From: Prof. Rekha Jain <rekha@iimahd.ernet.in>
Date: Wed, Jan 26, 2011 at 10:10 AM
Subject: Comments on the Consultation on Encouraging Telecom Equipment Manufacturing in India
To: lavgupta@gmail.com, pradvtdra@trai.gov.in
Cc: J Jena <jjena@coai.in>, Varun_Incights <varun_iitcoe@iimahd.ernet.in>

Dear Mr Lav Gupta

Please refer to our telecon. I am enclosing the comments on the above subject for TRAI's consideration.

I apologize for the delay as I thought that that the last day was January 28th, 2011.

Also, I request that you put us on a mailing list so that we have the latest info from TRAI.

I do hope you will find the contribution useful.

In case you have any queries, do let me know.

Thanks

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Comments_on_TRAI_Consultation _Paper_Telecom_Equipment_Manufacturing 2011.pdf
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Comments on TRAI's Consultation Paper on Encouraging Telecom Equipment Manufacturing in India dated 28th December, 2010

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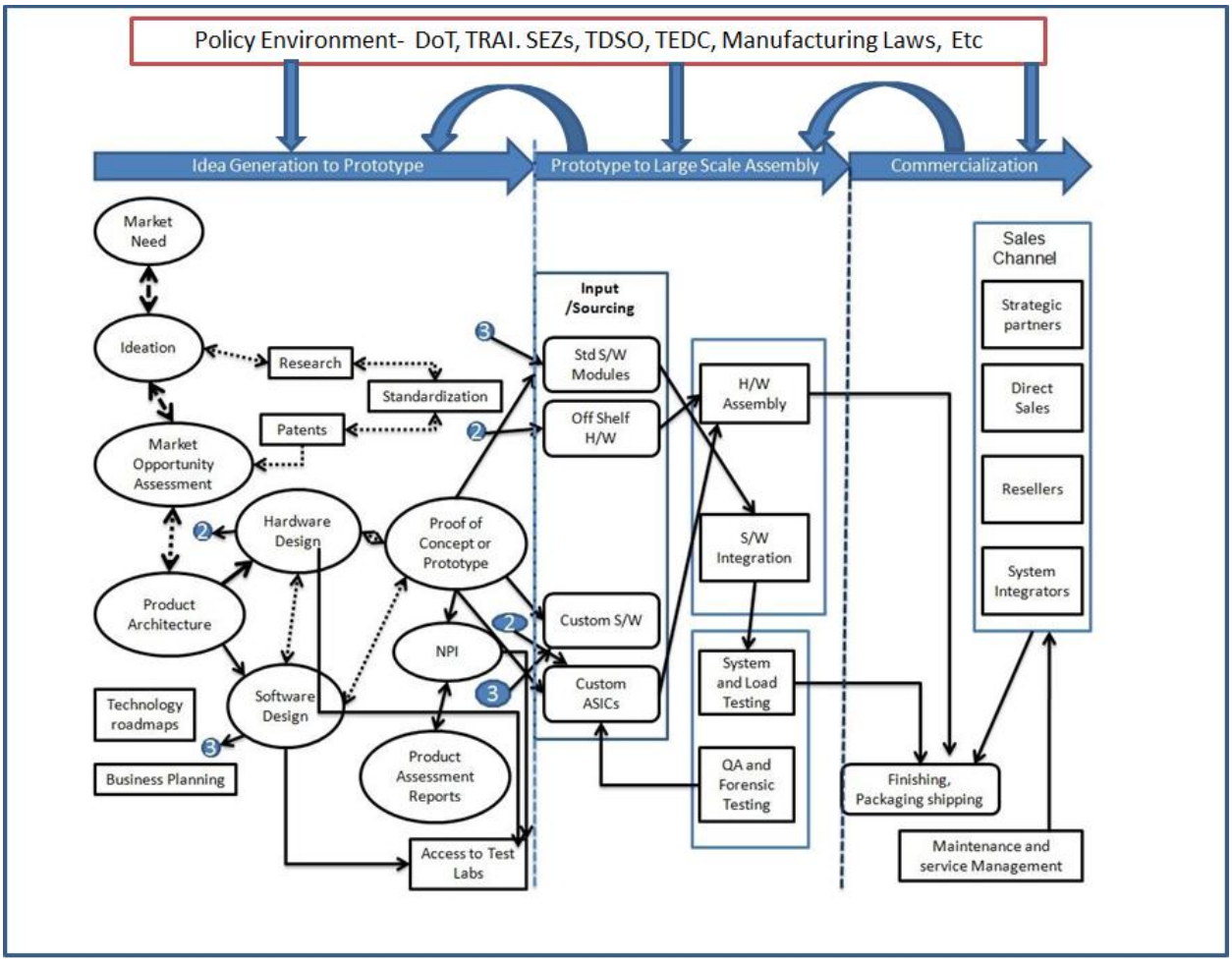
Start-ups in telecom industry face competition from globally recognized companies like NSN, Ericsson, Huawei, Alcatel Lucent and others. To understand a policy objective in this environment, we have used the value maps as shown in the figure below along with key resource requirement for different phases for effective policy implementation. The approach to support Telecom Equipment Manufacturing should involve a number of key steps taken in coherence. These includes funding and setting up research universities focusing on telecom (like Korea, Taiwan), setting up SEZ's, telecom clusters and incubators and working with custom and tax authorities.

We would also like to highlight the following two important considerations for the policy brief:

Innovation and entrepreneurship do not exist in a vacuum. An ecosystem consisting of various institutions, networks, processes, designed to support product creation, adoption and ensuring financial viability is important.

Innovation ecosystem should be designed to capture the local scientific, academic and research base effectively.



Idea Generation to Prototype	Prototype to Large Scale Assembly	Commercialization
Need for Public Funding, Mentoring, Networking, Incubation, etc		
Mentoring, Access to Incubation Labs, Access to Learning Centre's	Testing and Certification Labs, Stronger IP Protection	Alliance with International vendor
Understanding of Law, Market Gaps, Opportunities, etc.	Access to ASIC's	Tax Incentives
	SEZ,s, Clusters, Fabrication Unit	
Funding from Incubators	Angel Funding	Venture Capital Funding

*These Requirements are not tightly linked to the Phases.

The details of different aspect of value map are given below. The steps are not sequential with iteration possibilities at each stage.

Ideation to Prototype

This refers to the stage where new ideas and product concept are created and tested. The following are important elements within this phases:

1. *Market Need:* This is the time when an entrepreneur discovers the customer needs within the telecommunication ecosystem. The need may be due to the unavailability of the products for a particular problem or it can be with the way the problems are being solved currently.

2. *Ideation:* This refers to the way entrepreneur would want to solve the current problems.

3. *Research:* This refers to the stage when an entrepreneur's explore the ecosystem required for creating the solution including efforts required for solving the current problem.

4. *Designing the Product Architecture:* This entails the complex process of developing the overall architecture design for a new product or for enhancements of existing products.
    a. *Software Design:* This represents the detailed and complex development of the overall architecture design for a new product or for enhancements of existing products.
    b. *Hardware Design:* This involves the detailed and complex development of the hardware for the product.

5. *Prototyping:* The Step 4 may require prototyping, along with the integrated products. At this point of time the start-up may need *access to test labs*.

6. *Test labs:* These are physical demo labs, which are used for beta testing of any products in real life like environment.

7. *Development of Beta Stage Product:* this is an activity that in its final stages extends into mass assembly. Many companies perform the NPI function on newer products to make sure that it performs the way it was intended (often called the beta test/stage in technology)

8. *Product Assessment Reports:* These are the reports that are generated by testing the products in the life environment. These reports are used by Enterprises to get access to venture capitalist/private equity firms and other sources of investing.

In the meanwhile the start-up may also undertake

9. *Patenting*: These are exclusive rights for a limited period of time in exchange for a public disclosure of an invention.

10. Standardization: The investor may participate in the standardization of technology. This development, gives the entrepreneur competitive advantage as it mandates the adoption of the particular technology.

Prototype to Large Scale Assembly

This segment deals with the ability to mass produce the product that has been developed, which includes:

1. *Standard Software modules*: This refers to standardization software products often protocol stacks or other modules that can be purchased from the supplier. These are standard tasks or functions that are required to develop the product.

2. *Off-the-shelf hardware*: This deals with hardware components that are standard and can be purchased from suppliers; this includes circuit boards, chips, etc

3. *Custom Software*: This deals with software that is not standardized. It is often in this area where the intellectual property of a new product is contained especially with the evolving telecom industry.

4. *Custom ASICs*: This deals with developing custom made chips sets/components that are required to perform specific functions not available from the off shelf hardware.

5. *Software Integration*: This is the process of integrating software within the hardware equipments.

6. *System Load and Testing*: This is the integration of all the software modules that comprise the product. Once integrated, it is tested to ensure everything works together are designed. The output from this is often called Ver 1 of the product and is now ready for shipping to the customer.

7. *Quality Assurance (QA) and Forensic Testing*: This deals with assessing the quality of the sourced components/software and the final product. This function often provides feedback into the area of R&D as well as suppliers control.

8. *Finishing, Packaging and Shipping*: this represents the final stage of the product integration, cosmetics, and packaging so it is ready for customer use.

Commercialization

This stage deals with the sales of the product to the various types of customers through different sales channels, as well as the product/service support required to ensure it can be used and maintained by the customer. These functions include:

1. *Sales Channel:* This identifies the typical conduits through which product flows to the customer. Strategic partners, direct sales, resellers and system integrators are all potential vehicles that can be used to interact with the customer in order to sell and deliver the products.

2. *Product Support:* This provides the post sales interaction with the customer warranty issues, product upgrades and replacement are some of the issues that get addressed here.

Our Comments

Based on the above, we have identified the key areas that need to be the focus. We give the TRAI question in boxes before our analysis. We have clubbed related question so as to provide a coherent overview.

Vision and Mission

Questions from TRAI

- What should be the objective and focus of the R&D efforts for 2020
- Flowing from the above, what should be the objective and focus of the R&D effort for 2015
- What is the level of "Indian Products" that we should attempt achieve at the end of 2015 and 2020
- What should be degree of indigenous manufacture of components that we can reasonably achieve a period of 5/10 years?

There should be a series of national level workshops to identify key technologies for the future, say in 10-15 years. This should include consultation with leading scientific, research and academic institute. For example these could lead to a focus on green telecom.

This approach of skipping over generations of existing technologies to get a head start in the future has been followed in Taiwan and Korea for becoming the leaders in telecom

manufacturing (Competitive Advantages of the Latecomer Firm: A Resource-Based Account of Industrial Catch-Up Strategies; John A. Mathews).

There is also a need to explicitly focus on developing human capital for the sector possibly through public private partnership on research and education in the sector through setting up research universities as was done in Korea and Taiwan e.g. Public University and LG University in Korea.

We should also have target of a percentage of equipment costs of Indian origin at the broad level, (not at each equipment level) the total equipment over the next 15-20 years. The percentage needs to be based on industry wide consultation.

Institutional Mechanisms

Questions from TRAI

- Which Institutions, whether in the public or private sector, are best suited to carry out this efforts and why?
- What can be the linkages established with Institutions or Indians abroad? Will this reduce time delays?
- Should an R&D fund be set-up? If so, how can the fund be managed effectively to meet its objectives?
- What are the components that can be manufactured in the country with due consideration to commercial viability?
- What should be the role of the government and the industry in regards to the R&D Efforts? In particular what should be the investment, if any, by the government?
- Would setting up of Institutes like ITRI be desirable and feasible?

Based on the example of ITRI, key success factor was that it not only provided infrastructure support but also worked with the Electronics Support and Research Organization to provide services to small firms. In addition, the government provided a huge fabrication unit, an investment similar to that needed by product firms in telecom and IT. The Korean Electronics and Telecommunications Research Institute (ETRI) has provided similar support. Any Indian initiative must be holistic and take into account such factors.

Elaborating on the Indian scenario, we need support for all three phases identified earlier through setting up of new institutions. We give examples of areas where this should happen immediately: incubation, standardization and setting up research universities.

Incubation

The current environment is not supportive of the entrepreneur especially manufacturing. An example of the proposed institutional mechanism is the Telecom Entrepreneur Development Centre (TEDC) proposal by IIIMA Idea Telecom Centre of Excellence (IITCOE) to be a collaborative effort between DoT, Telecom Centre of Excellence Coordination Center (Department of Telecom) and IIM Ahmedabad's Centre for Innovation, Incubation and Enterprise and IITCOE with support from organizations like C-DOT, IITs, NITs, other leading engineering and research institutes/labs in the country. It is sought to be funded by DoT and private institutions. It is an initiative by the best minds in the country for the most needy ones – an inclusive initiative comprising of institutional as well as individual involvement of people of high caliber and knowledge.

Entrepreneurship is a high-risk proposition and all the partners in this TEDC understand the same and would want to mitigate the risk for the entrepreneurs through their collaborative effort. Considering the risk involved, the TEDC would be started as collaboration between Government/semi-Government agencies, but it would also engage closely with private stakeholders like operators, equipment manufacturers, and handset manufacturers among others.

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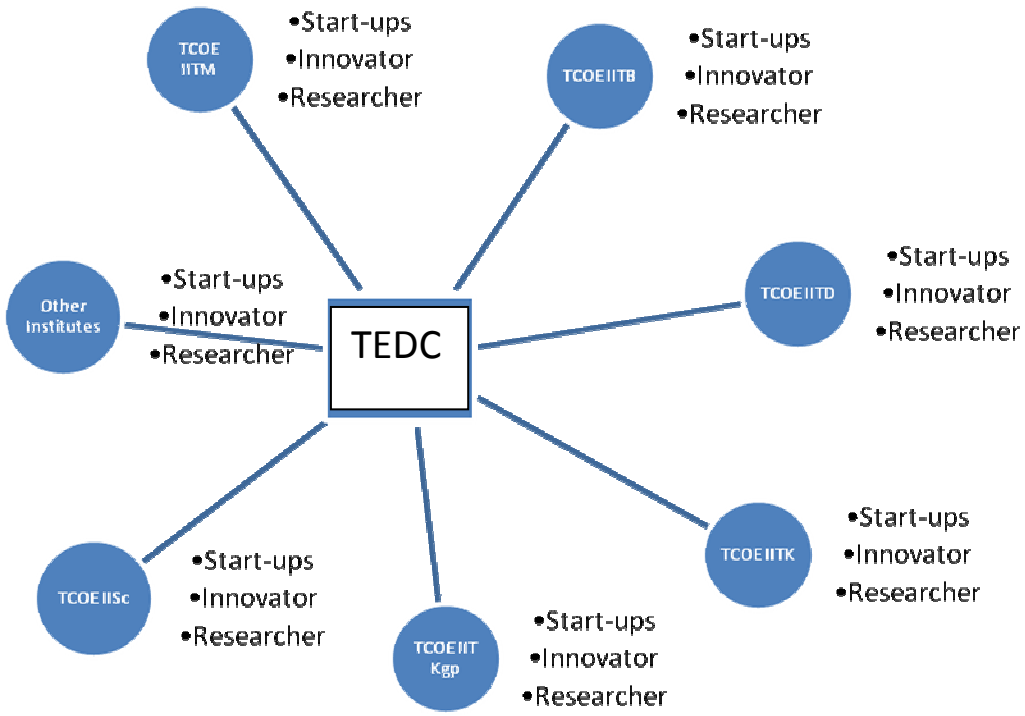

This could also be put in the framework of the sectoral innovation councils as proposed by Knowledge Commission. Public funding is necessary at this stage for R&D, but channels through which it is to flow need to encompass a broad range of research incubators, universities, standards development organizations among others. Government support in the case of Korea and Taiwan was not just in the form of setting up of infrastructure, but also in brokering with multinationals (Dodgson, Mathews, Hu and Kastelle, 2006). Similarly, public institutions in India can play a very important role in establishing appropriate IPR for Indian companies. However, despite India having extremely high quality of software development facilities, current environment enables the foreign technology providers to offer Indian telecom Industry, only the right to use the know-how and software programs for manufacturing of telecom equipment, retaining the propriety rights on know-how and software programs (This was exemplified in the conflict between blackberry and DoT) including source code for example, *on 27 April 2009, China announced 13 categories of products, so called "IT security products" should conform CCC (China Compulsory Certificate) implement regulation and it apply from, only a few day ahead, 1 May 2009. In view of security measure of China, China requested disclosure of source code of program run on these products*) with foreign technology provider only. In contrast, the scenario in India has resulted in complete dependency on foreign technology provider for procurement of software programmes for operation and Up gradation of telecom equipments and offering after sales support. Also as a result India software industry has not been able to make any contribution for development of telecom equipment industry, despite being globally recognized.

Once there is some progress, then public fund must be reduced over time. Private funding should be forthcoming. In countries such as USA, Japan significant public funding as been reserved for telecom products/services. We would also recommend government to work along with incubators to:

- To design market mechanism to allocate subsidies for rural BOP services/Products
- Incubators should develop linkages with overseas entrepreneurs and investors early
- Management processes in an incubator need to be designed to cater to the life cycle of an innovation.

Standards Organization

Indian presence in major wireless standards bodies like IEEE, WiMax Forum, 3GPP, 3GPP2, IETF, Metro Ethernet forum, MPLS Forum has not been up to the desired level, though it has increased after formation of Telecom centre of Excellence especially at IIT Mumbai and IIT Madras. The reason for the same can be one of the following:

- Most of the wireless standard bodies like 3GPP, 3GPP2 require membership of the partner SDO, and there are no Indian Standard development bodies which membership to these bodies, other than the Telecom Engineering Centre, DOT, which is a government organization, not directly involved in research.

- Given that significant standardization work is being carried out at TCOE's, there needs to a mechanism to proliferate to getting contribution from start-ups, which globally are the engine for innovation and entrepreneurship.

Research Universities

There are existing Indian world class institutions of higher learning that focus on telecom research. However, as telecom is a part of a larger portfolio of field of studies for them, a critical mass of teachers, students and industry-linkages that could impact national level outcomes are limited. Therefore, focused research universities are required, which may initially draw the resources from existing institutions. Such universities should not be treated as just degree granting institutions but must have strong industry linkages and a very high focus on research. Needless to say, appropriate systems for performance measures of these institutes and faculty compensation which are different from existing universities will need to be designed for them to be effective. Within these universities, the role of Technology Transfer Office (TTO) is very important for nurturing and bringing an innovation to commercialization. Therefore, it is important design TTO, staff them appropriately and provide appropriate incentives.

Nurturing such initiatives requires considerable time, effort, resources and interventions. However, if done properly, these could provide the basis for the huge human capital requirement of the telecom manufacturing industry

Financial Incentives

Questions from TRAI

- What could be the fiscal incentives to be offered by the government? Should such incentives be linked to any outcomes?
- Should electronic manufacturing service companies be incentivized? If so, how?
- What could be the duty structure to be imposed on imported goods?
- Is the duty on components currently being levied high? If so, on what components can the duty be reduced? What are the financial implications and the corresponding benefits?
- What would you suggest should be tax structure in respect of imported and indigenous manufacture of telecom equipment, keeping in view the international agreements?
- Should electronic Manufacturing service companies be incentivized?
- What should be, if any, the incentives to be given to individual service providers for use of Indian equipment?
- Likewise, what could be the disincentives, if any, for use of imported equipment? This is compatible with international agreements?

Funding/FDI

- What, in your opinion is the likely requirement of capital for companies that could take up the manufacture of telecom equipment?
- What could be the best manner of facilitating availability of capital to such firms?

- Government should incentivize foreign technology manufacturers especially customized ASIC's provider to set up their manufacturing unit in India. The government should create alliances with friendly countries to enable entrepreneurs and other stakeholders to get access to off the shelf hardware and customized ASIC's, if required). Simultaneously, it should broker linkages of these organizations with research universities.

- The Indian government can also position India as high end IT services providers in other countries to develop customized to jointly create next generation of equipments.

- These incentives required for attracting foreign technology players may include:
    - Simplification in customs clearance procedure for components import for manufacturing of telecom equipments in India.
    - Telecom equipment and their parts manufacturer should allow imports of components at zero customs duty without prior permission/ approval from central excise authorities subject to taxability of final products.
    - Amendments/Simplification in central excise law and procedure so that the trading and repair activities could be cater from manufacturing set up

- Central sales tax (CST) value added tax (VAT) rates should be equalized. CST rates are 2% against form "C" where as VAT rate is 14%, it should not be more than 2% on telecom equipments.

Setting up to Special Zones of Telecom Clusters

Questions from TRAI

- What, if any, are the advantages of setting up of clusters for manufacture of telecom equipment within the country?
- What is the investment required for setting up of such clusters?
- How can the financing of such clusters be best done, based on International experience?
- What would be the lead time required for setting up of such clusters?

The government can assist in developing entrepreneurship clusters by providing infrastructure and facilities. Government initiatives have played a significant part in the development of R&D 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. While small firms cooperated in product development, they competed for market access, thus ensuring pressure to innovate. The types of institutional capabilities that promote and sustain technology-based entrepreneurship develop over time as firms and products are created (Feldman and Francis, 2004).

Protectionism

Questions from TRAI

- Should the concept of mandatory use of Indian products/Indian manufactured products be introduced in the Indian context? If so, can this be immediately or should it be introduced at a later Date? If so, by what date?
- What could be the percentage to be stipulated for both these categories?

We believe that government should allow all players to compete in a fair and open manner to all players while nurturing the start-ups through institutional mechanism

Testing Facilities

Questions from TRAI

- What, in your opinion, would be the best agency to set up and manage such a common facility/ies?
- What would be the facilities and the level of investment required in such a facility?
- How will the investment pay for itself?

We should also open up test labs with C-DoT and other public facilities for start-ups and other identities in the ecosystem. The business models for the same needs to be designed in consultation with various academic and research institutes.

Thanks