TELECOM REGULATORY AUTHORITY OF INDIA

Recommendations

On

Telecom Equipment Manufacturing Policy

12th April, 2011

Mahanagar Doorsanchar Bhawan

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Preface

Telecommunications has today become an invaluable tool for both personal and commercial use. Over the last few years, there has been a significant increase in the number as well as improvement in the quality of applications, particularly in the mobile networks. End devices too have undergone a major transformation and are today capable of delivering a host of services. All this has been made possible by an increase in the processing capacities. Resultantly, telecommunications is no longer restricted to persons and is also increasingly being used for machine to machine communications. Little wonder then that the world is now talking of 50 billion connections by the year 2020.

India too is witnessing a rapid growth in its economy as well as in its telecommunications networks, each feeding on the other. Telecommunications infrastructure being the bedrock of this growth, it is reasonable to expect a manifold increase in the requirement of telecom infrastructure. The experience over the last few years has been that a major share of the telecom equipment has been imported and consequently the full benefit of telecommunications to the Indian economy, to that extent, has been deprived. It is, therefore, necessary to make a concerted effort in this direction for which a specific policy framework would be necessary.

TRAI has attempted to develop a Telecom Equipment Manufacturing Policy. The Recommendations contained in this document are the result of a consultative process. The Authority expects this policy to be an integral part of the New Telecom Policy that is on the anvil.

(Dr.J.S.Sarma)
Chairman, TRAI

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Introduction

(i) It is universally agreed that telecommunications contributes significantly to the overall socio-economic development of the country, and that the development of a modern nation to its full potential in the contemporary world can never be attained without modern telecommunication services. It is critical not only for the development of the ICT industry but also have widespread ramifications on the entire economy as it makes other inputs of economic development more productive. Reliable telecommunications improves productivity and efficiency of other sectors of the economy and enhances the quality of life for urban and rural population.

(ii) Developing a modern, reliable and robust telecommunication system needs availability of state-of-the-art telecommunication equipment. Telecom sector is highly technology-intensive and is characterised by rapid innovations and changes. It is necessary to leverage these technological developments through domestic production to provide an elegant, service-rich, rapidly deployable, scalable and cost-effective network. For a cost sensitive market like India, it is important to make available telecom equipment at a cost which would help build networks that can sustain large volumes at low per user revenues. This could be achieved through innovation and large scale manufacture of products based on new technologies that would help build cost effective networks.

(iii) Growth of telecom in India has few parallels in the world. With just about 5.07 million connections in 1991, when liberalisation started, it has grown to be the world's second largest network with a subscriber base of 826.25 million at the end of February 2011. In

the last five years itself, the network has grown at a CAGR of 44.56%. The telephone density was a meager 0.8% in 1991 but now stands at a respectable 69.29 with urban and rural teledensities of 154.01 and 32.95 respectively. The growth has so far breached several targets set by the government and continues unabated. The target of teledensity of 7 by 2005 and 15 by the year 2010 set in New Telecom Policy 1999 was achieved in 2004 and 2007 respectively and the target of 600 million connections set by the planning commission for the end of XIth five-year plan(2007-12) was achieved in February 2010. As the growth continues the number of connections is set to cross the 1 billion mark by the year 2014. More than 40% of the current monthly addition over 18 million customers are in rural areas. While there is no doubt that investment would continue to be made in the expansion and mordernisation of the network in urban areas, it is evident from the growth pattern that rural investments are going to increase significantly over the next few years.

(iv) This increase will not be only in terms traditional telephone or broadband connections. With rapid advances being made in machine to machine communication, cloud computing, tracking and positioning, controlling devices and processes, smart meters, smart grids and smart cities the number of connected devices and human being would together exceed all estimates that are being made today. According to GSMA the total number of connections would be about 15 billion by 2015 and 50 billion by 2020. India today has about 826 million connections against 6 billion connections all over the world. With the growth rate that India currently enjoys and also assuming that India would have among the largest share of non-telephony connections, it would be fair to

assume that India would have atleast 10% or 1.5 billion connections by 2015 and 5 billion connections by the year 2020.

(v) The needs of the country have changed over the years. For today's knowledge based society to grow quickly and to reap the consequent economic benefits, it has become necessary to extend Internet and broadband connectivity to every nook and corner of the country. Unlike voice connectivity, growth of broadband subscribers has been well below the potential with the number of subscribers at only 11.47 million at the end of February 2011. The number of Internet subscribers too stood at a modest level of 18.69 million at the end of December 2010 when broadband was 10.92 million. However, the number of people who could access the Internet through their mobile phones was estimated at 332.43 million at the end of December 2010. Proliferation of fiber optic network in the backbone and aggregation, as proposed by TRAI in the National Broadband Plan recommendations of December 2010, is likely to see corresponding investment in various broadband access technologies. The prospects of continued aggressive growth of the Internet and mobile data traffic would prompt service providers to invest in the growth of these networks.

(vi) Different types of service providers create networks to provide voice and data services to the customers. There are access service providers, long distance service providers and the Internet service providers providing retail services to the end customers. Then there are Infrastructure providers providing wholesale services to the telecom service providers. In the access domain, there are 19 licensed service providers providing voice, data and leased line services in various service areas. In 2009-10, the total revenue of

these service providers was Rs. 1,24,435 crore. In the long distance segment there are 29 National and 24 International long distance operators out of which 13 are providing voice and rest only VPN/leased line services. The turnover of NLD and ILD segments was Rs. 19,320 crore and Rs.8829.13 crore in 2009-10. There were 378 licenced ISPs at the end of July 2010 out of which165 were active. Their total turnover was Rs. 971 crore in 2009-10. In the infrastructure segment there are about 15 players offering towers to the service providers. The industry has about 400,000 towers today with the annual growth rate of about 20% per annum.

(vii) The network development activity by the service providers and infrastructure providers gives rise to requirement for telecom network and subscriber terminal equipment, towers, cables of various types, power and air-conditioning equipment. The access segment requires, among others, a variety of fixed and mobile switches, transmission equipment, fiber and copper cables and various kinds of system and application software, IN platforms, subscriber management systems, test equipment and other support systems like power and air-conditioning. Deployment of long distance networks requires, among others, switching, transmission equipment, fiber, landing stations, security systems, backend hardware and software. The ISP business requires various kinds of IP and Ethernet equipment, backend hardware and software, applications and content. The infrastructure provider can create passive infrastructure like fiber, duct and tower which can be leased by the service providers to provide services to the end customers. Proliferation of fiber optic network in the backbone and aggregation, as proposed by the Authority in the National Broadband Plan recommendations of December 2010, is likely to see corresponding investment in various broadband

access technologies. Further, with the introduction of 3G and the possibility of 4G in the near future, the data consumption is likely to multiply manifold. This would lead to exponential increase in the demand for the related equipment. Requirement of 3G equipment is expected to be of the order of Rs 10,127 crore and LTE and WiMAX about Rs 12,659 crore in 2015-16. By the year 2020, the combined demand is likely to be Rs 26,456 crore.

(viii) Most telecom equipment would be bought by telecom service providers, Government and end-users. In some cases network deployment would be outsourced to Original Equipment Manufacturers (OEMs) who may not only deploy their own equipment but also source equipment from other vendors. A lot of enterprise work is done by system integrators who may source equipment from many sources and provide support to the other segments of the ecosystem. Revenues and investment made by service providers indicate capability and willingness to invest in the expansion of the network. The telecom service providers have reported, in their annual reports an EBITDA of 18.92% in 2009-10[1]. One can conclude that, on the whole, the telecom companies are in a position to invest in expanding their networks. This is also evident from the reported investment (in net block) going up from Rs 148,653 crore in 2008-09 to Rs 225,610 crores in 2009-10, a growth rate of 51.77%. Increasing investment in network expansion augers well for the manufacturing industry in India and the situation is expected to continue for the next decade.

(ix) NTP-99 highlights the need for promoting indigenous telecom:

[1] According to the Annual Accounts submitted by the service providers to TRAI

"With a view to promoting indigenous telecom equipment manufacture for both domestic use and export, the Government would provide the necessary support and encouragement to the sector, including suitable incentives to the service providers utilising indigenous equipment."

"The Export of telecom equipment and services would be actively incentivised. Synergies among the various telecom players (manufacturers and service providers) would be exploited and used to provide integrated solutions for exports."

(x) Although the New Telecom Policy of 1999(NTP '99) contained stipulations regarding promotion of domestic products, promotion of exports and utilisation of indigenous equipment, no plans or schemes for implementation of these aspects of the policy have come to light. The following is quoted from NPT '99.

(xi) Despite significant growth of the telecom network and the subscriber base over the last decade, the telecom manufacturing sector has not shown corresponding increase. The contribution of all domestic products has been 12-13% in the year 2009-10 while Indian products could meet just 3% of the Indian demand. Much of the equipment used for expansion of the Indian network is imported from other countries. Looking at the industry data, it becomes quite clear that the telecom ecosystem has so far failed to adequately spur the manufacturing segment and as a result, the domestic telecom equipment manufacturing segment has not been able to meet the demand forcing the telecom operators to import most of the equipment required for their network.

(xii) There are reasons for the Indian manufacturing Industry not being able to meet the demand through domestic equipment manufacture. Manufacturing needs support of other components of the value chain to flourish. Manufacture of components and sub-assemblies in India would help both the Indian product companies and Indian manufactured product companies. Large global EMS vendors need to be encouraged to set-up competitive large scale operations in India. This would not only reduce the input cost but also enable the same infrastructure to be used across the entire electronics sector. It is very important to have a tax structure that encourages manufacturing. Today, import of components invites custom duty as against zero duty on the finished products. Smaller domestic players face the problem of not having economies of scale and availability of long term financing at low interest rates. R&D facilities, access to low cost funds and testing and certification are other areas which need to be looked into to make the manufacturing environment more conducive. There are several measures to be taken all of which could increase in domestic production and enhance the value addition to the products being manufactured in the country. A number of smaller Asian countries have made their mark while India continues to struggle with extremely low domestic production of telecom equipment. A robust telecom network needs a strong telecom manufacturing base which will in turn contribute handsomely to the GDP and employment of the country. There is therefore need for a comprehensive Telecom Equipment Manufacturing Policy that would give the country a definite direction and facilitate the country in being a strong telecom manufacturing powerhouse. This will also be consistent with the import of the following in the last budget speech of the Finance Minister.

"For sustained growth of GDP and productive employment for younger generation, it is imperative that the growth in manufacturing sector picks up. We expect to take the share of manufacturing in GDP from about 16 per cent to 25 per cent over a period of ten years. Government will come out with a manufacturing policy, which will bring down the compliance burden on the industry through self-regulation and help make Indian industry globally competitive."

(xiii) A thriving telecom manufacturing industry would have a positive impact on many other elements of the manufacturing value chain. The Hardware Task Force report[2] indicates that despite the huge requirement for telecom hardware and growing domestic consumption, there is a dearth of Indian manufacturers of telecom equipment who can effectively address these needs. India may have missed the first opportunity but there is no reason why it cannot now enter a high growth trajectory. India has the capability to create global manufacturing companies of its own if it can tap the next wave of telecom growth that would happen in the areas of wireless broadband, Next Generation Networks and Next Generation Mobile Networks. This stimulus must be leveraged to create globally competitive Indian Products and help build a vibrant telecom product industry from India.

(xiv) Indian manufacturers, whether Indian arms of multinational telecom companies manufacturing in India or the Indian product manufacturers developing and manufacturing products in India, contribute by way of value addition, making available high technology equipment in India, upgrading manpower skills,

[2] "Report of Task Force to suggest measures to stimulate the growth of IT, ITES and Electronics Hardware Manufacturing industry in India", Ernst & Young report, December 2009

bringing in new processes, increasing employment, developing ancillaries and development of economy of the country. Telecom equipment is also required by Defence and Space sectors. With manufacturing units and their supply chains in place in India, telecom equipment manufactured in India may be rendered cheaper compared to imported equipment. Domestic manufacturing can also help in addressing security and safety concerns, cut down the life-cycle time, and strengthen the other links of the value chain. Domestic production can not only reduce our imports, but also create a large export opportunity with the consequent benefits to the telecom industry and the country. Domestic manufacturing of telecom equipment in India is mostly based on technology developed abroad, therefore not only manufacturing but also higher and higher value addition needs to be promoted in India.

(xv) According to a CII-TIE report[3] there is a discernible shift in consumption and production of ICTE products towards high growth Asia Pacific region. There is persistent demand for products that are cheaper and more efficient than the existing ones and accelerate growth rates can be achieved through innovation. Within two decades, it is estimated that nearly two third of I.C.T.E. industry will move into Asia. According to the same report, by 2015, India's consumer market is bound to emerge as world's 8th largest and eventually escalate to the 5th position in 2025. This implies an increase in aggregate private consumption from U.S.$ 370 billion in 2005, to U.S.$ 746 billion by 2015 and U.S.$ 1521 by 2025 (McKinsey Global Institute Report). Middle class population will swell to 583 million in 2025 comprising 41% of

[3] Investment Opportunities in Developing Hi-tech ICTE Supply Chain in India, October 25, 2008

total population calling for India Centric Products and aligning resources to address the bottom of the pyramid. This also poses a fundamental national challenge of burgeoning demand-supply gap. Though ICTE is accepted as a key enabler in national development, ICTE production has in no way kept pace with the demand. The share of demand being met through local manufacturing has progressively declined. For 2007-08 import figures were estimated at US$ 24 billion as against production of US$ 18.8 billion with consumption shooting up to about U.S.$ 40 billion. Unlike many other emerging economies, India's ICTE industry so far is not driven by exports, which stood at a relatively low level of U.S.$ 2.95 billion during 2007-08. India's share in global ICTE equipment consumption is projected to rise from just above the present 2% to 5.5% in 2010 and 11.5% in 2015 thus touching U.S.$ 380 billion by that year (combined estimates of ISA-Frost & Sullivan, CII and others) This implies demand supply gap will grow exponentially unless production gets a major boost In that case, ICTE. Imports would gallop to well surpass India's oil imports. Currently, more than 70% components are imported and this is set to rise sharply. India is emerging amongst the fastest growing semiconductor market: With India's consumption of ICTE products growing from about U.S.$ 10 billion in 2004 to over U.S.$ 300 billion in 2015, demand for semiconductors is projected to shoot up from U.S.$ 1 billion in 2004 to over U.S.$ 40 billion by 2015(ISA-Frost and Sullivan estimates). If domestic manufacturing is not initiated, India will be compelled to import U.S. $ 150 billion worth of semiconductors in next 10 years. Filling up the burgeoning demand-supply and export-import gaps is a big challenge for Indian and the role of manufacturing investment remains absolutely critical.

(xvi) It is quite clear that there are several issues that the Indian telecom manufacturing industry faces which, if resolved, could lead to a thriving telecom manufacturing sector that would not only be able to meet a large part of the domestic demand but also export telecom equipment to other countries. To discuss these issues, the Authority decided to have wide ranging consultations with the stakeholders. A pre-consultation paper was issued in May 2010. Based on the comments received and further study, a consultation paper was issued on 28th December 2010 asking the stakeholders to give suggestions on the issues such as promoting manufacturing in India, component manufacturing, R&D and innovation, creation of Indian IPRs, manufacturing clusters, standardisation and creation of centralised test & certification facilities. Pursuant to the receipt of comments on the issues raised in the consultation paper, open house discussions were held on 2nd February 2011. The recommendations contained in this document are being made based on the suggestions made by the stakeholders and further analysis thereon.

(xvii) Recommendations made in this document cover the period up to the year 2020. Although it is proposed that the Indian manufacturing must be spurred to achieve the target of meeting 80% Indian demand through domestic manufacturing with a value addition of 65% by the year 2020, the increasing demand-supply gap and high export-import ratio require that all efforts need to be made to meet these this target by the year 2017. This may not be difficult to achieve as the report of the working group on telecom for the XIth five year plan itself envisaged meeting 75% of the Indian demand of telecom equipment and handsets through indigenous manufacturing with a value addition of 40%.

(xviii) Chapter I deals with the rationale and objective of the Telecom Equipment Manufacturing Policy. It traces the growth of telecom, looks at the assessment of demand for telecom equipment in Indian and prospects of manufacturing such equipment for domestic consumption and exports. Looking at the considerable pace at which the number of subscribers have grown and become 826.25 million at the end of February 2011, average monthly addition being 18.8 million in the last one year alone, estimates of 1 billion subscribers by 2014-15 now looks easily achievable. With wireless broadband and optical fiber based systems gaining traction it is expected that by the same time there would be about 160 million broadband connections. The growing subscriber base would necessitate expansion of telecommunications networks and increase in demand for various types of telecom equipment. The demand for telecom equipment in India was Rs 54765 crore (US$12 billion) in 2009-10 which was about 5.5% of the global demand. This is projected grow to Rs 96514 crore (US$ 19 billion) in 2015 and Rs 170,091 crore (US$ 34 billion) in 2020. Only about 12-13% of the demand for telecom equipment is being met by domestic production. The demand supply gap and the imbalance between the exports and imports of the telecom equipment provide a good opportunity for manufacturing of telecom equipment in India both by the global companies as well as the Indian product companies. With suitable measures there is a scope for taking the indigenous equipment production to a level where it can meet about 80% of the total domestic demand and also become export surplus. The chapter also defines some important terms used the telecom equipment policy.

(xix) Chapter II deals with measures for promotion of domestic manufacturing. A SWOT analysis of the telecom manufacturing

industry indicates that measures are required in the areas of preferential market access, duties and levies and facilities for testing and certification. The Authority is concerned about the low contribution of domestic products in meeting domestic demand and believes that market access needs to be provided to domestic manufacturers. To make sure that real manufacturing takes place and trading is not encouraged some stipulation of value addition has been done in the recommendations. The service providers get incentives for adherence to the prescribed market access. The Authority also recognises the capital intensive nature of the telecom industry. High risk factors in the product development make it difficult for new ventures to access capital. In this regard the Authority recommends that low cost finance in the form of loans at subsidised rates of interest be made available to domestic manufacturers. As regards the duties, levies and taxation there were a number of suggestions on reducing or rationalising these charges. Taking all these comments into account the Authority recommends that the domestic products should not face disadvantage vis-à-vis imported products in the domestic market. While opportunities exist, handset manufacturing faces some major challenges in India, relating to availability of infrastructure including power supply, water and roads, availability of skilled labour, difficulties in operations, anomalies in the tax structure and lack of a wider value chain providing cross- linkages. These handicaps translate into a lack of manufacturing competitiveness for Indian handsets and handset components vis a vis imports. As far as testing and certification is concerned the issue in front of the Authority was type of facilities required and the best agency to manage them. The Authority agrees that world class testing and certification facilities may be established as a common facility for Indian manufacturers. It recommends that TEC may be converted

to an autonomous agency with appropriate funding to establish and run this facility on commercial basis. Once the recommendation is accepted detailed guidelines can be worked out by TEC in consultation with TRAI. As competition increases within an even more globalised world, the appeal of industrial clusters not only remains strong but has become even more urgent. The authority is conscious of the fact that the Indian industry has an urgent need to set up efficient supply chains. Clusters offer many advantages that render participating industries more competitive. Clusters accelerate the process of local manufacturing and R&D. The Authority therefore recommends that ten clusters be identified near the sea or airports and they be provided with good infrastructural facilities so that the infrastructure disabilities that the domestic manufacturing companies face would be removed.

(xx) Chapter III deals with promotion of Indian products. The Indian product segment has not been able to make a serious contribution despite widespread belief that the capabilities exist. If the contribution of domestic manufacturing has been very low, the contribution of India products toward meeting the domestic demand has been a mere 3%! The main reason stated is the lack of the opportunity to leverage the domestic market growth. The Authority therefore is of the opinion that immediate wide ranging measures are required to increase domestic production as well as exports from the country. In this regard recommendations have been made in the areas of market access, promotion of exports, research and development, financial incentives, standardisation and setting up of clusters. It is quite apparent that Research & Development leading to generation of IPR for innovative and creative products is essential for the promotion of technological, industrial and economic development of a country. The Authority recommends creation of a

Telecom Research and Development Corporation (TRDC) for managing a Telecom Research Fund and also set up a telecom research park to provide the complete eco-system for carrying out research that would lead to generation of valuable IPRs and commercialisation of products. This park should be functional by December 2013. Further, as access to private capital is not easily available at all times the Authority recommends creation of a Telecom Manufacturing Fund which would help the entrepreneurs with venture capital in the form of soft loans or equity. The fund would be a corporate body headed by a person of eminence from the field of banking or venture capital finance. Standards play a very important role in telecommunications. There is a general feeling among the stakeholders that India has so far not been active in influencing global standards. It is important that manufacturers, operators, academic institutions and the Government take active role in the process of standardisation under a common banner of a standards development organisation set up by the government. The Authority recommends that an autonomous Telecom Standards Development Organisation be created for carrying out all standards related works.

(xxi) Chapter IV handles promotion of component manufacturing highlights the fact that present level of sourcing of components from within the country is small. Specially, the semiconductor based components are hardly manufactured in India. The present level of indigenous sourcing is very small, since most of the telecom equipment is imported in finished condition or semi-knocked-down (SKD) condition. Non-availability of indigenous components is a major constraint that the manufacturing industry faces today. Most of the critical components like Integrated Circuits(ICs) and Application Specific ICs (ASICs) and other sophisticated

subassemblies are all imported. The Authority recommends that 2-3 fab units may be set up in India. Out of these one fab unit should be with the cutting edge technology chip manufacture capability and can be set up with government funding support. Another fab unit should be for a variety of general purpose integrated circuit chips that are used in a large number of equipment**.**

(xxii) Chapter V reiterates the policy and measures suggested to implement the policy. It suggests a plan of action in the form of timelines for various activities. It then deals with financial implications of the measures and source of funding and concludes with benefits that would accrue from the implementation of suggested measures.

Chapter I

Need for Telecom Equipment Manufacturing Policy – Rationale and Objectives

1.1 To let the benefit of information economy percolate far and wide and benefit everyone requires vision and planning. These get embodied into the country's policies. These policies carry forward the national agenda with the help of a strategic plan. Growth of the Indian telecom network provides a powerful motivation for building matching research and manufacturing capabilities that would let the people of the country enjoy the benefits of technological innovations. It would however be imprudent to believe that the growth that the country's telecom network has witnessed can be sustained without credible domestic manufacturing capabilities. It is not hard to see that failure on this front is endemic with low production, low value addition and a gaping trade deficit. The need for a telecom equipment policy is much stronger today than ever before.

1.2 Before we get into other areas, we look at the type of telecom equipment used in the network and what the Indian network needs up to the year 2020. We then see the available data for demand, production, exports and imports for subsequent discussion on the measures to remove the ills in telecom equipment manufacturing and making recommendations.

A - Telecom Equipment and prospects for Domestic Manufacture

1.3 Telecommunication equipment discussed in these recommendations are either those that are used in the

telecommunications networks to provide service to the customers or the ones that are used by the end-users for making use of the services provided by the telecom networks. In the former case, we have active and passive telecom network equipment. These can be represented diagrammatically as in Figure 1.1

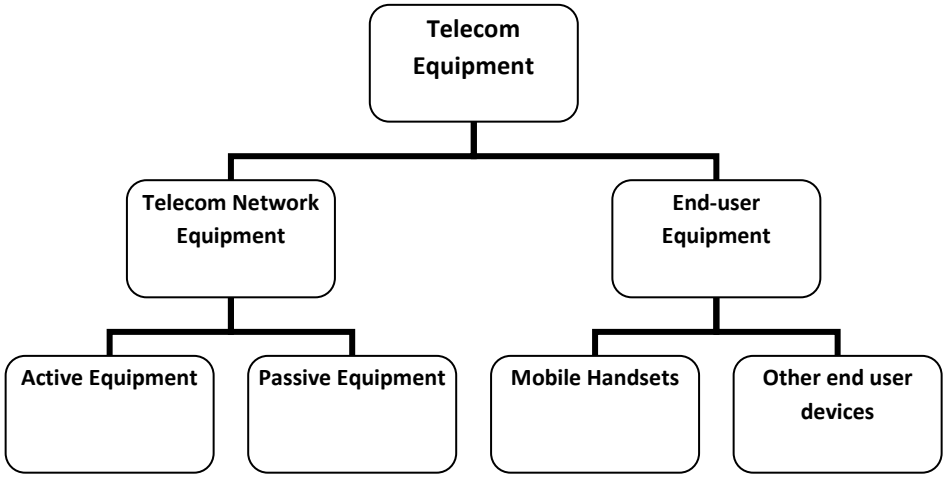


Figure 1.1 Types of Telecom Equipment

Telecom Network Equipment

1.4 The active telecom network equipment category consists of carrier equipment like fixed and mobile switches, base stations, IN platforms, routers, softwitches, LAN switches and transmission equipment. The passive network components are cables, towers, shelters and ducts. The end-user equipment consists of subscriber equipment and devices like modems, routers, mobile handsets, smartphones, data cards and dongles. The passive infrastructure is by and large sourced locally and is therefore not the subject of these recommendations. We discuss in detail the active telecom network equipment and the end-user equipment. These two categories comprise a large number of individual equipment and to

simplify examination we shall classify them into a few logical groups.

1.5 The Figure 1.2 below shows the broad groups of equipment that are important for the network today and are expected to be relevant for the period up to the year 2020 for which the recommendations are being made. A large part of the capex planned by the service providers would be spent on these equipments. We discuss here the broad categories of equipment and their requirement in India. Detailed description of the equipment is given in Annexure I.

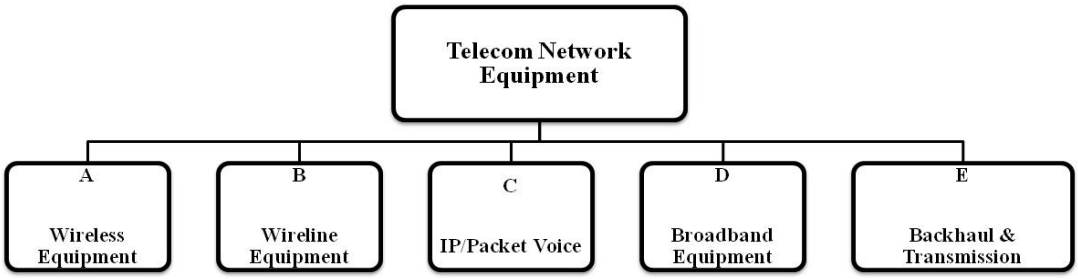


Figure 1.2 Categories of Telecom Network Equipment

1.6 Each of the categories, A to E, shown in Figure 1.2, contains groups of equipment, which further contain telecom products. For example, the wireless equipment category has groups designated as "2G equipment", "3G equipment" or "4G equipment". Each of these groups would have products, e.g 3G equipment will have NodeB, RNC, GGSN etc. A representative list of products is given in Annexure II. In the paragraphs below we shall see the common groups and products within the groups for various categories of equipment. It is at the product level that many aspects of domestic manufacturing and eventual policy recommendations would be

discussed. The details of the acronyms used are in the List of Acronyms.

1. Wireless Equipment

1.7 The wireless equipment today consists of primarily the 2G and the 3G equipment. These are made of Radio Access Network/Radio Network Controller equipment, switching and other core equipment. In future the 4G equipment like LTE or WiMAX is likely to form a major part of deployment by the service providers. The commonly used equipment in wireless network is given in Fig 1.3. The present wireline market is about Rs 38,773 crore

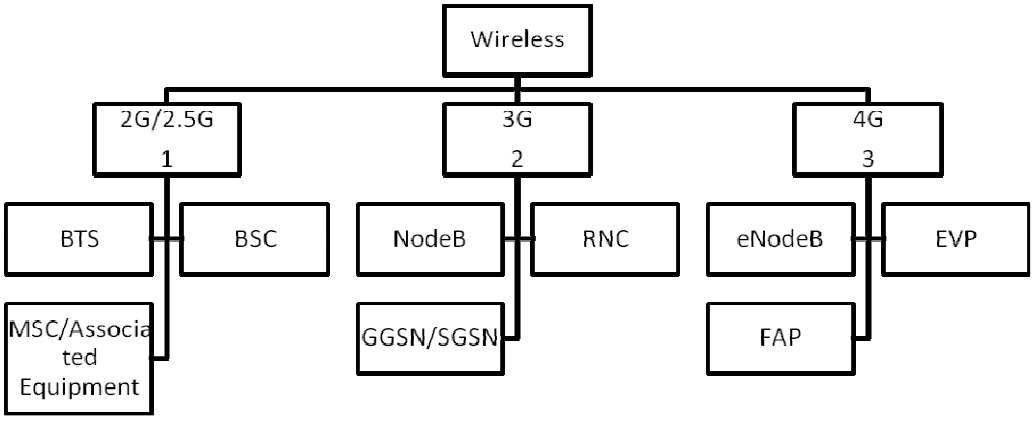


Figure 1.3 Wireless Equipment

2. Wireline Equipment

1.8 In the fixed networks the total equipped switching capacity as on 31st Dec 2006 was about 58 million and in March 2010, 79 million. In the long distance network, the TAX capacity of BSNL was 6.9 million ports in December 2006 which increased to 9.14 million by September 2010. The fixed line connections have actually shown a decline and not much investment is expected in copper cable or local switching systems. The Intelligent Services platforms for offering services like freephone, tele-voting and virtual calling cards

have been installed by most service providers in the last few years. According to Ovum, the present market for wireline equipment is about Rs 1182 crore. Figure 1.4 gives the wireline equipment.

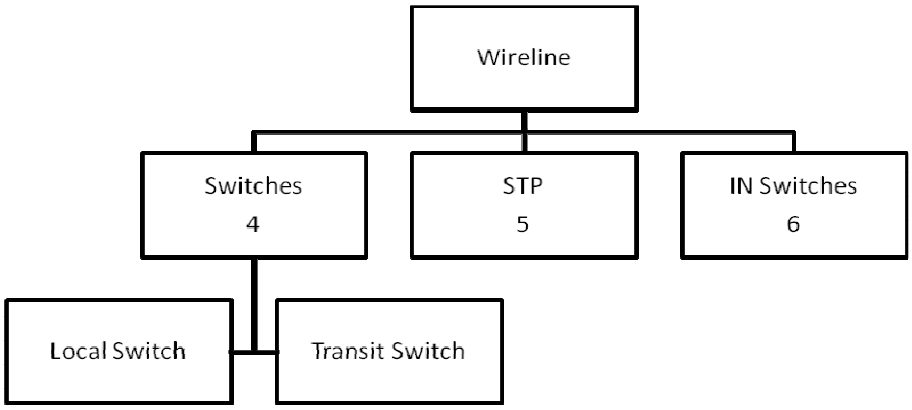


Figure 1.4 Wireline Equipment

3. IP and Packet Switching

1.9 The carrier grade IP and packet switching equipment are generally installed in the backbone and aggregation networks. These mainly consist of routers and LAN switches. The Voice over IP equipment primarily consists of softswitches, media and signalling gateways and session border controller. Commonly deployed IP/packet switching equipment is shown in Figure 1.5. The present market for the IP and packet switching products is about Rs 4968 crore.

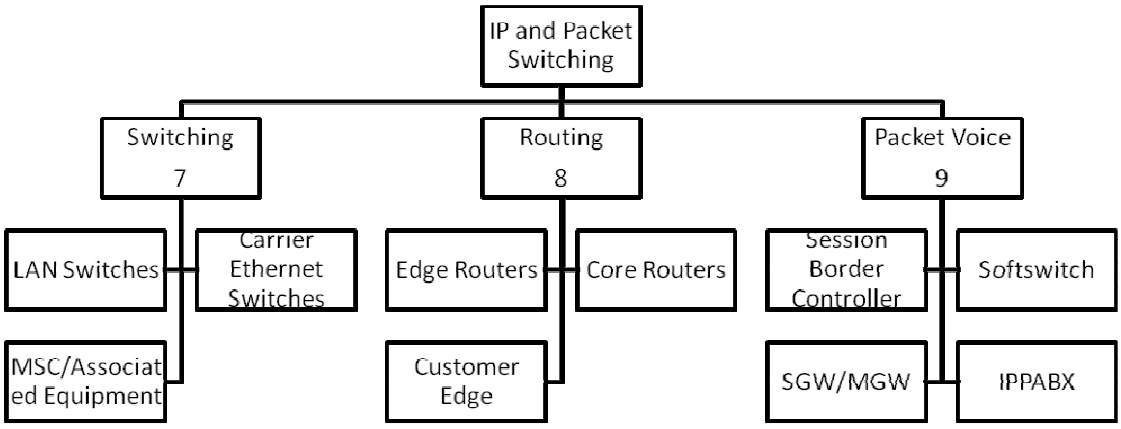


Figure 1.5 IP and Packet switching equipment

4. Broadband

1.10 The majority of broadband connections in India are today given on copper using xDSL technologies. However, as mentioned in the TRAI's National Broadband Plan recommendations of December 2010, out of the proposed 160 million broadband connections by 2014 about 22 million would be on DSL, 72 million on cable and remaining on wireless. Requirement of equipment, both network and subscriber is expected to grow manifold in next 10 years. Figure 1.6 gives the broadband equipment used in the network. The present market for broadband equipment is about Rs 5549 crores.

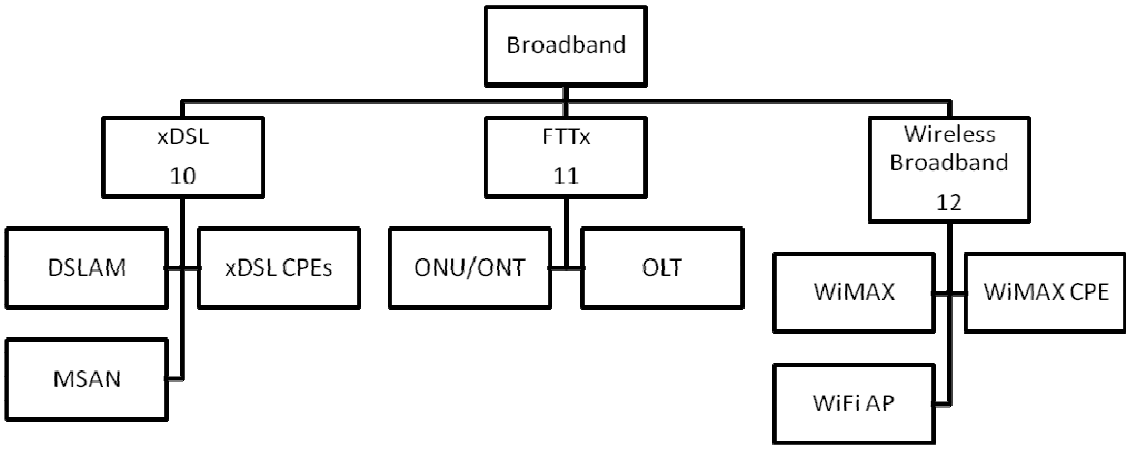


Figure 1.6 Broadband Equipment

5. Backhaul and transmission

1.11 Transmission equipment is required create links among other elements of the network. Backhaul is a microwave, optical fiber or copper link that is used to transport traffic between a number of distributed sites to a central point. Thus data is backhauled from all base stations in a mobile network to the Base Station Controller in wireless networks. In fiber optic network traffic from distributed sources could be aggregated at a point and then backhauled to the core network. Figure 1.7 gives the commonly used equipment for transmission and backhaul. The present market is about Rs 4846 crores.

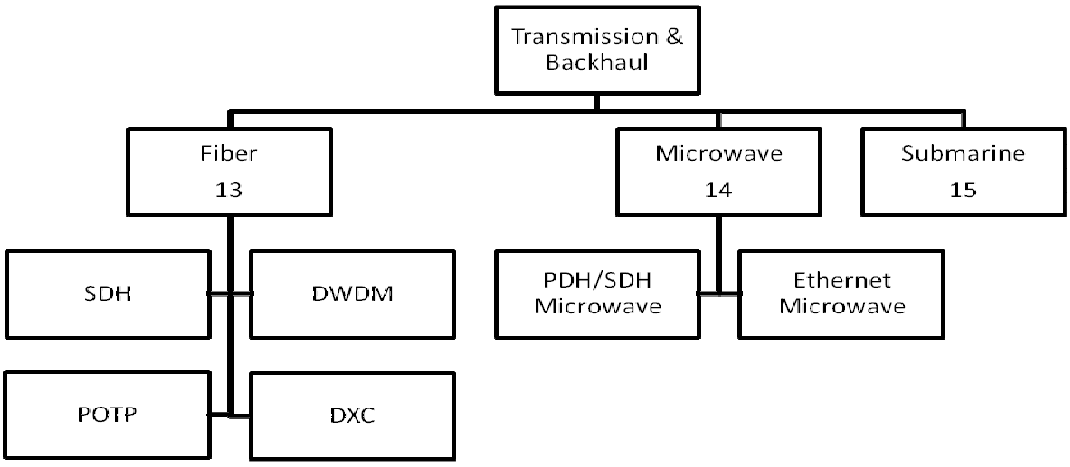


Figure 1.7 Backhaul and Transmission Equipment

End-User Equipment

1. Mobile handset

1.12 Mobile Handset is an umbrella term for mobile devices that typically use keys or touch-pads to input data and can be operated by hand. It includes devices like mobile phones and smartphones. The mobile handsets have evolved from a simple voice phone to a veritable computing device, a messaging device, a digital camera, music system, a positioning system, a mobile TV, a video phone, a video player and a voice phone all rolled into one. The global handset demand in 2010 was about 1.2 billion units valued at US$ 150 billion and it is projected to increase to 1.7 billion units by 2014. According to a recent advisory by KPMG and ICA[4], the annual handset demand in India is about 140 million units today.

4 Manufacturing Advisory Committee/Indian Cellular Association, January 2011

2. Other end user devices

1.13 There are a variety of devices used with mobile broadband and IP networks. There are data cards, dongles, modems and routers, adapters, IP-phones that allow users to use signals from the telecom networks in voice, video or data formats. Today the DSL modem market is the largest among these devices and is valued at Rs 2497 crores. In the details given later in this chapter, these are included in the broadband equipment.

B – Current telecom network scenario

1. Growth of Telecom in India

1.14 The growth of the Indian telecom sector, in terms of the number of subscribers, has been particularly significant over the last 5 years. India reached the first one million mark 25 years after independence, 100 million in April 2005, 500 million in September 2009 and is set to surpass the 1 billion mark much before December 2014. The target of 600 million connections set by the planning commission for the end of XIth five-year plan (March 2012) was achieved in February 2010 and that of 200 million in rural areas by March 2010. The milestones covered in terms of hundreds of millions of connections are given in Figure 1.8. With an average monthly addition of about 18.8 million subscribers during the last year, the number has crossed 826 million by end of February 2011. India surpassed the number of connections in US in March 2008 and has grown to be the world's second largest market after China.

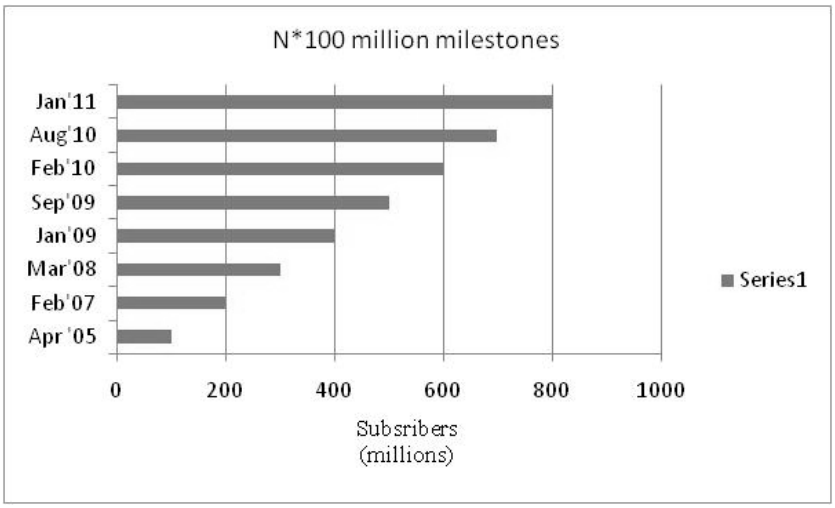


Figure 1.8 Achievement of subscriber base milestones

1.15 The tele density was just 8.8% in Jan 2005 but now stands at a respectable 69.29 with urban and rural teledensities of 154.01 and 32.95 respectively. The target of teledensity of 7 by 2005 and 15 by the year 2010 set in New Telecom Policy 1999 was achieved in 2004 and 2007. The rural and urban teledensities for the last three years are given in Figure 1.9. A large percentage of growth is now taking place in the rural areas. About 40% of the current monthly addition of more than 18 million is in rural areas. While there is no doubt that investment would continue to be made in the expansion and mordernisation of the network in urban areas, it is evident from the growth pattern that investments in rural areas are going to increase over the next few years.

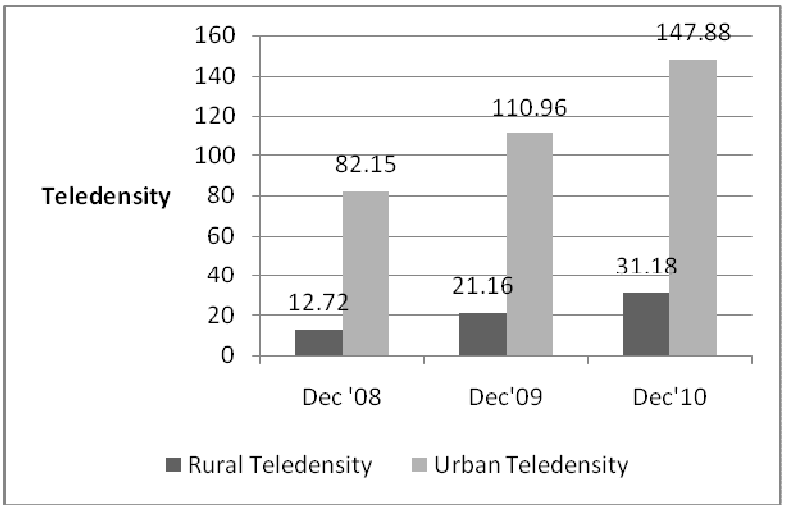


Figure 1.9 Urban and Rural Telephone Densities

1.16 While the growth in voice communications continues, specially on the mobile networks, Internet and broadband access are becoming essential, since many of the most effective applications and services which help foster development, and notably those related to telemedicine, e-commerce, e-banking and e-government, are only available through a high-speed Internet connection –. Broadband-based applications have a far greater impact on people, society and businesses. Despite the known benefits of broadband, the growth has so far been modest and the number of broadband connections stood at 11.47 million at the end of February 2011. The net broadband addition per month is just 0.2 to 0.3 million in contrast to around 18 million mobile connections per month. There were about 1.8 million data card subscribers at the end of September 2010 whose advertised speed is upto 3.1 Mbps. The availability of 3G and Broadband Wireless Access (BWA) technologies augur well for the growth of broadband. In December 2010, the TRAI had recommended the establishment of a fiber optic network in the urban areas as well as in all habitations with population more than 500. These developments should lead to

further investments in the wireline and wireless broadband networks.

1.17 According to Pricewaterhouse Coopers (PWC) in its report titled "Mobile Broadband Outlook 2015", the number of 3G subscribers in India is projected to cross 107 million-mark by 2015. PWC has estimated the rural subscribers to comprise 24% of the overall 3G subscriber base by 2015. This mobile broadband penetration will be driven by the introduction of innovative technologies, decreasing price of 3G/High-Speed Packet Access (HSPA) enabled handsets and enhanced user experience. Broadband Wireless Access/WIMAX growth is expected to increase from current level of 0.25 million to 11 million in 2013 (144 % PA). 3G Modem subscribers are expected to grow from the current level of 2 million to 22 million by 2013 (82% per annum). EV-DO and WCDMA subscribers are expected to grow from the current level of 3 million to 67 million by 2013 (88% per annum). The estimated equipment opportunity is about US$ 3 billion.

1.18 Development of new technologies in telecommunications is leading to emergence of information economy. Networks drive today's economy and digitisation enables rapid convergence of resources. The network economy offers unprecedented opportunities to combine and leverage resources across markets, value chains, products, services and technologies. This makes convergence a new business imperative. Convergence refers to the evolution of previously distinguishable digitalised information formats, services, applications, networks, and business models in ways that reduce or blend the distinctions. Convergence can be a stimulus within the information society ecosystem for creativity, improved productivity, continuous technological innovation, economic

growth, societal benefit and greater inclusion. Convergence facilitates the use and deployment of information communication technologies (ICTs) across all stakeholders - business, government and individuals. It enables content creation, the availability of information anywhere by a multitude of devices and from a multitude of sources as well as communication, collaboration, coordination and interoperability among people, services and applications through enterprise systems and digital networks. Today, continued evolution of ICTs, with the broadband as a key enabler, has built upon that foundation of network convergence and is reducing the importance of distance, connecting people and speeding information flows and processes – constituting a crucial development in the evolution of interdependent global enterprises and increasing the potential for greater inclusion and enhanced societal interaction. The evolution of technology and automation has enabled functions like knowledge-intensive man-machine and machine-machine interactions to be flexible and user friendly. This is leading to exponential rise in the connected devices. The merging of delivery platforms and content creates new opportunities for the development and delivery of services and products. With the possibility of delivering existing services more economically, delivering a range of new service and reducing total cost of ownership converged next generation networks are going to experience more investment in future.

1.19 The service providers have been investing in the growth of network and should have potential to do so in the coming years. According to the figures reported by the service providers, the gross revenue reported by service providers was Rs 157,985 crore which had grown at the rate of 6.51% over the previous year. Conservatively

taking the same growth rate over the next few years the gross revenue is expected to Rs. 216,583 crore by 2014-15.

2. Demand for Telecom Equipment in India

1.20 The demand for network equipment, which was so far largely been driven by voice is likely to undergo a significant change with the introduction of 3G services and the likely spread of broadband. India is expected to have a cumulative capex spend of about $121 billion in the next 5 years[5]. As compared to this, the global capital expenditure of all telecom operators was $277 billion just for the calendar year 2010 and the industry generated over $1.8 trillion in revenues through wireline and wireless services. According to the data submitted by the service providers, the Adjusted Gross Revenue of the service providers in the year 2009-10 was of the order of Rs 1,16,803 crore and the Net Block was Rs 2,25,610 crore. At the current growth rate, the net block is expected to grow to Rs 4,96,182 crore in the year 2014-15 which gives an indication that the capital investment made by the service providers in these 5 years would be of the order of Rs 2,70,572 crore (about US$ 60 billion).This indicates continued demand for telecom equipment in India.

1.21 The growth rate targeted for the manufacturing sector in the XIth 5-year Plan is 12%[6]. Requirement of Telecom Equipment during XIth Plan is expected to be worth US$ 67 billion, considering 75% of the Indian demand of telecom equipment & handsets worth US $ 73 billion would be met through indigenous manufacturing and besides an export potential of US $ 12 billion. To quote from the

[5] Ovum Analysis, www.ovum.com

[6] REPORT OF THE WORKING GROUP ON THE TELECOM SECTOR FOR THE ELEVENTH FIVE YEAR PLAN (2007-2012), Oct 2006 http://planningcommission.gov.in/aboutus/committee/wrkgrp11/wg11_telcom.pdf

report of the working group on the telecom sector for the XIth five-year plan:

"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."

1.22 The details of the domestic requirement of telecom products as projected in the XIth plan is given in Table 1.1:

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

Table 1.1 Domestic Requirement of Telecom Products

1.23 Many analysts predict high growth in wireless, specially the wireless broadband areas. Insight Research predicts[7] that global wireless revenues will jump from an overall 60% of all telecommunications services in 2008 to 72% in 2013, which amounts to a 14.4% compound annual growth rate. The Asia-Pacific region is expected to experience the highest growth rate in the next five years, at nearly 16%, led by China and India. In comparison the telecom sector in Latin America and the Caribbean will grow by 12%, fueled by emerging economies and the expansion of the middle class. Capital expenditures (CAPEX) by telecommunications service providers globally is expected to increase at a compounded rate of 2.4 percent, from $199.6 billion

[7] www.insight-corp.com/reports

in 2010 to $224.5 billion in 2015. According to Boston Consulting Group (BCG), the current size of the market in India including digital advertising, handsets, TV distribution, TV sets, mobile data services, wireless, laptops and PCs and wired voice services is around Rs 3,00,000 crore and is expected to cross the Rs 4,50,000 crore or $100 billion-mark in 5 years. Majority of the investments will go into the capital expenditure for setting up newer networks like 3G, BWA and developing the backhaul. The industry is expected to grow at 12% to13% annually.

1.24 According to IDATE Consulting and Research, the world telecom market would grow to Rs 6,19,284 crores[8] by end of 2013 out of which the mobile access market(excluding handsets) would be Rs 1,74,264 crores. The total telecom equipment market in India is projected to be about Rs 13,000 crores and market includes handset about Rs 76,000 crores. The mobile access and handset forecast shows a declining trend over the year from 2009 which does not match the fast growth of the subscriber base and increasing investment in the network for 3G. Table 1.2 shows telecom equipment market for various categories of equipment:

	2009	2010	2011	2012	2013
Wireline access	762	756	781	825	863
Mobile access	6451	4788	4549	4303	3736
Transmission	3238	3125	3257	3213	2999
WAN data routers and witches	1997	1751	1751	1739	1644
Voice switching	2545	2142	1915	1670	1499
Enterprise	2400	2274	2381	2426	2281
Mobile handsets	57431	85592	83809	75241	63069
Total	**74825**	**100428**	**98444**	**89416**	**76091**

Table 1.2 Telecom Equipment Market in India (IDATE forecast)

[8] 1 euro = Rs 63

1.25 Based on Ovum Global Analysis demand for various categories of equipment are given below. The total demand for 2009-10 was Rs 54,675 crore including handsets while it is projected to be about Rs 1,08,000 crore in 2015-16 and Rs 1,70,000 crore by 2019-20. Table 1.3 gives the telecom equipment market based on this analysis.

In Rs crore

	2009-10	2015-16	2019-20
Wireline Equipment	1,169	496	448
Wireless Equipment (excl. Handsets)	14,146	26,444	44,428
IP & Packet Switching Equipment	4,057	14,689	20,231
Broadband Equipment	7,201	7,761	29,815
Backhaul and Transmission equipment	4,372	7,838	10,960
Other (miscellaneous products)	61	12,467	2,899
Mobile Handsets	23,760	38,402	61,310
TOTAL	**54,765**	**1,08,096**	**1,70,091**

Table 1.3 Telecom Equipment Market in India (Ovum analysis)

1.26 The demand at the product level for different categories is described in the Table 1.4. The demand for wireless equipment was Rs 14,146 crore which is likely to grow to Rs 26,444 by 2015-16 and 44,428 crores by 2020. In this growth the 2G demand will decline in the long term while 3G will be predominant in medium term ie around 2015-16. In the longer term the demand for 4G equipment like LTE and WiMAX would be the maximum among all cellular technologies. Table 1.4 gives the current market and future demand for wireless products.

Wireless Equipment Demand (Rs Cr)	2009-10	2010-11	2015-16	2019-20
Wireless Equipment	14,146	12,637	26,444	44,428
2G Wireless	14,146	3,724	2,532	-
BTS/Antenna	5,658	1,489	1,013	-
BSC	5,093	1,341	911	-
MSC/GMSC/HLR/VLR/EIR	3,395	894	608	-
3G Wireless	-	8,689	10,127	2,646
NodeB	-	3,475	4,051	1,058
RNC	-	3,128	3,646	952
GGSN/SGSN	-	2,085	2,431	635
LTE/Mobile WiMAX/5G	-	-	12,659	23,810
eNodeB	-	-	7,596	14,286
MME/SGW/PDG/SAE	-	-	5,064	9,524
FAP	-	225	1,125	2,799
Handsets	23,760	26,136	38,402	61,310
Total	**37,906**	**38,773**	**64,846**	**1,05,738**

Table 1.4 Demand for Wireless Equipment

1.27 The demand for wireline equipment is around Rs 1169 crore in 2009-10 and is expected to decline to Rs 448 crore in 2019-20. Demand for individual products is given in Table 1.5

Wireline Equipment (Rs Cr)	2009-10	2015-16	2019-20
Switches			
Local	386	164	148
Transit	433	184	166
STP	234	99	90
IN Platforms	117	50	45
Total	**1,169**	**496**	**448**

Table 1.5 Demand for Wireline Equipment

1.28 The demand for IP and packet switching equipment like routers, LAN switches etc was Rs 4047 crore in 2009-10 and is projected to reach 20,231 crore in 2019-20. Demand for various products are given in Table 1.6

IP & Packet Switching	2009-10	2015-16	2019-20
Switching			
LAN Switches	2,228	10,752	13,069
Ethernet/IP Aggregation	408	806	1,268
Carrier Ethernet (incl. above)	10	202	951
Routing			
Edge IP/MPLS Routing	980	1,935	3,044
Core IP/MPLS Routing	245	484	761
Packet Voice	196	713	2,089
Softswitch	78	285	836
SGW/MGW	59	214	627
Session Border Controller	29	107	313
Media/Voice App Servers	29	107	313
Total	**4,057**	**14,689**	**20,231**

Table 1.6 Demand for IP and Packet Switching Equipment

1.29 The demand for broadband equipment is projected to grow at slower pace initially and then rise to Rs 29,815 crore from the level of Rs 7201 crore in 2009-10. Demand for broadband equipment is given in Table 1.7

Broadband Equipment	2009-10	2015-16	2019-20
FTTx	360	3881	20870
ONT/ONU	144	1,552	8,348
OLT	216	2,328	12,522
DSL Broadband	6,481	3,104	2,981
DSL Modem	3,240	1,552	1,491
DSLAM	2,916	1,087	745
MSAN	324	466	745
CMTS	360	776	5,963
Total	**7,201**	**7,761**	**29,815**

Table 1.7 Demand for Broadband Equipment

1.30 Back and transmission networks are important both for wireless as well as fiber-optic network. The demand for these equipment was Rs 4371 crore in 2009-10 which is projected to grow to Rs 10,960 crore in 2019-20. Details are given in Table 1.8

Backhaul and Transmission	2009-10	2010-11	2015-16	2019-20
Fiber/Optical				
Optical	3,960	3,886	5,811	7,922
SDH	2,632	2,635	3,188	3,588
DWDM	860	854	1,973	3,488
POTP (incl. within SDH, DWDM, DXC)	380	557	2,746	6,677
DXC	307	223	330	343
Submarine Systems (incl. Repeaters)	161	174	320	503
Microwave Backhaul	887	1,426	2,724	3,989
PDH/SDH Microwave	710	1,140	136	80
Ethernet Microwave	177	285	2,588	3,909
Total	**4,372**	**4,846**	**7,838**	**10,960**

Table 1.8 Demand for Backhaul and Transmission Equipment

1.31 Though the projection of demand from various sources may differ but all of them show high demand for mobile handset and by value the handset demand is even more than the wireless network equipment demand. A list of top ten manufacturers by value of the handsets sold in India during the year 2009-10 is given in Table 1.9. Out of the total market size of Rs 27,000 crore the top ten companies had about 92% share.

Sl No	Company	Sale (Rs Crore)
1	Nokia	14,100
2	Samsung	4,700
3	LG	1,600
4	Micromax	1,100
5	Spice Mobile	1,047
6	Karbonn	800
7	ZTE	500
8	Huawei	450
9	Lava	300
10.	Lemon	270
	Total	**24,867**

Source: Voice and Data Vol 17 Issue 6

Table 1.9 Top 10 Mobile Handset Companies by Sale

1.32 The mobile handset industry has been one of the fastest growing industries in the recent times. India represents 11.7% of the world market share of the mobile cellular handsets. Mobile phones

account for about 95% of all telephone users with the rural sector accounting for more than 33.6% of all wireless phone users. With an average monthly addition of 18 million subscribers and also taking into account the replacement demand, handset OEMs have a good domestic business opportunity as well as potential for exporting to other emerging markets. High demand has attracted a number of global and domestic producers. In 2009 the market saw entry of more than 100 new players. Today a number of major multinational OEMs such as Nokia, Samsung, LG and Motorola have thier manufacturing facilities in India. According to a recent advisory by KPMG and ICA[9], the annual handset demand in India is about 140 million units and is expected to touch 240 million units by 2015 and about 350 million by 2020. The handset market is estimated to be Rs 45,000 crore by 2014. Figure 1.10 gives demand projections for mobile handsets upto the year 2020.

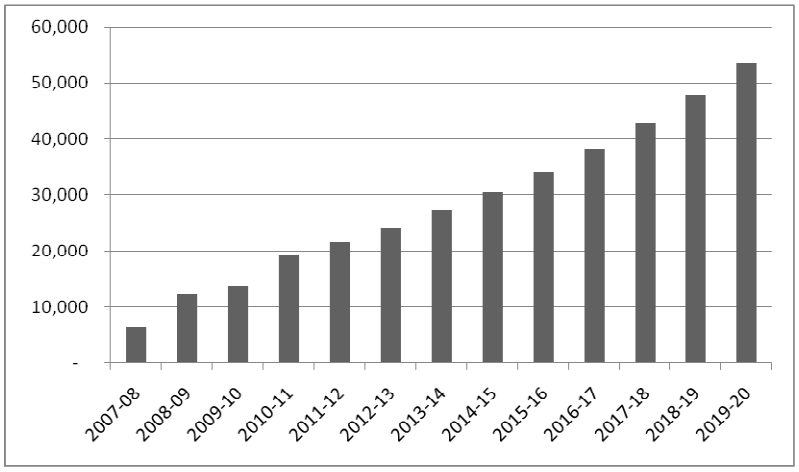


Figure 1.10 Projected Demand For Mobile Handsets

9 Manufacturing Advisory Committee/Indian Cellular Association, January 2011

1.33 The consultancy firm Ovum carries out detailed analysis of the capex spend of various operators on telecom equipment. Their global capex data for wireline and wireless equipment, however, includes, besides telecom equipment, other items expenditure on which is capitalised. In India, the wireline subscriber number is declining and these networks are not having much growth. Whatever expansion is there is by way of addition of subscriber line or trunk capacity. Major investment in non-equipment infrastructure is therefore not large. Taking into account investments made by typical wireline and wireless service providers it may be around 75% and 55% of the capex respectively in telecom equipment. Taking these factors into account the demand arrived for the future years is given in Table 1.10 It can be seen that the Indian demand for telecom active equipment and handset was Rs 58,781 crore in 2009-10 and constituted about 6.5% of the global demand for telecom equipment. The table also gives forecast for the years 2012-13, 2014-15, 2016-17 and 2019-20. By the year 2019-2020 the domestic demand will grow to about Rs 170,000 crore which represents 7.9% of the global demand.

Year	Global Total Demand(Rs crore)	Indian Demand (Rs crore)	% of Global Demand
2007-08	1,255,500	58,781	6.5%
2008-09	1,409,850	60,294	5.8%
2009-10	1,300,500	54,765	5.5%
2012-13	1,638,255	76,940	6.2%
2014-15	1,910,861	96,514	6.6%
2016-17	2,228,828	121,067	7.1%
2019-20	2,807,682	170,091	7.9%

Table 1.10 Telecom Equipment demand in India

C – Current status and scope of equipment manufacturing in India

1. Current Status of equipment manufacturing

1.34 Products manufactured domestically can be classified as Indian Manufactured Products (IMP) or Indian Products(IP) depending on where the IPR is held and to whom the commercial benefits of IPR accrue. Both types of products are manufactured by Indian registered companies but while in case of IMP the IPR resides outside India, in case of IP the product IPR resides in India and the benefits of this IPR accrues to the Indian entity holding the IPR. Another concept that is important in this regard is value addition done during the process of manufacturing of a product. In these recommendations value addition refers to the value of the inputs or bill of material sourced within the country and the value of IPR. More details of these would be discussed in section D in the context of the Telecom Equipment Manufacturing Policy.

1.35 In assessing the current status of manufacture of telecom equipment, data from many sources like Telecom Export Promotion Council, Director General of Foreign Trade, DGCIS and Industry estimates were examined. It was found that the information from various sources was at variance because of the way it had been arrived at. There is presently no organisation that maintains a manufacturing database of telecom production in India, imports and value addition on imports and imports that are re-exported with or without value addition. The table below gives domestic production data Telecom Exports Promotion Council (TEPC) and industry estimates for Indian products in Column C of Table 1.11. The export and Import data have been taken from TEPC and DGCIS reports. The mobile handset production figures are from

Indian Cellular Association. The Indian product data is as provided by the stakeholders based on the turnover of Indian product companies. Unless otherwise stated, this table, which broadly shows the trend, would be used for further reference

Year (A)	Indian Demand (Rs Crore) (B)	Total Production in India (Rs Crore) (C)	Exports (Rs Crore) (D)	Imports (Rs Crore) (E)	Mobile handset production (F)	Indian products (G)
2007-08	58,781	41,270	8,131	41,600	6,375	1000
2008-09	60,294	48,800	11,000	44,800	12,375	1200
2009-10	54,765	51,000	13,500	48,384	13,750	1400

Table 1.11 Telecom Equipment Manufacturing in India

1.36 If we look at demand and total production figures for the year 2007-08 in Table 1.11 (Columns B and C) then the domestic production appears to be meeting a large part of the Indian demand. If this was actually the case and we had the annual growth figure of 27.6% as predicted by DIT task force, then perhaps the country's manufacturing sector would have been exemplary. There is therefore more than what is revealed by the data. For example, imports are being double counted as domestic production even though there may be only a small value addition for local use or for re-exports. The average value addition today is of the order of 11%[10]. It is therefore necessary to make a correction in the production data to arrive at actual domestic production so that targets could be set for future years. The rough estimate for the percentage of domestic demand being met through domestic

[10] Telecom & Networking Today, February 2011

productions is of the order of 9-13%. Table 1.12 also gives the Indian products as a percentage of total demand which is in the region of 2 – 3%.

All monetary figures in Rs crore

Year	Indian Demand	Total Production in India	Indian Product-ion	% Indian demand met by domestic production	Indian Products as %age of Total production
2007-08	58,781	41,270	1000	9.16%	2%
2008-09	60,294	48,800	1200	10.41%	2%
2009-10	54,765	51,000	1400	12.32%	3%

Table 1.12 Manufacture of Indian Products

1.37 Efforts have been made to verify and reconcile information from available sources. While the figures arrived at may be fair approximations, what we need for our analysis in this and later chapters is the level of these activities and the trend. The findings would not be affected by any further accuracy of the data even if it was possible to do that in a reasonable amount of time and at a fair cost.

1.38 Rising demand for a wide range of telecom equipment, particularly in the area of mobile telecom, provides an excellent opportunity to domestic and foreign investors in the manufacturing sector. The last four years saw many renowned telecom companies setting up their manufacturing base in India. The total FDI inflows in telecom sector since April 2000 to January 2011 was Rs 46746.29 crore,

which constituted 8.06% of total FDI inflows into the country. This highlights the importance of India as a telecom manufacturing destination.

1.39 Presently, the telecom hardware manufacturing sector is dominated by international majors like Nokia, Ericsson, LG, Motorola, Samsung and Alcatel-Lucent, who have set up manufacturing bases in India and have catered to the local demand. Other foreign majors that have set up manufacturing bases in India include Foxconn, Flextronics, Elcoteq, Celestica, Elextronics Aspocomp, Salcomp, Siemens, Cisco, Perlos and Solectron. LG Electronics has announced that it will be further expanding its handset manufacturing facility in India and Nokia Siemens Networks launched its new facility for the production and distribution of mobile communications infrastructure at Oragadam near Chennai. Nokia-Siemens Network and Ericsson have setup their manufacturing units for complete range of Wireless equipments including BTS and complete transmission equipment within the country. Some of the Indian product manufacturers are BEL, Tejas Networks, Coral Telecom, VNL, Midas, Matrix, Valiant and Shyam Telecom.(An indicative list of the companies and their revenues are at Annexure III)

1.40 Unlike India, several other countries have enhanced their export potential. From the comparative data in Table 1.13 it can be seen that while the imports into India grew about 30 times from US$ 280 million in 1997 to US$ 8320 million in 2007, exports grew only about 6 times. Comparatively Brazil increased the exports by more than 10 times while increasing the imports only about 1.6 times. China has been an exceptional case of trade surplus in telecom as the exports have been more than 4 times the imports in

2007. China exports about US$80 billion worth of telecom equipment while its own consumption is about US$30 billion. Table 1.13 shows the comparative data of exports and imports.

US million $

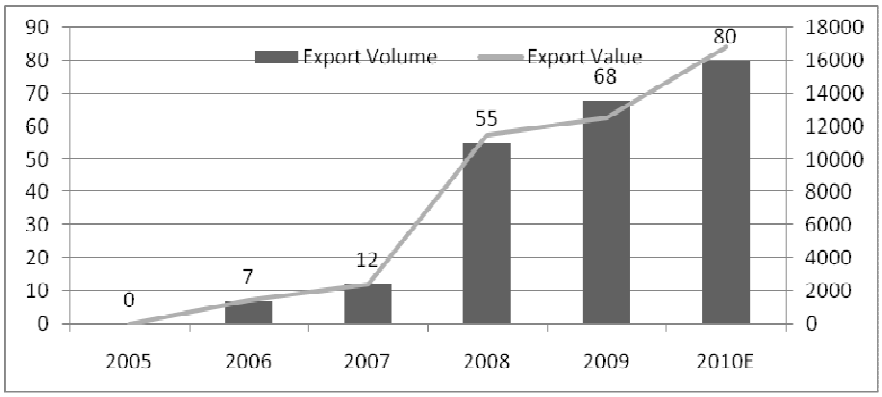
Country	**1997**		**2007**	
	Exports	**Imports**	**Exports**	**Imports**
India	63	280	355	8320
Brazil	214	2027	2332	3187
China	2685	2453	82035	19618
South Africa	119	1211	274	2785

Table 1.13 Export and import of equipment by India and other countries

1.41 That there is a problem with the telecom manufacturing sector can be seen from the difference between imports and exports. If one looks at more recent figures for imports into and exports from India given in Table 1.15 above then the trade imbalance between exports and imports of telecom equipment becomes quite glaring.

1.42 As far as the mobile handsets are concerned India was primarily an import market prior to 2002. Between 2002 -2005 a few global companies started manufacturing in India which had a positive impact on domestic production and exports picked up. Indian origin companies like Spice Mobile have also started manufacturing in India. The mobile phone production, exports and imports are given in Figures 1.11 and 1.12.

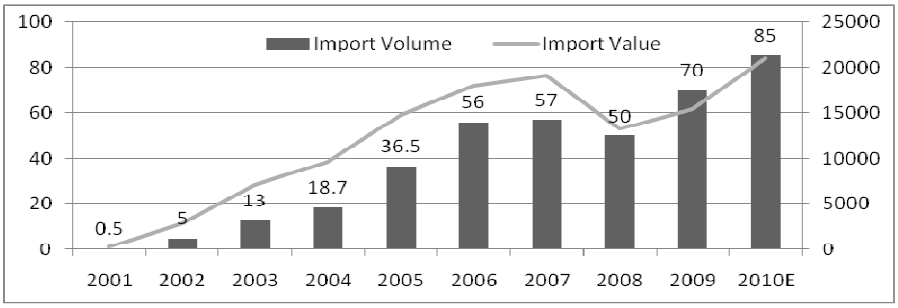
Volume on Million units, Value in INR. Crores



Source: Indian Cellular Association

Figure 1.11 Exports of Mobile Phones

Volume on Million units, Value in INR. Crores



Source: Indian Cellular Association

Figure 1.12 Imports of Mobile Phones

2. Scope for Telecom Equipment Manufacturing in India

1.43 The DIT task force[11] has projected the telecom equipment production to grow at a CAGR of 27.6% from 2009 to 2020. In its report the DIT task force had mentioned that the domestic production grew by 11.7% from 2007-08 to 2008-09. For projecting figures upto the year 2020 the task force presumed a growth of 27.6% beyond 2008-09. This obviously was under the presumption that the recommendations would be implemented. As not much progress has been made on the measures in the report, this growth percentage has to be made realistic to arrive at the figures for

[11] Report of Taskforce to suggest measures to stimulate the growth of IT, ITES and electronics hardware manufacturing industry in India, Dec 2009

2009-10 and 2010-11. The year 2010-11 is already over and whatever recommendations are made now may take time to be implemented. Thus we would presume half of the growth rate ie 13.8% for 2011-12 and 2012-13 and full projected growth rate for the period after that upto 2020. As the past data have part of imports included so would the projections. It has been said above that the past data of production has a component of imports also included, the same would happen with the projections. The potential Indian demand and production are given in Table 1.14 below.

Year	Indian Demand (Rs Crore)	Total Production (Rs Crore)
2007-08	58,781	41,270
2008-09	60,294	48,800
2009-10	54,765	51,000
2012-13	76,940	84,276
2014-15	96,514	1,37,217
2016-17	1,21,067	2,23,413
2019-20	1,70,091	4,64,152

Table 1.14 Potential for domestic production

1.44 The demand supply gap and the imbalance between the exports and imports of the telecom equipment provide a good opportunity for manufacturing of telecom equipment in India both by the global companies as well as the Indian product companies. Insofar as the gap between imports and exports are concerned, there is scope for increasing manufacturing of telecom equipment not only to meet its own requirements but also increase its exports which are meager today.

1.45 According to a CII-TIE report[12] there is a discernible shift in consumption and production of ICTE products towards high growth Asia Pacific region. India is endowed with a large domestic market for telecom equipment, innovation and cost efficiency of domestic R&D activities. These factor need to be leveraged in order to enable the country to play a significant role in the emerging global telecom industry landscape. The telecom equipment and services can become a high-growth source for export revenues, with a potential for annual export of UD$10 billion in five year[i] . In order to aggressively promote the export of domestic telecom equipment, there is need to leverage the domestic telecom market to create a market pull. Furthermore, the volume base of domestic market should be used to gain favourable terms of trade for export Indian telecom products. Focus on export of Indian telecom products should be a key agenda for the foreign trade, which may include market development initiatives, access to bi-lateral trade promotion programs etc.

1.46 India's growing market presents an opportunity to leverage its large domestic demand and also the export potential for developing manufacturing base. Without strong measures and additional investment to scale up production and diversify product portfolio, the level of export will remain insignificant. From Table 1.15 it is obvious that the telecom equipment export in the past has been miniscule compared to the existing potential. While some global companies find it cost effective to manufacture and export from India, such examples are not rampant despite quite a few success stories. Table 1.15 consolidates the information about demand, production, imports and exports discussed above.

[12] Investment Opportunities in Developing Hi-tech ICTE Supply Chain in India, October 25, 2008

All monitory values in Rs crore

Year	Total Indian Demand	%age of global demand	Indian Handset Demand	Total Production in India	Total Handset Production in India	Production of Indian Products	Exports	Imports
2007-08	58,781	6.5%	24,866	41,270	6,375	1,000	1,467	37,686
2008-09	60,294	5.8%	25,910	48,800	12,375	1,200	12,374	44,234
2009-10	54,765	5.5%	27,000	51,000	13,750	1,400	7,951	39,129
2011-12	68,697	5.9%	32,076	66,047	21,646	6,605	30,014	54,050
2012-13	76,940	6.2%	34,642	84,276	24,243	10,113	33,830	50,446
2014-15	96,514	6.6%	40,407	1,37,217	30,411	27,443	61,281	50,624
2016-17	1,21,067	7.1%	47,130	2,23,413	38,147	89,365	1,12,283	47,627
2019-20	1,70,091	7.9%	61,310	4,64,152	53,594	2,55,284	2,96,870	55,761

Table 1.15 Demand, Manufacture and Trade figures

1.47 There is a huge opportunity of tapping the domestic telecom equipment market and also the export market in the period upto the year 2020. All this cannot be achieved if proper policy is not put in place expeditiously.

D - Objectives for a Telecom Equipment Manufacturing Policy

1.48 The discussions above elucidate a number of startling facts. To say that India's performance in telecom equipment manufacturing has so far been much below its potential would be an understatement. The analysis given above very clearly points to the opportunities that were not made use of. This has led to the situation that India finds itself in with just about 12.5% of the demand for telecom equipment being met by domestic production. Even more seriously the Indian products just meet 3% of the demand. With this level of production, it no surprise that India imports much of its telecom equipment requirement. It is said that if this situation continues

there would be time when the telecom import bill will exceed the oil import bill! The situation is not limited to telecom equipment but down the manufacturing value chain electronic components are in worse predicament. Nearly the entire requirement of semiconductor chips is imported. This coupled with the fact that there are hardly any Indian IPR based telecom products lead to low value addition of about 11%.

1.49 The need to provide a strong impetus to the telecom manufacturing in India is now stronger than ever. Telecom services in India have been on the high growth trajectory and requirement for the telecom equipment continues to be high. If domestic production is not ramped up, the demand would be met by imports from other countries and self reliance cannot be achieved. India has missed having stake in technology standardisation, development and commercialisation so far and a couple of more years of apathy would seal the fate of telecom manufacturing in the country forever. India's Finance Minister in his budget speech in February 2011 set a target of increasing contribution of manufacturing from 16% to 25% over a period of 10 years. A strategic sector like telecom should give a befitting contribution to this target. A direct fallout of increase in manufacturing would be enhanced employment opportunities. With the expansion of the manufacturing base, development of ancillaries, support facilities like Research Park there would be employment for hundreds of thousands of skilled, semi-skilled and unskilled workers. Inability to bolster up production capabilities would manifest itself in the form of low employment generation and poor contribution to GDP. The need for a telecom manufacturing policy becomes even more compelling because of the fact that demand for telecom equipment is not limited to public telecom networks. Defence and Space has

communication needs and uses many of the same products. If good quality telecom products are available domestically these needs can be taken care of expeditiously in the interest of the country's security. Telecom is of strategic importance and domestic production can better ensure that there are no security loopholes in the domestic products. With increased domestic manufacturing the cost of equipment will reduce and availability of equipment to the domestic service providers would improve which should result in faster deployment and lower cost of the network resulting in benefit to the subscribers. Industrial development promotes socio-economic development of the area where the manufacturing units are located and improves the living standards of the people of the area. Therefore, a policy that promotes local manufacturing of telecom equipment would have diverse benefits for the country.

1.50 In the context of policy enunciation, it is important to understand the terms used in these recommendations:

1. **Domestic Manufactured Products(DMP)**

   Domestic manufactured products means products manufactured in India that meet the minimum value addition criterion prescribed in the policy. DMP can either be Indian Manufactured Products or Indian Products. It does not include products that do not meet the value addition criterion called here Low Value Addition Products(LVAP)

2. **Indian Manufactured Products (IMP)**

   Indian Manufactured Products are the products for which the following conditions hold good:

(i) The products have been manufactured in India by an entity duly incorporated in India

(ii) The product meets the minimum value addition criterion

(iii) The IPR of the product resides outside India.

3. Indian Products(IP)

Indian Products are telecom products for which the following conditions hold good:

(i) The products have been designed, developed and manufactured in India by an entity duly incorporated in India

(ii) IPRs for the products reside in India.

(iii) Commercial value of the IPRs accrue to India

(iv) The product meets the minimum value addition criterion prescribed in the policy.

4. Value Addition

Value addition considered in the context of these recommendations is by way of the value of the Bill of Material (BOM) sourced from within the country and the value of the IPR that resides in India whose value accrues to India. Value addition can be calculated as follow:

(i) Product Price (A)

(ii) Cost of IP in 'A' – (B)

(iii) Cost of Indian IP (C)

(iv) Cost of Bill of Material(BOM) in 'A' – (D)

(v) BOM sourced from domestic manufacturers (E)

(vi) Cost of total IP and BOM : B+D

(vii) Cost of India IP & BOM sourced from domestic manufacturers: C+E

(viii) Value Addition = [(C+E)/(B+D)]*100

1.51 The recommendations for inclusion in the telecom equipment policy are with regard to percentage of Domestic Manufactured Products and its constituents ie Indian Manufactured Products and Indian Products and the minimum value addition to qualify for these categories. Other domestic products that do not meet the value addition criteria (or low value addition products) form a common category with the imported products. While the strategy to achieve the policy stipulations are given in Chapters II and III, summary of the policy is given in Table 1.16. In this table the demand for any year is taken as 100 and the other figures are in relation to this demand The domestic manufactured products go from 30% in 2012-13 to 80% in 2019-20. The Indian Products out of domestic manufactured products would be 15% in 2012-13 and increase to 50% in 2019-20. In recommending this the Authority is conscious of the fact that the working group on telecom for the XIth five year plan had indicated meeting 75% demand but we are at 12% and it seems almost impossible to achieve 75% by March 2012. The target set in the policy are more realistic and achievable.

Telecom Equipment Manufacturing Policy

		2012-13	2014-15	2016-17	2019-20
1	**Demand**	100	100	100	100
2	**Imported/LVA**	70	55	40	20
3	**DMP**	30	45	60	80
	(i)IMP	15	20	25	30
	(ii)IP	15	25	35	50
4	**Min Value Addition**	25	35	50	65

Table 1.16 Summary of policy stipulations

1.52 The primary objectives of the policy could be summarised as follows:

1. To meet 45% of the domestic demand through domestically manufactured products by the year 2015 and 80% by the year 2020.
2. To provide market access to domestic manufactured products to the extent of 30% by the year 2015 and 80% by the year 2020
3. To increase value addition in domestic manufactured products to 35% by the year 2015 and 65% by the year 2020
4. To provide market access to Indian products to the extent of 25% by the year 2015 and 50% by the year 2020

1.53 The Authority recommends that the Telecom Equipment Manufacturing policy should be an integral and a significant part of the New Telecom Policy.

1.54 The Authority recommends that the proposed policy should have as objective the following targets:

		2012-13	2014-15	2016-17	2019-20
1	Demand	100	100	100	100
2	Imported/LVAP	70	55	40	20
3	DMP	30	45	60	80
	(i)IMP	15	20	25	30
	(ii)IP	15	25	35	50
4	Min Value Addition	25	35	50	65

Table 1.17 Summary of Policy Stipulations

Chapter II

Suggested Measures for promotion of Domestic Manufacturing

2.1 In order that the best objective of the proposed Telecom Equipment Manufacturing Policy (NTEMP) is met, it is essential that several measures are undertaken immediately. This chapter explores various measures for this purpose. The measures have to reinforce the strengths and address the areas of weaknesses. It is therefore proposed to carry out a SWOT analysis before identifying the required measures.

Telecom Manufacturing SWOT Analysis

2.2 To plan effectively for promoting indigenous manufacturing industry it is important to carry out a SWOT (Strengths, Weaknesses, Opportunities and Threats) analysis by matching resources and capabilities with the environment and working out what needs to be done during the period under consideration. Let us look at the *strengths* first.

1. Large domestic demand for telecom services forebodes great potential for domestic manufacturing given the right environment. Growth of telecom services in India, as described in the earlier chapter, has created a demand supply gap for telecom equipment. During the year 2009-10 only about 12.5% of the demand was met through domestic production. With the growth in demand expected to be about 12-13% annually[13], this gap would only increase if no proactive action is taken to close it.

[13] Ovum Global Analysis, www.ovum.com

2. A very important requirement for the manufacturing sector is technical manpower requirement. India has a big pool of highly skilled manpower and experienced technical people to work in production and R&D areas. Students graduating from higher institutes of learning and also from Industrial Training Institutes can be trained for jobs specific to telecommunication equipment and component manufacturing. For higher technical learning there are ten Indian Institutes of Technology, four Indian Institutes of Information Technology, 27 National Institutes of Technologies besides other government and private engineering colleges. Besides these, Government of India has made a considerable investment in skills development of young people through public Industrial Training Institutes (ITIs) and in addition there are privately funded Industrial Training Centres (ITCs). India generates about 10 lakh skilled manpower annually for various industrial activities. Today India has more than 4465 (1733 in Government sector and remaining in private) ITIs with a total capacity of 6.51 lakh training seats[14].

3. India has strong management experience in critical functions such as supply chain management, high-tech manufacturing systems, operational management. Another important factor in the growth of telecom and manufacturing activities is the Foreign Direct Investment flowing into the country. Telecommunications is a capital intensive industry, and access to capital is key to ensuring the deployment and expansion of a robust network. Investments have been forthcoming since liberalisation Foreign Direct Investment (FDI) has typically been the driver of telecom sector growth in liberalising economies. Foreign direct investment in

[14] http://dget.gov.in/main/summary.pps#295,35,Issues : Vocational Training

telecom infrastructure brings more than hard currency. Companies investing in telecom bring with them new technologies, business processes and methods and global brands. In the Indian telecom sector composite FDI (Direct + Indirect) of 74% is the sectoral cap. There is 100% FDI in some areas like provision of infrastructure and ISPs without gateways. FDI in telecom equipment was Rs 33,957 crore till 2007-08 and was Rs 5085 core in the year 2009-10 alone. A list of companies that have invested in India is given in Annexure III.

4. An important development that has happened in the last few years and has added to the strengths list of India is its growing semiconductor chip design capabilities. India has been traditionally acknowledged as software superpower is now exhibiting competency in the chip design industry. A number of big names in semiconductor manufacture are outsourcing their design work to India. There are over 130 chip design firms present in India and the vast pool of talent and growing domestic market has helped the country emerge as an important centre for chip design. This booming semiconductor design industry promises 3.5 million jobs by 2015, according to a report by the Indian Semiconductor Association (ISA).

2.3 On the *weakness* side there are important aspects that do not allow India to achieve its potential in domestic telecom equipment manufacturing.

1. Telecom manufacturing has not traditionally been a strong area for India. Even after years of high growth in terms of number of subscribers, production of telecom equipment has been floundering at about 12-13% of the total demand and worse still

the share of products developed and produced in India is just about 3% of the total production in India. Low level of telecom manufacturing is reflected in high imports and low export of telecom equipment as was brought out in chapter I.

2. One of the reasons for low level of telecom manufacturing in India is its low spending on telecom research and development. The total investment in research & development is low at 0.8% of the GDP and that in telecom features far below most other important sectors of the economy. There are hardly any essential telecom IPRs owned by an Indian telecom company. Lack of innovative telecom research and development of intellectual property rights leads to low value addition to the manufacturing process in India. There are other weaknesses in the telecom manufacturing value chain.

3. Effective supply chains have not been set up and most components are sourced from other countries.

4. There is chip design capability but hardly any manufacture of sophisticated semiconductor chips is done.

5. Another weakness is in the area of testing and accreditation because of which Indian manufacturers have to take the route of expensive testing and certification process of other countries.

6. Telecom product development and manufacturing are capital intensive and low cost funds, loans and grants are not available. The Indian manufacturers also face disability due to poor transport, power, water, sewage disposal infrastructure.

7. There seems to be no concerted effort to influence global standards and generate wealth of patents.

8. Funding for research & development leading to development of telecom equipment for mass absorption in future is also non-existent.

9. Entrepreneurs also lack a mechanism by which they can get soft loans/grants at different phases of product development and manufacturing.

2.4 There are quite a few *opportunities* that India could tap to increase its telecom manufacturing base.

1. High growth of the network and services is resulting in increasing demand for the telecom equipment.

2. New standards are being formed and new technologies like wireless broadband and fiber based systems are maturing to provide new opportunity for innovative research and generation of IPRs.

3. There is immense export potential with the global demand expected to increase from US$272 billion in 2009-10 to about US$600 billion in the year 2020.

2.5 The major *threats* that need to be faced include:

1. International agreements like ITA-1 of WTO resulting in zero duty regime on import of goods covered under the agreement.

2. Most preferred nation status and preferential treatment agreements that allow imports at zero or low duty resulting in the fledgling domestic manufacturing sector uncompetitive because of its low scale of operation.

3. Another threat is from the countries that offer subsidies and incentives to their manufacturers to make their products more price-competitive. On the other hand Indian manufacturers face disabilities because of Indian tax and duty structure.

2.6 Along with the increase in domestic production it is important to add as much value as possible. The stipulation of value addition is in accordance with the WTO rules for origin of goods according to which origin would be a country where it is wholly produced or where last the substantial transformation took place. In the context of preferential arrangements, rules of origin are applied with a view to assuring that preferential benefits are limited to products originating in, or at least partially processed in the beneficiary country. In manufacturing two aspects are important for arriving at the value added along the manufacturing value chain. The more the value of components sourced from the Indian component manufactures the more is the value added. In addition if the IPR is within India and the value of that IPR accrues to India then more value is added against IPR residing out of India.

2.7 From the SWOT analysis of domestic manufacturing it becomes apparent that measures would need to be taken in order to achieve full potential of the domestic telecom equipment market. The domestic telecom product market comprises India Manufactured (IM) products and Indian Products (IP). For our purpose we shall distinguish between the two as described in Chapter I.

2.8 With this background, it is proposed to address the various issues for promoting telecom equipment manufacturing in India. The first issue is whether the policy should actively provide for a "market pull" to be created in favour of Indian Products/Indian Manufactured Products. The following issues were raised in the

consultation with regard to measures for promoting domestic manufacture:

(i)	***Should the concept of mandatory use of Indian products/Indian manufactured products be introduced in the Indian context? If so, can this be introduced immediately or should it be introduced at a later date? If so, by what date?***
(ii)	***What could be the percentage to be stipulated for both these categories?***
(iii)	***What should be, if any, the incentives to be given to individual service providers for use of Indian equipment?***
(iv)	***Likewise, what could be the disincentives, if any,for use of imported equipment? Is this compatible with international agreements.***
(v)	***Should a percentage of the Indian market be reserved for the Indian manufacturers? If so, what should be the percentage?***
(vi)	***What, if any, could be the implications of such a step***

2.9 In response, stakeholders who did not support mandatory use of domestic products stated that every operator is conscious of delivering better quality of service to his customers and thus gets the best equipment available globally and ensures robust network in order to address large volume of customers and to meet their demands. Some stakeholders were of the view that while the Indian

industry would like to use locally manufactured products, it is imperative these products should compare well with those imported both in terms of cost and quality. One of the stakeholders said that there is a need to comply with the relevant international agreements that India is a signatory to, with a view to preclude any breach of the WTO rule of National Treatment and it is one of the trade-related investment measures incompliant with the National Treatment as clearly listed in TRIMs (Agreement on Trade-Related Investment Measures). Yet another stakeholder commented that they have reservations about suggestions that would mandate or set quotas on the commercial sourcing of equipments for commercial use as such tactics will distort the market for telecommunications equipment and ultimately increase costs to India's telecommunications sector. According to them such stipulation would be against GATT provisions. There was also a view that there should be no mandatory use of domestic products but Government should instead give good facilities and subsidy to the Indian manufacturers. Another stakeholder said that the country should introduce it gradually.

2.10 The stakeholders who supported mandatory use said that it should be mandated that all procurement by all Government/Government Licensees/telecom service providers, should at least procure 30% of their annual capex in the form of "Indian Products", beginning immediately. They said that this threshold should be increased by 5% every year, reaching 50% after 4 years. In their opinion only if adequate amount of "Indian Products" are not available, then at least "Indian Manufactured Products" must be procured (this will ensure that existing supplier base, who have manufacturing operations in India, is encouraged to scale up). According to these

stakeholders this recommendation is expected to be compliant with India's WTO commitment. Some stakeholders stated that to ensure that quality/price to the buyer is not compromised, the price paid should be the same paid for the balance procurement and the quality/technical specs should be the same that is set for imported equipment, based on globally accepted parameters. There were many stakeholders who suggested mandatory use of Indian Products.

2.11 Regarding market reservation, some of the stakeholders felt that there should not be any reservation as mandating percentages may have adverse effects on quality and performance. They felt that doing this would limit choice available to the operators. One of the stakeholders' mentioned that reservation for Indian manufacturers is only possible for procurement by government exclusively for government usage since India only holds the observer status in WTO's Government Procurement Agreement (**GPA**) and any other reservation in this regard would be discriminatory and not in line with the international laws. Some stakeholders felt that promoting innovation and investment needs to be undertaken in a way that will not disrupt the market, favour local over foreign product and impede growth of the market. Others opined that domestic manufacturers should be provided with all incentives possible but their end products should compete fairly with the best in class. In view of some other stakeholders mandating percentages for domestic products might have implications internationally.

2.12 Among those supporting market reservation, one of the stakeholders' said that to start with, a percentage of the Indian market of 10% may be reserved for domestic products as was done

for ADSL CPE in some tenders. It should be gradually increased to 60–70% in about 10-12 years. Some stakeholders felt that 30-70% of the requirements should be mandated for the use of Indian products, developed indigenously, by the service providers. According to these stakeholders, with such measures, the indigenous manufacturing industry in India will be more active, which can help to reduce the overall Capex and Opex of the operator over the years and can also help to create more job opportunities in the country. They also added that the technology control with Indian company will help address the security issues. Yet another stakeholder said (with reservations) Indian R&D, IPR and manufacturing will grow. According to some stakeholders, if equipment is imported into the country, the foreign manufacturer should give an undertaking that local manufacturing facilities will be set up within a period of 12 months and a repair centre will be setup in India within 12 weeks of getting a purchase order from the buyer agency. One of the comments was that the use of Indian manufactured or Indian products should be incentivised with the value addition criteria. There were many stakeholders who supported market pull or reservation for Indian Products. According to a stakeholder, implications of such a step will be providing encouragement to R&D efforts in India to develop products suitable for Indian environment, boost to Indian economy, employment opportunities, reducing capex and opex of operators and the users.

2.13 The relevant WTO provisions are reproduced at Annexure IV. As per Article III: 8(a) of GATT, the procurement by Governmental agencies of products purchased for Governmental purposes and not with a view to commercial resale or with a view to use in the

production of goods for commercial sale, is exempted from the provisions of GATT Article III, i.e. on National Treatment. Further, India is not a signatory to Government Procurement Agreement of the WTO (GPA) and, therefore, is not constrained by the stipulations of the GPA. WTO does not discourage countries to develop policies to promote domestic manufacturing. However the same must not result in providing less favorable treatment to "like" imported products of other WTO members. India has allowed 100% FDI in Electronics & IT. Any manufacturer whether of Indian origin or Indian arm of a global manufacturing who invests for manufacturing in India needs to be encouraged through access to Indian market. The policy of preference in Government Procurement, including controlled institutions, PSUs and Government Licensees will also help all those who have come through FDI route. Other countries have policies which provide for preferential market access. For example, the American Recovery and Reinvestment Act of 2009. When using funds appropriated under the American Recovery and Reinvestment Act of 2009, section 1605 of the Act, restricts the purchase of supplies that are not domestic end products. Most projects that receive funds or a loan guarantee under the new law are subject to the requirement, The definition of "domestic manufactured end product" requires that the product be manufactured in the United States, but does not include the requirement with regard to the origin of the components. Ohio State in the USA has stopped government funded projects from outsourcing to Asian countries. The EU, has long since reserved the right to award government contracts for drinking water, energy, transport, and telecommunications exclusively to EU companies. Moreover, it excludes U.S. firms from WTO procurement arrangements for contracts with airport, water and urban transportation authorities. Canada excludes all

procurements in respect of "urban rail and urban transportation equipment, systems, components and materials incorporated therein, as well as all project-related materials of iron or steel" from WTO and NAFTA agreements. India could therefore allow preferential market access for domestic electronic goods in respect of procurement by the Government, Government licensees or those public-private partnership projects in which Government has stake.

2.14 Preferential access would encourage manufacturing and consequent investment in R&D, components and other related verticals. It is proposed that domestic products, including both the Indian Manufactured Products and Indian products, as defined Chapter I, should have preferential access to procurement by Government (except Defence procurement) and Government licencees (telecom service providers both private and public) to the extent of 30%, 45%, 60% and 80% in the years 2012-13, 2014-15, 2016-17 and 2019-20 respectively. This would be subject to achievement of the graded minimum value addition of 25%, 35%, 50% and 65% in these years. If a service provider outsources part or complete installation and or maintenance of telecom equipment then the concerned equipment vendor would be liable to meet the value addition requirements. The starting year for the implementation of this policy is suggested as 2012-13 as the process of consultation by DOT with other ministries, approvals and possible modification of the licence conditions is expected to take some time.

2.15 **The Authority recommends that preferential market access be provided to the domestic manufactured products (comprising**

both Indian Manufactured Products and Indian Products) in procurement by the Government and Government Licencees(service providers both public and private) as per Table 2.1 subject to the value additions proposed for the corresponding years.

Year	2012-13	2014-15	2016-17	2019-20
Market Access for Domestic Manufactured Products	**30%**	**45%**	**60%**	**80%**
Value addition	**25%**	**35%**	**50%**	**65%**

Table 2.1 Market access for domestic products

2.16 If a Government licencee outsources part or complete installation and or maintenance of telecom network, then the equipment vendor would be liable to meet the value addition requirement. In this regard the Authority makes the following recommendations:

2.17 **The Authority recommends that Government or Government licencee (service providers- both public and private) would be responsible for meeting the market access criterion even if the installation, maintenance and operations are outsourced.**

2.18 It would be necessary to ensure that the policy is implemented in the desired form and is followed by the service providers. The policy regarding market access and minimum value addition should therefore be included in the licence conditions of the service providers and its implementation would be monitored by TRAI.

2.19 **The Department of Telecom should suitably modify the relevant clauses in the UAS Licences issued/to be issued and the Unified Licence to include the stipulations of percentages of market access, value addition and auditing in respect of domestic products.**

2.20 The equipment bought under the proposed preference should meet the relevant global standards, quality requirement and pass any acceptance testing prescribed in the procedures of the procuring organisation. As all domestic and imported products are to be certified by the TCO for conformance to standards and quality requirements of the Indian network ensuring this should not be a problem. The acceptance testing would be organisation specific according to pre-decided procedures of the organisation. The manufacturer would submit a certificate from its statutory auditor to the effect that the prescribed value addition condition has been met. This would be test audited by DOT. Later in these recommendations the Authority has proposed setting up of a Telecom Equipment Manufacturing Organisation (TEMO) for coordinating the implementation of the preferential market access policy. Once TEMO has been set up, the self-certification will be replaced by TEMO registration certificate for the products that get progressively tested and certified by TCO.

2.21 **The Authority recommends that to supply under the market access stipulation, the domestic manufacturer must submit a certificate from its statutory auditor to the effect that the prescribed value addition condition has been met. This would be test audited by the DOT or an agency authorised by DOT.**

2.22 On the issue of incentives to the service providers the comments were generally in favour of providing some incentives to the service

providers for using domestic products. One of the stakeholders commented that there was no need to provide incentives to operators for providing market reservation for 'Indian products' since countries like China have done this successfully. Some of the stakeholders were of the opinion that if the imported telecom equipment is subjected to zero import duty, reciprocal tax breaks can be provided. There were other stakeholders who said that incentives can be given to service providers in the form of lowering of license fee or spectrum charges for adopting domestic products. For Indian products the reduction in licence fee suggested by a stakeholder was 50%. Another stakeholder suggested that the service providers who use Indian products or Indian manufactured products in their core network should be given incentives in the form of rebates in the USO/R&D Fund contribution and/or tax holidays and such incentives should be linked with the amount of Indian products used in their network. Yet another stakeholder preferred disincentive for using imported products in terms of higher-percentage outflow. One of the stakeholders said that any financing being provided to service providers should include mandate for procuring "Indian Products".

2.23 Some stakeholders felt that there should not be any disincentives for the use of imported equipment. Any disincentive would not be in line with GATT as well as Indian commitment under the Information Technology Agreement (ITA). Another stakeholder said certain countries (e.g., Brazil) levy a differential import duty based on the availability of the same products in their country and India can follow the same model. Yet another stakeholder said that in order to procure imported equipment, local manufacturing should be made compulsory within a period of 18 months and for such

products, setting-up a repair centre to provide after-sales support, within 12 weeks of getting supply order, must also be mandated.

2.24 The Authority is in favour providing incentives to service providers for ensuring compliance to the market access stipulations. In any of the years if the service providers procure Indian Manufactured Products in excess of 10% above the stipulated percentage of market access then the service provider gets an incentive of 10% of their licence fee for that year. If the service providers procure more than 20% of the stipulated market percentage then they should get an incentive of 20% of their licence fee for that year. Licence fee for this purpose does not include USOF contribution of 5% of AGR. To calculate the financial impact of this measure one can estimate the amount of licence fee from projected figures of AGR. The AGR for 2009-10 was Rs 1,16,803 crore and if growth of AGR is taken as 1% annually then in 2012-1013 the AGR will be Rs 1,20,342 crore. If the licence fee net of USOF contribution is taken as 1% of AGR then the licence fee for 2012-13 will be Rs 1203 crore. If we further presume that 20% of the domestic production qualifies for 10% incentive and 20% for 20% then the incentive for the year 2013 would be Rs 72 crore. The service providers who do not fulfill the market access criterion would not get any incentive. If the same method is allowed for future years upto 2020 and taking the gap years same as the last calculated value then the total incentive comes to Rs 984 crore. In 2014-2015, 2016-2017 and 2019-2020 the proportion of production getting 10% and 20% incentives are 30:30, 40:40 and 50:40. This incentive may be small monetarily but a sense of achievement and prestige would be associated with it and the licencees would be encouraged to exceed the threshold level of production. Details are given in Chapter V.

2.25 **The Authority recommends that the service provider procuring more than 10% of the market access requirement of telecom equipment in the form of Indian Manufactured Products should get a rebate equivalent to 10% of its licence fee for that year and the service provider procuring more than 20% of its telecom equipment requirement in the form of Indian Manufactured Products should get a rebate equivalent to 20% of its licence fee for that year. For the purpose of this recommendation licence fee does not include USOF contribution of 5% of AGR.**

2.26 It is felt that to make implementation effective, along with the rewards, there has to be a system of penalties to discourage service providers from not meeting the market access requirements. The Authority is of the opinion that the service provider not meeting the access criteria should contribute to development of Indian Products by contribution towards R&D fund or Telecom Equipment Manufacturing fund. The Authority is therefore of the opinion that if a service provider is not able to meet the criteria of market access then it will deposit an amount equal to 5% of the shortfall in the value of the equipment in the Telecom Research and Development Fund or the Telecom Manufacturing Fund.

2.27 **The Authority recommends that if a service provider is not able to meet the criteria of market access then it will deposit an amount equal to 5% of the shortfall in the value of the equipment in the Telecom Research fund or the Telecom Equipment Manufacturing fund**

2.28 In order to achieve the objective, the domestic manufactured products are proposed to be given preferential market access i.e. market pull to the extent of the percentages indicated for them. All

Government licensees i.e. the service providers (both public and private) are required to give preference to the IP/IMP (in that order) before accessing the LVAP or the imported Products. While we discuss the measures for Indian Products in the next chapter, the following methodology is recommended for ensuring that the policy is followed in true earnest.

2.29 The Products will be certified by the Testing and Certification Organisation to be IP/IMP once they satisfy the criteria. These products will be registered by their manufacturers with the Telecom Equipment Manufacturing Organisation (TEMO), an Organisation of the manufacturing Industry, to act as a coordinator between the manufacturers and the service providers. The governing board of TEMO will consist of 7 members, 2 each from manufacturers of IP and IMP and 3 independent experts nominated by the Government. One of the Government members would be nominated as the Chairman of the Board. It will be incumbent on the procuring agency (Service providers, system integrators etc) to purchase the Indian Products subject to their availability and price being met. If the IP is not available, the procuring agency may purchase an IMP, but after giving notice to the TEMO of their intention to do so and waiting for a week. The function of TEMO will be to facilitate the information reaching the manufacturer of an IP to access the market and it does not have any authority to give a direction or to delay the procurement. On the other hand, if the IP is available but is not able to match the price, the procuring agency may purchase an IMP (after similarly giving notice to TEMO) but it will be required to deposit 10% of the value of the shortfall to the proposed R&D Fund or Telecom Manufacturing Fund. The procedure will be similar in the case of an IMP except that the percentage to be deposited will be 5%.

2.30 **The Authority recommends that a Telecom Equipment Manufacturing Organisation (TEMO) should be set up to coordinate between manufacturers and service providers for proper implementation of the telecom equipment manufacturing policy.**

2.31 In the preceding paragraphs we have discussed how the uptake of domestic products can be increased through enhanced market access. It was recommended that all domestic products should get preferential market access to the extent indicated. In order that the domestic products are produced in adequate quantity and measure up to the desired quality standards there are many other issues that need to be taken care of The SWOT analysis had thrown up a number of areas where measures are needed so that the domestic manufacturing potential is achieved to maximum possible extent. These are discussed under the following:

A. Financial Incentives
B. Testing and accreditation
C. Fiscal incentives
D. Non-Fiscal incentives
E. Setting up of clusters
F. Promotion of Exports of Domestic Products

A - Financial Incentives

2.32 The consultation paper had raised the issue of capital requirement for companies that could take up the manufacture of telecom equipment. It is recognised that capital requirements and economies of scale are key factors for the achievement of a

competitive cost structure for the telecom equipment industry. Especially for small companies and start ups, it is very important to have access to capital. The specific questions that had been raised are as follows:

(i) What in your opinion is the likely requirement of capital for companies that could take up the manufacture of telecom equipment?

(ii) What could be the best manner of facilitating availability of capital to such firms?

2.33 On the likely requirement of capital for companies that could take up manufacture of telecom equipment, the response of the stakeholders was that the manufacture of telecom equipment industry is capital intensive. According to their opinion, developing and testing of a product before it is available to market can take anywhere from few tens of crore rupees to thousands of crore rupees depending on the complexity of product being developed. They said that in the early stage new companies would in aggregate need perhaps Rs 1000 crore. In their opinion this would in turn act to stimulate other sources of private funds for co-investing in this category. One of the stakeholders felt that the fund requirement would be to the tune of Rs 250 crore, out of which Rs 100 crore should be funded by the Government. Yet another stakeholder indicated that companies like Nokia and Flextronics have invested around US$ 100 million to set up manufacturing plant in India and the same order of investment would be needed for any company planning to R&D based manufacturing of Indian products.

2.34 On the manner of arranging these funds stakeholders commented that capital can be arranged in the form of equity or loans. The

most common response of the stakeholders has been that the line of credit and funding to Indian companies should be on international norms and at a very attractive rate of interest. According to some stakeholders, Indian companies should get soft loans at 2% per annum for long-term (up to 7 years) that they can use for R&D as well as for working capital. In their opinion this will help them to compete effectively with foreign companies who get such loans from their governments. Some stakeholders said that low cost finance can attract companies and help them achieve larger levels of production. Another view was that such ventures are best suited to debt financing since they involve property, plant and machinery. Yet another stakeholder felt that capital equipment can be hired subject to feasibility in order to reduce initial investment cost and subsequently Government can allow subsidy/partial funding for infrastructure. One of the stakeholders fet that operators should also be given incentives for facilitating testing/field trials of indigenously developed telecom products.

2.35 The Authority recognises the capital intensive nature of the telecom equipment industry. Capital requirements are very large through every stage of the product cycle. High risk factors in product development make it very difficult for new ventures to access capital. As access to private capital is not easily available at all times, it is apt that sources of funding for the telecom equipment sector emanate from within the operations of the sector itself. Funding would be required for capital investment and working capital.

2.36 It is proposed to make available subsidised capital for small manufacturers. In these recommendations small manufacturers

are taken to be those domestic manufactured product manufacturers who have annual turnover less than Rs 1000 crore. It is possible that a company may try to take advantage of the benefits by creating multiple companies each with annual turnover less than Rs 1000 crores. In order to avoid this, the Authority is of the opinion that there should be a substantial equity clause in the telecom equipment manufacturing policy, on the lines of the substantial equity provision in the telecom Universal Access Service Licence conditions. As per the provisions in the UAS Licence 'substantial equity' refers to equity holding of 10% of more by one company in another company.

2.37 **The Authority recommends that for the purpose of benefits being recommended for domestic manufactured product companies with annual turnover less than Rs 1000 crore, only those domestic manufacturing companies should be eligible in which no other manufacturer having annual turnover of Rs 1000 crore or more holds substantial equity. Substantial equity herein will mean equity of 10% or more.**

2.38 Small manufacturers and start up ventures can be given access to debt capital on subsidised terms for a period of time, say 5 years The expected values of production of Indian Products up to 2019-20 have been discussed in the projections made in Chapter 1. Taking, in addition, values for small producers of Indian manufactured products in an initial proportion of 1:1 with Indian Products, decreasing with time, we can arrive at the total value of production from small manufacturers each year. With Incremental Capital Output Ratio assumed at 4:1, and debt equity ratio of 1:1, a 6% subsidy on debt requirements for Indian Products and 3% for

Indian Manufactured Products for 5 years works out to about Rs 23,144cr. While this is a large amount of money, this measure will yield substantial returns in the form of higher production and exports.

2.39 **The Authority recommends that all domestic telecom equipment manufacturers producing Indian Products or Indian manufactured products and having an annual turnover of less than Rs 1000 cr, should get access to debt finance for capital and working capital for a period of 5 years on subsidised terms. The extent of subsidy will be 6% for the Indian Product Manufacturers and 3% for producers of Indian Manufactured Products. The Government should formulate a subsidy scheme for the purpose and the subsidy grants can be channelised for disbursement directly to the lending banks.**

B - Testing and Certification

2.40 Products developed in India need to be tested extensively for meeting global standards and interoperability before bringing them to the market. It is also important that the indigenous equipment carries certificate of compliance to global standards for making them acceptable in the global market. For this purpose, specialised laboratories are required that house common telecom test facilities such as environmental test labs, radiation test labs etc along with the associated test and measurement equipment for use by Indian manufacturers at nominal rates. In the absence of these facilities the manufacturers have to go to international testing and certification labs which turns out to be quite expensive. In this regard the consultation paper raised the following issues:

(i) What, in your opinion, would be the best agency to set up and manage such a Common facility/ies?

(ii) What would be the facilities and the level of investment required in such a facility?

(iii) How will such an investment pay for itself?

2.41 Some stakeholders were of the opinion that test and accreditation agency and standardisation agencies should be separate and set up in Public Private Partnership (PPP) with initial bulk grant from the Government. The stakeholders also feel that the agency should be autonomous, self-sustaining and not for profit organisation maintaining a global standard. Another stakeholder said that test labs with C-DoT and other public facilities should be opened for start-ups and other entities in the ecosystem. The stakeholder continued that the business models for the same need to be designed in consultation with various academic and research institutes. Some stakeholders said that the Government may fund setting up these facilities till the agency achieves the status of internationally accredited autonomous body and later on an autonomous body may be created on self-sustenance basis. The stakeholders felt that this can be effectively setup if the operators are brought into the planning process and initially it's not a bad idea if some of the operators also invest in such a company/organisation. In the opinion of some of the stakeholders, product certification to global standards would facilitate acceptance of products manufactured in India in the International market and, therefore, enhance the exports.

2.42 On the question of the facilities stakeholders collectively suggested the following:

a) Facilities to carry out the following tests:

- Conformance testing against standards
- Inter-operability testing
- Product certification
- Physical/Thermal certification
- The facility of the Telecom Certification Lab (TCL) should be of international standards and the government should put in adequate investment in this regard.
- Blind Testing facility where the intent is to keep the test team personnel far from the influence of Equipment manufacturer. It requires having test personnel separate from sales / over the counter person. All documents should be submitted, along with the equipment to be tested

b) Stakeholders felt that the following facilities should be available at the testing centres

- Environmental Test Chambers (Dry Cold, Dry Heat, Rapid Temperature Cycling, Damp Heat, Damp Heat Steady state etc. covering different categories of equipment
- Vibration chamber
- EMI / EMC Test Facility
- Latest Test Instruments

c) Certification Lab for different protocols being standardised by different bodies which would mean to keep abreast of the R&D activities across the globe and even defining the protocol

development from ease of test and maintenance perspective.

- Test equipment for different networks and types
- Equipment and Consumer items for testing
- Working network models and prototypes
- Different service termination from different service providers
- Uninterrupted power supply
- Good IT infrastructure

2.43 It was stated by some stakeholders that testing and certification of all telecom products is important. In their opinion, testing and conformance to GRs/IRs should be mandatory for all products whether domestic or otherwise. In this regard they suggested the following:

a) TEC should test/validate all telecom products and services to be deployed in Indian telecom network.
b) All service providers must be asked to strictly by only TEC-certified products.
c) The testing agency should also be responsible for promoting Indian products.
d) TEC can be an important stakeholder in all government funded/aided R&D projects, hence should be accountable for successful adaptation and commercialisation of technology.
e) Ensure compliance to security requirements of the country and drive technology for development of encryption algorithms to plug security holes.
f) Ensuring open interfaces in evolving/new standards being brought India (e.g. 4G) so as to ensure interoperability and minimum SLA guarantees between all vendors

2.44 On the issue of the cost of setting up testing and accreditation facility, the stakeholders had different assessments. Some stakeholders said that it will need only a few crore rupees per year and that the labs can come up in the private or joint sector and be run on for-profit basis, by charging for their service. Another stakeholder said that the capital investment in these labs tend to be mainly on test equipment and software. Yet another stakeholder said that a Government grant of Rs 50 crore over a period of 3 years may be adequate with similar funding coming from the private investors. It was suggested that the investment may be recovered through certification business models, testing of equipment and interoperability and plugfest events.

2.45 A common Test & Certification facility offers a number of advantages. It makes available complex and expensive testing facilities for environmental, performance and conformance testing at one point. Setting up of such facilities will help telecom product designers, developers and manufacturers in achieving their compliance requirements as quickly and efficiently as possible. Once certified, the manufacturers and developers can confidently position their products in domestic and global market. Having testing facilities within India can also take care of the Government's concern about security related issues in a more effective manner. Establishment of such facilities requires significant investment and each individual manufacturer cannot afford its own testing facility. It is important to ensure that such facilities are established and run by a specialised agency which would make them available at affordable costs and non-discriminately to all the Indian telecom manufacturing companies.

2.46 India currently has Telecom Engineering Center (TEC) which has functions akin to a testing agency. It is a technical body under the Department of Telecom, Ministry of Communications performing the following functions: Specification of common standards with regard to Telecom network equipment, services and interoperability; Preparation of Generic Requirements (GRs), Interface Requirements (IRs); Issuing Interface Approvals, Certificate of Approvals, Service Approvals & Type Approvals; Formulation of Standards to drive indigenisation. Using TEC as the focal point for testing and certification agency will also take care of security issue related to equipment and networks more effectively. In this regard TEC can be used for testing all foreign equipment and also periodic technical audit of equipment in use in India from the security view point. It is proposed to give TEC a broader role which requires a paradigm shift in the working of the organisaton as a International standard testing and certification agency.

2.47 The Authority is of the view that there should be an international testing and certification agency that can test and certify both locally and globally manufactured products. The agency should be able work in an unbiased fashion and for this purpose it should be an Autonomous Agency headed by a technical person of eminence. In this regard the Authority recommends setting up of an International Testing and Certification Organisation (TCO) by converting TEC into an Autonomous Agency of the Government of India to function on commercial basis. The agency should be managed by a Board comprising technical representatives of the Government, Industry and Academic Institutions.

2.48 Setting up of a testing and certification organisation would require facilities such as test networks, network simulation equipment, test beds, test chambers, test and measuring equipment and so on. The initial funding to an extent of Rs 100 crore required to set up the agency would have to be borne by the Government. The test agency will get revenues from testing and certification activities. If the total production is Rs 295,988 crore and imports are Rs 399,158 crore and 2% of the total production and imports is tested then this will amount to Rs 13902 crore worth of equipment. Presuming 2% as the testing fee, the total accrual upto the year 2020 would be Rs 278 crore or approximately Rs 40 crore per year.

2.49 The Authority is of the opinion that an International level testing and certification organisation may be set up by way of converting TEC into an Autonomous Agency for testing and certifying all products manufactured in India or imported from other countries. This agency should be headed by an independent Board drawn from technical members of Government, industry and academia. The Authority, therefore, makes the following recommendation:

2.50 **The Authority recommends setting up of an International standard Testing and Certification Agency by way of converting TEC into an Autonomous Agency for testing all products manufactured in India or imported from other countries. This Agency should be headed by a person of eminence from the relevant field and will be managed by an independent Board drawn from technical members of the Government, industry and academia**.

C – Fiscal incentives

2.51 The following issues were raised in the consultation paper regarding tax and duty structures:

(i) What could be the duty structure to be imposed on imported goods?

(ii) What do you suggest should be the tax structure in respect of imported and indigenous manufacture of telecom equipment, keeping in view international agreements?

2.52 The issue of fiscal incentives generated a large number of responses. Most stakeholders have expressed the need for a transparent taxation structure that is in consonance with global norms and practices and avoidance of multiple taxes, for fostering the growth of the sector. They have asked for reduction or deferment of, or exemption from a number of taxes. The stakeholder comments are discussed in the following paragraphs.

2.53 Regarding duties on imported products, some stakeholders said that India has committed in the Information Technology Agreement that there should be no basic customs duty on import of specified IT items which include most telecom items. The stakeholders were of the opinion that Countervailing Duty on imports should not be more than Excise Duty so that there is a level playing field between Indian and foreign manufacturers.

2.54 On the other hand, some stakeholders pointed out that imported products are brought in SKD or CKD form and value addition during the process of assembly is very low. By imposing zero duty

on imported products the Government is actually incentivising low value addition.

2.55 Several stakeholders felt that the duty structure was loaded against the domestic telecom equipment manufacturing industry. While imports are subject only to Countervailing Duty equivalent to Excise Duty, domestic manufacturers are burdened in addition with VAT and Central Sales Tax (CST). Some stakeholders also pointed out that while there is a proposal to replace CST, VAT and Excise by a single Goods and Services Tax (GST), this, according to them, may take a long time due to opposition from the States. The stakeholders opined that there is an urgent need to limit the total incidence of tax on domestic manufacturers to 12% including VAT and Excise Duty, and to remove CST altogether. Alternatively, they advocated that a tax equivalent to 2% CST should be levied on imported products to bring in a level playing field. Other stakeholders have pointed out that import of telecom equipments for Railways, Defence & Infrastructure projects is free of customs duty while on the other hand Indian telecom producers have to pay Excise Duty and GST. According to them this results in Indian telecom products becoming uncompetitive compared to equivalent imported products. As such there should be Excise Duty and GST exemptions for sale of Indian telecom products to Indian Defence, Railways & Infrastructure projects that are exempt from payment of customs duty.

2.56 Some stakeholders have suggested waiving off of Excise, Sales Tax and VAT for domestic manufacturers for 5 years. According to them, such steps have encouraged investors to set up business in Vietnam. Stakeholders have also suggested waiving off of Octroi,

Entry Taxes and Local Sales Taxes levied by the State Governments on domestic telecom equipment manufacturers at least up to 2015.

2.57 Stakeholders also talked of deferred payment of various taxes. Some of them have said that the Government should allow deferred payment of Excise/VAT for 10 years with 1% interest. This will compensate for other duties, taxes and levies within the domestic tariff area like Sales Tax/Octroi/Service Tax/Entry Tax etc. Others have felt that incentive in terms of deferment of payment of Excise Duty, Service Tax, Sales Tax, VAT/GST should be provided for manufacturers of telecom products in India for a minimum period of 5 years.

2.58 On reduction of taxes, the stakeholders felt that Central Sales Tax (CST) and Value Added Tax (VAT) rates should be equalised. According to them CST rates are 2% against Form "C" whereas VAT rates vary between 4% and 14% from State to State. Some stakeholders said that since telecom products have become basic needs of society, they should also be considered as essential products and on principle no CST / VAT should be levied; otherwise domestic manufactured telecom products should be taxed at a very nominal rate; maximum @ 2% can be levied under Central Excise and Sales Tax/VAT without any statutory forms/formalities. Another stakeholder has said that the Central Sales Tax should be made 0% on telecom equipment including the entire value chain of raw materials.

2.59 In the opinion of one of the stakeholders, equipment that is manufactured indigenously in India can be provided tax breaks to

offset any preferential treatment accrued by the imported equipment with zero import duty. Some stakeholders have suggested that exemption in Minimum Alternate Tax (MAT) and an Income Tax holiday should be provided to the indigenous telecom equipment manufacturing industry. Some other stakeholders said that tax barriers on transfer of technology such as Withholding Tax on fees for transfer of technology and software imports should be removed. In their opinion tax on payment of royalty should be as low as possible. The stakeholders have also said that in order to encourage technology transfer, royalty payment up to 5% on domestic sales and 8% on exports should be exempted from Income Tax. Some stakeholders have suggested that accumulated CENVAT Credit should be refunded to the telecom manufacturer; however, if required, a minimum limit of accumulated CENVAT credit can be prescribed for providing the refund. It was suggested by some of the stakeholders that the Government of India should allow CENVAT credit at company level for Central Excise and Service Tax together, rather than at the manufacturing unit or place of business level. In the opinion of one of the stakeholders, various manufacturing units and places of businesses should be considered as 'one entity' at company level for Central Excise and Service Tax purposes in respect of all benefits and procedural compliances.

2.60 Some stakeholders felt that to encourage exports, full refund should be allowed on Excise Duty/Sales Tax from local manufacturing bases. In their opinion companies owned by Indians entrepreneurs should be supported with subsidies, tax benefits and export benefits to bring them on par with imported supplies. According to one of the stakeholders, export benefits in India (e.g. Duty Entitlement Pass Book Scheme or DEPB) are

designed for neutralisation of import duties that go into the process of manufacture. The stakeholder has further added that 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 like sales tax or service tax within the domestic tariff area. Some of the stakeholders felt that India has multiple taxes and neutralisation of all of these must take place before goods are exported otherwise, Indian exports from Indian manufacturers cannot be competitive. The stakeholders said that presently, export earnings are given income tax benefits but DEPB is not classified as export earnings. According to them if DEPB is recognised as export earnings, it would be seen as a fiscal benefit to motivate transnational companies to set up base in India. Some stakeholders also suggested Government should give "deemed export" status to Indian Products that are sold in the domestic market (DTA). In their opinion anti-dumping duties, where applicable, must be imposed.

2.61 The Authority has deliberated upon the various issues raised and suggestions given by the stakeholders. As per information received from the stakeholders, it is seen that the comparative tax structure for imported and domestic products is in general as given in Table 2.2:

Sl No	TAX Nomenclature	On Imports	On Domestic Products
1.	Customs Duty	Nil	-
2.	CVD	10%	-
3	SAD	4%(Adjustable)	
4.	Excise (now called Cenvat)	-	10%
5.	State VAT	-	4-14%
6.	Central Sales Tax(CST)	-	2%
7.	Octroi (Maharashtra)	As applicable	As applicable
8.	Entry tax, local area development tax in some states	As applicable	As applicable

Table 2.2 Comparative Tax Structure- Imports and Domestic Products

2.62 The Authority notes that while imported telecom equipment is subjected to zero import duty under India's ITA commitment, domestic products are at a comparative disadvantage because of multiple taxation of raw materials, components and finished products at the stages of import, manufacture and sales. There is primarily a need to correct the inverted duty structure that favours the import of finished products as against domestic manufacture.

2.63 Imported telecom products attract CVD equivalent to Excise Duty at the rate of 10%. The domestic producers pay VAT which ranges from 4% to 14% but is normally around 5%. Domestic producers pay CST at the rate of 2% which is not levied on imported products. Octroi and state entry taxes are applicable to both imports and domestic products. SAD which is applicable on imported products is adjustable. The implementation of the GST regime is likely to bring about across- the-board changes in

taxation structure and a number of taxes and duties are likely to be subsumed in the GST. However, the final rates and categories under GST have not yet emerged. In the present regime, the stakeholders have asked for restricting Excise + VAT on domestic products to 12% or less and neutralisation of the 2% extra that they pay as CST. Thus effectively a 4-14% reduction is what the domestic producers are looking for, 2-12% in VAT depending on the applicable slab and 2% in CST. The financial implication would be of the order of Rs 30847 crore up to 2020 as given in Chapter V. However, the measure would have multiplier effects on production and value addition

2.64 **To remove the comparative tax disadvantage on domestic manufactured products, the Authority recommends that the total incidence of Excise Duty and VAT on domestic manufactured products should be limited to 12%. In addition, as in the case of imported equipment, there should be no CST on domestic manufactured products or, alternatively, a tax equivalent to 2% should be imposed on imported products.**

2.65 While provision of a level playing field for domestic manufactured products vis a vis imports should be the underlying long term goal of tax policy, there is a case for special incentivisation of domestic manufacturing in the short run through the provision of a tax waiver or tax deferment. A deferment of payment of Excise Duty, Service Tax, Sales Tax, VAT /GST for manufacturers of telecom equipment for a period of 5 years would provide immediate relief to smaller domestic manufacturers and new ventures and this would supply the necessary stimulus required for the industry to take-off. If this benefit is allowed to the industry at a 1% rate of interest, the approximate financial implication would be Rs 3154 cr.

2.66 **The Authority recommends that a special incentive should be provided to producers of domestic manufactured products with total annual turnover less than Rs 1000 cr, by deferring the payment of Excise/Sales Tax/VAT/GST by them for a period of 5 years at a nominal rate of interest.**

2.67 Telecom manufacturing should be seen as essential infrastructure for development and self reliance. From this point of view, it is time that domestic telecom manufacturers, like other operators in other important infrastructure sectors, are given the initial impetus of an Income Tax holiday, which has yielded rich dividends in the form of growth of sectors like software and telecom services. This would be especially beneficial for smaller companies and start-ups which face difficulty in raising capital and lack the financial muscle for channelling resources into R&D and IPR development. The philosophy behind the Minimum Alternate Tax (MAT) of charging a minimum tax with reference to book profits on the ground that all profitable companies must contribute to the finances of the Government by paying of Income Tax, should also be reconsidered in the context of a perceived national need to encourage the growth of telecom product development and manufacturing in the country.

2.68 **The Authority recommends that an Income Tax holiday may be given for 10 years, on the lines of that given to the software industry, for producers of domestic manufactured telecom products, whose total annual turnover is less than Rs 1000 cr. They should also be exempted from payment of Minimum Alternative Tax.**

2.69 Though there were no specific issues raised in the consultation paper on manufacture of mobile phones, some of the stakeholders had raised these issues as part of telecom equipment manufacture. Some of the stakeholders have commented that for making the mobile handset manufacturing globally competitive, tax holidays and other tax benefits should be given. The stakeholders said that the customs duty on imported goods is zero and consequently domestic manufacturers need to be protected. Another comment was that all capital goods and other durable goods required for manufacture and setting up of manufacturing facilities should be exempted from the Basic Customs Duty and Additional Duty. The stakeholders also said that there was virtually no incentive on mobile phone export. According to them only a small segment of the mobile range gets this benefit which is not encouraging. They have sought appropriate incentives for manufacture and export.

2.70 On examination of the comments and other industry information, there appear to be handicaps that translate into a lack of manufacturing competitiveness for Indian handsets and handset components vis a vis imports. The KPMG –ICA Advisory[15] indicates that EBITDA margins for manufacturers in China are 11% of sales, whereas EBITDA margins in India range from 6%-2.4%. The mobile handset industry faces, apart from the infrastructure and eco-system disabilities, multiple taxes on domestic manufacture as compared to imports. It has been observed from the submissions of the stakeholders that the domestic mobile phones attract Excise Duty of 1%, NCCD of 1%, VAT in the range 4%-14% and CST 2%. The imported equipment attracts no basic custom duty, CVD of

[15] Manufacturing of Handsets, Components and Accessories, Manufacturing Advisory Committee/Indian Cellular Association.

1%, NCCD 1% and no VAT and CST. The position is depicted in Table 2.3:

Sl no	TAX Nomenclature	On Imports	On Domestic products
1.	Customs Duty	Nil	-
2.	CVD	1%	-
3.	Excise Duty	-	1%
4.	VAT	-	4-14%
5.	CST	-	2%
6	NCCD	1%	1%
7.	Octroi	As applicable	As applicable
8.	Entry Tax etc	As applicable	As applicable

Table 2.3 Comparative Tax Structure- Mobile Handsets

2.71 The imbalance in tax structure contributes to the lack of competitiveness of the domestic production of handsets and needs to be addressed. The Authority is of the view that the taxes and duties need to be structured in a manner that does not put domestic industry at a disadvantage.

2.72 **The Authority recommends that for the mobile handset industry, as in the case of telecom network equipment manufacturing, comparative tax disadvantages should be removed for domestically manufactured handsets by reducing VAT and by placing a tax equivalent to CST on imported products.**

2.73 **The Authority recommends that as an exceptional measure, to make it easier for domestic manufacturers to commence domestic production of mobile handsets, exemption from countervailing duties may be granted on import of capital equipment and Excise duty on domestically sourced capital goods for the handset manufacturing industry.**

2.74 Several stakeholders commented that in this era of competition it is important to reduce delays and transactions costs. They mentioned that sometimes it takes lesser time for the goods to be cleared from a foreign port and get transported to India then getting it cleared from the Indian customs. They cite excessive documentation as one of the reasons for the slow process. The Authority is therefore of the opinion that the customs clearance procedures, forms and documents for import of raw materials and components for domestic manufacture of telecom equipment in India be reviewed with the objective of simplification. To the extent possible, the exchange of information should be automated and done on-line. Likewise the State Governments should allow free movement of equipment/raw materials and provide a single window clearance for all State level requirements.

2.75 The competitive scenario today requires fast availability of equipment and its deployment. The demurrage charges while the equipment is under clearance, the cost of delayed deployment in the network all add to the cost of the manufacturer and the user. Delayed clearances have rippling effect. Delay in clearances cause inventory bottlenecks which affect the timelines and deliveries and may eventually invocation of penalty clauses in the ongoing orders and eventually cancellation or withholding of further orders and invocation of penalty clause.

2.76 **The Authority recommends all custom clearances for the import of raw materials and components for domestic manufacture of telecom equipment in India should be completed expeditiously and preferably within 7 days of application.**

D- Non-fiscal incentives

2.77 The stakeholders suggested that there should be a stable long term regulatory policy framework for say 5-10 years to enable the eco-system to stabilise. Some of the stakeholders suggested that greenfield investment should be promoted by giving free land or free rented land. In some stakeholders' opinion, manufacturing requires trained manpower and the Government should support or set up technical institutes in hub and spoke arrangement near clusters/SEZ/STPI. According to a stakeholder special reward may be given for employment of the disabled, in case the factory reaches a certain percentage of such employment. Stakeholders also suggested that there should be a national high-tech bonus to encourage innovations in the telecom sector. There were stakeholders who suggested that infrastructure should be developed so that new units do not face operational issues. It was suggested that ready to use and pay for infrastructure usage may be encouraged. A view expressed was that incentives for export support for manufactured in India equipment shall be enhanced. Some stakeholders felt that electronics/IT hardware manufacturing industry is one of the "Thrust Areas" of the Government of India, therefore, it needs special attention to simplification of procedures, self declaration, infrastructure support, single window clearances mechanism for all

state/municipal approvals, continuous and adequate supply of power and water etc.

2.78 The Authority perceives the need for a stable long term regulatory policy for the sector and the urgent need for infrastructure development. While these are very vast subjects, the Authority at this stage would like to make a more specific recommendation for focused development of industry specific trained manpower. While the requirement for engineering graduates can be met through our existing engineering institutes, the problem is more acute in respect of skilled and semi skilled manpower that would be required for various trades involved in the manufacturing industry. It is felt that as a first step, DOT must address HRD Ministry for inclusion of electronics and telecom to be part of the curriculum at the polytechnic level. The large manufacturing companies may have their in-house training setups but the smaller concerns may not find it viable to make such facilities for a small number of employees. There a number of Industrial Training Institutes and polytechnics across the country could be utilised for offering to entrepreneurs and manufacturers, facilities and programmes for training their employees in trades specific to telecom manufacturing. Special courses in telecom manufacturing could be designed for the purpose. This would go a long way in meeting in the medium and long term the needs of skilled and semi skilled manpower.

2.79 Some of the stakeholders also voiced their concern about the "provenness" clause in the Government tenders which requires the manufacturer to give proof that a certain number of their equipment are in operation in one or more telecom networks. According to them this effectively disallows Indian product companies from participating in those tenders even though their

products may be of same or better quality as compared to foreign products that meet the deployment requirement. The stakeholders further said that credible Indian product companies, that have a good track record of similar technologies, should be allowed to participate in such tenders. An independent body can evaluate if a credible Indian Products exists, and specific guidelines should be issued Public Sector Undertakings and Ministries to frame their procurement policies accordingly.

2.80 Most Indian telecom equipment manufacturing companies are comparatively small and have come into the manufacturing after the imported equipment had become entrenched in the Indian networks. Allowing Indian products to become eligible in such tenders will provide the stimulus needed for the domestic industry. Considering that the provenness clause in tenders is meant to ensure that the vendor has experience in deploying and supporting the required equipment under field conditions and that the equipment is reliable and functionally according to the requirement, it is obvious that a complete order cannot be given to a vendor who does not meet the provenness required, yet if the product is otherwise according to the required specifications and has been certified by the official testing and certification agency then a part of the order may be given to the qualifying Indian product company. Thus, taking into account the concerns of the Telecom Network provider for quality equipment, the Authority is of the opinion that the waiver of the provenness clause, subject to the conditions stipulated, would be limited to 10% of the procurement by quantity.

2.81 The Authority recommends that the requirement for "provenness" be waived for domestic manufactured products provided that the turnover of the domestic manufacturer is less than Rs 1000 crore and provided that the domestic product meets the requirement of quality, technical specifications and standards and are certified by the testing and certification organisation. In such a case the qualifying company would be given order upto 10% by quantity.

E - Setting up of clusters

2.82 Clustering of technology companies in an area is well-documented as being very beneficial to developing new industries in a country. Taiwan is an illustrative success story, as described in the Task Force report . Taiwan's Hsinchu Science Park, spread over 632 hectares, has clusters of most of the semiconductor component manufactures, thus saving on time and cost for assembly. This park includes independent wafer foundries, IC design companies, fabricators, as well as packaging and testing companies for the semiconductor industry all at one place. The model is now being replicated by China and Malaysia as well. Most countries have typically evolved clusters naturally over a time period. But, few such as Germany in the case of Solar Cell Industry or China as in the case of electronics have done this by design. The following issues were raised in the consultation paper regarding formation of clusters:

(i) What, if any, are the advantages of setting up of clusters for manufacture of Telecom equipment within the country?
(ii) What is the investment required for setting up of such clusters?
(iii) How can the financing of such clusters be best done, based on international experience?
(iv) What would be the lead time required for setting up of such clusters?
(v) What are the considerations for the location of such clusters?

2.83 It has been suggested by the stakeholders that India should encourage formation of clusters at the earliest. They have cited the following advantages.

- Reduction in the cumulative cycle time on the basis of reduced inter-company transit times
- Faster "time to market" as co-location of the broad hi-tech mfg ecosystem would allow tighter collaboration & faster decision/issue-resolution cycles
- The broad base of companies concentrated within cluster(s) is cost-beneficial for the related industries - e.g. logistics providers servicing multiple OEMs; component supply base supplying to multiple EMS providers. Hence, this scale allows bigger investments while yielding higher returns & capacity utilisations for the same.
- Over a period of time such an ecosystem ensures that the associated aspects of talent, housing, and community development evolve to meet the needs of a thriving industrial ecosystem
- Accelerates the process of local manufacturing and R&D;
- Improved logistics – easy to plan for infrastructure in specific places and hence benefiting from economies of scale. Makes it

easier to setup conformance/inter-operability test centers and quality compliance certification centers.

- If Telecom Clusters are set up, pooling of resources could be done effectively to increase production but it is very difficult to begin with. This will become successful only when sufficient orders are available to Telecom Clusters
- MNCs 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.

2.84 However, one of the stakeholders was of the opinion that clusters as a concept is not that relevant for the telecom industry. Though this industry is capital intensive, it does not require huge physical areas that other infrastructure industry needs. According to the stakeholder, an eco-system that can be leveraged across the entire electronics product industry (not just telecom) can be created. This will anyway happen wherever there are better infrastructure facilities and need not be tied to specific geographical areas.

2.85 On the issue of investment required and how financing can be done one of the stakeholders said that the real estate cost is escalating and a cluster having as large area as 50 to 100 sq kms costs hundreds of millions(Rs). The stakeholder further added that the Government doesn't have to spend all this, it needs to mark such zones/clusters, develop infrastructure for companies and people to move in there, encourage private companies to move operations by providing quality infrastructure. Some stakeholders favoured the Government providing financial support for the

development of core common infrastructure in an SEZ for telecom equipment manufacturing. An amount equivalent to 5% of the total investment by the SEZ developer and the 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 such clusters should be encouraged in the Private sector and given the 'duty free' facility as well as income tax benefit as provided to promoters of SEZ. Another stakeholder feels there is no need for financing because if "market pull" for Indian products is created, then the investments will come automatically

2.86 On the lead time, some stakeholder said that clusters should be set up as soon as possible so that the Indian products could occupy the Indian and global market rapidly. Another stakeholder's comment was that usually it takes 5-10years to build infrastructure and surrounding environment for the establishment of such Special Zones or Telecom Clusters. Yet another stakeholder felt that 2 to 3 years time may be required to create a few clusters in India.

2.87 According to some stakeholders, the location of clusters should be close to a port (air or sea) so that the manufactured goods can be easily exported. Also availability of skills, easy access to market, good infrastructure like road, electricity, water etc. are important points that should be considered for developing the industry. According to the stakeholder, the state government policy should be very good for encouraging these industries. Another stakeholder felt that for spread of clusters on a country-wide basis, at least 5 clusters in different regions of the country (East, West, South,

North and Centre) can be set up on immediate basis. The stakeholder felt that some of the parameters for selecting the location for clusters may be: availability of manpower, logistics, local commute, International connectivity, infrastructure (Uninterrupted Electrical supply at a reasonable cost), close location to ports, rail network etc.. Yet another stakeholder felt affordable real estate for companies and people who would move into such clusters.

2.88 The stakeholders provided the following examples of large clusters which India could emulate. A large cluster spreading in 100 sq km, such as Suzhou in China. The Japanese model for setting up Research parks such as the Yokosuka Research Park (YRP) is an area in Yokosuka City, Japan, where many of the wireless, mobile communications related companies have set up their research and development centers and joint testing facilities. India can even partner with investor countries like Singapore to setup such large zones and develop the complete ecosystem. The government can assist in developing entrepreneurship clusters by providing infrastructure and facilities. Government initiatives have played a significant part in the development of clusters as shown by SEMATECH in USA and VLSI development in Japan. In Taiwan, the government played a critical role in not only setting up the Industrial Technology Research Institute (ITRI), but also in identifying key future technologies, bringing in multinationals to provide knowledge transfer to small firms in return for access to Asian markets, and bringing together consortia of small firms to link with multinationals.

2.89 The Authority analysed the issue further. An industrial cluster is a geographically contiguous concentration of related and supporting industries that are rendered more competitive because of synergies arising from participation in a value-adding supply chain[16]. As competition increases within an even more globalised world, the appeal of industrial clusters not only remains strong but has become even more urgent. Policy makers in developed and developing countries are seeking better ways to create new clusters, sustain existing ones and revive those that are losing their vigour. Policy makers are influenced by iconic clusters of the Silicon Valley, California; Cambridge, UK; Medicon Valley in Greater Copenhagen Area; The Emilia-Romagna region in Italy; The Bavarian region in Germany; Sophia Antipolis in France; Hsinchu Science Park near Taipei. These clusters are responsible for sustaining the momentum of economies in which they have emerged.

2.90 The Authority agrees with the general feeling of the stakeholders that a manufacturing eco-system provided by manufacturing clusters would house a large number of OEM, component manufacturers, EMS/contract manufacturers and have all other supporting facilities to reduce time to market. Unlike a chemical plant or automobile manufacturing plant, telecom product companies' facilities do not require large land area. Thus, it is sufficient to provide proximity instead of land subsidy for related facilities, suppliers and other telecom product companies. According to a recent study conducted by the CII[17], formation of

[16] Martin and Stanley, 2003

[17] "Realizing the potential of ICTE manufacturing in India – a Framework", CII, October 2010

telecom clusters is estimated to result in ~15% improvement in profitability of domestic manufacturers through lower investment in common facilities, cluster financing and marketing expenses. For developing an effective manufacturing supply chain, the Draft Paper on National Electronics/IT Hardware Manufacturing Policy of the Department of Information Technology states that a 'Hardware Manufacturing Cluster Park' needs to be set up across the country. Considering all the views and other information at its disposal, the Authority makes the following recommendation:

2.91 The following are some of the advantages of having a special zone or a telecom cluster:

i) Reduction in the cumulative cycle time on the basis of reduced inter-company transit times

ii) Faster "time to market" as co-location of the broad hi-tech mfg ecosystem would allow tighter collaboration & faster decision/issue-resolution cycles

iii) The broad base of companies concentrated within cluster(s) is cost-beneficial for the related industries - e.g. logistics providers servicing multiple OEMs; component supply base supplying to multiple EMS providers. Hence, this scale allows bigger investments while yielding higher returns & capacity utilisations for the same.

iv) Over a period of time such an ecosystem ensures that the associated aspects of talent, housing, and community development evolve to meet the needs of a thriving industrial ecosystem

2.92 Clusters are already developing in India. In the area of telecom we have clusters in Chennai, Hyderabad, Nodia among other places. Geographical clusters are significant drivers of regional economic growth and competitiveness, and their impact on business competitiveness and regional prosperity have been well documented. Development of more clusters need to be encouraged in India to spur manufacturing through proximity of related units, better infrastructure facilities and cost benefit through better logistics. In this regard it is felt that atleast 10 new clusters should be formed well spread out in different regions. Each cluster would need an area of upto 100 square km and the Government should assist in making available such land close to a sea port or an airport. Manufacturing today faces disabilities because of lack of power, undeveloped roads and other infrastructure. These clusters should ensure that these disabilities are removed and manufacturing in these clusters becomes globally competitive. Each cluster should either have captive training facilities or should have linkages with technical institutes for training manpower for manufacturing of components and telecom products.

2.93 The Authority recommends that ten telecom clusters be identified immediately. The Central/State Governments should make all efforts to develop infrastructural facilities in a time bound manner so that the infrastructure related disabilities are removed for the units that are located in the clusters.

2.94 According to CII domestic manufacturing companies face infrastructural disabilities to the extent of 12.5% compared to countries like China and Taiwan. This renders the products

uncompetitive as compared to products from those countries. According to CII the following is the impact of disabilities:

	India	China	India Clusters
RM Support	2.5	1	2.5
Power	5	2	4
Finance	5	2.5	4

Table 2.4 Impact of Infrastructure Disabilities

2.95 Analysis done by TRAI shows that in clusters the actual disability is 1.5% on account of raw material support, 3% on account of power and 2.5% on account of finance. The Authority has separately made recommendations for finance support for capital and working capital and promoting manufacture of components. It has also been recommended in paragraph 3.90 that the Government should move expeditiously in removing infrastructural disabilities in the clusters.

F - Promotion of Exports of Domestic Products

2.96 In chapter I we had seen that today export of telecom equipment from India to other countries was about one fifth of the imports. There is, however, immense growth potential that can be tapped.

2.97 It was suggested by the stakeholders that Indian Product companies, after establishing a strong base in India, should become exporters and gain global market share. Telecom is a global industry and many countries in the past have used the

exports of telecom equipment as a significant part of their bi-lateral trade, especially in developing nations like those in Africa. It has been suggested that telecom equipment export should also be made a high priority sector and trade missions abroad should actively promote this. Another stakeholder said that all telecom related Indian government funded line-of-credit or grant-in-aid project should be routed through a government agency like TCIL, and they in turn should be required to only use Indian Products. Currently, this basic rule is relaxed, and at times foreign products are supplied as a part of India's line of credits. Additionally, TCIL should work closely with other government agencies such as ONGC/MMTC/EIL etc so that they can barter "erection commissioning of Telecom networks" against purchase of natural assets like Mines / Oil blocks and aerable land. This can be the strategic move to acquire market share in countries that have low foreign exchange reserves. According to another stakeholder the "Indian Product" brand should be promoted in the international markets by creating a dedicated fund of Rs 50 Cr per annum. One of the comments was that the current guidelines of Ministry of Commerce under the market development & market access schemes need to be made more practical and useful for the needs of the telecom equipment industry. The current limits of travel assistance, market support are too low, too restrictive and are directed towards small industries, whereas the telecom industry is an industry where even a small company can be of several hundred crores revenues and typical global companies are several Billion dollars in size.

2.98 The Indian demand has been, hitherto, predominantly met through imports. Telecom equipment manufacturing being at a low level the export potential could not be tapped. Another factor that makes it

important to have specific strategies for exports is the discernible shift in consumption and production of ICTE products towards high growth Asia Pacific region. The telecom equipment and services can become a high-growth source for export revenues. The domestic demand, innovation capabilities and enhancement of manufacturing through the suggested measures should be leveraged in order to enable the country to play a significant role in the emerging global telecom industry landscape. The existing organisations like Telecom Export Promotion Council and Telecom Consultants India Ltd need to be strengthened for carrying out activities that will promote growth. TCIL can become a system integrator to set-up, operate and maintain networks in other countries by sourcing the equipment from India. To provide more autonomy in decision making Government may disinvest TCIL so that it holds only 49% equity. In addition India may leverage its software capabilities to promote bi-lateral trade in which telecom equipment may be exported in lieu import of raw material like copper and tin from other countries.

2.99 **The Authority recommends that TCIL may be strengthened as a system integrator for installing and operating networks in other countries using telecom equipment sourced from India. Further, to enable more autonomy and efficiency, TCIL may be disinvested such that the Government holds upto 49% equity.**

2.100 **The Authority recommends that India should use its strengths in software to enter into bi-lateral trade agreements with other countries which results in India exporting telecom equipment in lieu of raw materials like tin and copper.**

Chapter III

Promoting Manufacture of Indian Products

3.1 The Indian product segment has not been able to make a notable contribution despite widespread belief that the capabilities exist. India has proven its capabilities in the fields of software and semiconductor chip design, however when it comes to manufacturing the situation is alarming. India has abundant technical and managerial talent but the manufacturing environment existing today does not seem to be encouraging R&D driven Indian product companies.

3.2 The following issues were raised in the consultation paper with regards to measures for promoting Indian products.

(i) Should the concept of mandatory use of Indian products/Indian manufactured products be introduced in the Indian context? If so, can this be introduced immediately or should it be introduced at a later date? If so, by what date?

(ii) What could be the percentage to be stipulated for both these categories?

(iii) What should be, if any, the incentives to be given to individual service providers for use of Indian equipment?

(iv) Likewise, what could be the disincentives, if any,for use of imported equipment? Is this compatible with international agreements.

(v) Should a percentage of the Indian market be reserved for the Indian manufacturers? If so, what should be the percentage?

(vi) What, if any, could be the implications of such a step

3.3 Among stakeholders the proponents of market access for Indian products cited many reasons for supporting it. Some stakeholders state that in the case of telecom equipment since the volumes drive the price down, it is absolutely necessary for the Government to mandate the use of Indian Products to provide the market pull, without which the Indian Product industry will never come out of the vicious circle and be globally competitive. There were other stakeholders who felt that it should be mandated that all Government/Government Licensees/telecom service providers, should at least procure 30% of their annual capex in the form of "Indian Products", beginning immediately. In their view, this threshold should be increased by 5% every year, reaching 50% after 4 years. The stakeholders said that only if the Indian products are not available, then at least "Indian Manufactured Products" must be procured. The stakeholders further added that to ensure that quality/price to the buyer is not compromised, the price paid should be the same paid for the balance procurement and the quality/technical specifications should be the same as set for imported equipment. Another opinion was that in addition, Government funded projects as well as defence/security projects should be built using "Indian Products" only, if they are available in the country and if they meet the technical specifications. This, the stakeholders contend, is in line with practice in other countries. Another view favoured the concept of mandatory usage of a certain minimum amount of "Indian Products" in the network to be immediately made applicable for all government/government licensees in the telecom sector. This can be done by suitable modifications to the license condition. This, the stakeholder considered, is consistent with applicable WTO rules for India, since

government procurement as well as procurement of equipment having security/national interest (as telecom networks are) is not covered under the WTO agreements signed by India. According to a stakeholder the service providers may be incentivised to the extent of 13% of the value of Indian products purchased. This amount is equal to the disability factor faced by Indian manufacturers. A number of stakeholders suggested that 30, 50 & 70% usage of Indian product should be mandated by some years like 2012, 2013 and 2015 respectively and one even suggested 100% by 2020. Any operator who is not procuring the required percentage of Indian products should be required to pay R&D cess. It was also suggested that the operators, who use the indigenously developed Indian Products, should be given incentives in form of rebates in the USO/R&D Fund contribution and / or tax holidays. Such incentives should be linked with the amount of Indian products used in their network. A stakeholder while agreeing with this concept said that it should be introduced after three years.

3.4 Those who did not support the concept of mandatory use of Indian Products were of the view that Indian products must compete with the international products in terms of price and quality and that non-tariff barriers to restrict imports is not in the interest of telecom sector and also not consistent with WTO requirement. Some other stakeholders said that mandatory use of Indian products may not be in line with the GATT. Yet another stakeholder agreed that it is imperative that in an industry such as telecom with intense competition, these products should compare well with those imported both in terms of cost and quality. According to another stakeholder, instead of reservation, the Government should only give good facility and subsidy to the Indian manufacturers.

3.5 The stakeholders' comments were analysed. In order that the Indian Products are able to carve out a market for themselves within the country and abroad, there is a need to provide Indian products with a fair opportunity to stand up to the competition provided by Indian Manufactured and Imported products. The most important step for the country to take for successful commercialisation of Indian products would be to allow the Indian product industry to use the high growth of the Indian market. If this is not done, the advantage of growth of the Indian Telecom network will be taken by products whose IPRs do not belong to India. In the last chapter it was recommended that all domestic manufactured products, that have the prescribed value addition, should have preferential market access to the extent of 30% in 2012-13 going upto 80% in the year 2019-20. This recommendation does not distinguish between Indian manufactured and Indian products. Having recommended that, it is important that the Indian products should also be given market access because in the initial phases as hardware costs are highly dependent on volumes and unless allowed preferential access to the domestic market they would not be able to get the economies of scale to reduce their production costs and the battle for them would be lost before it begins. The concern of the service providers regarding quality of the Indian products that qualify for preferential market accessed, based on value addition, could be addressed by ensuring that the Indian products are at par on technology and quality as compared to global players and should be procured through a competitive bidding process. Conformance of the products to global standards and their quality could be certified by the testing and certification agency being proposed by the Authority in these recommendations. This will ensure that there is no adverse impact on end-user services or pricing, while at

the same time encouraging the creation of Indian Products. Once such reservation is in place financial and other resources to create Indian Products would not be difficult to arrange.

3.6 International experience also shows that many countries have followed policies that have lead to the growth of their indigenous product industry. Supporting the infant domestic product industries through various policy-level incentives is a common practice followed by most countries and Indian need not be an exception. The efficacy of such interventions has been proven in multiple studies and many countries like China, Brazil, Mexico, Indonesia and the USA and they are already reaping the benefits of such measures. According to reports, China has only 2% share of the US market. Brazil imposes high taxation on import of products which are domestically manufactured.

3.7 India has proven itself in the fields of software services as well as hardware chip design over the last decade. The natural next step for the Indian product industry is to leverage this design and manufacturing expertise to develop complete products involving software, hardware and IPR. However, it continues to flounder as far as telecom equipment manufacturing is concerned. Manufacturing of Indian Products is also revelant from the security viewpoint as the IPR and control over the product design would reside in India. A continuous focus on the part of the Government would be required to encourage sustained growth in the share of Indian Products in the telecom network.

3.8 In paragraph 2.15 it has been recommended that preferential market access for all domestic manufactured products would be 30% in 2012-13 and would go upto 80% in 2019-20. Access for Indian products out of the access reserved for domestic

manufactured products needs to be decided keeping in view the production capabilities and likely growth. Having considered various factors the Authority is of the opinion that while, for the year 2012-2013 the market access for domestic manufacture (consisting of both Indian manufactured products and Indian products) would be 30% and market access for Indian products alone would be 15%. This would imply that out of 30% market access for domestic manufactured products, the Indian products get exclusive access to 15% market and the remaining 15% is available both to the Indian Manufactured products as well as the Indian products. Similar stipulation continues for other years with a change in percentages as indicated in Table 3.1. As indicated in Chapter 1, the minimum value added stipulation would apply to the Indian Products as well.

Year	2012-13	2014-15	2016-17	2019-20
Market access for Indian products	15%	25%	35%	50%

Table 3.1 Market Access for Indian Products

3.9 The preferential market access would also apply to Government/Government licencees who outsource any part of their network to other companies, and the agency to which the network has been outsourced must be required to comply with these reservations. The recommendations made in respect of Indian Manufactured Products in para 2.17 would also apply to Indian Products.

3.10 **The Authority recommends that preferential market access may be given for Indian products as per the following table:**

Year	2012-13	2014-15	2016-17	2019-20
Market access for Indian products	15%	25%	35%	50%

Table 3.2 Market access for Indian Products

3.11 It is felt that to make implementation effective there has to be a system of penalties to discourage service providers from not meeting the market access requirements. The Authority is of the opinion that the service provider not meeting the access criteria should contribute to development of Indian Products by contribution towards R&D fund or Telecom Equipment Manufacturing fund.

3.12 The Authority recommends that if a service provider is not able to meet the criteria of market access then it will deposit an amount equal to 10% of the shortfall in the value of the equipment in the Telecom Research fund or the Telecom Equipment Manufacturing fund

3.13 The method of operationalisation mentioned in paragraphs 2.28 and recommendation made in paragraph 2.29 applies to Indian Products as well.

3.14 In order that the Indian products are produced in adequate quantity and measure up to the desired quality standards there are many other issues that need to be taken care of. The SWOT analysis carried out in Chapter II has thrown up some areas where steps are required to be taken in order to promote Indian products and they are discussed under the following:

A. Research and Development

B. Financial Incentives

C. Fiscal Incentives

D. Standardisation

A- Research & Development

3.15 Research and Development (R&D) is an important set of activities in the telecom manufacturing value chain which has the potential of bringing immense value to the country. It is widely accepted that over 85% of the value is created by the organisation that does R&D, designs the product and owns the IPR and the brand. The physical manufacturing of telecom equipment contributes less than 15% of the total value.

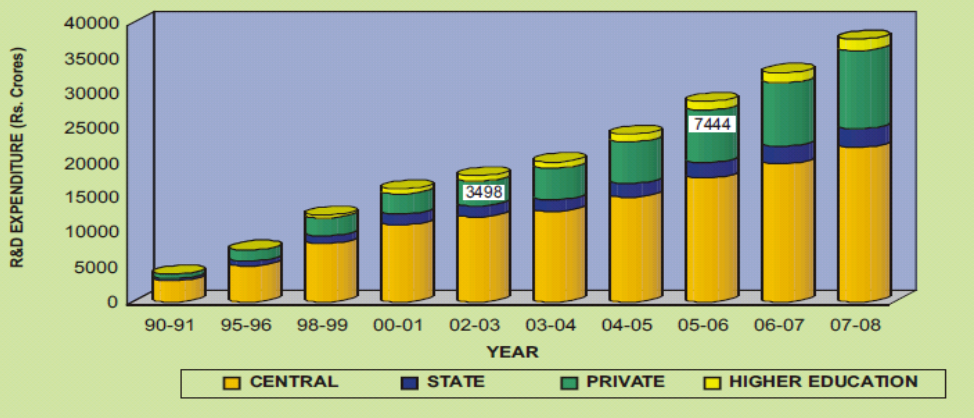
3.16 The existing Government policy regarding R&D in telecom manufacturing as enunciated in the New Telecom Policy 1999 is as follows:

"Recognising that telecommunications is a prime pre-requisite for the development of other technologies, telecommunications research and development (R&D) activities would be encouraged. Government would take steps to ensure that the industry invests adequately in R&D for service provision as well as manufacturing. Indigenous R&D would be actively encouraged with a view to accelerate local industrial growth and hasten transfer of technology. Premier technical institutions would be encouraged to undertake R&D activities on a contribution basis by the telecom service providers and manufacturers so as to develop multi-dimensional R&D activities in telecommunications and information technology."

3.17 It has been more than 10 years since the declaration of the policy by DOT. Inclusion of focus on R&D was the right step but

unfortunately there has been an absence of a concerted plan of action for implementation of the R&D policy.

3.18 In general the R&D situation in India is poor compared to many other countries. According to the World Bank data[18] for the year 2007, while most of the developed countries spend 2% or more of their Gross Domestic Product on R&D, in India this expenditure is only 0.8%. The research is mostly driven by the Government sector. According to the available data for the year 2007-08 about 74.1% of the total R&D expenditure was met from Government sources and 25.9% from private sources[19]. An ecosystem needs to be created so that the contribution of the private sector increases substantially during the next few years. Figure 3.1 Shows the Government and Private expenditure on R&D.



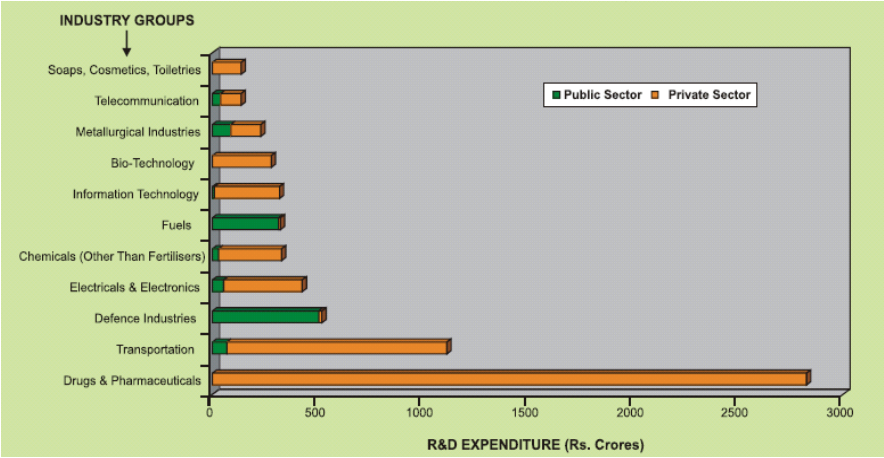
Source: Department of Science & Technology

Figure 3.1 Government & Private expenditure on R&D

3.19 While the overall investment on R&D is not encouraging, the situation on the telecom front is still worse. According to the data published by the Department of Science and Technology for the year 2007-2008, the industrial sector R&D expenditure worked out

[18] World development indicators, http://data.worldbank.org/indicator/GB.XPD.RSDV.GD.ZS
[19] Source: Department of Science & Technology, www.dst.gov.in

to be 30.4%. In developed countries this is usually more than 50%. As can be seen from the Figure 3.2, the R&D investment in telecom has been way below Pharmaceuticals, Transportation, Chemicals, IT and even Bio-technology. There is therefore a need to have appropriately funded planned efforts for telecommunications. The success of Indian products in Pharmaceutical and Transportation sector is a clear indication of the value that can be created if sufficient investment is made on R&D in telecommunication sector as well.



Source: Department of Science & Technology[20]

Figure 3.2: R & D Expenditure by leading Industry Groups

3.20 Research for telecommunications can broadly be divided into two categories: Fundamental or Basic research and Applied Research. Fundamental research is carried out by institutions of higher learning like Indian Institutes of Technology, Indian Institute of Science and some other Universities and Research Centres. Applied research has traditionally been conducted by select public sector units like BEL and CDOT, research centres and academic institutions. Sporadic private sector initiatives have also been there. Applied research leading to product development and adjunct development of features and applications is an area that

[20] Research and Development Statistics at a Glance: 2007-08

can create a lot of entrepreneurship. In the mid 1980's Center for Development of Telematics (C-DoT) developed a highly successful 256 line Rural Automatic Exchange (RAX). Today about 2/3rd of India's fixed telecom lines are based on C-DOT technology switches. Lately, not too many of indigenously developed telecom technologies have made their presence felt in the telecommunications networks. Many companies like Alcatel, Cisco etc. have also set up their research & development (R&D) centers in India. The CDOT-Alcatel Research Center (CARC) is owned in the ratio 51:49 by Alcatel and CDOT and is dedicated to broadband wireless access. According to the information on their website[21], Nokia has three Research & Development centers in India, based in Bangalore, Hyderabad and Mumbai. These R&D hubs are working on next-generation packet-switched mobile technologies and communications solutions to enhance corporate productivity. According to recent reports Huawei Telecommunications (India), the local unit of China's Huawei Technologies Co., will invest about $2 billion over the next five years to set up a new research and development center[22].

3.21 The following issues relating to R&D were raised in the consultation paper:

[21] http://www.nokia.co.in/about-nokia/company
[22] http://www.totaltele.com/view.aspx?ID=461011

(i) ***What should be the objective and focus of the R&D effort for 2020?***

(ii) ***Flowing from the above, what should be the objective and focus of the R&D effort for 2015?***

(iii) ***Which Institutions, whether in the Public or private sector, are best suited to carry out this effort? And why?***

(iv) ***What can be the linkages established with Institutions or Indians abroad? Will this reduce time delays?***

(v) ***What should be the role of the Government and the Industry in regard to the R&D effort? In particular, what should be the investment, if any, by the Government?***

(vi) ***Should an R&D fund be set up? If so, how can the fund be managed effectively to meet its objectives?***

(vii) ***Would setting up of institutions such as the ITRI (Taiwan) be desirable and feasible?***

3.22 On the question of objectives and focus of R&D efforts the stakeholders gave a number of comments like IPR generation and having world class educational institutions. The stakeholders felt that to match the pace of growth and demands of consumers a robust infrastructure for R & D is required in the country. In their view money invested now in R & D probably will generate income in the years to come. Some of the potential areas cited by them are future wireless technologies, cognitive radios, softswitches, mobile broadband, cloud computing, LTE, Advanced LTE, video call technologies, new generation technologies, IP based new generation softswitches/routers, L2 and L3 switches, transport systems, Microwave radio systems, software defined radio, distributed antenna system, equipment related to security and surveillance, customer premises equipment (CPE), VSAT based systems, non-conventional energy sources, technologies for rural telecom expansion and portable charges. Specifically for 2015 a

stakeholder mentioned that at least one Indian CPE (handset) with complete firmware, software and architecture developed indigenously based on open source platforms should be developed indigenously. Some stakeholders said that by 2015 India should have developed known next generation technologies. Another stakeholder felt that by 2015 we should have created world-class Indian products in a majority of the core areas of telecom technologies like routers, switches, optical transmission etc. A stakeholder felt that by the year 2020 we should have atleast one Indian handset with 70% value addition. Also by this time India should have full control on the on-going and next generation technologies.

3.23 The objectives of the research are manifold. First, the research should focus on generation of IPRs. The second objective is to use the IPRs to add value to the Indian products that would be useful for use in the Indian telecom networks and also for export to other countries. Another objective would be to make contribution to formation of global standards in order to incorporate India specific features that can be exploited to create IPRs.

3.24 In order that research be focused at creating technologies for reducing cost of existing services, modernising networks to offer new services and spurring entrepreneurial activities, the areas must be carefully chosen. One needs to plan for future and be aware of areas that would be technologically important over the years. In this regard it is important to note the projection of demand for various types of equipment given in Chapter 1 signifies business opportunities by 2015 and 2020. If concerted effort is not made in the areas that show high growth then the present opportunity that is beckoning India may again be lost as has happened in the past. Additionally, instead of focusing in all areas

and spreading out the available investment too thin, we should focus our R&D and create telecom products in the core areas of technology that are important from strategic as well as long-term commercial interests.

3.25 **The Authority recommends that the focus areas for the R&D fund should be the following:**

(1) Next Generation Networks consisting of technologies for core and access: core and edge routers, Softswtiches, Ethernet Switches, xDSL

(2) Next Generation Mobile Networks: LTE Advanced, IP Multimedia susbsystems, cognitive radio, software defined radio, WiMax, distributed antenna systems, backhaul technologies

(3) Fiber optic technologies

(4) Terminal Devices – modems, routers, dongles, data cards, mobile handsets, wireless access points, mobile handsets etc

(5) Security and surveillance equipment, sensors

(6) Non-conventional energy for telecom

(7) Any other area considered commercially relevant in future

3.26 The stakeholders also stated that India must have Universities that are in the top 100 institutes globally in terms of R&D in ICT. They also suggested creation of a Telecom Standards Organisation, Telecom Entrepreneur Development Center and liberal funding to established Indian manufacturers for accessing critical IP with strategic investment in university spin-off firms in USA and Europe. One of the stakeholders suggested that India should aim

to generate 25% of global IPR in 5G technology space by 2020 by which time India should have design (IPR) ownership of most of the core Telecom network components so that 100 % of telecom networks requirements can be met using Indian Products. Another stakeholder felt that R&D in telecom space should be done by the private sector with the participation of academia. It was suggested that we should leverage the knowledge of a substantial number of expat Indians working on cutting edge ICT. Many of these issues falling within the domain of this paper would be taken up in the ensuing paragraphs.

3.27 On the issues of the institutions best suited to carry out research and linkages that should be established with institutions and Indians abroad some stakeholders felt that the Government should be responsible for overall planning and should steer various institutions so as to achieve cohesion in efforts. They said that Government may also involve institutions like TEC, CDOT, IIT, IIIT, IISc, NIIT, TCOEs for managing R&D centres. In their opinion collaboration may also be done with international institutions so that we can develop world class products. Stakeholders felt that research must be done through a public-private partnership model as profit oriented commercial firms are most efficient convertors of knowledge to revenues. A stakeholder said that individual resident researchers engaged in telecom research under the aegis of a University or R&D centre may also be supported based on merit of their proposals. There were suggestions that we can also take the support of NRI forums that are ready to contribute towards R&D in the home country and tap the expertise and investments of Indians abroad. One opinion was that linkages to Institutions abroad shall be limited to Academic Institutions abroad preferably dominated by Indians.

3.28 While agreeing that both Government and Industry have roles to play, some stakeholders felt that the Government should provide assistance and support while the enterprise should play the leading role. They said that the government should encourage such efforts in the form of grants/soft-loans, so that adequate R&D is done and telecom products and IPR can be created in India. The stakeholders even suggested that the Government should constitute a Technology Administrator (e.g., Telecom Engineering Centre) to control and closely monitor the R&D efforts in the public and private sector in the country. In their view, there is a need to synergise the disparate efforts of various Government R&D funding organisations like Council for Scientific and Industrial Research(CSIR), Department of Science and Technology(DST) and Department of IT(DIT). Some stakeholder felt that electronics/IT hardware sector needs special attention to address simplification of procedures, self declaration, post audit for import & export facilitation by customs and central excise authorities, infrastructure support, single window clearances mechanism for all state/municipal approvals, continuous and adequate supply of power and water etc.

3.29 On the issue of funding, some of the stakeholders suggested that the fund should take care of technology Incubation to the tune of Rs 50 crore (all by Government as grant), pre-commercial stage technology development to the extent of Rs 500 crores (Rs 250 crores by Government as soft loans and matching R&D investment by commercial firms), and a dedicated Telecom Venture Funds of Rs 2000 crores. The stakeholders also suggested that at least Rs 25 crore of annual funding be made available to both academia as well as private companies for participation in global

standardisation efforts. Some stakeholders mentioned that to take up research activities in all the core areas of the telecom technology, a corpus of Rs 5000 Cr (US$1.11 billion) is considered adequate. There have been many suggestions regarding additional financing which include using proceeds from auction of spectrum charges, re-instating the 2% cess on CAGR of service providers for R&D corpus and the USO fund. Some stakeholders also suggested that 5% cess should be applied on the AGR of the telecom service providers and adjusted against use of Indian products. Thus a service provider using 100% Indian products would not pay any cess while the one using 100% imported products would pay 5% cess. This was opposed by many service providers on the grounds that it would be an additional burden and anti-competitive.

3.30 International experience shows that R&D activities have been very successful in some countries. Learning from the successes of many other countries an ecosystem has to be created to boost R&D in the Indian telecom sector. **Israel** with just about 200,000 technology professionals has been able to create R&D driven companies, exporting telecom equipment globally. Israel has set up funding for R&D expenses of Israeli companies to the extent of 50% of their expenses to help them to become global technology leaders. The grants are provided as conditional loans subject to royalties of about 3-5% of sales payable only in the case of technology and commercial success. **Brazil** only allows the import of such products if they are not produced domestically thereby encouraging local development. ICT is **Canada's** one of the most invested sectors representing almost 40% of the total investment. The country provides investment in research and development worth and estimated US $ 5.7 billion in 2006. The Canadian

Government encourages R&D through generous R&D tax credits to help drive innovations and through direct support of research sectors**.** **Finland's** Public Policy implemented in the course of last two decades has played an important role in reinforcing the country's innovative capacity, by creating adequate framework conditions for innovation. Important investment in R&D together with the establishment of an effective network of public agencies supporting public and private R&D and a cluster based approach to innovation which encouraged numerous interaction and knowledge and technology transfers amongst small and larger firms, service providers, research institutes and universities. Besides funding activities countries like **Japan** and **Taiwan** have created exemplary facilities for research or technology parks which have lead to development and commercialisation of telecom products. Some details of these parks are given in Annexure V.

3.31 The Authority examined the question of creation of fund from the point of view of its necessity, nature, size, financing and application. It has been observed(as commented upon by the stakeholders) that there is no dedicated fund for research in key telecom areas with a focus to generate IPRs and develop products crucial for high value-addition indigenous manufacturing. There have been efforts through funds run by some Government departments but results have not been encouraging for telecom. Research in the academic institutions is more focussed on furthering the knowledge body or searching for new knowledge rather than generating telecom related intellectual property and helping industry develop products that could be mass produced for use in telecom network in future. Organisation like Telecom Centres of Excellence (TCOEs) have been engaged in some projects

but due to various constraints have not so far reported much success.

3.32 There are two sets of activities required for promoting manufacturing of Indian products through research. The first one involves carrying out research and development for creation of useful IPRs that will lead to development of standards based innovative products for future telecom networks. The second set of activities includes development and successful commercialisation of products based largely on Indian IPRs. The Authority is therefore in favour of creating two funds, one for each of these sets of activities.

3.33 As far as the funding of R&D activities is concerned, there are two ways in which support is considered necessary. The first is to support individual research centres or in-house research activities of telecom equipment manufacturing companies in areas where the return on investment takes time or the period of product development is so extended and loaded with uncertainty that individual research organisations may not be able to commit funds on a sustained basis. The amount of fund required for each project may be high and beyond any individual private organisation or an institute where finances may have more pressing alternative uses. It has also been seen that in most companies researchers are often involved in short term product development that help business rather than focusing on novel long-term projects. It is believed that the support provided for research activities would help create telecom technologies that would matter in the years to come. The second way to provide support would be to establish a Research and Development Park that would provide an ecosystem for strong

collaborative research. The park would stimulate and manage the flow of knowledge and technology amongst universities, R&D institutions, companies and markets. It would facilitate creation and growth of innovation-based companies through incubation and spin-off processes. A research park would help in increasing the wealth of its community by promoting the culture of innovation and the competitiveness of its associated businesses and knowledge-based institutions.

3.34 Insofar as the setting up of a research park is concerned some of the stakeholders' said that at least two world class research and development centres in public – private partnership mode may be promoted out of which one centre would be exclusively for developing products for rural applications and the other centre may be responsible for driving global standards in international bodies such as ITU/ISO etc. Some other stakeholders from the mobile handset industry said that Government funded research institutes or institutes through PPP focussing on R&D on select components, decided through a collaborative thought process between Government and the industry, should be set up. Further according to them, strategic tie ups between Indian and global firms leading to technology transfer should be encouraged. On the question of setting up an institution like ITRI of Taiwan, stakeholders said that setting up of such an institute may be looked into by the government of India. They feel that larger projects requiring development of complex technologies and success in competing against large OEMs from abroad both require one to gather a critical mass of Intellectual Property and experts in one place, to build organisational ability to provide customer support, and to have marketing and sale effort aimed at large customers. There were some others who felt that instead of

creating yet another entity, we must give a mandate to IITs, IISc, NITs.

3.35 The Authority examined the issue of establishing a research and development park in detail. As far as the official definition goes, the International Association of Science Parks (IASP) says that: "A research park is an organisation managed by specialised professionals, whose main aim is to increase the wealth of its community by promoting the culture of innovation and the competitiveness of its associated businesses and knowledge-based institutions. To enable these goals to be met, a research park stimulates and manages the flow of knowledge and technology amongst universities, R&D institutions, companies and markets; it facilitates the creation and growth of innovation-based companies through incubation and spin-off processes; and provides other value-added services together with high quality space and facilities."

3.36 Research and development parks provide a location in which government, academia and private companies can collaborate and cooperate for development, transfer and commercialisation of technology. These parks can be sources of entrepreneurship, talent, and economic competitiveness and are key elements of the infrastructure supporting the growth of today's global knowledge economy. The Authority considers that setting up a world class Telecom Research Park would be beneficial not only for the telecom sector but all related industries. The park will help fostering partnerships and innovation. It would offer facilities for R&D in technological fields relevant for the future, generation of IPRs, collaborative research design and procurement, training for personnel, interaction with academia within and outside the

country, assistance to telecom companies and personnel involved in development of key equipment identified as important for the country's network and export potential. The research park would also provide the much needed launch pad for startup companies. Park-provided training in such areas as intellectual property law and business planning help the fledgling businesses to succeed. It is not only the businesses that will benefit from the park. Academic institutions would benefit by exposure to the cutting edge research being conducted in the industry. Besides building area, these parks offer a number of shared resources, such as uninterruptible power supply, telecommunications hubs, reception and security, management offices, restaurants, banks, convention center, parking, internal transportation, entertainment and sports facilities, etc. In this way, the park offers considerable advantages to hosted companies, by reducing overhead costs with these facilities.

3.37 In terms of size, parks range from those which are essentially city centre incubators to large tracts of urban or suburban land which not only offer incubation space, but also accommodation for companies at very different stages of maturity. Further variety exists in the technologies they support, with some focusing on one technology while others cover most. International experience shows success of such research parks. There are over a hundred such parks in North America. Hsinchu Science and Industrial Park in Taiwan has been inspired by the Silicon Valley in the United States. It has attracted Taiwanese from abroad to build companies in the park. The park has since become one of the world's most significant areas for semiconductor manufacturing. More than 400 high-tech companies, mainly involved in the semiconductor,

computer, telecommunication, and optoelectronics industries, have been established in the park since the end of December 2003. It is home to the world's top two semiconductor foundries, Taiwan Semiconductor Manufacturing Company (TSMC) and United Microelectronics Corporation (UMC), both of which were established at the nearby Industrial Technology Research Institute(ITRI). Brazil is one of the developing countries which has strongly encouraged establishment of technology parks and business incubators, mostly for budding small high tech companies. Japan has had success with Yokosuka Research Park(YRP). Many of the wireless, mobile communications related companies have set up their research and development centers and joint testing facilities YRP in an area of 61.7 hectares with a paidup capital of 5 billion yen. There are 66 research institutes in the park spread over a number of buildings. It boasts of all the supporting facilities and even residential accommodation within the park. It cooperates and coordinates with counterparts both domestically and overseas in R&D activities.

3.38 The Authority feels that establishment of a research and development park dedicated to telecommunications would facilitate R&D, innovation, IPR creation and commercialisation for fast and sustainable growth of telecom industry. The park is expected to promote economic development and competitiveness of the country by creating new business, adding value to companies and create employment. Such a park in an area of about 1000 acre would require and investment of about Rs 5000 crore and could become operational by 2013. The park would be managed by a society that would have representation from the government, academia and the industry. This society would manage all the property and facilities.

It would have committees for day to day administration of various activities. Suggested timelines and cost figures are given in Table 3.3.

Telecom Research Park Timelines and Cost	
1. Approval for setting up park	May-11
2. Finalisation of terms & conditions	Jul-11
3. Process of incorporation/registration	Aug-11
4. Identification of location	Jul-11
5. Architectural works	Sep-11
5. Civil, electrical works of main bldg	Dec-12
6. Other development and bldg works	Dec-13
7. Procurement of equipment	Dec-12
8. Staff	
9. Inviting businesses	01-07-2012 onwards
10. Initial Investment/Govt Equity	Rs 5000 crore
11. Proposed area	1000 acres
12. Facilities for more than 1000 companies	
13. Scientists & Engineers 50,000	
14. Other staff 300,000	
To start functioning by 2013 from its own location	

Table 3.3 Timeline And Cost Figures for Research Park

3.39 The Authority recommends that a Telecom Research and Development Park should be established with the purpose of facilitating research, innovation, IPR creation and commercialisation for fast and sustainable growth of the telecom industry. This park should be functional by December 2013.

3.40 The second application of the fund mentioned in para 3.35 was to fund research and development leading to development of Indian

telecom products. The fund should have adequate resources to finance initial capital requirement, working capital requirement, registration of IPR, development of prototypes, conducting trials and taking the product to a level where it can be taken up for large scale production. Research and development of a product goes through a number of stages including ideation, exploration and prototyping. Generally 10% of the ideas may go to prototyping and finally 20% of prototypes may reach the market as commercial products. Funding is crucial in these stages of research and development.

3.41 The Authority feels that an R&D fund of Rs 10,000 crore should be set up as a corpus that would be invested in secure deposits and bonds and the interest accruals would be used to finance R&D projects. Presuming that each successful project that reaches upto the level of commercialisation requires support to the extent of about Rs 20 crores from the R&D fund over a period of two years and there are about 40 projects on the active list at any time then an average funding of Rs 400 crore per year would be required. At 8% a corpus of Rs 10,000 would yield Rs 800 crore on annual basis that would be available for funding R&D projects. The projects to be funded would be thoroughly evaluated and the research centre involved would also have to bear 50% of the cost of the project. For the educational institutions the funding could go upto 100%.

3.42 There are many ways the proposed R&D fund can be financed. There are some telecom related accruals to the Government like spectrum auction proceeds, service tax on the services of the service providers, licence fee etc. It has been the consistent stand

of TRAI that revenues from telecom may be used for development of telecom. Though this would be the matter of detail to be worked out, if a recipient company is able to successfully commercialise the product then there would be provision for returning full or part of the fund over a period of time.

3.43 The Authority recommends that TRDC should set up Telecom Research and Development Fund(TRDF) with a corpus of Rs 10,000 crore which should be invested in secure deposits and bonds and the interest accruals should be used for financing R&D projects.

3.44 The fund's main role would be to assist in R&D leading to generation of IPR for innovative and creative products. Indian industry today participates in R&D efforts in diverse ways. Some of the global companies like NSN, Ericsson, Alcatel and Huawei have set up their R&D centres in India. These global companies hold a number of essential patents for technologies that have been standardised and are currently in use. Research to improve the existing products and processes or for developing new products is carried out in collaborative mode with their other research centres around the world. Instances of filing of IPR by these companies in India are few and far between. Besides collaborative nature of work leading to filing of IPR elsewhere, it has been cited that registering IPRs in India is a tedious and expensive process. There are some Indian telecom product companies as well that are involved in innovative and R&D based product development and manufacture. These companies register IPR in India and the overall value generated from their activity may be much higher. Further analysis showed that the procedures for filing IPR in India and other major

countries are well defined. The procedure becomes complicated because before a patent is accepted a global search has to be done through legal agencies. Besides this the patent may also be required to be filed in other countries. All this takes time and increases the cost and small companies may not be in a position to bear the cost of initial registration as well as annual renewals. The Authority feels that the proposed Research Fund which should assist India IPR creators in protecting their intellectual property and also provide financial assistance.

3.45 The Authority recommends that the R&D fund should be utilised for research, IPR creation and development activities. The fund should give soft-loans, grants, reimbursement of R&D expenses, IPR filing and renewal fee.

3.46 It is not enough just to specify the focus areas but it is also important that selection of projects for funding should be based on their potential of evolving into a successful IPRs and commercial products that would add value to the country's manufacturing activities. These products should add up to a portfolio of products that would allow the country to meet a large part of the country's telecom equipment demand from domestically developed and produced equipment. The expert group that would be responsible for managing the fund would have to evolve a procedure to evaluate and review projects during the period they are funded by the research and development fund.

3.47 **The Authority recommends that the selection process for the projects to be financed should give due weightage to the potential of the project for resulting into successful IPR and**

evolving into successful commercial products that would help the country in increasingly manufacturing indigenously developed telecom equipment.

3.48 According to Innovation frontline[23] companies like Nokia, Nortel, Huawai, ZTE and Qualcomm have fixed their royalty rates for LTE in the range of 1% to 3.5%. India's projected requirement for LTE/WiMax for the year 2020 alone is Rs 18310 crore and assuming 3% royalties for 4G equipment, the annual royalty value of this would be Rs 549 Crore. Funding research that leads to creation of IPR gives good potential of earning revenue for the country. Let us examine this further. To remove the effect of outliers let us consider data of 5 years starting the year 2012-13. The total imports for these five years are Rs 236,771 crore. At an average royalty rate of 1.5% the royalty would come to about Rs 3552 crore(or Rs 296 crore per year). Today the domestic production is based on foreign IPRs and the consumers of the equipment end up bearing this cost. If we again take as representative the total production of five years beginning 2012-13 it comes to Rs 627,182 crores. Taking into account today's situation even if we assume 90% IPRs are foreign, at the rate of 1.5% the royalty would amount to Rs 8466 crores or about Rs 700 crore annually. If half of this could be saved through Indian research programme then annual accruals would be about Rs 350 crore. Taking together the saving and earnings by way of Indian IPRs the amount comes to Rs 646 crores every year. Besides royalty on IPRs the fund would also receive interest on loans that it provides to research centres.

[23] http://techipm-innovationfrontline.blogspot.com/2009/07/lte-ipr-royalty-rates.html

3.49 The proposed Telecom Research and Development fund would get royalties for the IPRs and patents generated by projects funded by the fund. The royalties would be proportional to the investment made for a particular research. The objective is that the fund should generate its own revenue streams and become self-sustaining.

3.50 The Authority recommends that the R&D fund should be able to accept the royalties for the commercialised products, interest on soft-loans, contributions and any other accruals related to its activities. The royalty should be proportional to the funding made available to a research project.

3.51 For management of the fund the stakeholders had suggested that a special agency may be created on the lines of UIDAI. Some other stakeholders said that the fund should be chaired by reputed industry leaders and should include people from premier institutions like IIT's and senior members of DoT, DIT, TRAI, etc. This agency should be responsible for evaluating and selecting projects for funding and provide "end to end" support. According to them the special agency should be accountable for time bound development of Indian products in the focus areas and to create IPRs and brands that will enable Indian companies to take leadership position for productising, within next 4-5 years.

3.52 To provide funding support for both the sets of activities described above the Authority favours setting up of a Telecom Development Research Corporation (TRDC) as the apex body for coordination of all research and development related activities in the area of telecommunications. While the day-to-day management of the research and development park would be carried out by the society

set up for the purpose, TDRC would look after the strategic affairs. The R&D fund would also be managed by the TDRA. For these two purposes a fund of the order of Rs 15000 crores would be available to TRDC out of which Rs 10,000 crore would be used for the purpose of funding research activities and Rs 5000 crore for setting up of a Telecom Research and Development Park.

3.53 **The Authority recommends that a Telecom Research and Development Corporation(TRDC) should be set up and an amount of Rs 15,000 crore may be made available to this Corporation for the following purpose:**

a) Setting up of an R&D fund

b) Establishing a Research and Development Park

3.54 It has already been mentioned in para 3.36 that the park would be managed by a society under TRDC which would have representation from the government, academia and the industry. On management of R&D fund the Authority is of the view that it should be run by a professionally managed board with experts drawn from industry, banking sector, academia and the Government. The board should have complete autonomy in selection of projects and amount of funding they should receive. The person heading the management board should be an eminent person with proven research capabilities and quality published work in the area of telecommunications.

3.55 **The Authority recommends that the fund should be managed by a special autonomous board drawn from industry, academia and government and headed by a person of eminence from the field of research in technology.**

3.56 The following issue was raised regarding fiscal incentives for research and development

(i) What could be the fiscal incentives to be offered by the Government? Should such incentives be linked to any outcome?

3.57 The stakeholders felt that research and development should be made attractive by incentivising on land, taxation, labor policies, financing, and exports. They have suggested a string of tax incentives refund of excise and sales tax, no Minimum Alternative Tax (MAT) and same custom duty on hardware and embedded software. Other financial benefits the stakeholders seek are 300% R&D credit for income tax, deduction of R&D expense and incentives for employing disabled persons and income tax holidays. They agreed that incentive should be tied up with the outcome. Some of the stakeholders representing the mobile handset industry said that there is no technology tax holiday for mobile phone manufacturing and services only income tax (exports through SEZ) and customs duty holidays are available. According to them a 100% write off on all technology related expenditure in any year in a block of ten years at the choice of assessee be permitted.

3.58 Currently available tax benefits to the in-house R&D Centres include weighted deduction of approved R&D expenses of 200% of the total expenditure in Income Tax for 3 years and duty free import of specified goods (analytical & specialty equipments).

Commercial R&D companies are eligible for 10 years tax holiday, excise duty waiver for 3 years, custom & Excise duty exemption, state subsidy etc.

3.59 The Authority feels that the importance of R&D and the consequent creation of intellectual property cannot be over-emphasised. It is therefore necessary to support R&D effort through an innovative tax regime. Presently the main tax benefit available for Research & Development activities is in the form of weighted deduction for in-house R&D. Companies engaged in R&D activity do not get weighted deduction in respect of expenditure not approved by DSIR though the R&D facility may be an approved one. Any other tax incentive provided for R&D expenses of Indian manufacturing companies to make equipment of high quality and at par with imported equipment would not violate international agreements. The Authority therefore recommends the following:

3.60 The Authority recommends that the duties and taxes should be structured to promote research in telecom. The proposed TRDC will make a recommendation in this regard.

B – Capital requirement for telecom equipment manufacturing

3.61 The second set of activities mentioned in para 3.30 relates to commercialisation of products based on the IPRs generated within the country. The consultation paper had raised the issue of capital requirement for companies that could take up such manufacture. It is recognised that capital requirements and economies of scale

are key factors for the achievement of a competitive cost structure for the telecom equipment industry. Especially for small companies and start ups, it is very important to have access to capital. The specific questions that had been raised are as follows:

3.30 What in your opinion is the likely requirement of capital for companies that could take up the manufacture of telecom equipment?

3.31 What could be the best manner of facilitating availability of capital to such firms?

3.62 On the likely requirement of capital for companies that could take up manufacture of telecom equipment, the stakeholders said that the manufacture of telecom equipment industry is capital intensive. Some of the stakeholders were of the opinion that developing and testing of a product before it is available for the market can take anywhere from few tens of crore rupees to thousands of crore rupees depending on the complexity of product being developed. Another stakeholder felt that the fund requirement would be to the tune of Rs 250 crores, out of which Rs 100 crores should be funded by the Government. Yet another stakeholder has indicated that companies like Nokia and Flextronics have invested around US$ 100 million to set up manufacturing plant in India and the same order of investment would be needed for any company planning to R&D based manufacturing of Indian products.

3.63 On the manner of arranging these funds the stakeholders commented that capital can be arranged in the form of equity or loans. The most common response of the stakeholders has been that line of credit and funding to Indian companies should be on international norms and at a very attractive rate of interest. In their view low cost finance can attract companies and help them achieve larger levels of production. Another view was that such ventures are best suited for debt financing since they involve property, plant and machinery. Some stakeholder felt that operators should also be given incentives for facilitating testing/field trials of indigenously developed telecom products. Another view was that for funding new start-ups with seed money, there is currently not much private capital available and thus setting up a fund specifically for the purpose is recommended. This fund could be administered by a private operator funded by the Government or in a semi-autonomous organisation run jointly with a public-private partnership model. Some of the other stakeholders said that the indigenous manufacturing development fund can be used for providing grants for innovations, R&D, IPR and product development and promotion – support seed, angel and venture funding. In the view of some other stakeholders, as manufacturing involves property, plant and machinery these are ideally suited for debt financing. Others said Capital can be arranged by Equity and loans. Yet another stakeholder's view was that positive incentives that do not discriminate between domestic and foreign products would be beneficial for promoting R&D and manufacture of telecom equipments in India.

3.64 Capital requirements are very large through every stage of the product cycle. High risk factors in product development make it

very difficult for new ventures to access capital. An enterprise goes through many stages and fund requirement is different at different stages. Seed funding is the very first investment and is mostly raised from family and friends (F&F). Seed funding may be of the order of 5-10 lakhs. Then comes the Angel Investors who are individuals who invest their own personal funds in an idea or a company that they feel strongly about. Most of the angels are seasoned entrepreneurs, company executives or High Networth Individuals. The angels fill the gap between seed and venture capital. Generally the fund angle investors lend is in the range of Rs 5-10crore. The Authority is of the view that seed and angel funds may be arranged by the manufacturing company.

3.65 The Venture Capital fund is the biggest requirement for startups and growth stage companies. It is long term equity capital invested in new or rapidly expanding enterprises and is very important for entrepreneurs. Traditional debt financing is not always available to start-up and other emerging enterprises because they generally lack the collateral, track record, or earnings required to get a loan. Venture capital was instrumental in the success of companies like Cypress Semiconductor, Apple Computer, Intel, Cirrus Logic and Federal Express.

3.66 Venture finance is not usually available on easy terms for Indian product companies. Recessionary pressures on the economy and fast obsolescence of telecom technologies make getting such funds even more difficult. In this regard a manufacturing fund would go a long way in supporting telecom equipment manufacturing start-ups. The fund could disburse venture capital in the form of soft-loans or equity for supporting commercialisation activities.

Technology and knowledge based ideas, properly supported by the manufacturing fund, can be propelled into a powerful engine of economic growth and wealth creation in a sustainable manner. The Indian telecom manufacturing industry also faces disabilities as compared to China and Taiwan because of poor infrastructure and high cost of finance. Starting at a late stage, Indian manufacturing companies would need financial assistance to get into accelerated mode. There should therefore be a dedicated Telecom Manufacturing Development Corporation for providing low cost finance to the Indian manufacturing companies. The fund should be professionally managed and headed by a person of eminence from the field of banking or venture capital finance.

3.67 The Authority recommends creation of a Telecom Manufacturing Fund(TMF) for providing venture capital to indigenous manufacturing in the form equity and soft loans for supporting pre and post commercialisation product development and brand creation. The TMF would be managed by a corporate body and headed by a person of eminence in the field of banking/venture capital finance.

3.68 To look at the size of funding activities internationally, Willis Stein and Partners Llc is an Illinois private equity firm investing in consumer service, education, and specialised business service companies looking for Chicago private equity and across the nation. It has provided more than $3 billion in backing across 50 companies and has also aided entrepreneurs in raising billions in debt equity. Another Venture Capital fund, Washington based Technology Development Fund, manages an $80 million fund focused on communication in the United States. Another

Company, Adam's Capital Management Inc. has $815 million in committed capital across four funds. The company specialises in early stage private equity investment opportunities in IT, networking infrastructure, and semiconductor, providing funding amounts ranging from $1 million to $10 million and up to $30 million during the life of a partnership.

3.69 The telecom equipment demand as projected by Ovum would be of the order of Rs 1,70,091 crore in the year 2020. Considering that the high growth rate in mobile telephony would continue for the next few years India is expected to have about one tenth of the projected global subscriber base of 50 billion. In addition developments in the area of machine to machine communication, cloud computing, tracking and positioning systems, smart grids etc. may lead to actual investment being of the order of about Rs 10 lac crore.

3.70 Funding would be required for capital investment and working capital. There would be some companies at the beginning of the curve who would need funds to develop products and bring them up to a level where they can be successfully mass produced. Considering an initial requirement of about Rs 30 crore on an average the fund could finance 40 such companies. Half of these products would go to the stage of mass production and would require an additional funding to the tune of 50 crore for creating assets and about one third of that for working capital. The proposed manufacturing fund, therefore, should have a size of nearly Rs 3000 crore. The venture fund proposed would give initial finance as equity where the business would put matching stake to avoid financing frivolous ventures. Later part of the fund could be

in the form of debt. In order that the companies that need the fund more get priority, the allocation of fund may inversely proportional to the net worth of the company. Priority may also be given to companies with higher value of Indian IPRs. The fund could be set up by DOT with the help of financial corporations, government funds like pension fund and private participation with appropriate capital structure. The fund could partly be funded by proceeds of spectrum auction as part of Government contribution. The fund would itself become remunerative after a few years of operation. If every year 40 projects are funded and 20 are successful then presuming that of the 80 crore funds that each of them receive, 40 crore is in the form of equity and 40 crore is debt. If the return on equity is 14% and that on debt 8% then for 20 successful projects of 2012-13 next year the revenue would be Rs 176 crore. Upto the year 2020 the total accruals would be Rs 4400 crore presuming a maximum of 100 projects at any time. Once the saturation level of 100 is reached the annual revenue would be Rs 880crores which can be used to finance future projects.

3.71 The Authority recommends that the manufacturing fund should be an open fund with contribution from the Government and other bodies like finance corporations. The Government would initially provide an amount of Rs 3000 crore to establish TMF and start financing activities.

C - Standardisation

3.72 The following issues were raised regarding the standardisation of telecom equipment:

(i) What, in your opinion, would be the best agency to set up and manage such a Common facility/ies?

(ii) What would be the facilities and the level of investment required in such a facility?

(iii) How will such an investment pay for itself?

3.73 On the issue of the best agency a stakeholder commented that TEC is already responsible for developing standards for Indian telecommunication Industry, should continue to be nodal agency for standardisation. Another stakeholder commented that the standardisation agency should be separate from testing and accreditation and set up in Public Private Partnership (PPP) with initial bulk grant from the Government. The agency should be autonomous, selfsustaining and not-for-profit organisation maintaining a global standard. Yet another stakeholder said that standardisation agency should be set up as an autonomous Telecom Standard Development Organisation(TSDO) which needs to be setup for this objective. Another comment was that the best way to form an India standard development organisation (SDO) which may be recognised by Government of India but operated by the industry, drawing membership from within and outside the country. It may be best if the ETSI model or TIA model of operation is followed. On the issue of funding a stakeholder felt that the Government may be funded for setting up these facilities till agency achieves a status of internationally accredited autonomous body and later on an autonomous body may be created on self-sustenance basis. A stakeholder felt that this can be effectively setup if the operators are brought into the planning process. Initially some operators may also invest in such a company/organisation. On the question of financing a stakeholder

said that a TDSO would need arount Rs 20 crore per year of which Rs 10 crore per year in the initial years should come from the Government and the rest can come from the membership fees.

3.74 The need for a standards organisation for development of telecom in India has never been felt stronger before. Standards play a very important role in operation of telecommunication networks to ensure interoperability, affordability and consumer safety as well as to facilitate comparison between competitive products and services. India has so far not been active in influencing global standards. Unless we can do this it would be difficult to have a good share of IPRs in the key telecom areas. A very important linking pin in the promotion of manufacturing activities is having essential IPRs for technologies that are going to be important in the time to come. India should therefore actively drive international standard setting do that it can develop products suited to Indian requirements.

3.75 An agency that could collate and identify certain key requirements by way of technical specifications and put all its efforts in the international standards development organisations get these incorporated as specifications in the emerging standards as well by way of amendments or addendums to the existing technical standards especially those which have potential for massive deployment in the country. Having India specific features in the global standards and then generating a portfolio of IPRs relating to these standards would give the first-mover advantage to Indian R&D and product companies. This will give an opportunity not only for India to showcase its technical prowess in the international arena but also, and more importantly, give an opportunity to leverage the intellectual property developed in the country by way of potential licencing when such technologies gain

popularity around the world. This agency would also be crucial in ensuring that the equipment produced in India conforms to relevant global standards.

3.76 It is important that manufacturers, operators, academic institutions and the Government take active part in the process of standardisation under a common banner of a standards development organisation set up by the government. As members of the standards organisations these entities would not only help in driving standards but would also contribute management expertise and finances for working of the standards organisation.

3.77 There are international examples of such standards bodies. The European Telecommunications Standards Institute (ETSI) is officially recognised by the European Union as a European Standards Organisation which produces globally-applicable standards for Information and Communications Technologies (ICT), including fixed, mobile, radio, converged, broadcast and internet technologies. ETSI unites manufacturers, network operators, national administrations, service providers, research bodies, user groups and consultancies. It's purpose is to produce and perform the maintenance of the technical standards and other deliverables which are required by its members. They also take care of areas related to standardisation such as interoperability, including protocol testing and methodology and we also offer forum-hosting services. ETSI is a not-for-profit organisation with more than 700 ETSI member organisations drawn from 62 countries across 5 continents world-wide. ETSIs funding is derived from member contributions, grants, revenue from its assets and services provided by ETSI. Other sources of income include contributions from the European Commission and the Secretariat of the

European Free Trade Association (EFTA), income from 'commercial' activities, including sales of standards, events (such as interoperability testing events), and services to outside organisations. Another example is The American National Standards Institute (ANSI) which serves as the administrator and coordinator of the United States private sector voluntary standardisation system. It was founded in 1918 by five engineering societies and three government agencies. It is a private, nonprofit membership organisation supported by a diverse constituency of private and public sector organisations. ANSI facilitates the development of American National Standards (ANS) by accrediting the procedures of standards developing organisations (SDOs). It promotes the use of U.S. standards internationally, advocates U.S. policy and technical positions in international and regional standards organisations, and encourages the adoption of international standards as national standards where they meet the needs of the user community. Comprised of nearly 1,000 businesses, professional societies and trade associations, standards developers, government agencies, and consumer and labor organisations, ANSI represents the diverse interests of more than 120,000 entities and 3.2 million professionals worldwide. Annual budget of ANSI is about US$ 22 million. The Canadian Standards Association, also known as the CSA, is a not-for-profit Standards organisation with the stated aim of developing standards for use in 57 different areas of specialisation. CSA also provides advisory services, training materials and print and electronic published standard documents. It is composed of representatives from government, industry, and consumer groups.

3.78 The proposed Telecom Standards Development Organisation should be an autonomous body exclusively carrying out

standardisation related activities. It would have representatives of manufacturers, service providers, research organisations, testing and certification agency and the Government. It should be headed by a person of eminence. Funding should be done by the Government for 5 years and thereafter it should be taken over by the industry. The source of funding for the Standards Organisation after the initial handholding period would be membership fee, standards activities, contributions from other ornanisations and events like plugfests.

3.79 **The Authority recommends that an autonomous Telecom Standards Organisation(TSO) be set up for carrying out all works relating to telecom standards. It will also have the responsibility of driving international standards and drawing up specifications of the equipment to be used in the Indian telecom network. The governing board of the organisation should consist of experts from the academia, research centres, industry and the Government and the organisation should be headed by a person of eminence in the area of technical standarisation.**

Chapter IV

Promoting component manufacturing

4.1 Manufacturing of telecom equipment, whether by global suppliers manufacturing in India or Indian product manufacturers, require a robust supply of components. These components are either sourced locally or are imported. With the declining duties on finished goods imports of electronic products in general has increased resulting in declining demand of electronic components. Signing of the International Trade Agreement (ITA) at the World Trade Organisation (WTO) in 1997 eliminated all customs duties on IT products, thereby creating an environment of direct competition between Indian component manufacturers and international players. As a result of this, over the years, the contribution of domestic manufacturing to domestic consumption has declined. Figure 4.1 shows how the contribution of domestic manufacturing to domestic consumption of components has declined.

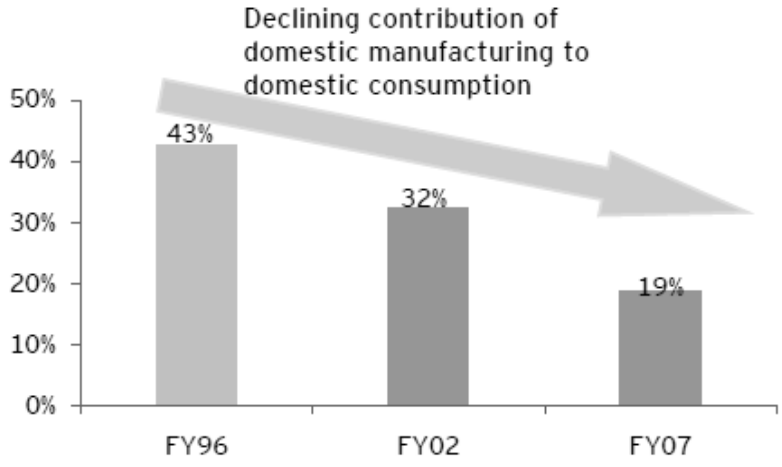


Figure 4.1 Declining contribution of domestic components

4.2 The electronic components can broadly be classified as active and passive components. The active electronic components have gain or directionality. Examples of active components are: diodes, transistors, electron tubes, Integrated Circuits, power sources and semiconductor chips. Passive electronic components are those that allow electrical current to flow in either direction and do not amplify the signal. Some examples of passive components are resistors, connectors, cables, resonators, transducers, sensors and detectors. Besides these there are electromechanical components like relays, buzzers, microphone and speakers.

4.3 According to ELCINA, in 2008-09 the Indian electronic component market (supplying to telecom, consumer electronics, defense and IT verticals) was valued at US$ 2.1 billion, with an 11% share of the total electronics market. It is revealing to see the share of revenue by types of components sold in India. From the figures available for the year 2007, the highest share of 23% was that of passive components followed by electron tubes at 21%(Fig 4.2). There is hardly any share of active components like integrated circuits.

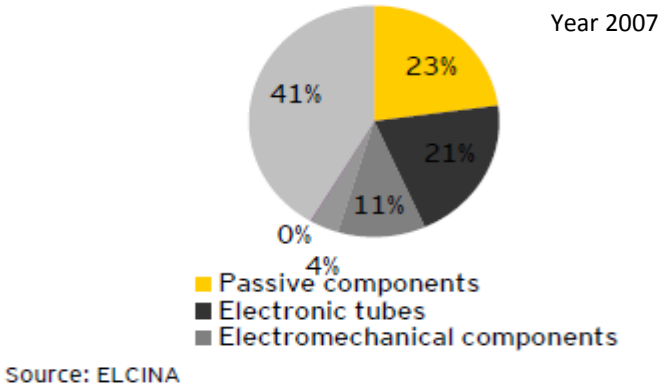


Figure 4.2 Indian electronic component revenues

4.4 Production of electronic components in India declined by 13.3%, from USD2.4 billion in 2007-08 to US$ 2.1 billion in 2008-09. For the five-year period of FY04–09, the segment grew at a low CAGR of 4.6%. Fluctuations in growth rates and a decline in production characterised this period. The production of electronic components is expected to reach US$ 2.6 billion in 2013-14 and US$ 3.4 billion in 2019-20(Figure 4.3).

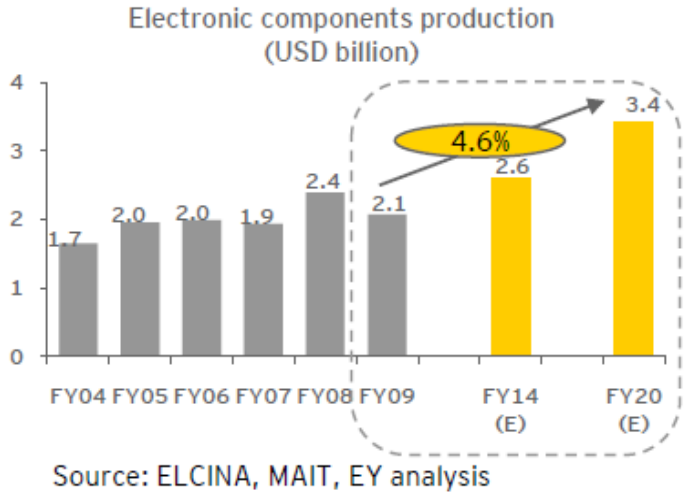


Figure 4.3 Electronic component production

4.5 In the case of telecom the present level of indigenous sourcing is very small as most of the telecom equipment is imported in finished condition or semi-knocked-down (SKD) condition. According to the estimates arrived at in Chapter I, the demand for telecom equipment in India in 2009-10 was Rs 54,765 crore while the estimated global demand for the same period was Rs 13,00,500 crore. The Indian demand is expected to grow to Rs 86,003 crore in 2014-15 and Rs 1,51,567 crore by 2019-20. This would translate into a big opportunity for the component manufacturing industry. Measures are, therefore, needed to be

taken to encourage increased production of electronic components and their use by the telecom equipment manufacturing sector.

4.6 Sourcing of good quality inputs at the right price point is of strategic importance as it has a significant impact on the profitability of a manufacturing concern. In taking strategic decisions about sourcing of components, the manufacturers usually face a make or buy decision. Decisions of buying either from within the country or from global sources depend upon competitiveness of rates. It is also important to create a proper supplier base so that production is not adversely affected if a source dries up. The 'make' strategy may be more flexible for a company but it may have high management and wage costs. The 'buy' strategy may enjoy high-powered market incentives, but on-time delivery, quality and cooperation from the suppliers may become important issues**.** Regarding the supplier base, number and location of suppliers are important. Manufacturers often safeguard against the supplier's exploitation by establishing multiple sources, which promote competition among suppliers; they expect to be given better control of price levels as well as more reliable supply through diversification of risks. Some global manufacturers bring in their captive component manufacturer when they set up manufacturing base in another country.

4.7 Manufacture of sophisticated telecommunications equipment requires many types of electronic components. Although Indian production facilities in the telecom sector have fostered the growth of many local partners and suppliers for electrical and electromechanical components, not all components can be sourced locally and are procured through global suppliers. Most of the critical components like Integrated Circuits(ICs) and Application Specific ICs (ASICs) and other sophisticated subassemblies are all

imported. Production facilities for sophisticated semiconductor wafers have been talked about for quite some time but not much progress has been made. Ancillary production is being encouraged in India but has not yet come up-to the level which would ensure cost effective electronics components availability inside the country and, thus, help in reducing overall equipment cost. Non-availability of indigenous components is a major constraint facing the manufacturing industry today. India will have to make an extra effort to see how large component suppliers can set up base in the country. Continued dependence of domestic manufacturers on imported components would expose them to price fluctuations in the international market, higher international cost, import duties and delay in deliveries. Component obsolescence in international market requires frequent changes in design for the indigenously developed products. If the volume of import is not large, then support from chip set manufacturers may be lacking.

4.8 The following issues were raised during the consultation:

3.10 What are the components that can be manufactured in the country with due consideration to commercial viability.

3.11 What should be the degree of indigenous manufacture of components that we can reasonably achieve a period of 5/10 years.

3.12 What do you think is the feasibility of setting up of commercially viable fabricating units to manufacture chips, ICs?

3.13 Is the duty on components currently being levied high? If so, on what components an the duty be reduced? What are the financial implications and the corresponding benfits?

3.14 Should electronic manufacturing service companies be incentivized? If so how?

A - Type of equipment for which component should be manufactured in India

4.9 On the question of types of components that can be manufactured, some of the stakeholders' suggested focus on a few components like bare PCBs, mechanical components, chassis, wiring, cables and accessories, electro-mechanicals, transformers, electrical components, crystals, oscillators, some IC's (ATMP level) and niche passive components etc so as to build economies of scale. Another stakeholder suggested the following components because of their commercial vialbility: resistors, capacitors, inductors, General purpose ICs, transformers, transistors, diodes including GD tubes, crystals, crystal oscillators, fabrication of ASICs designed by Indian Companies and mechanical enclosures. Some stakeholders suggested setting up of fab in strategic alliance with leading vendors by announcing special package of incentive. Some of the stakeholders felt that India should do less sophisticated components like PCBs and ATMP for ICs however most stakeholders demonstrated faith in India's capability and necessity for making ever semiconductor chips. They felt that this would allow leveraging of India's capabilities in software, design and system integration. There were other stakeholders who felt that systems should come first, which will then drive the components.

4.10 Some of the stakeholders were of the view that the Government should not determine what technological components can or should be produced in India as this would be contrary to the open market that India is striving to create. The stakeholders felt that establishing economic plans or government targets for indigenous

manufacture of components will be counterproductive, inefficient, and, ultimately, ineffective. These stakeholders were also of the view that India should avoid mandatory quantitative targets as they are contrary to GATT. In addition, the government should not consider providing incentives to local Indian manufacturing facilities to buy raw materials or components made in India as it will be against WTO Agreement. According to the stakeholder, the government could provide significant tax incentives for companies which invest in local manufacturing facilities, promote the development of infrastructure and encourage other necessary regulatory improvements such as ensuring an efficient and effective rule of law.

4.11 On the question of the degree of indigenous manufacture that can be achieved in next 5 to 10 years, some stakeholders felt that India should be able to meet 75% of its total domestic requirement by 2015 and over 90% by 2020, while others were not that optimistic and felt that the degree of indigenous manufacture of components that we can reasonably achieve over a period of 5/10 years should be approximate 30-40%. There was an opinion that the present level of almost 70 – 80% sourcing of components (in value) from outside India should be brought down to around 30 to 40% in a period of 5 to 10 years. Another set of targets proposed was to achieve 70% by 2015 and 100% by 2020. A stakeholder felt that firstly we have to enhance the capability to manufacture accessories and related products and create an industrial environment for higher end telecom manufacturing and then India can start PCB assembly and module processing for telecom equipment. It will take around 5 to 10 years to implement such step-by-step plan.

4.12 On the question of feasibility of setting up of commercially viable fabricating units to manufacture chips a number of stakeholders felt that the country should have at least one fab with up-to-date technology for manufacturing ICs. One stakeholder suggested that for having at least one fab with up-to-date technology for manufacturing ICs the Semi Conductor India Ltd (SCL), Mohali may be augmented to sub micron technology with controlling stake with private investors so that it can swiftly cope up with global technology advances. One of the comments was that the semiconductor fab is highly capital intensive and it is also critical to have a plan to ensure capacity utilisation of the fab. The stakeholder expects that with efforts of Government and the industry this important segment would attracts serious technology investors to set up chip manufacturing facility in the country. One of the stakeholders suggested that we should focus on ATMP units alone in first phase as these units can be set up with a reasonable investment of Rs 450 to 900 crore investment roughly.

4.13 The following focus areas were identified in Chapter III for manufacture in India and therefore it would be reasonable to build up component manufacturing base for these equipment:

a) Next Generation Networks consisting of technologies for core and access: IP/MPLS core and edge routers, Softswtiches, Ethernet Switches, xDSL
b) Next Generation Mobile Networks: LTE Advanced, IP Multimedia susbsystems, cognitive radio, software defined

radio, WiMax, distributed antenna systems, backhaul technologies

c) Fiber optic technologies – PON Systems: ONU/ONT, FOC, MSAN
d) Terminal Devices – modems, routers, dongles, data cards, mobile handsets, wireless access points, mobile handsets etc
e) Security and surveillance equipment, sensors
f) Non-conventional energy for telecom

4.14 Based on the type of equipment that should be manufactured in future some of the basic components that would be needed are resistors, capacitors, inductors, general purpose ICs, transformers, transistors, diodes and GD tubes, PCBs, Crystal oscillators, ASICs designed by Indian companies and mechanical enclosures. We shall examine the scope of manufacture for various types of components under the following categories:

a) Active Components
b) Passive Components, PCBs and Sensors
c) Mechanical and Plastics
d) Electromechanical Components
e) Mobile phone components

Active Components

4.15 Active components mainly include discrete semiconductors and Integrated Circuits(IC). The demand for these components is met almost entirely by imports. There are hardly any integrated circuits manufactured in India and barely 10% of the requirement of discrete semiconductors is available locally. Semiconductor content is on an average about 25% by value for any electronic system/subsystem. For sophisticated telecom products it may go

to 60%. The global market for semiconductors was US$ 220.1 billion in 2009 and it was forecast to be US$ 246.9 billion in 2010, $300 billion in 2011 and $317.8 billion in 2012[24]. Manufacture of these components is characterised by heavy investment in setting up a manufacturing base.

4.16 Semiconductors chips are important constituents of all telecom equipment. According to Silicon India, the worldwide semiconductor market is around US$ 275 billion, and the India market is around US$ 8 billion. It is an important component of the manufacturing value chain and low cost high volume availability is necessary to increase domestic manufacturing of telecom products. Asia pacific consumed a total of 56.1% of the total global market in 2008. About 30%-60% of the total value of the Bill of Material are taken up by semiconductors. India designs a large number of chips for other countries and it would be an irony if it cannot manufacture chips on its own designs. Other countries use these designs to do semiconductor business of billions of dollars.

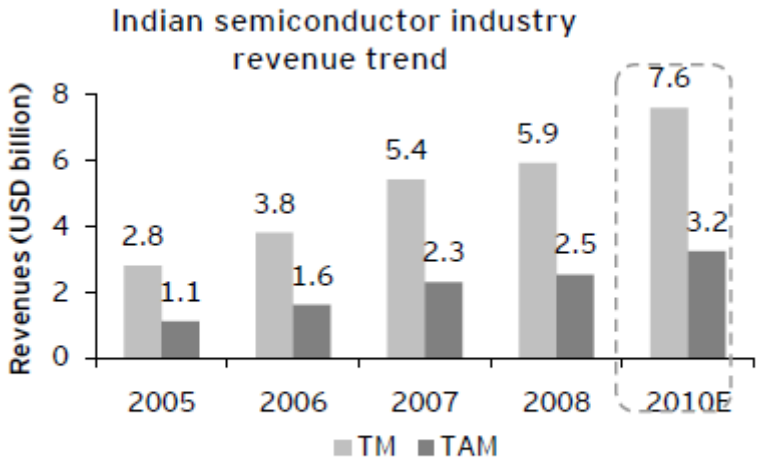
4.17 India's semiconductor market is large as can be seen from the figure 4.4 below. Figure 4.5 gives the total market(TM) and total available market (TAM). According to the DIT task force report of December 2009, the projected size of the high-tech manufacturing which relates to semiconductor-related manufacturing and includes wafer fabs, ATMPs, solar PV manufacturing, storage devices, displays, display panels, LEDs and nano-technology products is US$4 billion in 2014 and US$22.6 billion in 2020.

[24] Semiconductor Association

Segment	TM revenues (USD billion)
IT/ OA	2.5
Wireless handsets	1.7
Communications	0.8
Consumer	0.4
Industrial	0.1
Automotive	0.1
Others	0.3

Source: "India Semiconductor Market - 2008," ISA - Frost & Sullivan, January 2008

Figure 4.4: India's total semiconductor market



Source: Aneesha Dhar, "Transfer pricing report," EY CBK, June 2009, via IRAD

Figure 4.5 India Semiconductor Industry revenue trends

4.18 Burgeoning domestic demand for semiconductors and components make it a strategic national imperative to put in place a smoothly functioning ecosystem that can fulfill this demand. According to

CII-Tie report[25] India may require close to 10 Fab sites, each producing 10,000 8-inch equivalent wafers per month to fully satisfy the demand. This semiconductor demand will sprout from demand for systems such as broadband modems, set top boxes, telecom and mobile phones, laptops, automotive electronics, power electronics, RFID systems, consumer electronics such as MP3 players, digital cameras, TVs and PC chip sets. Though export focus will be critical, domestic demand needs to be pushed through high volume products that incorporate chips into their application systems.

PCB's and Passive Components

4.19 There is a strong potential for enhancing sourcing of these components locally. The reason is that there is an existing manufacturing base for PCBs as well as leaded passive components such as capacitors and resistors. There is shortage of PCBs, and even more so of high end multi layer PCBs which are used in present day high tech equipment. More than 80% of local demand for PCBs is met by imports. Advanced Sensor technology for multi-sensor devices like temperature, humidity, air flow and motion control etc are not currently manufactured in India in any significant manner and their development needs to be incentivised. In 2010 the demand for PCBs was assessed to be Rs 239 crore as against a production of Rs 118 crore with an annual increase of 30%. The required investment has been assessed by Ministry of Science and Technology as Rs 1500 crore.

[25] Investment Opportunities in Developing Hi-tech ICTE Supply Chain in India

Mechanical & Plastics

4.20 India has potential to exploit its product design capabilities and provide dies and moulds for advanced CPE's. Typically 5-10% of the BOM for Telecom Equipment is constituted by these components. There is sufficient talent, capacity and capability to exploit this opportunity. Presently a large quantity of equipment is imported as finished product inhibiting growth of manufacture in the areas of mechanical and plastic parts. Specialised chasis and precision mechanical enclosures are required for high value telecom equipment; e.g. Advanced Telecommunications Computing Architecture (ATCA) Chasis. Testing and quality control facilities for these components are needed within the country. If these products receive certification of conformance to global standards then not only the Indian manufacturers would increasingly source these components from indigenous vendors but export potential would also increase.

Electro-mechanical Components

4.21 This category includes Relays and Switches etc. Of this transformers are the major component still used in telecom equipment. There is a strong industry of this family of components, estimated at over US$ 1.4 billion and can cater to Telecom Manufacturing in a big way.

Mobile Phone Components

4.22 The overall handset component demand in India is expected to touch about Rs 36,000 Crore by 2012. The manufacturing adoption roadmap so far has seen a higher emphasis on labour intensive parts such as plastics, metals and casings. The immediate opportunities would include back-end processes such as assembly testing and packaging, battery and charger. Other components that are used in making a mobile phone are LCD module, PCB, processor, Memory chip, camera and acoustic modules.

B - Measures for promoting component manufacturing

Encouraging fab and fabless manufacture

4.23 We have seen in the discussions of active components that semiconductor based components are one of the most important constituents of telecom equipment. The semiconductor content could be from 25% to 60%, by value, for telecom products. Indian market is currently valued at US$ 8 billion and only 10% of the requirement is service by domestic manufacturing. According to DIT task force report India is a US$ 45 billion electronics market today and is expected to reach US$ 400 billion by the year 2020. Besides telecom there is a big market in information technology and office automation, consumer electronics, mobile phones, aerospace and defence. The current production gap is about US$20 billion which could become crippling by the year 2020 if no measures are immediately initiated.

4.24 There are other reasons why having semiconductor fabrications facilities becomes economically important. For the amount invested

in semiconductor R&D and manufacturing, there is a GDP multiplier effect of about 22 times. This includes benefits from direct impact in terms of commercialisation of products created of semiconductor manufacturing efforts and direct impact on investment in salaries, equipment etc in the region where fab is located. Then there is substantial benefit from sale of high tech products that improves productivity in other sectors. When the Government makes investment, there is incremental private semiconductor manufacturing funds which produces a multiplier effect in the economy.

4.25 As the major part of the electronics hardware is constituted by semiconductor component, there is an urgent need to promote semiconductor fabrication(fab) within the country. There are two types of set-ups that are important for this industry, fab and fabless manufacture. A fab is a facility that produces its own silicon wafers. A 'fab unit' has been defined as a semiconductor wafer fabrication facility and eco-system including the manufacture of semiconductors like LCD, OLED, storage devices, solar cells, etc. Setting up fab units to manufacture semiconductor chips requires large capital investment and there is also a need for Government effort to set up such facilities. A fabless semiconductor company will be one that will focus on design, development, packaging, testing and sale. By using this type of business strategy, a fabless company is able to avoid the high costs involved with building and operating its own manufacturing facility. In this regard India has some strengths that can be tapped. India has established itself as good source of chip design and most of the top global manufacturers have their design centers here. These domestic design companies need to be encouraged to undertake design work for local market and applications.

4.26 In March 2007, the Government of India had announced a special package to encourage fabs under the Special Incentive Package Scheme (SIPS) of the Department of Information Technology. The period of incentives was upto March 2010 with a ceiling of 2-3 fab units and 10 supporting units. Under the scheme incentive of Government Equity upto 26% and CAPEX subsidy of 20% for units proposed to be set up in SEZs and 25% for non-SEZs was offered. There was an investment threshold limit of Rs 2,500 crore for the fab unit and Rs 1,000 crore for ecosystem units. Because of the global economic recession and high threshold limit there was hardly any response to the scheme. Because semiconductor based components are key to electronic equipment manufacture in general and telecom equipment in particular, it is necessary for the Government to make a renewed effort in this direction.

4.27 The Department of IT has estimated the cost of a high technology semiconductor fabrication unit (fab) is about Rs 15,000 crore and that of a general purpose semiconductor fab is about Rs 10,000 crore. These investments would be characterised by a long recovery period making it necessary for the Government to incentivise their setup through infusion of grants and/or equity. Once the facility has been built up, support by local market or local buying would need to be worked out to encourage private investment. The Authority has taken note of the stakeholders comments and the above information and makes the following recommendations:

4.28 The Authority recommends that a cutting edge technology fab facility with should be set up with government funding support in the form of equity, grants and softloans. The

Government should provide upto 75% funding of which upto 49% should be in the form of equity and remaining as debt.

4.29 The Authority recommends setting up a second fab unit for manufacture of a variety of general purpose chips that could be used in a large number of equipment with government funding support in the form of equity, grants and softloans. The Government should provide upto 50% out of which upto 49% should be in the form of equity and remaining as debt.

4.30 Regarding the fabless manufacture the stakeholders have suggested that the Government should set up fabless manufacturing units to capitalise on good design capabilities already built up in the country. According to the stakeholders the highest value addition happens at the stage of design and these units will add to the technological capability of the country. The stakeholders added that market for such manufacture is huge as these units can serve a number of Industries. There were some stakeholders who said that the fabless model is quite attractive for India because these companies do not require prohibitive investments. According to them fabless companies are usually of medium size of about 150 to 200 people with a turnover of Rs 500 crore. Some of the incentives that have been suggested by the stakeholders are required for fab-less companies are: capital for startups, tax exemptions and R&D grants, mandatory use of components, reliability and failure mode analysis lab to assist the fabless companies.

4.31 According to an IBEF report[26] India is on the world map in chip designing; the growing production and consumption of electronics across various sectors is further driving growth of semiconductor designing in the country. According to data provided by ISA the semiconductor designing segment generated revenues worth US$ 6 billion in 2007 and is expected to reach approximately US$ 14.4 billion and US$ 43.1 billion by 2010 and 2015, respectively. During 2005–2015, it is expected to register growth at a CAGR of approximately 29.5 per cent(Figure 4.6). A Frost & Sullivan report on the Indian semiconductor sector estimates that the number of chip designs executed in India will increase at a CAGR of 13 per cent from 320 in 2005 to 1,075 in 2015. Revenue of the different sub segments – embedded software, VLSI design and hardware/board design – is expected to register a CAGR of approximately 30 per cent, 24 per cent and 27 per cent, respectively, from 2005 to 2015(Figure 4.7)

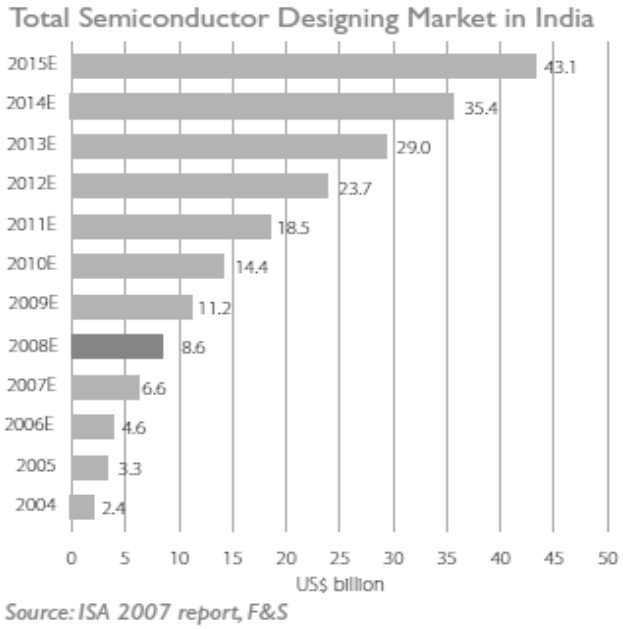


Figure 4.6 Design market of India

[26] Semiconductor Sector–Overview, December 2008, www.ibef.org

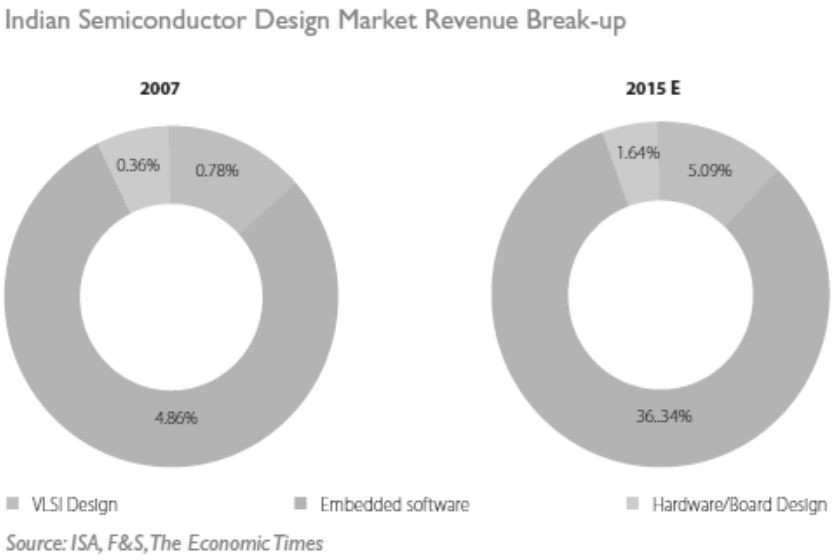


Figure 4.7 Design market revenue breakup

4.32 There are 125 integrated chips (IC) design companies operating in India and almost 50 per cent of the semiconductor design work in the country is carried out in the areas of wireless and wired communications. Even though many companies continue to design as well as manufacture semiconductor chips, simple economics make it easier for the existence of both fabless companies and manufactures that focus solely on building the actual product.

4.33 High business potential of fabless set-ups come from the fact that they can serve a number of segments like telecom, energy meters, Smart grids(owned mostly by Indian OEMs), Inverters, Radio Identification (RFID), lighting, gadgets related to education, gadgets related to security, automotive (specifically two wheelers), defense and aerospace, etc. One can get the idea of the revenue of a large fabless operation by looking at the top three global companies in fabless design which are Qualcom, Broadcom and AMD with 2010

revenues of US$ 7098 million, US$ 6540 million and US$ 6460 million.

4.34 A fabless company makes it possible for semiconductor chip developers to take their ideas from the drawing board to the marketplace with a relatively small initial investment. According to the Global Semiconductor Association, once considered in minority, today there are close to 1,300 fabless companies worldwide, and this number continues to grow with an increasing number of integrated device manufacturers (IDMs) outsourcing a greater percentage of their manufacturing. According to their December 2010 report[27], over the past two years, a number of leading semiconductor companies have already transitioned or have outlined their plan to become fab-lite/fabless, such as NXP, AMD, IDT, Texas Instruments (TI), and Renesas Electronics Corp. Fabless sales have grown 9.5% in 2009. Statistics demonstrate that fabless companies have set the bar high for the overall semiconductor industry, and these companies continue to raise the benchmark of success year after year. All these factors make the case for Indian fabless industry even stronger.

4.35 In Chapter III recommendations have been made regarding research and development fund, research-park, manufacturing fund, testing and certification facilities. These facilities would be of general nature and fabless manufacturing companies would be able to make use of these facilities subject to the terms and conditions worked out. The testing and certification agency recommended by the Authority would be able to offer reliability and failure mode analysis facilities to fabless companies. One of

[27] How Fabless companies drive tech, December 2010

the main issues that remains concerns the tax structure. International experience shows Governments in many countries have incentivised fables manufacturing. In Taiwan generous tax incentives were provided to qualified firms, including a five-year tax holiday followed by a maximum tax rate of 22%. Israel has given cash subsidy to fables startups in the past. In Israel fables companies have also benefitted from tax benefits in the form of a tax holiday for the first two profitable years, and for a 10-year period after that paid a reduced tax rate on the order of 15% as against the normal tax rate of 35%. This aspect is covered with the other components in the following paragraphs.

Electronic Manufacturing Service

4.36 Electronic manufacturing services (EMS) is a term used for those companies that design, test, manufacture, distribute, and provide repair services for electronic components and assemblies for original equipment manufacturers (OEMs). The role of EMS in promoting component manufacturing is well recognised. On this issue some of the stakeholders were of the opinion that establishment of EMS companies should be encouraged and they should be provided preferential tax treatment. Some stakeholders even suggested that the Government should provide space in SEZ to establish EMS companies. Some stakeholders pointed out that some countries(Malaysia and Vietnam) have given duty exemption on components/raw-materials (along with incentives for processing them into finished goods or component sub-assemblies. Some stakeholders mentioned that test equipment may be allowed to be hired from foreign companies at nil duty.

4.37 It is seen that initially labour cost was the main motivation but emphasis has now shifted greatly from labour costs only to total

cost of ownership to include managerial resources, organisational structuring, manufacturing competencies, IP and logistics. India has attracted FDI from ESM companies like Foxconn, Flextronics and Jabil. Evidence so far suggests that EMS in India is set to create big impact. EMS companies can ensure a steady raw material supply, if they start procuring at least domestically available raw materials from local vendors. Hiring an EMS/CMS is advantageous for a telecom manufacturer for assisting them in their manufacturing tasks as it saves them from duplicating facilities that already exist. These service companies are run by experienced and expert people and have the required infrastructure to perform all these functions. They have right equipment, expert personnel and focused approach to provide better results to their clients. Most companies that offer contract electronics manufacturing service offer wide range of services. This array of services includes designing, creating, testing and distributing the electronic products. The large manufacturers are not looking only for low manufacturing cost for outsourcing their activities to EMS but also factors like inventory cost and risk, and transportation costs as well as unit costs. Prime benefits of outsourcing include cost reduction, additional capacity, shorter time to market and state of the art manufacturing capabilities[28].

Duties and taxes for component industry

4.38 Besides the semiconductor components, it has been further noted that the electronic component industry in India has not kept pace with the growing demand for electronic products and dependence on imports has been increasing. The ratio of locally manufactured components used in electronic equipment, which include telecom

[28] Adapted from TiE-CII Report: Investment Opportunities in Developing Hi-tech ICTE Supply Chain in India

equipment, made in India has gone down from 50% in 1996-97 to about 20% today as the component required in the modern telecom products are not manufactured locally or because of inverted duty structure where there is no duty on finished products but there is duty on components. Stakeholders have submitted that this is a very discouraging and unfortunate trend, which needs to be reversed. This downturn is linked to the announcement of the signing of the ITA-1 Agreement under the WTO which brought 217 Tariff Lines covering all ICT Products and their inputs, largely components, to zero Customs Duty. This opened up the local industry to unbridled competition, which it was not prepared for and fresh investments stopped flowing in due to uncertainty about profitability of the industry.

4.39 The stakeholders have also submitted that the production of electronic components stagnated at approximately US$ 2 billion during 2006 and 2007 and only in 2008-09 it increased to 2.8 billion. This meets only about 20% of the local demand. The market for electronic equipment, products and design including components presents a huge opportunity projected at US$ 125 billion by 2014 and US$ 400 Billion by 2020[29]. This presents a huge opportunity for component manufacturing and the value is estimated at about 25% or US$ 100 billion.

4.40 On the specific question of duty on electronic components one of the stakeholders said that the duties are high. Another stakeholder said that the Duty on components was almost the same as that on the equipment and suggested that if Indian Government wants to

[29] Report by DIT Taskforce

encourage local manufacturing, it is suggested to reduce the import duty on the components. Some stakeholders commented that the Basic Custom Duty on all components used for manufacturing of Telecom Equipments in India should be at 0% since the duties on finished products that are being imported are already zero. They said that specifically for dual-use components duties must be made zero, based on the declaration of end-use. Another specific suggestion was that CVD should be reduced to 3-5% in order to lessen the investment in manufacturing sector and SAD may not be levied. Although the Government may lose some revenue, this measure will have the advantage of rendering the Indian telecom products competitive vis-à-vis imported equipment. Other stakeholders felt that inverted duties are making imports more attractive than manufacturing. The stakeholders were of the opinion that to encourage local manufacturing of components the total tax, including Excise and VAT, should be limited to 12%. As far as the CST is concerned the stakeholders would ideally prefer no CST or alternatively an equivalent tax on imported components would level the playing field and result in accruals to the Government. In addition, the Indian industry faces disabilities due to lack of infrastructure, high finance and energy costs compared to competing countries.

4.41 Analysis reveals that for domestically manufactured components the Excise duty is 10% and the central sales tax (CST) is 2%. The State VAT varies from 5% to 20%. In some States there are taxes like Octroi, entry or local area development tax which varies from 2% to 4%. This effectively makes the duty/tax incidence on components effectively same as that on the telecom equipment. In view of WTO regime there is no Custom duty on imported

components except on those which have dual use. The imported components attract countervailing duty(CVD) equivalent to Excise ie 10%. There is no CST and no VAT on the imported components. There is SAD of 4% which is set off against Excise. The regime therefore favours imports rather than local manufacturing of components. Dual-use inputs are currently subjected to a higher import duty than the finished products. This anomaly needs to be rectified.

4.42 The mobile component industry is facing issues that are peculiar to it. An analysis of the comments shows that there is exemption of customs and excise in special zones in respect of duty on parts, components and accessories for manufacturing of mobiles and their parts and accessories. However, the benefit is not available to the service sector, which is subjected to full CVD of 10% and basic duty of 7.5%. If this exemption is extended to the service sector in Domestic Tariff Area(DTA), as it exists in SEZ environment, it would encourage such activities in the DTA. From the available data it is seen that about 10% of domestic sales of the parts and accessories is for after sales service. This is expected to rise to Rs. 4010 crores by 2015 if the suggested measures are implemented. The revenue loss because of this measure will be in the range of 105-410 crores per year but this would curb smuggling and promote manufacturing.

4.43 The Authority recommends the following regarding taxes and duties on domestically manufactured components:

- **Taxes and duties should be so structured that they are not disadvantaged vis-à-vis imported components.**
- **Total of Excise and VAT should be limited to 12%**

- **Component manufacturing companies including fab and fabless manufacture should be exempt from Minimum Alternative Tax (MAT).**

4.44 The Authority recommends that the taxes and duties on the components should be lower than that on the finished products.

4.45 The Authority recommends that the dual use imported inputs required for manufacture of telecom equipment should not be subject to bond payment if the importer can indisputably prove use for telecom product manufacture.

Chapter V

Summary of policy, measures and plan of action

5.1 This chapter covers the following important aspects

A. Summary of the main features of the policy and recommended measures

B. Plan of action

C. Financial implications of the measures recommended

D. Sources of funding

E. Benefits of the policy

A- Policy and recommended measures

5.2 Table 5.1 summarises the main targets of the Telecom Equipment Manufacturing Policy (TEMP).

Telecom Equipment Manufacturing Policy

		2012-13	2014-15	2016-17	2019-20
1	**Demand**	100	100	100	100
2	**Imported/LVAP**	70	55	40	20
3	**DMP**	30	45	60	80
	(i)IMP	15	20	25	30
	(ii)IP	15	25	35	50
4	**Min Value Addition**	25	35	50	65

Table 5.1 Telecom Equipment Manufacturing Policy

5.3 The policy consists of the following definitions

1. **Domestic Manufactured Products(DMP)**

   Domestic manufactured products means products manufactured in India that meet the minimum value addition criterion prescribed in the policy. DMP can either be Indian Manufactured Products or Indian Products. It does not include products that do not meet the value addition criterion called here Low Value Addition Products(LVAP)

2. **Indian Manufactured Products (IMP**)

   Indian Manufactured Products are the products for which the following conditions hold good:

   (i) The products have been manufactured in India by an entity duly incorporated in India
   (ii) The product meets minimum value addition criterion prescribed by the Authority
   (iii) The IPR of the product resides outside India.

3. **Indian Products(IP)**

   Indian Products are telecom products for which the following conditions hold good:

   (i) The products have been designed, developed and manufactured in India by an entity duly incorporated in India
   (ii) IPRs for the products reside in India.
   (iii) Commercial value of the IPRs accrue to India
   (iv) The product meets the minimum value addition criterion prescribed by the Authority

4. Low Value Addition Product (LVAP)

Low Value Addition Products are telecom products that are assembled in India for which the value addition is lower than the minimum prescribed value addition under the policy.

5. Value Addition

Value addition considered in the context of these recommendations is by way of the value of the Bill of Material (BOM) sourced from within the country and the value of the IPR that resides in India whose value accrues to India. Calculation of value addition is as described in Chapter I

5.4 The policy summarised in Table 5.1 defines targets for the years 2012-13, 2014-15, 2016-17 and 2019-20. The gap years take the last defined value i.e. value for 2013-14 would be same as that for 2012-13.

5.5 Demand for a particular year is taken as 100% and other targets for each category of product are defined in relation to the demand. The Domestic Manufactured Products meet 30% of the demand in 2012-13 and grow to meet 80% of the demand in the year 2019-20. The Indian Manufactured Products meet 15% of the demand in the year 2012-13 and grow to 30% in 2019-20 while the Indian Products meet 15% of the demand in 2012-13 and grow to meet 50% in the year 2019-20.

5.6 The policy stipulates that the Domestic Manufactured Products should have a minimum level of value addition. According to the definition of the value addition, this would imply that increasingly higher amount of components are sourced from domestic

manufacturers or more products are based on Indian IPRs or both. The minimum value addition criterion for the benchmark years are 25%, 35%, 50% and 65%.

5.7 The following measures have been suggested for implementation of the policy:

For Domestic Manufactured Products

(i) Market Access and minimum value addition in the benchmark years are as given in Table 5.2:

Year	2012-13	2014-15	2016-17	2019-20
Market Access for Domestic Manufactured Products	30%	45%	60%	80%
Value addition	25%	35%	50%	65%

Table 5.2 Market Access for Domestic Manufactured Products

(ii) 10% or 20% of the licence fee for a particular year would be given to the service provider as incentive, if the service provider exceeds the market access criterion by more than 10% or 20% respectively.

(iii) All domestic manufactured product manufacturers with annual turnover less than Rs 1000 crore should get debt finance subsidy for capital and working capital for a period

of 5 years @ 6% for Indian Product manufacturers and 3% for Indian Manufactured Product manufacturers.

(iv) A Testing and Certification Organisation is to be set up for testing all products manufactured in India or imported from other countries.

(v) The total incidence of Excise Duty and VAT on domestic manufactured products should be limited to 12%.

(vi) CST of 2% on domestic manufactured product should be removed or an equivalent tax be imposed on imported products.

(vii) Special incentive may be given to domestic manufactured product manufacturers with total annual turnover of less than Rs 1000 crore in the form of deferment of Excise/CST/VAT/GST for a period of 5 years at nominal interest.

(viii) A 10 year Income Tax holiday for manufacturers of domestic manufactured telecom products may be given to the manufacturers whose total annual turnover is less than Rs 1000 crore.

(ix) The domestic manufactured product manufacturers with annual turnover of less than Rs 1000 crore should be exempted from payment of Minimum Alternative Tax.

(x) For mobile handset industry comparative tax disadvantage should be removed for domestically manufactured products by reducing VAT and placing tax equivalent to CST of 2% on imports.

(xi) Exemption should be given to the domestic manufactured product manufacturers from countervailing duties on imported capital equipment and excise duty on domestically sourced capital goods for the domestic handset manufacturing industry.

(xii) All custom clearance for import of raw material and components for domestic manufacture of telecom equipment should be completed expeditiously and within not more than 7 days of application.

(xiii) Requirement of "provenness" be waived for domestic manufactured product manufacturers with annual turnover of less than Rs 1000 crore for products certified by the test and certification organisation. In such a case the company may be given order up to 10% by quantity.

(xiv) Export of domestic products should be actively encouraged. Telecom should be included in grant-in-aid programmes and bilateral trade agreements.

(xv) Total Excise and VAT on domestically manufactured components should be limited to 12%.

(xvi) Component manufacturing companies should be exempt from MAT.

(xvii) Taxes and duties on the components should be lower than that on finished products.

(xviii) Dual use imported inputs required for telecom equipment manufacture should not be subject to bond payment.

For Indian Products

(i) Market access should be provided for the Indian Products as per the following table

Year	**2012-13**	**2014-15**	**2016-17**	**2019-20**
Market access for Indian products	**15%**	**25%**	**35%**	**50%**

Table 5.3 Market Access for Indian Products

(ii) Focus areas for the research and development have been identified.

(iii) A Research and Development Park should be established within 2 years for the purpose of facilitating research, innovation, IPR creation and commercialisation of Indian Products at an approximate cost of Rs 5000 crore.

(iv) A Research and Development Fund to be created with a corpus of Rs 10,000 crore for giving soft loans, grants, reimbursement of R&D expenses and IPR fee for research and development activities.

(v) A Telecom Research and Development Corporation (TRDC) should be set up and an amount of Rs 15,000 crore may be made available to it for creating the R&D Fund and establishing the R&D Park.

(vi) Duties and taxes should be structured to promote research in telecom. TRDC will make recommendations in this regard.

(vii) A Telecom Manufacturing Fund (TMF) should be set up, with an initial amount of Rs 3000 crore, for providing venture capital to Indian Product manufacturers in the form of equity and soft-loans.

(viii) A Telecom Standards Organisation (TSO) should be set up for carrying out all works related to telecom standards, driving international standards and drawing up specifications of the equipment to be used in the Indian telecom network.

(ix) Clusters should be set up to remove infrastructural disabilities.

(x) Manufacturing units in the clusters to be provided with subsidy to the extent of 4.5% up to the year 2015 and 2.25% up to the year 2020 to compensate for infrastructural disabilities.

(xi) Two fab units should be set up with government funding support in the form of equity, grants and soft loans.

B- Plan of Action for implementation of the policy

5.8 The plan of action consists of putting in place a number of measures for meeting the policy targets by increasing domestic manufacture and value addition. The important measures are:

i. Mandating of market access and incorporation in the licence conditions
ii. Setting up of a Telecom Equipment Manufacture Organisation (TEMO)
iii. Instituting fiscal measures like reduction in taxes and deferment of payment of taxes
iv. Undertaking financial measures like interest subsidy on debt capital
v. Setting up of a Testing and Certification Organisation
vi. Setting up of research facilities like a Research Park and a Research Fund
vii. Setting up of a Telecom Manufacturing Fund
viii. Setting up of a Standards Organisation
ix. Setting up of telecom manufacturing clusters

5.9 The timelines are set out in the Gantt chart indicated overleaf. **(Table 5.4)** As can be seen, the expected gain from the policy is likely to be more than 10 times the initial cost.

	2011-2012	2012-2013	2014-2015	2016-2017	2019-2020	Cost	Benefits	Remarks
Recommendations						**(Rs Crore)**	**(Rs Crore)**	
1. Market Access for domestic products								C: Incentives for value addition B: increased prod & VA
2. National Telecom Manufacturing Policy							853173	B:Rs 853173 crore worth additional production + Rs 678161cr value addition+ positive trade bal in 14-15
3. Interest Subsidy for domestic manufacturers				-		22782		C: 6% for IP and 3% for IMP B: Increased Indian product manufacture
4. Incentives for meeting value addition						984		C:10%/20% of Licence fee B: Increased value addition
5. Tax deferment benefit						3154		C: Deferred taxes for 5 years B: More investment in manuf
6. Creation of Test and Certification agency						100		Support for 5 years. B: Certification of Indian prod for domestic use and exports
7. Tax benefits						37450	119444	C: Limiting Excise and VAT to 12% B: Increased Production
8. Dual use components to be exempt on self certification								B:Streamlines production process
9. Custom Clearance within 7 days								B: Streamlines production process
10. Market Access for Indian Products								B:Increased domestic production and VA
11. Export of Indian products to be encouraged								B:Increased exports
12. “Provenness” to be waived for Indian Products		-						B:Promotes Indian products
13. Setting up TRDC								
14. R&D Fund						10000	16392	B:Promote research, IPR generation and product development
15. Focus areas for R&D								Generation of required essential IPRs

16.Selection of research projects								
17. Utilization of R&D funds								
18. R&D fund can accept royalties etc								The fund becomes self sustaining
19. Fund to be managed by autonomous board and headed by eminent person								B:Efficient management
20. Duties and Taxes for fund to be proposed by TDRC								
21. Telecom Research and Dev park						5000	400	
22. Manufacturing Fund						12000	4312	Self sustaining after 4 years
23. Telecom Standards Organization						100		
24. Identification of clusters						1000		B:Removes infrastructural diabilities
25. Removal of disability in clusters								
26. Duties and taxes on mobile								
27. Mobile phone research & testing								B:Helps develop new products
28. Cutting edge technology fab						6250	4946	B:Reduce imports, reduce royalty
29. General purpose fab								
30. Taxes and duties on components to be less than products								
31. Dual use components should not be subject to bond payment								
					Total	**98820**	**998707**	Gain factor > 10 times

Table 5.4 Gantt Chart of Plan of Action

C - Financial Implications of the policy

Costs and Accruals

5.10 Table 5.5 below gives the estimates of costs and accruals from the policy. Various figures in the table have been discussed in the relevant sections of these recommendations. The total cost of all the measures comes to Rs. 98820 crore over the period up to the year 2020. The methods of assessment of financial effects of incentives to service providers, fiscal and financial measures, are explained in the paragraphs below Table 5.5. The direct accruals include earnings from the research fund, the technology park and testing and certification activities. There are accruals from increased taxes and also benefits in the form of increased production. The costs and accruals are summarised below:

Costs and Accruals

	Major Costs		**Cost(Rs Crore)**	**Accruals (Rs crore)**
1	R&D Fund		10000	16392
2	Research Park		5000	400
3	Manufacturing Fund (Rs 3000*4 yrs)		12000	4312
4	Interest subsidy		22782	
5	ED/VAT/CST/ MAT waiver*		37450	
6	Deferment of Tax*		3154	
7	Incentives for value addition		984	
8	Setting up fabs		6250	4946
9	Testing & Certification Agency		100	40
10	Clusters		1000	
11	Standards Organisation		100	
		Total	**98820**	**26090**
	Major Benefits			
1	Increase in Production			853173
2	Value addition			678161
3	Taxes on increased prod.			119444
4	Increase in exports			430624
	Total Benefits			**998707**

Gain factor is about 10 times

**Adjustment made for exports*

Table 5.5 Costs and Accruals

Financial implications on account of incentives to service providers for exceeding market access criterion

5.11 The Authority has recommended that an incentive equal to 10% or 20% of the licence fee for a particular year should be given to the service provider, if the service provider exceeds the market access criterion by more than 10% or 20% respectively. Table 5.6 summarises the assessment of the financial implication for this measure. The first row gives the percentage of service providers falling under 10% and 20% incentives. The licence fee is taken at 1% of AGR. The amount for the gap years is taken as that of the last benchmark year. The total financial implications come to Rs 984 crore.

Amount in Rs crore

Incentive for value addition

% in 10%/20%	20/20	30/30	40/40	50/40
	2012-13	2014-15	2016-17	2019-20
AGR(Rs crore)	120342	122761	125229	129023
Lic fee	1203	1228	1252	1290
10% of Lic fee	24	37	50	65
20% of Lic fee	48	74	100	103
Total	72	110	150	168
Accounting for gap yrs	144	221	451	168

Table 5.6 Financial Implications of Incentives for exceeding market access criterion

Financial Implications of Interest Subsidy

5.12 The Authority has also recommended that all domestic manufactured product manufacturers with annual turnover less than Rs 1000 crore should get debt finance subsidy for capital and working capital for a period of 5 years @ 6% for Indian Product manufacturers and 3% for Indian Manufactured Product manufacturers. For assessing the financial implication, the incremental debt capital requirement for

incremental annual output from small manufacturers is calculated using an Incremental Capital Output Ratio of 4:1 and a debt equity ratio of 1:1 as in Table 5.7. Subsidy is calculated on average debt in each year assuming 10% repayment annually.

Statement of Incremental Capital Output Ratio & Subsidy Burden							
							(Rs. in Crore)
Year	**Total Production of DMP < Rs. 1000 Cr**	**Incremental Production**	**Incremental Capital Fund**	**Incremental Debt**	**Cum. Outstandg Debt (After 10% repayment)**	**Average Outstandg Debt**	**Subsidy Burden**
2012-13	20097	6888	27551	13775	32440	26590	1198
2013-14	32194	12097	48387	24193	53390	42915	1934
2014-15	59188	26994	107978	53989	102040	77715	3433
2015-16	98548	39359	157437	78718	170554	136297	6172
2016-17	146905	48358	193431	96716	250214	210384	10044
Total							**22782**

Notes:
1.Capital Return Ratio has been taken as 4:1
2. In Capital Fund Debt & Equity Ratio has been taken as 50:50
3. Government Subsidy taken as 6% (Indian) & 3% (DM) on Debt Fund
4. Debt repayment period has been taken 10 years & 1/10th Debt paid every year

Table 5.7 Financial Implications of Interest Subsidy

Financial implication of other tax benefits

5.13 For various tax benefits such as reduction of Excise Duty, VAT and CST, and exemption from MAT, the benefits are calculated as in table 5.8 and 5.9.

(Rs. in Crore)

Year	Total production	Adjustment For Exports (on average @50% for 8 years)	4% reduction in ED /VAT / CST
2012-13	60033	30016	1201
2013-14	80384	40192	1608
2014-15	106806	53403	2136
2015-16	141028	70514	2821
2016-17	185265	92633	3705
2017-18	242350	121175	4847
2018-19	315903	157952	6318
2019-20	410558	205279	8211
Total	**1542327**	**771163**	**30847**

Table 5.8 Financial Implications of tax benefits(Excise, VAT and CST)

Total production of small manufacturers (< Rs. 1000 Cr) 2012-13 to 2016-17	356932
Assumed book profits	10%
MAT @ 18.50 %	**6603**

Table 5.9 Financial Implications of tax benefits(MAT)

Deferment of Tax

5.14 For the deferment of payment of ED and VAT for domestic product manufacturers with annual turnover less than Rs 1000 crore for a period of 5 years, the extent of the opportunity cost is calculated in Table 5.9. Rate of interest has been taken as 1% and opportunity cost as 8%.

Opportunity cost due to deferment of taxes for 5 years						
						(Rs. in Crore)
Year	**Total Production**	**Excise Duty @10%**	**VAT @ 2%**	**Total Taxes deferred**	**Opportunity Cost to Govt @ (8 %-1%) p.a.**	**Interest @ 1% p.a.**
2012-13	20097	2010	402	2412	844	121
2013-14	32194	3219	644	3863	1082	155
2014-15	59188	5919	1184	7103	1492	213
2015-16	98547	9855	1971	11826	1656	237
2016-17	146905	14691	2938	17629	1234	176
Total	**356932**	**35693**	**7139**	**42832**	**6307**	**901**
Net Opportunity Cost after adjustment for exports @ 50%					**3154**	

Table 5.9 Financial Implications of Deferment of Taxes

D- Sources of Funding

5.15 The costs of the different measures and accruals from various sources were summarised in table 5.5 above. As was seen, the expected benefits and accruals from the policy are expected to be more than 10 times the estimated costs. For implementing the policy measures, the various sources of funding are discussed below:

(i) Interest subsidy is required to be met out of the Government budget as annual grant which can be channelised to the banks and other lending agencies.

(ii) The impact of the fiscal measures will initially be on the Central/State Government budgets in the form of revenue forgone, but will be offset several times over in the form of higher value addition and contribution to GDP by the equipment manufacturing industry.

(iii) The impact of the incentives paid to service providers will again initially be on the budget of the Government of India in the form of licence fees forgone; however the amounts are expected to be small and the measure would encourage the service providers to participate in the national cause.

(iv) For the R&D fund, Research Park and setting up of fabs, initial funding would be by the Government. Government could consider the utilisation of some telecom related accruals such as spectrum auction proceeds, service tax on the services of the service providers, licence fee etc for the purpose. These investments made by the Government would earn interest and royalties on IPR and in time would become self sustaining.

(v) The Telecom Manufacturing Fund would also have at the inception, participation by the Government and financial institutions. Government funds like pension funds and private participation with appropriate capital structure could also be considered. The fund could partly be funded by proceeds of spectrum auction as part of Government contribution. Like the research fund, the manufacturing fund is expected to become self sustaining and earn profits after a certain period.

(vi) The Testing and Certification agency, the Standards Organisation, and manufacturing clusters would have to be set up by the Government.

E- Benefits of the telecom equipment manufacturing policy

5.16 The measures recommended to be instituted through the Telecom Equipment Manufacturing Policy should result in the following major benefits:

(i) It would provide the necessary stimulus to the struggling domestic telecom equipment industry. The industry would be

put on a high growth path and this would pay back rich dividends in terms of increased production, value addition and exports.

(ii) The industry would be geared up to meet the explosive demand for 5 billion connected devices by the end of the year 2020.

(iii) Increased production would result in increased contribution of telecom manufacturing to the GDP.

(iv) The policy would result in increased earning of foreign exchange from exports.

(v) Increased R&D and manufacturing would lead to improved supply of domestic telecom equipment to strategic sectors like Defence and Space.

(vi) Increased domestic manufacturing would mitigate the strategic security concerns that go with the imported equipment.

(vii) The available manpower would acquire better technological skills through training and experience.

(viii) Increase in production would create employment opportunities for hundreds of thousands of people with different skill-sets and educational backgrounds.

(ix) India would not only achieve greater self reliance but would also become an important source of new technology equipment.

Chapter VI

Summary of Recommendations

Chapter I: Need for Telecom Equipment Manufacturing Policy – Rationale and Objectives

6.1 The Telecom Equipment Manufacturing policy should be an integral and a significant part of the New Telecom Policy.

(Para 1.53)

6.2 The proposed policy should have as objective the following targets:

		2012-13	2014-15	2016-17	2019-20
1	Demand	100	100	100	100
2	Imported/LVAP	70	55	40	20
3	DMP	30	45	60	80
	(i)IMP	15	20	25	30
	(ii)IP	15	25	35	50
4	Min Value Addition	25	35	50	65

(Para 1.54)

Chapter II:Suggested Measures for promotion of Domestic Manufacturing

6.3 Preferential market access should be provided to the domestic manufactured products (comprising both Indian Manufactured Products and Indian Products) in procurement by the Government and Government Licencees(service providers both public and private) as per Table 2.1 subject to the value additions proposed for the corresponding years.

Year	2012-13	2014-15	2016-17	2019-20
Market Access for Domestic Manufactured Products	30%	45%	60%	80%
Value addition	25%	35%	50%	65%

Table 2.1 Market access for domestic products

(Para 2.15)

6.4 Government or Government licencee (service providers- both public and private) would be responsible for meeting the market access criterion even if the installation, maintenance and operations are outsourced.

(Para 2.17)

6.5 The Department of Telecom should suitably modify the relevant clauses in the UAS Licences issued/to be issued and the Unified Licence to include the stipulations of percentages of market access, value addition and auditing in respect of domestic products.

(Para 2.19)

6.6 To supply under the market access stipulation, the domestic manufacturer must submit a certificate from its statutory auditor to the effect that the prescribed value addition condition has been met. This would be test audited by the DOT or an agency authorised by DOT.

(Para 2.21)

6.7 The service provider procuring more than 10% of the market access requirement of telecom equipment in the form of Indian Manufactured Products should get a rebate equivalent to 10% of its licence fee for that year and the service provider procuring more than 20% of its telecom equipment requirement in the form of Indian Manufactured Products should get a rebate equivalent to 20% of its licence fee for that year. For the purpose of this recommendation licence fee does not include USOF contribution of 5% of AGR.

(Para 2.25)

6.8 If a service provider is not able to meet the criteria of market access then it will deposit an amount equal to 5% of the shortfall in the value of the equipment in the Telecom Research fund or the Telecom Equipment Manufacturing fund.

(Para 2.27)

6.9 A Telecom Equipment Manufacturing Organisation (TEMO) should be set up to coordinate between manufacturers and service providers for proper implementation of the telecom equipment manufacturing policy.

(Para 2.30)

6.10 For the purpose of benefits being recommended for domestic manufactured product companies with annual turnover less than Rs 1000 crore, only those domestic manufacturing companies should be eligible in which no other manufacturer having annual turnover of Rs 1000 crore or more holds substantial equity. Substantial equity herein will mean equity of 10% or more.

(Para 2.37)

6.11 All domestic telecom equipment manufacturers producing Indian Products or Indian manufactured products and having an annual turnover of less than Rs 1000 cr, should get access to debt finance for capital and working capital for a period of 5 years on subsidised terms. The extent of subsidy will be 6% for the Indian Product Manufacturers and 3% for producers of Indian Manufactured Products. The Government should formulate a subsidy scheme for the purpose and the subsidy grants can be channelised for disbursement directly to the lending banks.

(Para 2.39)

6.12 Set up an International standard Testing and Certification Agency by way of converting TEC into an Autonomous Agency for testing all products manufactured in India or imported from other countries. This Agency should be headed by a person of eminence from the relevant field and will be managed by an independent Board drawn from technical members of the Government, industry and academia.

(Para 2.50)

6.13 To remove the comparative tax disadvantage on domestic manufactured products, the Authority recommends that the total incidence of Excise Duty and VAT on domestic manufactured products should be limited to 12%. In addition, as in the case of imported equipment, there should be no CST on domestic

manufactured products or, alternatively, a tax equivalent to 2% should be imposed on imported products.

(Para 2.64)

6.14 A special incentive should be provided to producers of domestic manufactured products with total annual turnover less than Rs 1000 cr, by deferring the payment of Excise/Sales Tax/VAT/GST by them for a period of 5 years at a nominal rate of interest.

(Para 2.66)

6.15 Income Tax holiday may be given for 10 years, on the lines of that given to the software industry, for producers of domestic manufactured telecom products, whose total annual turnover is less than Rs 1000 cr. They should also be exempted from payment of Minimum Alternative Tax.

(Para 2.68)

6.16 For the mobile handset industry, as in the case of telecom network equipment manufacturing, comparative tax disadvantages should be removed for domestically manufactured handsets by reducing VAT and by placing a tax equivalent to CST on imported products.

(Para 2.72)

6.17 As an exceptional measure, to make it easier for domestic manufacturers to commence domestic production of mobile handsets, exemption from countervailing duties may be granted on import of capital equipment and Excise duty on domestically sourced capital goods for the handset manufacturing industry.

(Para 2.73)

6.18 All custom clearances for the import of raw materials and components for domestic manufacture of telecom equipment in India should be completed expeditiously and preferably within 7 days of application.

(Para 2.76)

6.19 The requirement for "provenness" be waived for domestic manufactured products provided that the turnover of the domestic manufacturer is less than Rs 1000 crore and provided that the domestic product meets the requirement of quality, technical specifications and standards and are certified by the testing and certification organisation. In such a case the qualifying company would be given order upto 10% by quantity.

(Para 2.81)

6.20 Ten telecom clusters be identified immediately. The Central/State Governments should make all efforts to develop infrastructural facilities in a time bound manner so that the infrastructure related disabilities are removed for the units that are located in the clusters.

(Para 2.93)

6.21 TCIL may be strengthened as a system integrator for installing and operating networks in other countries using telecom equipment sourced from India. Further, to enable more autonomy and efficiency, TCIL may be disinvested such that the Government holds upto 49% equity.

(Para 2.99)

6.22 India should use its strengths in software to enter into bi-lateral trade agreements with other countries which results in India exporting telecom equipment in lieu of raw materials like tin and copper.

(Para 2.100)

Chapter III: Promoting Manufacture of Indian Products

6.23 Preferential market access may be given for Indian products as per the following table:

Year	2012-13	2014-15	2016-17	2019-20
Market access for Indian products	15%	25%	35%	50%

Table 3.2 Market access for Indian Products

(Para 3.10)

6.24 If a service provider is not able to meet the criteria of market access then it will deposit an amount equal to 10% of the shortfall in the value of the equipment in the Telecom Research fund or the Telecom Equipment Manufacturing fund.

(Para 3.12)

6.25 The focus areas for the R&D fund should be the following:

(1) Next Generation Networks consisting of technologies for core and access: core and edge routers, Softswtiches, Ethernet Switches, xDSL

(2) Next Generation Mobile Networks: LTE Advanced, IP Multimedia susbsystems, cognitive radio, software defined radio, WiMax, distributed antenna systems, backhaul technologies

(3) Fiber optic technologies

(4) Terminal Devices – modems, routers, dongles, data cards, mobile handsets, wireless access points, mobile handsets etc

(5) Security and surveillance equipment, sensors

(6) Non-conventional energy for telecom

(7) Any other area considered commercially relevant in future

(Para 3.25)

6.26 A Telecom Research and Development Park should be established with the purpose of facilitating research, innovation, IPR creation and commercialisation for fast and sustainable growth of the telecom industry. This park should be functional by December 2013.

(Para 3.39)

6.27 TRDC should set up Telecom Research and Development Fund(TRDF) with a corpus of Rs 10,000 crore which should be invested in secure deposits and bonds and the interest accruals should be used for financing R&D projects.

(Para 3.43)

6.28 The R&D fund should be utilised for research, IPR creation and development activities. The fund should give soft-loans, grants, reimbursement of R&D expenses, IPR filing and renewal fee.

(Para 3.45)

6.29 The selection process for the projects to be financed should give due weightage to the potential of the project for resulting into successful IPR and evolving into successful commercial products that would help the country in increasingly manufacturing indigenously developed telecom equipment.

(Para 3.47)

6.30 The R&D fund should be able to accept the royalties for the commercialised products, interest on soft-loans, contributions and any other accruals related to its activities. The royalty should be proportional to the funding made available to a research project.

(Para 3.50)

6.31 A Telecom Research and Development Corporation(TRDC) should be set up and an amount of Rs 15,000 crore may be made available to this Corporation for the following purpose:

a) Setting up of an R&D fund

b) Establishing a Research and Development Park

(Para 3.53)

6.32 The fund should be managed by a special autonomous board drawn from industry, academia and government and headed by a person of eminence from the field of research in technology.

(Para 3.55)

6.33 The duties and taxes should be structured to promote research in telecom. The proposed TRDC will make a recommendation in this regard.

(Para 3.60)

6.34 Create a Telecom Manufacturing Fund(TMF) for providing venture capital to indigenous manufacturing in the form equity and soft loans for supporting pre and post commercialisation product development and brand creation. The TMF would be managed by a corporate body and headed by a person of eminence in the field of banking/venture capital finance.

(Para 3.67)

6.35 The manufacturing fund should be an open fund with contribution from the Government and other bodies like finance corporations. The Government would initially provide an amount of Rs 3000 crore to establish TMF and start financing activities.

(Para 3.71)

6.36 An autonomous Telecom Standards Organisation(TSO) be set up for carrying out all works relating to telecom standards. It will also

have the responsibility of driving international standards and drawing up specifications of the equipment to be used in the Indian telecom network. The governing board of the organisation should consist of experts from the academia, research centres, industry and the Government and the organisation should be headed by a person of eminence in the area of technical standarisation.

(Para 3.79)

Chapter IV: Promoting component manufacturing

6.37 A cutting edge technology fab facility should be set up with government funding support in the form of equity, grants and softloans. The Government should provide upto 75% funding of which upto 49% should be in the form of equity and remaining as debt.

(Para 4.28)

6.38 Set up a second fab unit for manufacture of a variety of general purpose chips that could be used in a large number of equipment with government funding support in the form of equity, grants and softloans. The Government should provide upto 50% out of which upto 49% should be in the form of equity and remaining as debt.

(Para 4.29)

6.39 The following are recommended regarding taxes and duties on domestically manufactured components:

- **Taxes and duties should be so structured that they are not disadvantaged vis-à-vis imported components.**
- **Total of Excise and VAT should be limited to 12%**

- **Component manufacturing companies including fab and fabless manufacture should be exempt from Minimum Alternative Tax (MAT).**

(Para 4.43)

6.40 The taxes and duties on the components should be lower than that on the finished products.

(Para 4.44)

6.41 The dual use imported inputs required for manufacture of telecom equipment should not be subject to bond payment if the importer can indisputably prove use for telecom product manufacture.

(Para 4.45)

List of Acronyms

Sl No.	Acronyms	Expansion
1	2G	Second Generation
2	2.5G	Second and Half Generation
3	3G	Third Generation
4	3GPP	Third Generation Partnership project
5	4G	Forth Generation
6	ADSL	Asymmetrical Digital Subscriber Line
7	AMD	Advanced Micro Devices
8	ANS	American National Standards
9	ANSI	American National Standards Institute
10	APT	Asia-Pacific Telecommunity
11	ASIC	Application Specific Integrated Circuit
12	ATCA	Advanced Telecommunications Computing Architecture
13	ATMP	Assembly, Testing, Packaging And Marking
14	BCG	Boston Consulting Group
15	BIMTS	Board Of Indian Mobile Terminal Standards
16	BOM	Bill Of Material
17	BSC	Base Station Controller
18	BSO	Basic Service Operator
19	BSS	Base Station Subsystem
20	BTS	Base Transceiver Station
21	BWA	Broadband Wireless Access
22	CAGR	Compound Annual Growth Rate
23	CAPEX	Capital Expenditures
24	CARC	CDOT-Alcatel Research Center
25	CCS7	Common Channel Signalling 7
26	CDMA	Code Division Multiple Access
27	CDOT	Center for Development of Telematics
28	CENVAT	Central Value-added Tax
29	CFC	Capital Finance Corporation
30	CII	Confederation of Indian Industry
31	CKD	Completely Knocked Down
32	CLS	Cable Landing Station
33	CMS	Contract Manufacturing Services
34	CMTS	Cellular Mobile Telephone Service
35	CN	Core Network
36	CPE	Customer Premises Equipment
37	CSA	Canadian Standards Association

38	CSIR	Council of Scientific and Industrial Research
39	CST	Central Sales Tax
40	CVD	countervailing duty
41	DAS	Distributed Antenna System
42	DC	Direct Current
43	DEPB	Duty Entitlement Pass Book Scheme
44	DGCIS	Directorate General of Commercial Intelligence and Statistics
45	DIT	Department Of Information Technology
	DMP	Domestic Manufactured Product
46	DOT	Department Of Telecom
47	DSIR	Department of Scientific & Industrial Research
48	DSL	Digital Subscriber Line
49	DSLAM	Digital Subscriber Line Access Multiplexer
50	DST	Department of Science and Technology
51	DTA	Domestic Tariff Area
52	DTMF	Dual-Tone Multi-Frequency Signaling
53	DWDM	Dense Wave Division Multiplexing
54	DXC	Digital Cross Connect
55	EBITDA	Earnings Before Interest, Taxes, Depreciation And Amortisation
56	EDGE	Enhanced Data rates for GSM Evolution
57	EFTA	European Free Trade Association
58	EIL	Engineers India Limited
59	EIR	Equipment Identification Register
60	EMC	Electromagnetic Compatibility
61	EMI	Electromagnetic Interference
62	EMS	Electronic Manufacturing Services
63	EPABX	Electronic Private Automatic Branch Exchange
64	ETSI	European Telecommunications Standards Institute
65	EU	European Union
66	EVDO	Evolution Data Only
67	EVP	Electronic Voice Phenomenon
68	F&F	Family and Friends
69	FAB	Fabrication
70	FAP	Femtocel Access Point
71	FDI	Foreign Direct Investment
72	FMS	Focused Market Scheme
73	FON	Fiber Optic Components
74	FPS	Focussed Product Scheme
75	FTTH	Fiber to the Home
76	FTTx	Fibre to the X

77	FVCI	Foreign Venture Capital Investors
78	GATT	General Agreement on Tariffs and Trade
79	GD Tubes	Gas Discharge Tubes
80	GDP	Gross Domestic Product
81	GGSN	Gateway GPRS Support Node
82	GMSC	Gateway Mobile Switching Centre
83	GPA	Government Procurement Agreement
84	GPON	Gigabit Passive Optical Network
85	GPRS	General Packet Radio Service
86	GRs	Generic Requirements
87	GSM	Global Standard For Mobile
88	GST	Goods and Services Tax
89	HLR	Home Location Register
90	HSPA	High Speed Packet Access
91	I/O	Input/ Output
92	IASP	International Association of Science Parks
93	IBEF	India Brand Equity Foundation
94	IBW	In-Building-Wireless
95	IC	Integrated Circuit
96	ICA	Indian Cellular Association
97	ICT	Information And Communication Technology
98	IDMs	Integrated Device Manufacturers
99	IISC	Indian Institute of Science
100	IIT	Indian Institute Of Technology
101	ILD	International Long Distance
102	IMP	India Manufactured Product
103	IMS	IP Multimedia Subsystem
104	IN	Intelligent Network
105	IP	Internet Protocol, Indian Product
106	IPPBX	Internet Protocol Private Branch Exchange
107	IPR	Intellectual property Rights
108	IRs	Interface Requirements
109	ISA	Indian Semiconductor Association
110	ISO	International Organisation for Standardisation
111	ISP	Internet Service Provider
112	IT	Information Technology
113	ITA	Information Technology Agreement
114	ITC	Industrial Training Centres
115	ITI	Industrial Training Institutes
116	ITRI	Industrial Technology Research Institute
117	ITU	International Telecommunication Union
118	JNNURM	Jawaharlal Nehru Urban Renewal Mission

119	KITVEN	Karnataka Information Technology Venture Capital Fund
120	LAN	Local Area Network
121	LED	Light-Emitting Diode
122	LTE	Long Term Evolution
123	MAT	Minimum Alternative Tax
124	MGW	Media Gateway
125	MME	Mobility Management Entity
126	MMTC	Minerals and Metals Trading Corporation of India Ltd
127	MNC	Multinational Corporation
128	MOEA	Ministry of Economic Affairs
129	MPLS	Multi-Protocol Label Switching
130	MPLS-TP	MPLS Transport Profile
131	MS	Mobile Station
132	MSAN	Multi-Service Access Node
133	MSC	Mobile Switching Centre
134	MSISDN	Mobile Station Integrated Services Digital Network
135	MVNO	Mobile Virtual Network Operator
136	NCCD	National Calamity Contingent Duty
137	NFAP	National Frequency Allocation Plan
138	NGN	Next Generation Network
139	NG-PON	Next Generation Passive Optical Network
140	NIXI	National Internet Exchange Of India
141	NLD	National Long Distance
142	NLOS	Non Line Of Sight
143	NOC	Network Operation Centre
144	NRI	Non-resident Indian
145	NSN	Nokia Siemens Networks
147	OAN	Optical Access Network
148	ODF	Optical-fiber Distribution Frame
149	ODN	Optical Distribution Network
150	OEM	Original Equipment Manufacturer
151	OFC	Optical Fibre Cable
152	OLT	Optical Line Terminal
153	ONGC	Oil and Natural Gas Corporation Limited
154	ONT	Optical Network Termination
155	ONU	Optical Network Unit
156	Opex	Operating Expense
157	OSA	Open Service Architecture
158	OTN	Optical Transport Network
159	P2P	Peer to Peer

160	PBB	Provider Backbone Bridge
161	PBB-TE	PBB Traffc Engineering
162	PBX	Private Branch Exchange
163	PC	Personal Computer
164	PCB	Printed Circuit Board
165	PCM	Pulse Code Modulation
166	PDCP	Packet Data Control Protocol
167	PDH	Plesiochronous Digital Hierarchy
168	PDN	Packet Data Network
169	PLC	Power Line Communication
170	PLMN	Public Land Mobile Network
171	PON	Passive Optical Network
172	POTP	Packet Optical Transmission Platform
173	PPP	Public-Private Partnership
174	PSK	Phase Shift Keying
175	PSTN	Public Switch Telephone Network
176	PSU	Public Sector Undertaking
177	PV	Photovoltaic
178	QoS	Quality Of Service
179	QPSK	Quadrature Phase-Shift Keying
180	R&D	Research And Development
181	RAN	Radio Access Network
182	RAT	Radio Access Technologies
183	RAX	Rural Automatic Exchange
184	RF	Radio Frequency
185	RFID	Radio Frequency Identification
186	RLC	Radio Link Control
187	RLU	Remote Line Unit
188	RNC	Radio Network Controller
189	ROADM	Reconfigurable Optical Add-Drop Multiplexer
190	ROW	Right Of Way
191	RPR	Resilient Packet Ring
192	SAD	Special Additional Duty
193	SAE	System Architecture Evolution
194	SAMTECH	Semiconductor Manufacturing Technology
195	SBC	Session Border Controller
196	SCL	Semi Conductor India Limited
197	SDH	Synchronous Digital Hierarchy
198	SDO	Standard Development Organisation
199	SEBI	Securities and Exchange Board of India
200	SEZ	Special Economic Zone

201	SGSN	Serving GPRS Support Node
202	SGW	Signalling Gateway
203	SIPS	Special Incentive Package Scheme
204	SKD	semi-knocked Down
205	SLA	Service Level Agreement
206	SME	Small and Medium Enterprise
207	SMSC	Short Message Service Center
208	SONET	Synchronous Optical Networking
209	ST	Sales Tax
210	STM	Synchronous Transport Modules
211	STP	Signal Transfer Point
212	STPI	Software Technology Parks of India
213	SWOT	Strengths, Weaknesses, Opportunities And Threats
214	TAM	Total Available Market
215	TAX	Trunk Automatic Exchange
216	TCIL	Telecommunications Consultants India Ltd
217	TCL	Telecom Certification Lab
218	TCOE	Telecom Centres of Excellence
219	TD-CDMA	Time Division Synchronous CDMA
220	TDICI	Technology Development and Information Company of India Ltd.
221	TDM	Time Division Multiplexing
222	TDRC	Telecom Development Research Corporation
223	TEC	Telecom Engineering Center
224	TEPC	Telecom Equipment and Services Export Promotion Council
225	TI	Texas Instruments
226	TM	Total Market
227	TMDC	Telecom Manufacturing Development Corporation
228	TRAI	Telecom Regulatory Authority Of India
229	TRIMs	Trade Related Investment Measures
230	TRIPs	Trade Related Aspects of Intellectual Property Rights
231	TSDO	Telecom Standard Development Organisation
232	TSMC	Taiwan Semiconductor Manufacturing Company
233	UASL	Unified Access Service Licence
234	UIDAI	Unique Identification Authority of India
235	UMC	United Microelectronics Corporation
236	UPS	Uninterrupted Power Supply
237	USO	Universal Service Obligation
238	USOF	Universal Service Obligation Fund
239	VA	Value Addition
240	VAT	Value Added Tax

241	VDSL	Very High Data Rate Digital Subscriber Line
242	VLR	Virtual Location Register
243	VLSI	Very-large-scale integration
244	VNL	Vihaan Networks Limited
245	VoIP	Voice Over Internet Protocol
246	VPN	Virtual Private Network
247	VSAT	Very Small Aperture Terminal
248	WCDMA	Wideband Code Division Multiple Access
249	WDM	Wavelength Division Multiplexing
250	Wi-Fi	Wireless Fidelity
251	Wi-Fi AP	wireless access point
252	WiMAX	Worldwide Interoperability For Microwave
253	WTO	World Trade Organisation
254	xDSL	X-Type Digital Subscriber Line
255	YRP	Yokosuka Research Park

Annexure I

Description of Telecom Equipment

A Wireless Equipment

1. The global market for mobile wireless infrastructure is about US $33 billion. The Indian wireless market is around Rs 7360 crore(US$1.6 billion). In India cumulative investment related to 3G is expected to be in the region of Rs 500 billion for the period 2010-15. 3G handset sales are expected to be approximately 135 million in 2015. The equipment manufacturer revenue from 3G roll out is expected to be Rs 165 billion in 2015 growing at a CAGR of 72% between 2011 and 2015[30]. The commonly used equipment in wireless network is given in Fig 2.1.

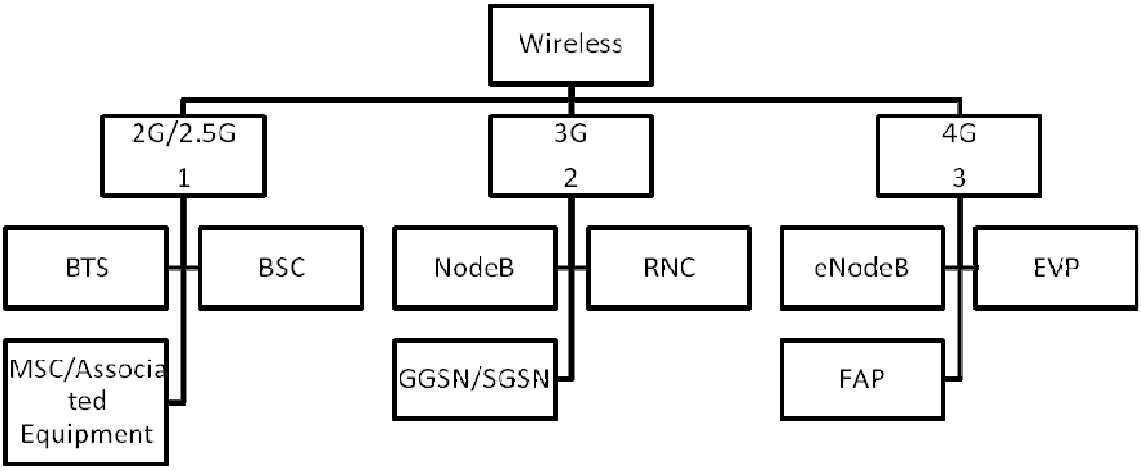


Figure AII.1 Wireless Equipment

(a) 2G Wireless

(i) Base Transceiver Station(BTS)

[30] Mobile Broadband – Outlook 2015, PWC

2. Brief Description: BTS provides radio connectivity to the mobile station. BTS is numerically the most significant component in an operator's network with highest total expenditure on installation, maintenance and upgrades among all components of the network. A GSM cell consists of one BTS and all the equipment and antennas needed to support the traffic and signalling channels for that cell. A BTS is connected to Base Station Controller (BSC) and performs many functions under its control. Various BTS configurations are used to divide the cell into sectors using directional antennas. Use of sectored cells allows service providers to accommodate more subscribers without additional expense for towers and real estate. 3G and BWA auctions are complete and major Indian operators have already launched 3G services based on HSPA technology. BWA services based on LTE may be launched later this year. The number of BTSs have shown considerable increase growing from 72,550 in March 2006 to 5,60,276 in September 2010.

    - The current market of BTS in India is about Rs 2658.8 crores.
    - Globally 5 million base stations are supposed to be added in next 5 years with roughly one million base stations added each year. India would be roughly adding 10% of these base stations. The market projections from Ovum indicate a require of Rs 2695 crore by 2015 and Rs 4286.5 crore by 2020

3. Femtocell is a small cellular base station, typically designed for use in a home or small business. It connects to the service provider's network via broadband (such as DSL or cable); current designs typically support 2 to 4 active mobile phones in a residential setting, and 8 to 16 active mobile phones in enterprise settings. A femtocell allows service providers to extend service coverage indoors, especially where access would otherwise be limited or unavailable. The concept is applicable to

all standards, including GSM, CDMA2000, TD-SCDMA, WiMAX and LTE solutions. A Femtocell Access Point consists of a base station and core network functionalities and uses femtocell to refer to the area covered by the FAP. A FAP may implement technologies like GSM/GPRS/EDGR, UMTS/HSPA/LTE and mobile WiMax. Operators are now considering investing in femtocells because of the significant benefits in terms of cost-effectiveness, local coverage and increased revenue through implementation of home-zone type services.

- The current market for FAP is estimated to be Rs 225 crore
- The projected market for 2015 and 2020 is Rs 1125 crore and Rs 2799 crore respectively

(ii)BSC

4. BSC provides the direction and coordination for allocating resources and coordinating the access of multiple mobile in a cell. It manages a large number of BTSs in the network. BSC connects to a Mobile Switching Center (MSC) and coordinates to route signalling and traffic for all mobiles in the BSCs coverage area. BSC also determines when the mobile should perform handover and to which neighbouring cell. Any transactions required between the MSC and the mobile for any communication or resource allocation are coordinated through the BSC.

- Current Status: The current market for BSCs in India is Rs 2367 crore
- Potential: The requirement in 2015 and 2020 is expected to be Rs 2400 crore and Rs 3817 crore respectively

(b) 3G Wireless

(i) RNC

5. The Radio Network Controller (RNC) is equivalent of BSCs in 3G and is responsible for controlling the Node Bs that are connected to it. It

carries out radio resource management, some of the mobility management functions and is the point where encryption is done before user data is sent to and from the mobile. The RNC connects to the MSC for circuit switched voice and to the SGSN in the Packet Switched Core Network for data. It is analogous in function to BSC of 2G/2.5 G GSM networks.

- The current market for RNC is estimated to be 263 crore
- The potential market for 2015 and 2020 is expected to be 2160 crore and 3817 crore

(ii) NodeB

6. NodeB in UMTS is equivalent of BTS in GSM. It is the part of the network that communicates directly with mobile handsets. The NodeB equipment consists of power amplifiers, digital signal processors, radio frequency transmitters and receivers and back-up batteries. It uses WCDMA/TD-SCDMA as the air interface technology. A Node B can serve several sectors, depending on the configuration and type of antenna. A Node B is connected to Radio Network Controller (RNC).

    - The current market for NodeB is estimated to be about Rs 295 crore
    - The market for 2015 and 2020 is expected to be Rs 2425 crore and Rs 4286 crore

(iii) GGSN/SGSN

7. These are used in the GPRS network. The GGSN serves as the gateway between the GPRS network and other packet networks. It is responsible for routing data to the mobile stations at their current point of attachment to the network. The Serving GPRS Support Nodes (SGSN) controls GPRS service in a particular geographical coverage area. The GSNs can be considered to be routers with GPRS functionality.

- The current market is estimated to be Rs 117.5 cr
- The market in 2015 and 2020 is expected to increase to Rs 1457 crore and Rs 2575 crore respectively

(c) 4G Wireless

(i) eNodeB

8 The evolved RAN for LTE consists of a single node, i.e., the eNodeB (eNB) that interfaces with the UE. The eNB hosts the PHYsical (PHY), Medium Access Control (MAC), Radio Link Control (RLC), and Packet Data Control Protocol (PDCP) layers that include the functionality of user-plane header-compression and encryption. It also offers Radio Resource Control (RRC) functionality corresponding to the control plane. It performs many functions including radio resource management, admission control, scheduling, enforcement of negotiated UL QoS, cell information broadcast, ciphering/deciphering of user and control plane data, and compression/decompression of DL/UL user plane packet headers.

- The potential market for eNodeB in 2015 and 2020 is expected to be Rs 403 crore and Rs 8543 crore.

(ii) MME/SGW/PDN/SAE

9 The MME is the key control-node for the LTE access-network. It is responsible for idle mode UE tracking and paging procedure including retransmissions. It is involved in the bearer activation/deactivation process and is also responsible for choosing the SGW for a UE at the initial attach and at time of intra-LTE handover involving Core Network (CN) node relocation. It is responsible for authenticating the user (by interacting with the HSS). The Non-Access Stratum (NAS) signaling terminates at the MME and it is also responsible for generation and allocation of temporary identities to UEs. It checks the authorisation of

the UE to camp on the service provider's Public Land Mobile Network (PLMN) and enforces UE roaming restrictions.

- The potential market in 2015 and 2020 is expected to be Rs 268 crore and Rs 5695 crore

(iii) IMS

10. IP Multimedia Subsystem (IMS) is a generic architecture for offering multimedia and voice over IP services, defined by 3rd Generation Partnership Project (3GPP). IMS is access independant as it supports multiple access types including GSM, WCDMA, CDMA2000, WLAN, Wireline broadband and other packet data applications**.** IMS deployment will be associated closely with LTE deployment. According to ABI Research, approximately $8.4 billion was spent on IMS during 2009. This figure that figure will rise to $17.3 billion in 2014. Leading IMS vendors such as Ericsson, Nokia Siemens Networks and Alcatel-Lucent have invested huge sums in IMS but sales so far have been sluggish. IMS deployments also face hurdles, especially due to their complexity and expenses.

(d) MSC/GMSC/HLR/VLR/SMSC

11. NSS provides all the components and the transmission facilities which make up the GSM switching Network. It consists of the MSC, VLR, HLR, Short Message Service Center (SMSC), Equipment Identification Register (EIR). The role of the NSS is to provide telecommunications services to mobile subscribers by coordinating the mobiles' mobility and routing/switching of calls and services. The GMSC is the entry point to route mobile terminated calls. The MSC performs switching coordination for all the mobiles in its geographical area. It supports one or more BSCs. It switches all calls to and from mobiles and coordinates handover. As a Gateway MSC, it acts as a network gateway to interrogate the appropriate HLR for mobile terminated calls and routes

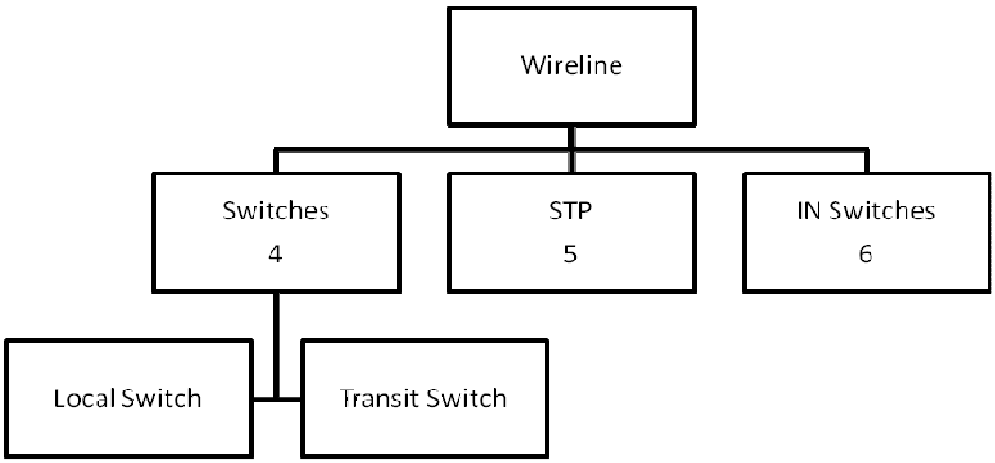
to the call to appropriate MSC. The mobile switching centres (MSC) were 613 in March 2007 and have grown to 1234 by September 2010

- The current market for NSS related equipment is Rs 1597 crores
- The market is projected to be Rs 1619 crore in 2015 and Rs 2575 crore in 2020

(f) DAS

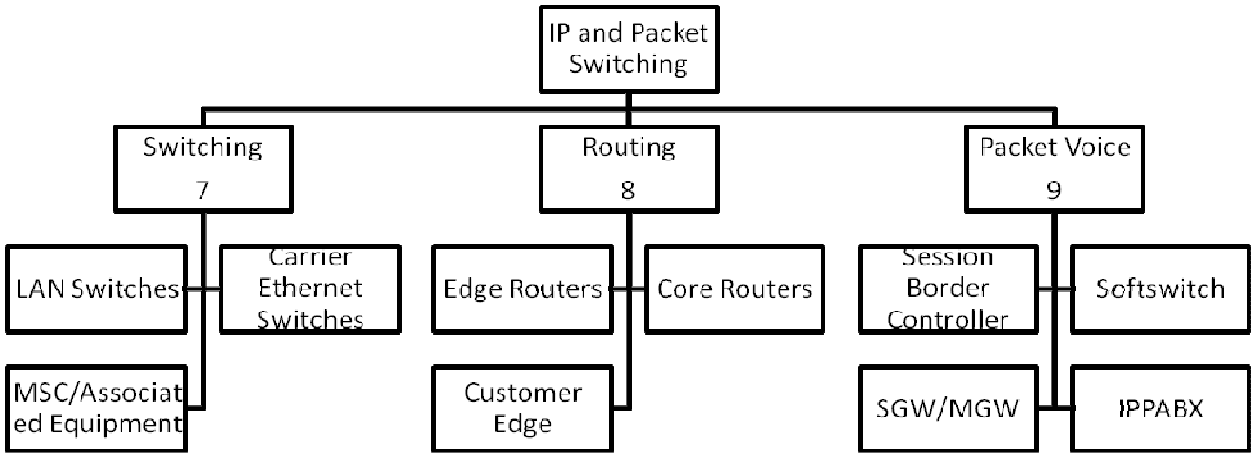
12. DAS use fiber cable within buildings to actively distribute signals to a network of small powered antennas. The system still requires a base station in the building but allows for that signal to be sent throughout the building more efficiently and more reliably by transmitting the signals from multiple locations within the building. A market for IBW solutions based on DAS has been steadily growing, and ABI Research found in a recent analysis of the subject that the market stands to top $1 billion annually by 2010. The total market size of inbuilding solutions would be US$ 15 billion by 2014 and 90% of this would be for DAS.

B: Wireline Equipment



1. In the fixed networks the total equipped switching capacity as on 31st Dec 2006 was about 58 million and in March 2010, 79 million. The fixed line connections have actually shown decline and not much investment is expected in copper cable or local switching sytems. In the long distance network, the TAX capacity of BSNL was 6.9 million ports in December 2006 which increased to 9.14 million by September 2010. The Intelligent Services platforms for offering services like freephone, televoting and virtual calling cards have been installed by most service providers in the last 5 years.

C: IP and Packet Switching



IP/Packet switching equipment:

1. The carrier grade IP and packet switching equipment are generally installed in the backbone and aggregation networks. These mainly consist of routers and LAN switches. The Voice over IP equipment primarily consists of softswitches, media and signalling gateways and session border controller.

(g) LAN Switches

2. An Ethernet switch is a network switch that transmits data at Ethernet standard rates. A network switch is another term for a device that connects different parts of a computer network together. Switches enable several users to send information over a network at the same time without collisions. Just like routers allow different networks to communicate with each other, switches allow different nodes of a network to communicate directly with each other. Switches allow the nodes to communicate in a smooth and efficient manner. India needs to develop products which can support high availability terabit switches.

Switches market is a $2 billion market globally in service provider applications. Cumulatively over next 5 years this will be a $20 billion market at the global level. In addition there is large enterprise switching market. India's LAN switching market touched $1 billion in revenues this year.

- The current market is Rs 4500 crore
- Projected market for 2015 and 2020 is Rs 10294 crore and Rs 23552 crore

(h) Routers

3. A router is a combination of hardware and software that forwards packets among networks based on information in the packet headers and routing tables. Routers are fundamental to the operation of the Internet and other complex networks. A router could be a core router or an edge router. A core router is designed to operate in the Internet backbone or core and supports multiple interfaces and routing protocols. A core router forwards packets to computer hosts within a network. In contrast an edge router routes packets between a self-contained network and other outside networks. It sits at the edge of a backbone network and connects to core routers. A router at the customer premises that connects to the provider edge router is referred to as customer edge router. We need to develop these advanced routers with terabit routing capabilities, deep packet inspection, high availability and resiliency. Router market globally is around $10.57 billion which was growing 25% YoY before the downturn. Cumulative opportunity size of this market is expected to be $83 billion by 2015.

- The current market for Core IP/MPLS routers is Rs 495 crore and for edge routers is Rs 1980 crore.

- The potential market for core routers is Rs 1768 crore and Rs 6317 crore

(i) Session Border Controller

4. A Session Border Controller (SBC) is a session management platform that controls call admission to a network at the border of that network, and optionally performs a host of call-control functions to ease the load on the call agents within the network. It may include other functionalities like policy based call routing, quality of service, fault monitoring, configuration, accounting, performance, and security functions.

- The current market for session border controllers is Rs 44.6 crore
- The potential market is Rs 130 crore in 2015 and 383 crore in 2020

(j) **MGW**

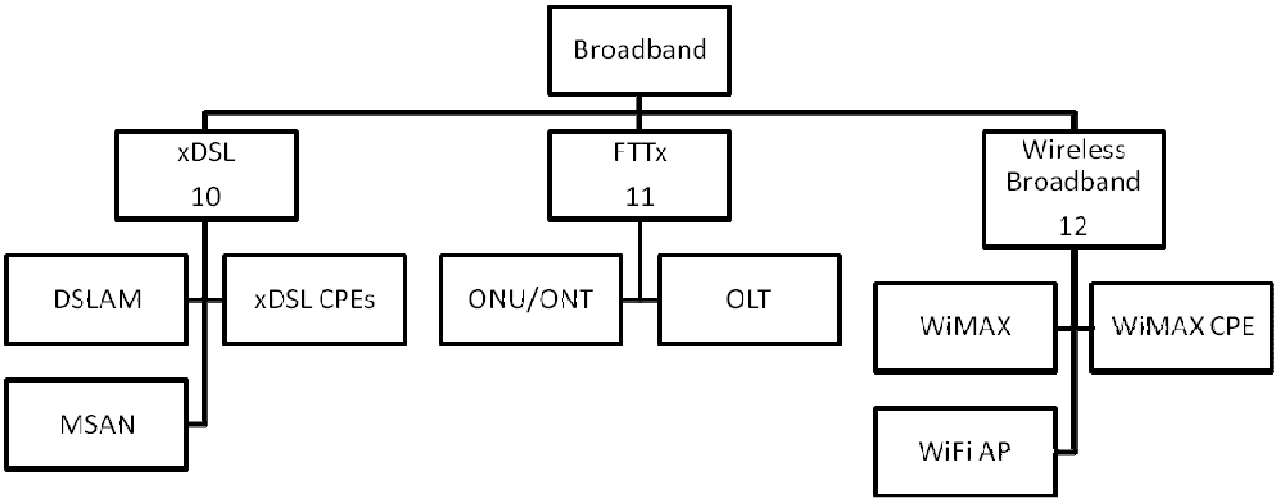
5. A Media gateway is a translation device or service that converts digital media streams between disparate telecommunications networks such as PSTN, SS7, Next Generation Networks (2G, 2.5G and 3G radio access networks) or PBX. Besides the conversion function it may also functions as an echo canceller, DTMF and tone sender. Media gateways are often controlled by a separate Media Gateway Controller which provides the call control and signalling functionality. A Signaling Gateway is a network component responsible for transferring signalling messages between Common Channel Signaling (CCS) nodes that communicate using different protocols and transports. Transport conversion is often from SS7 to IP.

(k) **SGW**

6. Over the last decade or so, the maturity of technologies that allow the carriage of toll-quality voice over packets (Voice over IP) has shown significant progress. Carriers around the world are now gradually migrating their legacy networks from TDM-based switching to packet-based “soft” switching that can result in significant capital and

operational savings through the use of a universal "converged" network for all services viz., voice, fixed/mobile broadband, enterprise leased lines and virtual private networks (VPNs). The global cumulative demand for technology products that comprise a VoIP solution such as IP EPABX equipments, Media Gateways for protocol translation, Softswitches for packet voice switching, protocol servers such as SIP servers and Session Border Controllers (SBC) for security enforcement at gateway locations etc is estimated to be ~$2.2 billion in 2010. This market will show significant growth in India over the next five years to address the challenge of cost-effectively extending mobile voice coverage to low ARPU rural areas and improving the rural teledensity. The current market for IP equipment is about Rs 5000 crore which is expected to go up to Rs 12749 crores by the year 2020.

D: Broadband



The majority of broadband connections are today given on copper using xDSL technologies. However as mentioned in the TRAI's National Broadband Plan recommendations of December 2010, out of the

proposed 160 million broadband connections by 2014 about 22 million would be on DSL, 72 million on cable and remaining on wireless. Requirement of equipment, both network and subscriber is expected to grow manifold in next 10 years.

(i) DSL:

1. Almost 87% of broadband connections use DSL-based access technologies. ADSL2+, VDSL technologies allow the user to get higher data rate through copper infrastructure. Global market for DSL technologies is around $2.6 billion in 2010. Cumulatively over next 5 years this will be of the order of $14 billion.DSL technologies use DSL modems on the customer premises and DSLAM equipments at the customer premises. Considering the low penetration of broadband in the country (approx 10.7 million connections in 2010), and the government investments in National Broadband (NBN), there is expected to be significant demand for these technology products in the next five years.

(ii) **Cable**

2. Approximately 7% of broadband connections in the country use cable technologies for Internet access. Cable services primarily involve the installation of a set-top box at the customer premises and a CMTS equipment at the exchange office. Global CMTS market was ~$1 billion in the current year and is expected to be cumulatively $6.1 billion in the next 5 years.

(iii)**PON**

3. Building next generation knowledge based society would require providing high speed connection to each and every citizen of the country. Governments around the world are kick starting mechanism to provide 100s of Mbps broadband connectivity through GPON, GEPON and WDM-PON by building optical fibre connectivity to each and every

household. Global market for xPON is around $3.1 billion with cumulative opportunity of around $24 billion. This excludes the effect of broadband stimulus packages announced by various governments after the onset of recession.

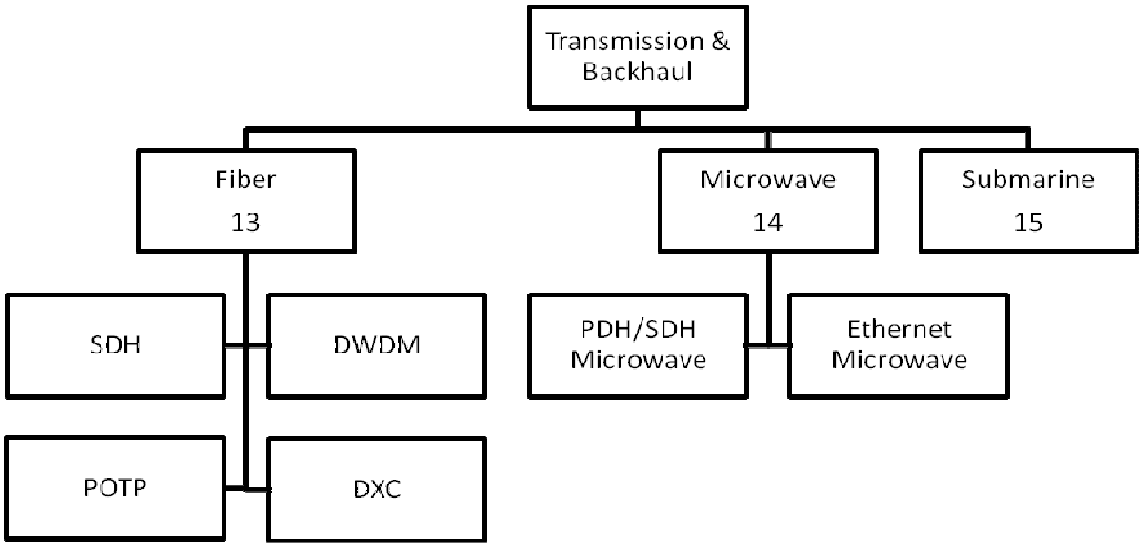
(iv) **Ethernet FTTx**

4. Point-to-Point Ethernet is also used for broadband access. Approximately 4% of Internet connections in India use this technology as broadband can be provided efficiently in high rise buildings using direct Ethernet to home. Globally this is a $170 million market with a cumulative market size of around $1 billion in the next 5 years.

(v) **WiMaX/WiFi CPE**

5. This is used to provide fixed or mobile broadband services to residential customers over airwaves. This is becoming increasingly popular in India to provide last mile connectivity to the customer especially in rural areas. The WiMAX/WoFO CPE demand is expected to be of the order of Rs 4200 crore by the year 2020

E: Backhaul and transmission



(i) **SDH/DWDM**

1. SDH (Synchronous Digital Hierarchy) is a standard technology for synchronous data transmission on optical media. It provides faster and less expensive network interconnection than traditional PDH (Plesiochronous Digital Hierarchy) equipment. SDH uses the following Synchronous Transport Modules (STM) and rates: STM-1 (155 megabits per second), STM-4 (622 Mbps), STM-16 (2.5 gigabits per second), and STM-64 (10 Gbps). Dense wavelength division multiplexing (DWDM) is a technology that puts data from different sources together on an optical fiber, with each signal carried at the same time on its own separate light wavelength. Using DWDM, 80 or more separate wavelengths or channels of data can be multiplexed into a light stream transmitted on a single optical fiber. Each channel carries a time division multiplexed (TDM) signal. Long distance high capacity transmission of both voice and packet traffic require optical transmission based on SDH/DWDM. These networks provides sub-50ms resiliency against fibre failure and provide excellent OAM capabilities to localise faults. Higher capacity requirements in long distance transmission are enabled using newer technologies like OTN and ROADM capabilities. Global SDH/DWDM market is $15 billion and is expected to be cumulatively $100 billion in

next 5 years growing at a CAGR of 4.3%. Ultra Long-Haul DWDM equipments are also used for high-capacity undersea transmission across countries and continents and was a $775 million market in 2010 growing at 13% CAGR in Asia-pacific.

Carrier Ethernet

2. It brings the compelling business benefit of the Ethernet cost model to achieve significant savings while enabling new distributed applications for Enterprises and accelerating deployment. For Service Providers it provides a set of certified network elements that connect to transport Carrier Ethernet services for all users, locally & worldwide. Increasing amount of data traffic especially in cities require an overlay transmission network based on Carrier Ethernet. For this investment has to be made for designing equipments which can provide Connection oriented and connectionless Ethernet based on PBB/PBB-TE/MPLS, OAM&P capability based on CFM & Y.1731, Synchronisation based on SyncE and PTP. This market constitutes a segment within the switch market mentioned above and is growing rapidly.

POPT

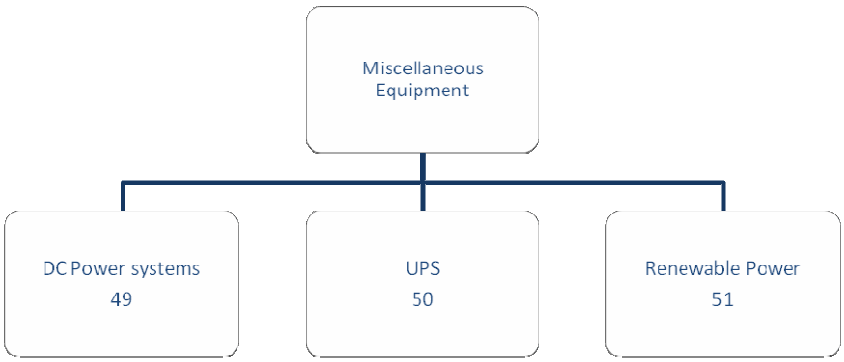
3 POTP(Packet Optical Transmission Platform) and is also referred to as CPO in the optical industry. As per Ovum this most packet-capable evolution of aggregation platforms is focused on providing “Carrier Ethernet” capability. It may use MPLS/MPLS-TP or PBB-TE encapsulation for data service management and sometimes also includes integrated WDM. POTP typically provides aggregation and switching for SDH/SONET and packet traffic, but transport of one or the other may or may not be native. These products typically provide flexible and dynamic allocation of TDM and packet bandwidth, either through a universal/hybrid central switching matrix or through a matrix distributed on I/O cards; the long-term trend is likely towards a universal/hybrid approach. The global market for POTP was $1.55

billion in 2010 and is expected to grow at a high CAGR of 34% over the next five years

Microwave

4 India uses predominantly microwave based technologies for backhauling traffic from the base station to the fibre location. The initial PDH/SDH radios are being upgraded with Hybrid or IP/Ethernet radios to cater to the increasing data backhaul requirement from the base station. Hybrid radio is used to provide native transport of circuit switched traffic along with transport of low data rate backhaul. IP/Ethernet radio is used to backhaul high data rate. Global microwave backhaul is currently a $6.2 billion market and cumulatively it is expected to procure equipments worth $44 billion in next 5 years. Of this Hybrid and IP/Ethernet is estimated to be $20 billion in the next 5 years.

F: Miscellaneous



Annexure II

Representative List of Products

Wireless Equipment	ANDSF	**Backhaul & Transmission**
BTS – Macro/Micro/Pico/Femto	CRF	SDH/DWDM
BSC	Mobile phones	Add-drop Mux
MSC/GMSC	IMS core	DxC
SMSC	Tower	Carrier Ethernet
AuC/EIR/HLR/VLR	Antenna	Packet Optical Platform
GGSN	Distributed Antenna System	Microwave/Radio
SGSN		Submarine systems
CGF/SRF/SCF	**IP/Packet switch**	
Node B	Router- P/PE/CE	**Broadband Equipment**
RNC	LAN Switch	xDSL CPE
HSS	BNG	DSLAM
FAP	Session Border Controller	WiMAX RAN
eNodeB	IP PABX	WiMAX CPE
Serving Gateway	MGW	WiFi
Packet Data Gateway	SGW	MSAN
SAE	Softswitch	**Miscellaneous**
MME	SIP Server	DC Power Systems
Optical Fiber	Optical Amplifier	UPS
Fibre and accessories	Photonic Switches	Renewable Power
ODF		
FTTx	**Wireline Equipment**	
ONT	Fixed Line Switches	
ONU	MDF/DDF	
Optical Splitters	AIN System	
Optical Attenuator	IP STP	

Annexures III

List of companies who have invested in India

Sl. No.	Name of the Indian Company	Foreign Country	Activities	FDI
1	Hughes Escorts Communication Ltd		V-SAT equipment/services in India	74%
2	Aircel Ltd.	Mauritius	CMTS	74%
3	BT Telecom India Pvt. Ltd	Mauritius	ILD, NLD	74%
4	AT&T Global Network Services India Pvt. Ltd.	USA	ISP, ILD, NLD	74%
5	Reliance Communication Ventures Ltd.	FIIs	CMTS	74%
6	Bharti Airtel Ltd.	Mauritius /FIIs /OCBs /NRIs	CMTS	74%
7	Chorus Call Inc.	USA	tele-conferencing	51%
8	Hutchison Essar Ltd.		CMTS	68.1%
9	Essar Telecom Investments Ltd.	Mauritius	Investing company	99%
10	Spice Communications Pvt. Ltd.	Mauritius	CMTS	74.0%
11	Idea Cellular Ltd.	FIIs, FVCIs	CMTS	74%
12	Worldcom Communications (I) Pvt. Ltd.	Singapore	ISP	74%
13	Reliance Communication Pvt. Ltd.	GDR	CMTS	74%
14	India Holdco(Essar Communications)	Mauritius	Investing company	100%
15	Cable & Wireless Networks India Pvt. Ltd.	UK	ILD, NLD	74%
16	BT Telecom India Pvt. Ltd	Mauritius	ILD, NLD	74%
17	Essar Spacetel Ltd. (now Vodafone Essar Spacetel Ltd.)	Netherlands	CMTS and UASL	74%
18	Vodafone Essar Gujarat Ltd.	Netherlands	CMTS and UASL	74%
19	Vodafone Essar Cellular Ltd.	Netherlands	CMTS and UASL	74%
20	Vodafone Essar Mobile Services Ltd.	Netherlands	CMTS and UASL	74%
21	Vodafone Essar South Ltd.	Netherlands	CMTS and UASL	74%
22	Vodafone Telecom East Ltd.	Netherlands	CMTS and UASL	74%
23	Vodafone Essar Digilink Ltd.	Netherlands	CMTS and UASL	74%
24	Equant Network Services India Pvt. Ltd.	France	ISP	74%
25	Sistema Joint Stock Financial Corporation	Russia	UASL	41%
26	Global Assets Holdings Corporation P. Ltd.	Malaysia	Network Services	49%

27	Ortel Communication Ltd.	Mauritius	Network Services	71%
28	Hathway Cable & Datacom Pvt. Ltd.	Mauritius	Cable TV Network	37%
29	Devas Multimedia Pvt. Ltd.	USA	ISP – operating cum holding	70%
30	SingTel Australia Holding Pte ltd	Singapore	Internet, IT consultancy services etc.	74%
31	ExlServices.com (India) Pvt. Ltd	USA	internet and voice based customer care	74%
32	Hathway Cable & Datacom Pvt. Ltd.	Mauritius	Cable TV Network	43%
33	Aditya Birla Telecom Ltd	Mauritius	CMTS	68%
34	Essel Shyam Communication Ltd	CCPS	uplinking services, VSAT services	49%
35	Den Network Ltd	FIIs, FVCI, VCF	cables distribution and internet services	49%
36	Equnat Network Services India Pvt. Ltd	Netherlands	ILD/NLD/ISP	74%
37	Alcatel-Lucent India Ltd	France	telecom based services	67%
38	Tata Teleservices (Maharashtra) Ltd	Japan	telecom services	20%
39	Tata Teleservices Ltd	Japan	Telecom services	26%
40	Bharti telemedia Ltd	NRI/OCB	Teleport Activity	48%
41	Pacific Internet India Pvt. Ltd.	Singapore	ISP	74%
42	Telecordia Technologies Inc	USA	MNP Solutions	74%
43	Asianet Satellite Communications Ltd.	Mauritius	Teleport Activity	48%
44	Broadband Pacenet India Pvt. Ltd	Cyprus	ISP	45%
45	Tikona Digital Networks Pvt. Ltd.	-	ISP	70%
46	Vodafone Essar Spacetel Pvt. Ltd.	-	ILD/NLD/ISP	74%
47	Powermax Communications	USA	Broadband communications services	74%
48	Unitech Wireless	Singapore	UASL	67%
49	Devas Multimedia Pvt. Ltd.	Mauritius	ISP	74%
50	Scorpios Beverages Pvt. Ltd.	Cayman Island	Investing company	49%
51	AG Mercantile Company Pvt. Ltd.	Cayman Island	Investing company	49%
52	Telecom Investments Indian Pvt. Ltd.	Cayman Island	Investing company	49%
53	Sistema Shyam Teleservices Ltd.	Russia	UASL	74%
54	Tikona Digital Networks Pvt. Ltd.	Mauritius	ISP	69%

Annexure IV

Relevant WTO Provisions[31]

The WTO agreements cover goods, services and intellectual property. They spell out the principles of liberalisation, and the permitted exceptions. They include individual countries' commitments to lower customs tariffs and other trade barriers, and to open and keep open services markets. They set procedures for settling disputes. These agreements prescribe special treatment for developing countries (For example **extra time** is allowed for developing countries to fulfill their commitments in many of the WTO agreements, export subsidies are allowed where per capita income of a country is less than 1000 dollars). They require governments to make their trade policies transparent by notifying the WTO about laws in force and measures adopted, and through regular reports by the secretariat on countries' trade policies.

The basic structure of the WTO agreements is divided in various parts. The umbrella WTO Agreement is for establishing WTO, GATT deals with goods, GATS with services and TRIPS with intellectual property. There is an agreement for settling disputes and trade policy reviews ensure transparency. The overall structure of WTO is represented by following diagram.

WTO Framework

The basic structure of the WTO agreements: how the six main areas fit together — the umbrella WTO Agreement, goods, services, intellectual property, disputes and trade policy reviews.

Umbrella	**AGREEMENT ESTABLISHING WTO**		
	Goods	Services	Intellectual property
Basic principles	**GATT**	**GATS**	**TRIPS**
Additional details	Other goods agreements and	Services annexes	

[31] www.wto.org

	annexes		
Market access commitments	Countries' schedules of commitments	Countries' schedules of commitments(and MFN exemptions)	
Dispute settlement	**DISPUTE SETTLEMENT**		
Transparency	**TRADE POLICY REVIEWS**		

Telecommunication services fall under GATS. Commitments in telecommunications services were first made during the Uruguay Round (1986-94), mostly in value-added services. In post-Uruguay Round negotiations (1994-97), WTO members negotiated on other telecommunications services. Since then, commitments have been made by new members while signing the WTO agreement , or unilaterally at any time.

Since the question at hand is about manufacturing of equipment, which falls under "Goods", agreements signed under GATT will apply. As far as patents, copyrights, trademarks etc, related to technology, processes, design etc for manufacturing, are concerned these will be covered under TRIPS. For providing incentives we need to ensure that these incentives are in accordance of the provisions under GATT.

Most relevant article to be complied while providing some concessions to domestic manufacturers will be Article III which deals with National Treatment on Internal Taxation and Regulation.

GATT Article III:

Para 1. The [Members] recognise that internal taxes and other internal charges, and laws, regulations and requirements **affecting the internal sale, offering for sale, purchase**, transportation, distribution or use of products, and internal quantitative regulations requiring the mixture, processing or use of products in specified amounts or proportions, **should not be applied to**

imported or domestic products so as to afford protection to domestic production.

Para 2. The products of the territory of any contracting party imported into the territory of any other contracting party **shall not be subject**, directly or indirectly, **to internal taxes or other internal charges of any kind in excess of those applied**, directly or indirectly, **to like domestic products**. Moreover, no contracting party shall otherwise apply internal taxes or other internal charges to imported or domestic products in a manner contrary to the principles set forth in paragraph 1.*

Para 4. The products of the territory of any [Member] imported into the territory of another [Member] shall be accorded **treatment no less favourable than that accorded to like products of national origin in respect of all laws, regulations and requirements** affecting their internal sale, offering for sale, purchase, transportation, distribution or use.

Para 5. **No contracting party shall establish or maintain any internal quantitative regulation** relating to the mixture, processing or use of products in specified amounts or proportions which requires, directly or indirectly, that any specified amount or proportion of any product which is the subject of the regulation must be supplied from domestic sources. Moreover, no contracting party shall otherwise apply internal quantitative regulations in a manner contrary to the principles set forth in paragraph 1.*

Para 7. No internal quantitative regulation relating to the mixture, processing or use of products in specified amounts or proportions shall be applied in such a manner as to allocate any such amount or proportion among external sources of supply.

Para 8. (*a*) The provisions of this Article (we read Article III on national treatment) **shall not apply to laws, regulations or requirements governing the procurement by governmental agencies** of products purchased for

governmental purposes and not with a view to commercial resale or with a view to use in the production of goods for commercial sale.

(*b*) **The provisions of this Article shall not prevent the payment of subsidies exclusively to domestic producers**, including payments to domestic producers derived from the proceeds of internal taxes or charges applied consistently with the provisions of this Article and subsidies effected through governmental purchases of domestic products.

Moreover, there is a separate agreement called Government Procurement Agreement (GPA) under WTO which deals with obligations under government procurement. India had not signed the GPA but India has been accepted as observer to this agreement with effect from 10-2-2010 (The legal meaning of observer vs signatories could not be clarified). In that case government procurements are not bound by article III of GATT and can be decided to suit local requirements.

As regards inverted duty structure on components, for most of the components the inverted duty structure has been resolved by DIT. Only for few components which have dual use the inverted duty structure still exists. Further, for 213 items which are part of ITA list of WTO the duty is already zero. If a case of a component is to be taken up it should be represented to DIT which in turn will take up the same with revenue department for rationalisation.

Annexure V

Research Parks

2.74 Yokosuka Research Park was established in April 1993 in an area of 61.7 hectares with a paidup capital of 5 billion yen in Hikarino-oka, City of Yokosuka. There are 66 (Research institute:57)(as of Jun. 2009. The basic purpose was to formulate comprehensive R&D policies and plan R&D projects to make it attractive to the participating R&D Organisations. It cooperates and coordinates with counterparts both domestically and overseas in R&D activities. It plans and implements works that support the development of telecommunications technology which it will commercialise in the future. Numerous national and private (both domestic and overseas) research organisations specialising in radio telecommunication technology have located themselves in YRP. Activities at YRP

- Research and Development in technological fields which utilise radios waves, such as mobile communications, satellite communications, wireless optic communications, etc. Technological resource development for the exploitation of unutilised frequencies and the efficient use of currently utilised frequencies. Research and development into the standardisation of technical standards, terminals, and personal digital communications relating to radio and telecommunication.

- Collaborative Research designs and procurement, Technical exchange with overseas technical personnel, The R&D Committee is currently deliberating matters concerning specific areas of cooperative research.

- Personnel training: Training of researchers and technical personnel in telecommunications.

- Community Information Systemisation Support: Information and Exchange support for small and mid-size companies. Advancement of Community Information Systemisation

- YRP Academia collaboration

3.24 Yokosuka Telecom Research Park, Inc. (YRP Inc.) has established an interoperability testbed, which is used as "The Development Supporting Platform for 2G and 3G Mobile Terminals for Global Markets. The YRP-IOT testbed provides a suitable environment for the first time in Japan to develop and verify 2G and 3G GSM and W-CDMA terminals for global markets. This eliminates the need for Japanese mobile operators and manufacturers to go overseas to test their products, thereby cutting down the development cost and time-to-markets.

3.25 Another example is that of Industrial Technology Research Institute (ITRI). Founded in 1973 ITRI was established from the merger of three research organisations of the Ministry of Economic Affairs (MOEA), Union Industrial Research Laboratories, Mining Research & Service Organisation, and Metal Industrial Research Institute. ITRI - is an applied research organisation across multiple industrial technology fields. In over thirty years ITRI has been dedicated to research and development and industrial services etc., and continued to assist the government in executing industrial technology policies and promoting industrial development by nourishing industrial technology capabilities. Since its establishment, ITRI is devoted to R&D closely relevant to the industries and makes great effort to improve domestic industrial technologies.

ITRI has three mission statements: first, to expedite the development of new industrial technology; two, to aid in the process of upgrading industrial technology techniques; and three, to establish future industrial technology. The focus areas are: Communication and

Optoelectronics, Precision Machinery and MEMS, Materials and Chemical Engineering, Biomedical Technology, Sustainable Development, and Nanotechnology. Focus on these six major fields will lay down the foundation for innovative research in the future of technological industry, and hence, transform our domestic industry into global bedrock for technological innovation

3.26 As the global market becomes increasingly competitive, ITRI plans to take advantage of future opportunities. ITRI's position in industrial technology industries is no longer simply a scientific research institute; it is actually an organisation that leverages advance technology for economic improvement to bring about industrial development. With generating economic values as the starting point, ITRI hopes to transform Taiwan from a technology leader to a valued pioneer, changing Taiwan from “production” to “creation”. In the future, ITRI will strive to strengthen technological innovation and value creation ability, such that ITRI can be the technological pioneer, forging a path for all technological industries. ITRI's mission is to become an innovative world-class institution that creates technological value Bedrock for every technological entrepreneur start-ups.

[i] Policy recommendations to increase telecom growth and export of telecom equipment & services - TECP

सत्यमेव जयते

भारतीय दूरसंचार विनियामक प्राधिकरण
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TELECOM REGULATORY AUTHORITY OF INDIA
Mahanagar Doorsanchar Bhawan, Jawahar Lal Nehru Marg,
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Fax : 91-11-23213294

No. 802-1/2011-TDRA

3rd May, 2011

To
The Secretary,
Department of Telecommunications,
Ministry of Communications & Information Technology,
Sanchar Bhawan,
New Delhi-110 001.

Subject: Corrigendum to the TRAI's recommendation on Telecom Equipment Manufacturing Policy dated 12.04.2011.

Sir,

Kindly refer to the letter No. 802-1/2011- TDRA dated 13.04.2011 of Chairman, TRAI through which TRAI had sent its recommendations on "Telecom Equipment Manufacturing Policy".

2. It has been noticed that some minor errors have inadvertently crept into one of the figures, one table and an annexure. Annexure to this letter contains the corrigendum which indicates the corrected versions of the same.

3. In view of the above DOT is requested to take cognizance of these corrections in the recommendations.

4. This letter along with the Annexure is being uploaded on the TRAI website www.trai.gov.in.

With regards,

Yours faithfully,

(R.K. Arnold)
Secretary

Annexure

Corrigendum to the TRAI's recommendations on "Telecom Equipment Manufacturing Policy" dated 12.04.2011

1. Page 38: Figure 1.10 following Paragraph 1.32 depicts production figures while the paragraph itself deals with the projected demand. The correct figure is given below:

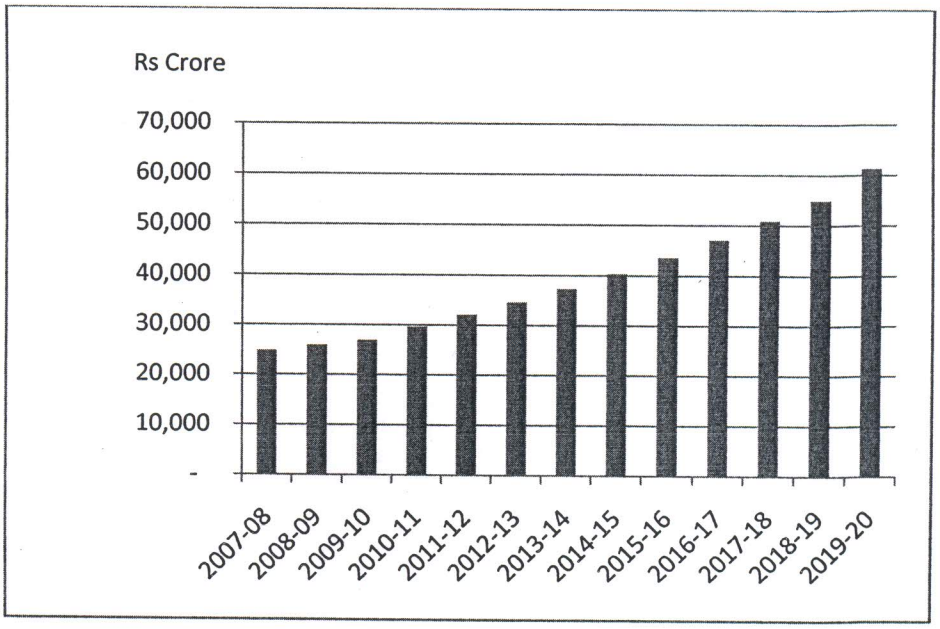

Figure 1.10 Projected Demand for Mobile Handsets

2. Page 43: In Paragraph 1.39 a reference has been made to an indicative list of companies and their revenues as being contained in Annexure III. This annexure was, however, inadvertently left out. An indicative list of companies and their revenues is now placed at Annexure VI. The reference in Paragraph 1.39 will change to " An indicative list of companies and their revenues are at Annexure VI)

Annexure VI

List of Companies and their Revenues

Indian Product Companies		
Technology	**Indian Product Companies**	**Cumulative revenues of last 3 years (Rs Crore)**
Optical Transmission	Tejas Networks, Fibcom, UTL Ltd., Ordyn, Coral Telecom	2500
IP Switches/Routers/EPABX/Access	Coral telecom, Matrix Telecom, Realtime Systems, Valiant, CDOT, BEL	500

Wireless Infrastructure-GSM/Wimax/others	Vihaan Networks, Midas Communications, CDOT, Sloka Networks, Coral Telecom	500
Antenna, Radios RF products	Bharat electronics Ltd (BEL), Shyam telecom, Kaveri Telecom, ECIL	500
Indian Manufactured Product Companies		
Technology	**Companies**	**Cumulative revenues of last 3 years(Rs Crore)**
Optical Transmission	Tellabs, NSN, HFCL	500
Wireless Infrastructure-GSM/Wimax/others	Ericsson, NSN, ITI (for Alcatel-Lucent), Motorola	20000
IP Switches/EPABX/Access	Avaya, MRO-Tek	500
Mobile Handsets	Nokia, Motorola, Samsung, LG	5000
Antenna, Radios RF products	Andrews, HCL Comnet, Shilpi	2500

3. Page 187: In Table 5.5 accruals from testing and certification agency were inadvertently mentioned on annual basis while all other figures are for the period upto 2020. This figure may be read as Rs 377 crore in place of Rs 40 crore and the total accrual as Rs 9,99,044 crore instead of Rs 9,98,707 crore. Corresponding changes in paragraph 2.48 at page no 82 are given below:

   "Setting up of a testing and certification organisation would require facilities such as test networks, network simulation equipment, test beds, test chambers, test and measuring equipment and so on. The initial funding to an extent of Rs 100 crore required to set up the agency would have to be borne by the Government. The test agency will get revenues from testing and certification activities. If the total production less exports of the telecom network equipment is Rs 543,608 crore and imports are Rs 399,158 crore and 2% of the total production and imports are tested then this will amount to Rs 18,855 crore worth of equipment. Presuming 2% as the testing fee, the total accrual upto the year 2020 would be about Rs 377 crore."