPP	Member
4.	Representative of CII	Member
5.	Representative of FICCI	Member
6.	Representative of ASSOCHAM	Member
7.	Representative of AUSPI	Member
8.	Representative of COAI	Member

IV. Sub-Group on Technology and Research & Development

The Sub-Group on Technology and Research & Development consists of the following members:-

1.	Prof. N. Balakrishnan, Associate Director IISC	Chairman
2.	Shri Vijay Madan, ED C-DOT	Convener
3.	Sr. DDFG (TEC), DOT	Member
4.	Representative of Department of IT	Member
5.	Representative of DOS	Member
6.	Representative of IIT, Delhi	Member
7.	Representative of IIT, Madras	Member
8.	Representative of CSIR	Member
9.	Representative of BSNL	Member
10.	Representative of COAI	Member

V. Sub-Group on Taxation/Levies in Telecom Sector

The Sub-Group on Taxation/Levies in Telecom Sector had the following members:-

1.	Shri Y.S.Bhave, Special Secretary ,DoT	Chairman
2.	DDG(FEB)	Convener
3.	Representative of M/o Commerce and Industry	Member
4.	Representative of DEA	Member
5.	Representative of AUSPI	Member
6.	Representative of COAI	Member
7.	Representative of TEMA	Member
8.	Representative of CII	Member
9.	Representative of BSNL	Member
10.	Representative of Tata Tele services	Member
11.	Representative of Bharti Televentures	Member
12.	Representative of ASSOCHAM	Member