

DIGITAL INDIA

GUIDE BOOK

BROADBAND INDIA FORUM

Ushering Affordable, Ubiquitous Broadband For All By 2020

**BROADBAND INDIA FORUM IS BUILDING A ECO SYSTEM
WITH THE HELP OF ITS MEMBERS TO
PROVIDE BROADBAND TO ALL AT ANY WHERE ANY TIME**

Education



VISION

Realizing the full potential of every Indian

ISSUES ADDRESSED

- ▲ Literacy, Creativity & skills
- ▲ Culture, Recreation and the Good Life
- ▲ Access: Anyone, Anywhere, Anytime
- ▲ Lifelong Learning
- ▲ Testing, Evaluation & Certification,
- ▲ Integration, Aggregation & Flexibility
- ▲ Technology in Education

EMERGING TRENDS AND CONCEPTS

- ▲ **Adaptive Learning** programmed for desired learning output
- ▲ **Adaptive Testing** replacing one-size-fits-all assessment of academic proficiency
- ▲ **Collaborative & Social Learning** that allows construction of knowledge with peers or in social groups
- ▲ Lectures and home assignments get swapped in **Flipped Classroom**
- ▲ Game play with defined learning outcomes through **Game based learning**
- ▲ **Hybrid or Blended Learning**, a combination of classroom and online learning
- ▲ **Learning Analytics** which decipher trends and patterns from educational big data
- ▲ **Massive Open Online Course (MOOC)** aimed at unlimited participation and open access via web
- ▲ **Remote/ Internet Labs**

- ▲ **Reputation metrics** as a substitute to institutional certifications like degrees
- ▲ **Virtual Learning Environment** for delivering learning materials to students via the web and includes assessment, collaboration and communication tools

FUTURE TECHNOLOGIES

- ▲ 3D Printing
- ▲ 4G/5G Communication Technology
- ▲ Artificial Intelligence
- ▲ Brain Computer Interface
- ▲ Cloud Computing
- ▲ Gesture Recognition
- ▲ Holography
- ▲ Internet of Things
- ▲ Machine Vision
- ▲ Machine Augmented Cognition
- ▲ Photonics
- ▲ Quantum Computing
- ▲ Real Time Translation
- ▲ Volumetric Screens
- ▲ Wearable Technology

Food and Agriculture



VISION

State-of-the-art technologies to ensure adequate, nutritious, healthy and safe food for growing population

BROAD COVERAGE

- ▲ Status of Indian agriculture and projection for 2035
- ▲ Issues and challenges
- ▲ Strengths of Indian agriculture
- ▲ Strategies to overcome the challenges
- ▲ Technology perspectives and Policy issues for future

FACTS AND FIGURES

- ▲ Food grain production (2013-14) : 264 MT*; **Estimated (2035): 398.6 MT**
- ▲ Per capita net availability of food grains (2012): 450.3 gms/day; **Estimated (2035) : 451.4 gms/day**
- ▲ Milk production (2012-13) : 132.4 MT; **Estimated (2035) : 237.8 MT**
- ▲ Per capita availability of Milk (2012-13): 287 gms/day; **Estimated (2035): 454 gms/day**
- ▲ Per capita Meat consumption (2011-12): 4.5 kg/year; **Estimated (2035): 10 kg/year**
- ▲ Per capita Fish consumption (2011-12): 7.4 kg/year; **Estimated (2035) : 10 kg/year**

* 3rd advanced estimates, Ministry of Agriculture, Government of India

FUTURE TECHNOLOGIES

- ▲ Advanced Genomics and Phenomics
- ▲ Precision Agriculture and Robotic farming
- ▲ Hydroponics/Aquaponics and vertical farming
- ▲ ICT application in agriculture particularly sensor technologies
- ▲ Nanotechnology applications in agriculture
- ▲ Multipurpose crops (sucrose, fodder, fuel etc.)
- ▲ Conversion of C₃ to C₄ crop plants
- ▲ Renewable energy sources
- ▲ E-sensing (e-nose & e-tongue)
- ▲ Remote sensing and GIS applications
- ▲ Perennial cereal crops
- ▲ Rapid diagnostic tools for detection of zoonotic diseases
- ▲ Apomyxis for fixing hybrid vigour
- ▲ Molecular manufacturing of food

Environment



VISION

Sustainable, clean and healthy environment

BROAD COVERAGE

- ▲ Human habitat
- ▲ Industrial environment
- ▲ Green house gases & air pollution
- ▲ Natural Resources Management

FUTURE TECHNOLOGIES

- ▲ Cost effective recovery of precious metal
- ▲ Re-designing of biomedical equipments to facilitate segregation and reuse
- ▲ Space conditioning technology
- ▲ Low cost treatment at source to make it a resource material
- ▲ Immobilization technology (biological and chemical for leachable solid waste)
- ▲ Remediation through nano material for both bio and non bio components
- ▲ Biomass boilers / gasification using rice and straw husk waste with high silicon content
- ▲ Pathways for conversion of cellulosic biomass in combustible (liquid fuel) form
- ▲ Thorium route for power generation
- ▲ Carbon capture by using algae from fuel gas
- ▲ Direct use of renewable energy for H₂O electrolysis

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- ▲ Plasma technology for waste management
- ▲ Development of more efficient biological processes for industrial & municipal solid waste treatment and management
- ▲ Development of cereals/ crop variety with nitrogen fixation properties
- ▲ Faster biodegradation of pesticides
- ▲ Lowering /shortening half life of pesticides
- ▲ Development of pest and disease resistant crop varieties
- ▲ Biological control of pests & diseases
- ▲ Development of high power to weight ratio systems for energy efficiency
- ▲ Storage battery with fast recharge and long life time
- ▲ Technology for mitigating forest fire
- ▲ High yielding rice, varieties that grow under non flooded conditions in unsaturated (aerobic) soil
- ▲ Transgenic crop plants resistant to biotic and abiotic stresses
- ▲ Microbial mining

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Chairman's Message



Digital India program is a comprehensive program of the Centre with the aim at making internet available, accessible and affordable to all Indians along with online delivery of services and increasing digital literacy. Such a pan-India digitized economy and population would be a tremendous advantage to India and information highways would become engines of growth with flow of knowledge, ideas, information, services, etc.

Though the vision is grand and if achieved, would surely leapfrog India into a league of its own, there are many challenges. There is a digital divide that separates urban India from rural India (Bharat). The have nots live in rural areas where little internet penetration has occurred. Even urban areas do not have proper infrastructure to support internet for all. The National Optical Fibre Network, to connect 250000 Gram Panchayats, was sluggish since start and lags behind hugely and now has been subsumed under the Digital India umbrella. Broadband penetration has been stagnant but mobile internet has proliferated. However, infrastructure to support such a large mass of people is lacking. With heavy auctions for spectrum, telecom companies have become choosy about where to provide services and prices are bound to go high. Another concern is lack of legal framework to address cyber crimes, privacy issues and breach of data. India remains extremely vulnerable to cyber attacks and there are little avenues in such scenario. If Aadhar data is used and gets breached, results could be disastrous. Again, there is a tremendous lack of literacy and digital literacy. Farmers are unable to take advantage of mobile based services and portals for prices, weather and scientific advice given for them. Besides, to have mobile internet proliferation, India will have to import even more hardware and electronics consumer goods. Also, the debate on net neutrality needs to be solved as it is of critical importance to India aspiring to bridge the digital divide.

Broadband India Forum (BIF) has always pioneered the cause of identifying challenging tasks and providing simple, practical and effective recommendations and suggestions that when implemented has fructified into success. It has played a pro-active role as a key partner who brings the industry-government interface to address issues in various sectors of the Telecom reform, policy & implementation over the years.

I am happy to announce that BIF has again come forward to organise the Digital India Conclave on 24th August to bring together the cream of the think tank from the government and the private sector industry to identify, deliberate and address all possible challenges to help achieve the dream of our Hon'ble Prime Minister of providing digital delivery of services to all citizens of this country in the targeted timeframes.

I wish the program all success.

Shyamal Ghosh, IAS (Rtd.)

Chairman, Broadband India Forum



President's Message

The Hon'ble Prime Minister Shri Narendra Modi launched the Digital India programme on 1st July 2015 to revolutionise governance through the use of digital technology. The vision of Digital India programme aims at providing inclusive growth in areas of electronic services, products, manufacturing , skill development, job opportunities, digital literacy, Government to Citizen (G2C) services etc. The vision of Digital India is centred around three key areas – Digital Infrastructure as a Utility to Every Citizen, Governance & Services on Demand and Digital Empowerment of Citizens. Very heartening thing is that envisaged investment of \$ 100 Bn combined between govt and private has been committed to get rid of this bottleneck of capital.

Broadband India Forum (BIF) had envisioned and conceived a 10 point agenda with solutions focussed to deliver a digital India within less than a month of the present government coming to power in May 2014. BIF 10 point agenda on broadband for all by 2020 was promptly sent to the Honourable PM on 10 Jun 2015 which was acknowledged by the PMO on 20 Jun 2015. Subsequently, the Hon'ble Prime Minister made the announcement of Digital India from the historic ramparts of Red Fort on the 15th August, 2014.

It is indeed our pleasure and honour to bring the industry and the government together on a common platform by organising a conclave on Digital India to show case its' members contribution to the Digital India Program. Through this flagship event, we hope we would be able to highlight the industry and academia achievements towards as contribution towards the realization of Digital India mission and vision which would encourage others to follow suit immediately by becoming an integral part of vision of the honourable PM for Digital India.

I am confident that the launch of this Guide Book for Digital India would help the industry and academic institutions to learn even more through the various case studies of our members' engagements in Digital India and government initiatives.

It is our endeavour to get engaged with the industry and academia to continue this journey to benefit the citizens of India to reap the gains of higher economic growth and good citizen services.

Col. Mahesh Khera

President

Broadband India Forum



Introduction of the Guide Book

The Hon'ble Prime Minister Shri Narendra Modi launched the Digital India programme on 1st July 2015 to reform governance through the use of digital technology. The vision of Digital India programme also aims at inclusive growth in areas of electronic services, products, manufacturing and job opportunities etc. The vision of Digital India is centered on three key areas – Digital Infrastructure as a Utility to Every Citizen, Governance & Services on Demand and Digital Empowerment of Citizens.

Broadband India Forum (BIF) is a non-profit organisation and is being chaired by Shri Shyamal Ghosh-former Secretary DIT and DOT and also the first and past Administrator of the USO Fund. BIF is proud to organise a conclave on Digital India to show case industry & academia contribution to the Digital India Program. The conclave to be held 24th August 2015 at Le-Meridien, New Delhi would be our endeavour to highlight achievements of all stakeholders which would encourage other industry members to follow suit respectively.

We at BIF are extremely proud of the fact that we shall be amongst the first to release a Guide Book for Digital India Conclave, which would include case studies of industry engagements in Digital India and government's initiatives to help the industry.

We intend to keep the ongoing consultation process with DeITy, DOT and also our members and industry colleagues so that we can make the Digital India mission more meaningful and more inclusive to all citizens, government agencies, the corporate and the industry. The recommendations of the conclave shall be then forwarded to all the key stakeholders to help steer policy and implementation of the Digital India mission in the right direction and help sustain and accelerate the momentum.

Anil Prakash
Secretary General
Broadband India Forum

CASE STUDY – VODAFONE



M-Pesa: eM-powering Financial Inclusion

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1 BACKGROUND

Countries at all income levels have population groups that are not adequately serviced by the formal financial system due to the lack of availability and access to suitable financial products.

Financial inclusion in its true essence is not just about having a Bank account. True financial inclusion means the ability to be able to provide last mile access to financial services which can be delivered through any means / channel including an account. This can well be reflected by the number of active accounts in the system providing proper and convenient access to the financial system.

Mobile penetration & adoption in India hold the potential of becoming a channel of choice for providing access to financial services. This coupled with a deep rural Telecom distribution network presents a unique opportunity to address the challenges of last mile access.

2 LEVERAGING TECHNOLOGY - MOBILE SOLUTIONS FOR HIGHER PENETRATION

The Prime Minister's Jan-Dhan Yojana which aims at financial inclusion recognizes that the move towards digital India with the use of cost-effective cellular technology will fuel improvements in the delivery system.

As per latest data released by telecom regulator "Telecom Regulatory Authority of India" (TRAI), the total number of mobile connections currently has risen to 933 million. It is also expected that there will be 600 million broadband users by 2020. These dramatic numbers can be used, to reach out to the millions of underprivileged for the provision of financial services.

Telecom distribution as customer servicing points will also aid in improving the current ratios especially in rural India of:

- 1 branch per 12,000 people
- 34 branches every 1,000 Kms

3 M-PESA: eM-POWERING FINANCIAL INCLUSION

M-pesa is an innovative financial service from Vodafone that brings the bank to the mobile and addresses the issue of access to financial services. This is one of the few solutions which

were showcased amongst a huge list of enablers tabled for Jan Dhan Yojana, at the meeting with the Prime Minister on financial inclusion.

The uniqueness and power of the m-pesa lies in its ability to address all aspects of financial inclusion starting from access to a mobile based Account. This can over a period of time be extended to provide access to Pension schemes, Micro Insurance, credit and Investment opportunities.

In 2007, M-PESA was started in Kenya as a CSR pilot project, to transfer money over mobile because it was unsafe to carry cash. That soon changed into a service that became the backbone of financial services in Kenya. M-pesa currently has a footprint across the world and is live in 10 countries including India. 70% of Kenya's financial transactions are handled through M-PESA.

M-Pesa is an innovative service launched by Vodafone India which brings the Bank to the Mobile. These services are offered under a **Prepaid Mobile Wallet license issued by RBI in Nov, 2012 to Vodafone M-Pesa Limited** under the Payment and Settlement Systems Act (PSS Act), 2007.

These services have been further enhanced through a unique business proposition linking the prepaid instrument to a bank account and enabling a complete suite of services on the Mobile.

It leverages Vodafone's global expertise in the mobile payments space, the mobile distribution and penetration in India and the security of Financial Services provided by ICICI Bank.

- As of date, Vodafone m-pesa runs 3 of the top 5 mobile banking deployments across the world.
- In India, Vodafone has an extensive telecom distribution network with close to 1.7million multi brand outlets and 9000 exclusive stores.

Distribution reaches:

Vodafone M-Pesa services are offered on a PAN India basis across 85000 outlets. Each of these outlets is an ICICI Bank, Business Correspondent - Customer Service Point and the customers can enroll for M-Pesa services, CashIN and

CASE STUDY — VODAFONE

CashOUT at any of these points. This distribution makes **M-Pesa the largest Business Correspondent network** in the country. Close to 65% of these outlets are in rural areas providing comprehensive access at remote locations – to convert CASH into e-Money and vice versa.

About M-Pesa

M-Pesa works on a simple USSD menu allowing access on simple phones; and does not require internet availability. With M-Pesa a customer can:

- ✓ Deposit and withdraw CASH at a proximate m-pesa agent outlet
- ✓ Send money to any bank or any mobile in the country – 24X7
- ✓ Pay merchants for goods and services
- ✓ Make various bill payments, DTH and Utility
- ✓ Purchase airtime – prepaid/ postpaid

There are over 3.5 m customers who are experiencing the safety, instancy and convenience of M-Pesa.

4 M-PESA: MAKING A DIFFERENCE

M-Pesa has been instrumental and played an important role in various initiatives rolled out for different segments of the society.

Mobile based disbursement of government subsidies (MNREGA) - Odisha

There is a tie up with Panchayati Raj Department, Government of Odisha to implement the first of its kind, mobile based disbursement of wages under MGNREGS (Mahatma Gandhi National Rural Employment Guarantee scheme) in Odisha.

Under this arrangement, mobile retail outlets in each Gram Panchayat in Ganjam district act as Business Correspondent Agents to enrol workers and provide them with a mobile money account residing on their mobile. These workers, who are the last mile beneficiary, are able to receive their daily wage payments directly through their mobiles and are able to easily withdraw cash from any nearby Vodafone M-pesa retail outlet.

This pilot will cater to 17,000 beneficiaries in its first phase.

Empowering Mothers – Disbursement under National Rural Health Mission

The M-pesa Digital Wallet enables timely and transparent financial assistance to the expectant mother, contributing to the objective of the Janani Suraksha Yojana of NRHM.

NRHM through its 'Janani Suraksha Yojana' (JSY) scheme provides for financial assistance of Rs1400/- per birth to the pregnant women who have attained 19 years of age and belong to the below poverty line (BPL) households. M-pesa helped meet the scheme objective of reducing maternal and neonatal mortality, which was hampered earlier, since the financial assistance was not reaching the beneficiary on time.

M-pesa allowed the money to be directly received by the woman on her mobile phone which could be en-cashed in a secure and convenient m-pesa agent. Further there was provision of end to end tracking of whether the money has been en-cashed by the intended beneficiary, when and from which agent.

Enabling Online Railway Booking:

M-pesa Facilitates Online Railway Bookings through the extremely user friendly mobile application "139 Railways Reservation", along with other advantages, will put an end to long wait in queues at railway booking counters providing convenience to customers as they can now book e-tickets on the go anytime, from anywhere.

Empowering access to clean Drinking Water:

Water Health, a leader in running decentralized water purification systems, provides clean drinking water at 40 paise per liter. However a big challenge in catering to last mile and managing cash is to reduce the physical effort and 'leakages' involved in revenue collections in **36 districts** where it offers drinking water solutions to communities.

This is where Vodafone M-Pesa help's it in its cash-collection process at 450 locations across **five States** — Gujarat, Tamil Nadu, Karnataka, Andhra Pradesh and Telangana.

In this unique arrangement the consumer doesn't get charged but water health pays for transaction cost. Vodafone's executives will visit each of the WaterHealth centres, collect cash

from the operators and convert it into digital money (M-Pesa balance) in their phones. This allows operators to remit the (digital) cash to WaterHealth.

Pension on Mobile: Department Of Social Welfare (DOSW), Haryana

Department implements a number of schemes for the care, protection and rehabilitation of socially under-privileged. Key schemes are Social Security Pension, Welfare of Physically Challenged, Welfare of Old and Welfare of Minority Communities. Currently the pension is getting disbursed in these villages through the Village Sarpanch.

Vodafone India, in partnership with the Government of Haryana, will facilitate mobile-based disbursement of monthly social security pension. The pilot initiative covered 868 beneficiaries in 5 villages in the Karnal and Mahendragarh districts of the Indian state of Haryana.

With the induction of Vodafone M-Pesa, beneficiaries with any active mobile number can directly receive payment of the pension. Pensioners can now use the SMS service, mentioning the amount of the pension, the withdrawal code and the withdrawal procedure. They can then withdraw the amount by authorizing the transaction with the withdrawal code at a Vodafone M-Pesa retail outlet

M-PESA impacting lives in Kenya

Today over 700 businesses have integrated with M-PESA to extend various innovative services at lower cost to the people in remote areas.

- M-PESA for a solar-charged home power service. M-KOPA customers can buy a solar-powered lighting and mobile phone charging kit by making an initial upfront payment using M-pesa. This initiative has played a critical role in providing electricity not just to individuals but also SMEs which has made a significant impact on the quality of life, and on the overall economy of Kenya. M-KOPA offers affordable solar power to 150,000 homes within a period of 3 years.
- M-PESA Water ATMs: In water, Grundfos LIFELINK has leveraged M-PESA to create a fee-for-service model whereby rural communities access safe water and pay for it using M-PESA. Customers are provided with

RFID tags which can be reloaded with M-PESA. Once loaded this RFID tag can be used for water dispensation. Currently over 40 projects provide self-sustaining water supply to over 100,000 people in Kenya.

5 CONTRIBUTING TO DIGITAL INDIA

The payment bank license will enable in offering a more comprehensive portfolio of banking and financial products and services, accelerating India's journey into a cashless economy.

Vodafone remains committed to actualize the government's vision of financial inclusion by leveraging the reach of mobile technology to service the unbanked and underserved sections of the society."

6 REFERENCES

<http://www.trai.gov.in/WriteReadData/WhatsNew/Documents/Press%20Release%20on%20Telecom%20Subscription%20Data%20as%20on%2031st%20January,%202014'.pdf>

Information and Communication Technologies



VISION

Paperless activities and services in every form with no physical computer by 2035

APPLICATION AREAS

- ▲ Electronics for inclusive society
- ▲ Healthcare in India
- ▲ Banking
- ▲ Telecom
- ▲ Energy and Smart Grids
- ▲ Government
- ▲ Industry
- ▲ Education
- ▲ Commerce
- ▲ Agriculture
- ▲ Cyber Security
- ▲ Disaster Management

Habitat



VISION

"Sustainable Habitat - 2035: Housing for all" through affordable, safe, environment friendly, equitable and inclusive development of human settlements

BROAD COVERAGE

- ▲ Possible future scenarios
- ▲ Trends, concerns and issues in the area of planning materials and
- ▲ Challenges in the building sector and its implementation strategies
- ▲ Future technologies including blue

Food and Agriculture



VISION

State-of-the-art technologies to ensure adequate, nutritious, healthy and safe food for growing population

BROAD COVERAGE

- ▲ Status of Indian agriculture and projection for 2035
- ▲ Issues and challenges
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- ▲ Strategies to overcome the challenges
- ▲ Technology perspectives and Policy issues for future

FIGURES

- ▲ **Second largest telecom industry** in the world
- ▲ **100%** Tele-density by 2020
- ▲ **165 million** mobile Internet users in India by 2015
- ▲ **600 million** internet users by 2020 (160 million)
- ▲ **304 million 3G** subscribers by 2020
- ▲ Electronics hardware demand to reach **USD400 billion** by 2020
- ▲ Machine to Machine communication (M2M) /Internet of Things will grow to **26 billion units** by 2020
- ▲ **Exa-scale** computer (1018 FLOPS) by 2015

TECHNOLOGY AREAS

- ▲ Solid State display and Photovoltaic
- ▲ Photonics

- ▲ Speech Technologies
- ▲ ICT and Robotics
- ▲ Cloud Computing Technologies
- ▲ Image processing and computing, media and entertainment
- ▲ Artificial Intelligence
- ▲ Decision, Control and Security systems
- ▲ Solar power (PV) battery

BLUE SKY RESEARCH IDEAS

- ▲ Machines /robots to connect all personal and emotional needs
- ▲ Inter-planetary communications systems
- ▲ 3D telepresence
- ▲ Sensing devices to be able to feel the product on internet before buying it
- ▲ Intelligent vehicles to detect emergency situations and take over the control
- ▲ Virtual Courts and Digital Evidence
- ▲ Complex real time dynamic disaster management response systems

FACTS AND FIGURES

- ▲ Building stock demand: 411 million sq. m (2012) to **690 million sq. m (2035)**
- ▲ Cities with population of 1 million plus is expected to increase from 53 in 2011 to **70 by 2030**
- ▲ **By 2030, 40%** of Indian population would live in urban areas
- ▲ Demand for affordable houses will increase from 25 million in 2010 to **40 million by 2035**

TRENDS IN HOUSING

- ▲ Energy efficiency and cost effective
- ▲ Faster and efficient construction
- ▲ Safe and environment friendly
- ▲ Disaster resistant buildings
- ▲ Net zero energy buildings
- ▲ Inbuilt intelligent features
- ▲ Prefabricated technology combined

- ▲ Sensor technologies for smart and intelligent building systems
- ▲ Embedded technology to enhance the quality of construction
- ▲ Alternative sources of energy for sustainable habitat: Solar, Building Integrated Photo Voltaic (BIPV), Wind, Thermal etc.
- ▲ Material alternatives to aggregates
- ▲ Additive manufacturing (3D Printing)

BLUE SKY RESEARCH IDEAS

- ▲ Housing to adapt to unexpected situations such as, changing climates, earthquakes, cyclones, fire etc.
- ▲ Habitation on the Moon and under the sea
- ▲ Building as living organisms
- ▲ Interactive building interiors —change of colours, lights, temperature by just touching the walls just like touch screen
- ▲ City underneath a city or a desert

FACTS AND FIGURES

- ▲ Food grain production (2013-14) : 264 MT*; **Estimated (2035): 398.6 MT**
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- ▲ Apomyxis for fixing hybrid vigour
- ▲ Molecular manufacturing of food



EMPOWERMENT THROUGH DIGITAL INDIA, CHALLENGES CASE STUDY FROM PRIOR EXPERIENCES



Dr. Venkata C. Majeti
CEO, Loment

ABSTRACT:

Loment is an integrated communications, technology (ICT) company with emphasis on privacy and security solutions that directly benefit the end user. This paper presents a few of our experiences in the design, development and deployment of messaging applications across computer, tablet and mobile devices.

BACKGROUND:

Digital India is an initiative by the Government of India to integrate various government and non-government agencies, people and support infrastructure through electronic records, Internet and mobile technologies, and cloud computing to deliver services directly to the end user. The initiative covers a wide variety of industries including communications, healthcare, education, banking, payments, utilities, land records, surveillance, etc.

This initiative is similar in nature to various digital record-keeping activities under way in developed as well as developing nations. This memo is a record of Loment experiences in working with different countries and is being shared in the Digital India Conclave inaugural conference. It is expected that the inaugural

conference will be followed by an industry consortium that will bring awareness of various issues and solutions to the marketplace.

Case Study 1: Use of SMS technologies

SMS or short messaging service is a popular mobile technology around the world, particularly in India where inter-regional voice calling was subject to usage sensitive billing as opposed to nation-wide (unlimited) calling available to U.S. customers. SMS use can be broadly classified as P2P or person to person and A2P or application to person; P2A or person to application is also allowed in order to facilitate certain network based services.

In addition to user to user communication, SMS is also used for a variety of services:

- "top up" or add monetary value to a prepaid mobile account
- "transfer talk-time" or avail one user's value or minutes to another user
- "transfer money" from user to user, or from bank account to recipient(s)
- "remittances" or international money transfer including the use of deposit and withdraw, as the mobile equivalent of mobile travelers cheques

CASE STUDY – Loment

- “two-factor authentication” of email networks and financial services

As seen in these examples, the use of SMS goes far beyond social communication status. Many of these day to day transactions involve financial value that is also of interest to third parties that are able to legally or illegally intercept the SMS messages in a given area, or targeted to a single device.

In the healthcare industry, SMS or text messages have proven to be extremely useful in patient communications – prescription reminders, health tips, remote care especially in rural areas, etc. However, use of the public and unsecure SMS messaging was considered to be non-compliance of regulatory requirements.

Loment has developed a secure SMS application that provides an enhanced privacy and security software layer around carrier service provider SMS communications. Our Peanut Secure SMS application was originally designed for Symbian, BlackBerry, Windows Mobile, and Android operating systems; the application was later revised entirely in native code implementation for Android devices and is available from Google Play store.

Case Study 2: Use of Public Email Services

During our interactions in India with University administration, State level government offices, business users, and individuals, we noticed broad and sweeping use of public email services including Rediff, Yahoo, Gmail, Microsoft (Hotmail, live.com, and Outlook), and AOL. The reasons can be attributed to growing numbers of incoming messages, larger attachments in documents, spreadsheets, etc. Though government and business users initially started on their own private email service, capacity problems on server forced user groups to gradually migrate entire personal and work communications to free public services.

Customers are also aware of frequent hacking on email networks but depend on the service for day-to-day interactions at work. For official use, the Government of India has banned the use of public email since early 2015, notified central government and union territories staff that all communication should use exclusively on

government provided Ids.

While the methods discussed above are necessary from national security perspective, it may also pose practical problems; for example, each organization requires a (i) needs assessment, (ii) budget allocation, (iii) secure equipment, storage, networking and data center capacity, (iv) ensure adequate resources in terms of power, air conditioning, and basic infrastructure, and (v) also account for future growth.

The switch from use of public email service to private service is against the backdrop of an opposite trend in the advanced countries. For example, in the U.S. market, small to medium business customers are moving from hosted email service to a network-based service. Personal email is moving out of the desktop and laptop computer environment in order to have access to the communication as well as documents from a multitude of devices – namely computer, tablet and mobile devices. In the office environment, email server is being replaced by cloud service – also provided as a hosted (and paid) email service; this is to reduce cost of day to day administration, cost of tracking virus, spam, also backup, restore, and personnel salaries.

The two trends discussed above are not necessarily independent of or orthogonal to each other. It is possible to simultaneously move from a “public” or free email service to a hosted and private service; from device-centric model to a network-centric model. In addition, use privacy and security enhancements for all email communications, both in the controlled environment and for outside (e.g., business partners and supply-chain) communication.

Loment has developed a secure email application that provides an enhanced privacy and security software layer around private or public email services. Our Walnut Secure Email is available on mobile phones, tablet and computer devices; it is supported on Android, iOS, Windows, MAC, Unix/Linux operating systems and also as Outlook Plugin. Our software application coexists with native or other secure email applications in order to provide an ancillary or complimentary function; for example, intra-office communication might be secured using an appliance model such as

Exchange Server or Lotus Notes, while Walnut security is used for inter-office communication with business partners and supply chain.

Case Study 3: Digital India Specific Examples

Harvesting:

Communication between government ID accounts and other users on private or public networks is still subject to address book harvesting and aggregation of user IDs on social media. The scope and reach of this problem will be discussed later as a special case.

Spam:

Use of public and/or private Wi-Fi networks, where a user may access incoming email communication, reply to messages, etc. would automatically trap the user email ID. From a single exposure, the author experienced continuous inflow of spam from Indian market to our servers based in U.S. The unsolicited spam email also comes with a disclaimer, "Note: we are not spammer. We found your email through manually efforts. We are sorry if you get email 2 or 3 times. You can simply reply with "remove" so we will delete your email address from our list. Thanks again." However, reply of any kind only confirms the validity of recipient address to the mass mailing sender, resulting in further spam and targeted phishing attacks.

Duplication of Data:

In our experience with RBAC, or role-based access control systems, enterprise data is often duplicated across multiple servers. While access control policies are effective or enforced on data in one place, the same data may be available from a different server where access control policies are not effective. Further, policy changes over time has a major impact on day to day administration.

Aggregation:

In the digital domain, any information captured on the network can be duplicated easily to multiple servers, services, and also aggregated with other available information. As a result, advanced persistent threats or APT can continuously aggregate user data often in multiple different stages. An individual or small to medium size business organization is not in a

position to recognize and or stop the attacks. Further, log reports, network management and event records that are in place today are inadequate as enterprise data moves from appliance model to a cloud storage model. This poses security concern for public data such as UDID or unique identification records, health records, bank and financial records, etc.

Security versus Convenience:

All transit passengers through Delhi airport are woefully aware of going through security inspection, twice if the destination is to a U.S. city, even when they exit and get back to the same seat on the same airplane. However, the same inconvenience is not tolerated by an average consumer in the mobile and tablet application domain. This is because, in the digital domain, social integration has gradually eroded privacy and security measures for PII or personally identifiable information – this includes a person's full name, address, mobile or wireline telephone number, email accounts, address book or contact information of others in the possession of a user, date of birth, also information that might be the basis of password selection or alternative authentication such as place of birth, school, among others.

As we rush to digitize necessary information on all people, there is also a need for public awareness of how to protect PII, especially information we carry on other people.

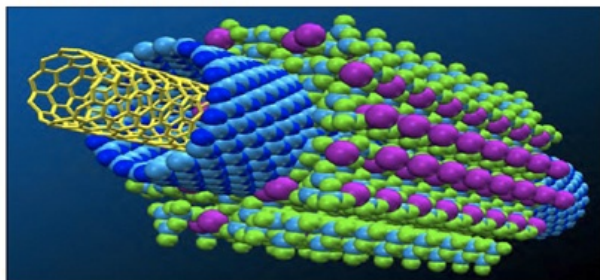
Summary:

Loment business plan started with a simple statement, "all digital communication is essentially lacking in privacy, security and identity management." In the course of our product design, development and deployment, many of our primary objectives had to be compromised in order to create products for market adoption. The statement is more true today than five years ago. As we continue efforts to digitize all information, a catalogue of issues, problems and solutions are needed. Also needed is a public awareness program on the necessary safety and precautions, especially in the rural areas and in urban youth. We look forward to our participation in this effort.

Thank you.

(Dr. Venkata C. Majeti)

Materials



VISION

India should be a global leader in niche materials and its processing technologies by 2035

BROAD COVERAGE

Future technology trends and projections, R&D directives, pointers for research and policy imperatives of the following materials:

- ▲ Electronic & Energy Materials
- ▲ Glass & Ceramics
- ▲ Metallic Materials
- ▲ Polymers & Composites
- ▲ Biomaterials

FACTS AND FIGURES

- ▲ India to emerge as world's second largest **steel** producer in future, the production would touch **300 Mtpa** by 2030
- ▲ Annual consumption of **Aluminium** is expected to touch **10 Mt** by 2020
- ▲ India is expected to be the **2nd largest copper** market by 2025, with a size of 2.7 MT
- ▲ Recycleability of **Zinc** makes it a preferred metal today and the figure of **~30% recycling** in India is estimated to reach >80% by 2035
- ▲ 5% of total world production of **Silicon** during next five years. By 2035, India should aim to target **30%** of total electricity production through Silicon
- ▲ In future, **glass** consumption in India to grow at 9% in construction, 20% in automotive, **10-12%** in consumer goods and 12-15% in pharmaceutical sectors

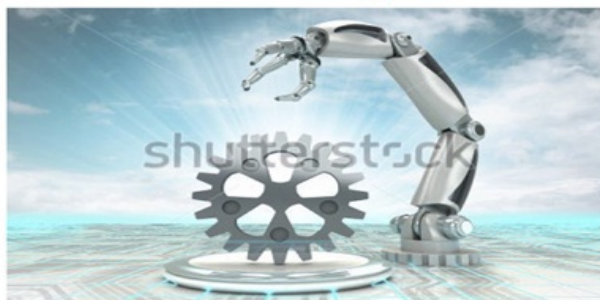
NEXT-GENERATION MATERIALS

- ▲ Super-strong Graphene
- ▲ Smart Materials and Sensors
- ▲ Environment friendly & Bio-degradable
- ▲ 100% recyclable ▲ Sports Material
- ▲ Light weight-high strength alloys
- ▲ Shape-memory ▲ Energy saving
- ▲ Meta-materials
- ▲ Programmable Matter
- ▲ Biomimetic materials

FUTURE TECHNOLOGIES

- ▲ Functionalised Magnetically directed Ceramic Nanoparticle (MNP) technology for advanced drug delivery
- ▲ Perovskite material based solar cells
- ▲ Battery made of Self healing polymers
- ▲ Technologies for growing large area high quality Graphene
- ▲ Injectable scaffolds
- ▲ Transparent polymers with a 10-fold reduction in permeability via additives

Manufacturing



VISION

Strengthening manufacturing base of India through clean, green and lean processes backed by smart skill work force

SECTORS COVERED

- ▲ Leather
- ▲ Composite Manufacturing
- ▲ Micro Nano Manufacturing
- ▲ Electronic Appliances & ICT products
- ▲ Textile and Apparel Manufacturing
- ▲ Food Processing

FIGURES

- ▲ Metal fabrication sector expected to generate revenue of **10 Lakh Crores** by 2035
- ▲ Value of textile and apparel industry likely to reach **USD 140 billion by 2020** and around USD 385 billion by 2035
- ▲ Indian chemical industry turnover is expected to reach **USD 250 billion** by 2035. Chemical production will reach 260 MMTPA by 2035 with an overall growth of 75-80% during 2010-20
- ▲ Demand for electronics in the Indian market is expected to grow from US\$ 45 billion to **USD 400 billion by 2020** and USD 3200 billion by 2035 at a growth rate of 15%. The export market is likely to move from USD 4 billion to 80 billion by 2020
- ▲ Indian composites industry is expected to grow steadily and reach approximately **INR 46000 crore** in 2035
- ▲ **Leather garment** would become a high value product with

& TECHNOLOGIES

- ▲ Additive manufacturing (3D printing)
- ▲ De-materialisation
- ▲ Precision manufacturing
- ▲ Process intensification
- ▲ Multi material construction
- ▲ Lean manufacturing
- ▲ Embedded electronics
- ▲ Adaptive automation
- ▲ Micro-nano manufacturing
- ▲ Modularity
- ▲ Mass production of multifunctional products
- ▲ Nano Photonics
- ▲ Water-less processes
- ▲ Noise and odour free production
- ▲ Zero emission processes
- ▲ Biologically inspired nano scale process/fabrication
- ▲ Modulating raw material quality through genetic modulations
- ▲ Biodegradable/recyclable products

Infrastructure



VISION

To build integrated, robust, technology-driven, cutting-edge infrastructure for inclusive growth, sustainable development and a strong economy

AREAS COVERED

- ▲ Urban Infrastructure
- ▲ Water and Sanitation
- ▲ Pipelines (Oil and Gas)
- ▲ Ports, Shipping and Waterways
- ▲ Roads and Bridges
- ▲ Civil aviation

FIGURES

- ▲ Urban population in India to be around **600 Million** by 2030
- ▲ Cities with population of 1 million plus is expected to increase from 53 in 2011 to **70** by 2030
- ▲ Road freight traffic is estimated to grow at about 9 per cent per annum and road passenger traffic at about **17 per cent** over the next 20 years
- ▲ By 2030, demand for urban railway in India is expected to be **four times** the supply, and demand for urban roads **1.8 times** the supply
- ▲ Total cargo traffic and cargo capacity at ports (both Major & Minor ports) by 2030-32 is estimated to be **3,154** and **4,100 MT** respectively
- ▲ Estimated air traffic for passenger and cargo by 2031-32 is **696.5 million** and **15,900** metric tonnes respectively
- ▲ Manpower projection in infrastructure and real estate sector

TECHNOLOGIES

- ▲ Smart self-healing materials for faster construction
- ▲ Increased durability and improved performance of infrastructure, especially road and bridges
- ▲ Geo-synthetics for roads and solar roadways
- ▲ Segmental and pre-cast construction in bridges
- ▲ Wireless connectivity for safer, quicker transportation—both vehicle-to-vehicle (V2V) and vehicle-to-infrastructure (V2I)
- ▲ High Speed Rail Corridors of speed above 250 kmph with advanced track technology, automated signalling and train control
- ▲ Ultra high performance concrete and tunnelling technologies for railway construction
- ▲ Magnetic levitation transport
- ▲ Wireless sensor networks
- ▲ Adsorbed Natural Gas (ANG)
- ▲ GIS applications for long-range water supply facilities

CASE STUDY – MITSOT-Pune

MIT Pune's

MIT SOT

MIT SCHOOL OF TELECOM MANAGEMENT

INTRODUCTION

MIT group of institutions, Pune was established in 1983 under the guidance of Prof. (Dr.) V. D. Karad, who is the founder executive president of MAEER Pune, India. The institute's vision is to excel in the field of education and research. It now encompasses 74 institutes, 65000-plus students in various college and schools in the field of engineering, management, pharmacy, medicine and general education.

MIT School of Telecom Management (MITSOT), an AICTE approved Telecom management Institution is a constituent of MIT Group, Pune which has a legacy of 33 glorious years of excellence in education. MITSOT has proven to be a leading institution & premier place of learning in the country and attracts the best & brightest students.

Digital India Mission

MITSOT has been at the forefront in taking forward the Prime Minister's 'Digital India' initiative, to the masses. MITSOT students and faculty members organized various events, based on innovative themes aiming at taking the 'Digital India' message to the citizens at large.

MITSOT in association with **Confederation of Indian Industry (CII) and Deloitte** organized a conference TELETECH 2015 consecutively for the sixth year, one of the biggest event in telecom space in the Western part of the country at Pune. Following the guidelines received from PMO, the theme for this year was "**Digital India: Unleashing Prosperity**."

Book, titled "Next Generation Mobile Communications-Mobile, Infra Technology, Management, Data" McGraw Hill Publication

Dr. Milind Pande and Prof. Rishi Kappal have collaborated for bringing out a world class text book titled "Next Generation Mobile

Communications-Mobile, Infra Technology, Management, Data" which focus on Indian Telecom ecosystem. The book, is published by McGraw Hill Education. This book is endorsed by the stalwarts of Telecom Industry and offers a 360 degree, inside-out perspective on the engineering, technology and business management essentials of the telecom industry.

EMPOWERING SOCIETY WITH LIVE PROJECTS UNDER DIGITAL INDIA MISSION

Mobile enabled Highway traffic management system:

Mobile enabled Highway traffic management system helps in speed control. Accidents and emergency support are the crucial problem on highways. HTMS solution provides scope for development of cellular connectivity based emergency support system. Its features are Weather Monitoring, Incident Detection, Video Surveillance, Classification of vehicles sizes and count using IR based non-intrusive sensors. Dynamically updating variable message signs can be used at HTMS locations for public utility messages. The Project was under Industry-Academic partnership program. This was a project initiative by MITSOT students & Faculty members.

H2E2: Wireless Sensor Network (WSN) Green Platform for Precision Agriculture by MITSOT

Hybrid Hexagonal Energy Efficient (H2E2) platform is a technology which enables precision agriculture by covering maximum area in minimum sensors, increased energy efficiency, network lifetime and reducing cost. Precision agriculture includes efficient management of resources, irrigation management, crop management etc. by improving economic value for farmers..It reduces sensor requirement by 50% and covers maximum area. System is scalable and can be replicated over larger area

of agricultural land. This M-Agriculture Project is funded by MHRD GOI

H2E2 Performs and Offers Following things

- Sense soil moisture, soil temperature, PH and Weather Data like Air Moisture, Temperature, Atmospheric pressure, Wind Speed, Wind Direction and RainGauge .
- Process the collected data, compare with the requirement of the crop and sets actuator ON/OFF like water pump, solar , light and camera .
- Sends the recorded data as sms to farmer and related people, receives SMS commands from farmers to set actuator ON/OFF
- Mobile Application is being developed to monitor and control farm from remote location
- Data analytics will be run on the field data to predict the actions taken by farmers
- Solar powered sensor nodes with longer lifetime
- Energy Efficient Wireless Network to reduce cost and improve efficiency

MITSOT Mobile Based attendance system:

Students and Faculty members of MITSOT developed Mobile Based attendance system supported on Android platform used WiFi /Cellular network in campus to mark the attendance. The intelligent system authenticates the student in provided network or region. All MITSOT classrooms are equipped with smartboards — the new program runs with the help of this screen and a specially-designed Android system-supported 'Attendance App' on cellphones. The professor taking a lecture opens the system, after which students present in the room open their app and click on the lecture's slot. Simultaneously, the Smart Board screen lists the students, with photographs. Once a student clicks to record presence, it is indicated on the screen for the professor to verify. If there is any doubt, the professor can nullify the record and ask the student to re-record attendance. The professor's approval finalises it in the system. This entire process has to be completed before the the slot turns inactive, as per the scheduled timetable recorded on the app and the system.

CareMother-Mobile Pregnancy Care:

CareMother Project of MITSOT is an end to end solution with sensor kit for medical test, mobile application and web portal for regular care for high risk and normal pregnancy at doorstep.

- Allows remote and regular healthcare at doorstep saving 5 hours of time, efforts and medical test cost from Rs. 400 to Rs. 100
- It identifies and provide care to high risk pregnancy, saving a life
- Cheaper advanced test like hypertension induced Preeclampsia parameters and tests, Diabetes, Anaemia, Fever, special symptoms, Foetal Heart Rate, Hb Count, Weight, Pulse Rate, Fundal Height etc. can be recorded and diagnosed through caremother portable kit
- Provides data collection, awareness information, tracking, scheduling, basic medical tests, early diagnosis for high risk pregnancies, which adds value to doctor's business
- Empowers Gynaecologist/Government ability to reach and manage many patients and offer them quality service
- Multilingual interface and unique touch based data entry, which will help to overcome hurdle of awareness and low education
- Works in no network condition/offline mode as well and synch automatically when in network

BEST PRACTICES

MIT SOT organized digital India week

1.Conference on "Digital India – Challenges & Opportunities.

DIW@MITSOT was an event organized in association with CII,BSNL, IAMA & Deloitte for industry and academia to exchange thoughts and ideas on emerging issues of Digital India . The theme for the Panel Discussion being, "Digital India – Challenges & Opportunities" this initiative by MITSOT received a huge response from the corporates, academicians and media.

2. Awareness Campaign on Cyber Hygiene & Cyber Security

Another activity undertaken by the students of MITSOT spread awareness in many Rural colleges across Pune District on Cyber Hygiene & Cyber Security.



3. Digital empowerment of Vidyashram School by donating 25 computers.

In a significant move towards social commitment, MITSOT adopted Vidyashram School for under privileged. After assessing the requirements at the school, MITSOT immediately donated 25 computers to Vidyashram School to empower the students with better resources for digital learning.

4. Digital empowerment of the National Blind Federation, Pune

In yet another significant gesture, MITSOT Pune, reached out to a somewhat neglected and marginalized section of citizens, the visually handicapped. MITSOT donated computer Systems to the National Blind Federation, Pune.. Our Students interacted with the members of the association, helping them discover the benefits of the various apps available.

5. Awareness Campaign on “Engine ON, Mobile OFF”.

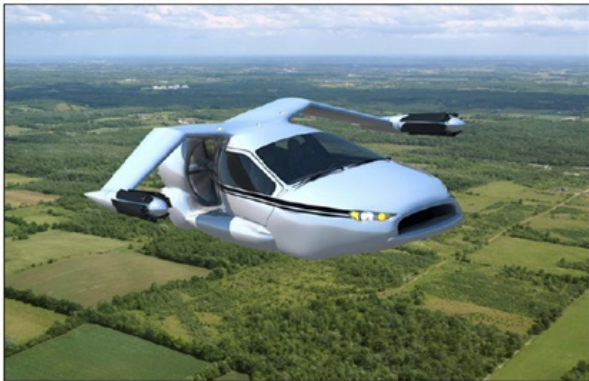
As part of the ‘Digital India Week, MITSOT ran a campaign namely “Engine ON, Mobile OFF”, with a view to create awareness and caution regarding the accidents caused due to talking on mobile phone while driving.

LESSONS LEARNED BY STUDENTS

The entire Digital India Mission has resulted into some direct and tangible benefits for Students and Faculty who participated and executed the various activities & Projects. Besides being a unique and ‘eye-opening’ experience, it also helped in understanding from close quarters the socio-economic reality and issues being faced by the common masses in India, on one hand struggling to make ends meet while trying hard to provide the future generation with education and skills necessary to reap the benefits of digitalization, towards a better, secure future.

It is a stark reality that even after 68 years of independence, a large section of India’s population remains caught in the vicious circle of poverty, illiteracy and unemployment. Denied basic needs such as gainful employment or education, millions of Indians are condemned to live in misery and deprivation. ‘Digital India’ initiative @ MITSOT is aimed at removing some of the major obstacles in governance and bring about major reforms in education , Agriculture, Traffic Management and healthcare, in the process creating wealth along with millions of new job opportunities across the spectrum.

Transportation



VISION

Sustainable, clean, safe, inclusive, smart and integrated mobility system

SECTORS COVERED

- ▲ Railways
- ▲ Airways

FIGURES

- ▲ **85% of Passenger** traffic and more than 60% of freight traffic is carried by roads
- ▲ **13-fold** growth in passenger cars in India by 2035 as against 2005
- ▲ Total **freight traffic** in 2031-32 will be **1300** Billion Tonnes Kilometers (BTKM) as against 2011-12 in 2000 BTKM
- ▲ **Average trip length** of road will increase from 2.5-10.3 Km in 2007 to **4-14.8 Km** in 2031
- ▲ Energy demand is expected to grow at **5-8%** per annum in future
- ▲ India will become the **5th** largest in domestic air travel by 2031

FUTURE TECHNOLOGIES

- ▲ Advanced propulsion technologies
- ▲ Fuel cell drive train

- ▲ Intelligent vehicles- Autonomous power train and vehicle control
- ▲ Super high efficiency electric machines - superconductors
- ▲ Vehicle to Vehicle and Vehicle to Infrastructure communications
- ▲ Magnetic levitation
- ▲ Tilting train technologies
- ▲ Alternate fuel based locomotives (fuel cell)
- ▲ Fuel cell technology or renewable sources of energy for ships
- ▲ Fog vision systems
- ▲ Next generation avionics and flight control systems

BLUE SKY RESEARCH

- ▲ Flexible and foldable vehicles
- ▲ Automotive Paints to help charge the vehicle
- ▲ JPod, Hyper loop, high-speed pressure tubes for transportation
- ▲ Evacuated tube transport, non-stop

Medical Sciences & Health Care



VISION

India will be a healthy state by providing affordable and accessible health care to every citizen through prophylactic, promotive, curative and rehabilitative aspects of technologies

MISSIONS

- ▲ Enhance longevity and health span.
- ▲ Encourage nutritional intervention for better Health
- ▲ Expand health awareness especially Hygiene & Public Health
- ▲ Eliminate preventable infant & maternal mortality and improve mother and child health care
- ▲ Eradicate natural outbreaks and control infectious diseases
- ▲ Evolve novel therapeutic approaches
- ▲ Ensure minimization of all forms of disabilities
- ▲ Ensure synergy and quality of indigenous and modern system of healthcare
- ▲ Efficient networking of rural and urban healthcare delivery system
- ▲ Encourage and implement indigenous biomedical technologies

FACTS AND FIGURES

- ▲ India's Life expectancy will reach **70 years by 2030** from currently 65.48 years at present
- ▲ Maternal mortality rate will reduce to **15/100,000 by 2035** from the current 200 deaths/100,000 live births (2010)
- ▲ Under-5 mortality rate will reduce to **6/1000 by 2035** from the current 59 deaths/1000 live births (2010)
- ▲ Total health spending will be **5.5% of country's GDP by 2022**, up from the current 4.0% (2010)
- ▲ Out-of-pocket health spending will come down from the current 61% (in 2010) of the total healthcare to **23% by 2022**
- ▲ Health worker density per 1000 population (doctors-allopathy, nurses and midwives) will reach **3.33% by 2025** from 1.29% in 2011

FUTURE TECHNOLOGIES

- ▲ Personalized medicine
- ▲ Digital Health delivery
- ▲ Self diagnosis
- ▲ Artificial organ
- ▲ Next generation genomics
- ▲ Big data
- ▲ Bio-printing and regenerative medicine
- ▲ Optogenetics
- ▲ Robotic surgical system
- ▲ Controlled drug delivery
- ▲ Evidence-based medicine

BLUE SKY RESEARCH

- ▲ Gene manipulation to delay ageing process and increase health span
- ▲ Neo-eugenics to reduce or eliminate rare genetic disorders
- ▲ Regeneration of organs
- ▲ Biological scanner to indicate multiple pathogenic load of an individual

Water



VISION

Uninterrupted, affordable and safe drinking water to all

BROAD COVERAGE

- ▲ Status of present and future projections of water demand
- ▲ Broad Categories
 - Water Resources Broadening
 - Improving Water Environment
 - Water Infrastructure
 - Increasing Water Productivity & Conservation

FUTURE TECHNOLOGIES

- ▲ Smart leak detection system
- ▲ Smart monitoring, energy storage and technologies to increase efficiency of cooling towers & boilers
- ▲ Water purification technologies based on in-situ treatment, biomimetic, novel materials (graphene, CNT, FO) and ultra-sound
- ▲ Recycling and reuse technologies for zero discharge
- ▲ Harnessing atmospheric moisture to meet fresh water shortages
- ▲ Seismic tomography for investigating rigidity of rocks

- and understanding litho-logical characteristics for construction of dams, reservoirs and tunnels
- ▲ Ground penetration radar to detect ground water surface and water contamination
- ▲ Climate resilient cropping system
- ▲ Geo-synthetic & poly-fibre for canal lining
- ▲ Trenchless technologies for water infrastructure
- ▲ Immersion vibratory roller compactor concrete

FACTS AND FIGURES

- ▲ **By 2050, 30%** of area and 16% of the population in India will be under absolute water scarcity
- ▲ By 2035 water demand will increase up to **1009** Billion Cubic Meter (BCM) from 710 BCM in 2010
- ▲ Not only quantity, **water quality** will be a major issue in future. 19 Indian states are affected by fluoride, 7 by arsenic and 16 by nitrate
- ▲ Rapid urbanisation will pose serious **water demand** in years to come. For migration

- of every 1 million population into cities, domestic water use increases by **40.15** Million Cubic Metres (MCM)

FUTURE RESEARCH AREAS

- ▲ Non-contact sensors to measure water level anywhere across the depth and width of the river
- ▲ Robust, tamper-proof and reliable water meters that can be clamped without any plumbing
- ▲ Agriculture in the sea to grow plants, like sea weeds to yield edible components which can source micronutrients
- ▲ Microbial Fuel Cell that generate electricity through the metabolic activity of electrochemically active bacteria using wastewater as substrate
- ▲ Development of net water positive materials for water purification
- ▲ New generation of RO membranes, like Graphene that work on the basis of chemical engineering and rely less on energy to push water molecules across them
- ▲ Hydro-fracturing during floods to maximise the water recharge

CASE STUDY – Dr. Karnika Seth



Empowerment of Children Through Digital Awareness

Karnika Seth, Cyber law Expert

Chairperson Lex Cyberia

Founding Partner, Seth Associates

Founding Director of an NGO, FIRE

INTRODUCTION

Information Technology has become an integral part of our lives. With growing use and dependency on Internet for business, entertainment, communication, and networking, internet has also become a vital part of our children's lives. Although we know that the impact of internet on children is immense yet little or no attention has been paid to its adverse effects on impressionable minds of our children.

Karnika Seth, a distinguished Cyber law Expert & Chairperson, Lex Cyberia who is also a renowned author & educationist authored a useful Guidebook on this subject titled 'Protection of Children on Internet' published by Universal Publishing Co. The Book was released on 1st May 2015 by Hon'ble Justice Altamas Kabir, Former Chief Justice of India at the Russian Centre for Science and Culture, New Delhi. The book release was graced by distinguished Guests of Honour, Judge of the Supreme Court of India, Hon'ble Justice M.B. Lokur, and Judges of the High Court of Delhi, Hon'ble Justice Badar Durrez Ahmed and Hon'ble Justice S. Ravindra Bhat. Dr. Gulshan

Rai, National Cyber Security Coordinator, Government of India and Mr. Siddharth Luthra, Senior Advocate & Former Additional Solicitor General of India also graced the occasion as Guests of Honour.

ABOUT THE BOOK

The book is a social initiative directed at bringing cyber empowerment through cyber awareness to protect children who use Information technology more than any other section of our society. It is perhaps the first Indian book on this subject & such a book was imperative in the digital times as it will contribute substantially in creating cyber awareness to protect children. It is a very simple, timely and practical guide book for parents, children, educators, lawyers, officers in Ministry of Women & Child Development, NGOs, and officials of law enforcement.

Highlights of the book

- It aims to bring cyber awareness on protection of children in cyberspace from various cybercrimes including trolling, cyberbullying, cyberstalking, child

CASE STUDY – Dr. Karnika Seth

pornography and other forms of online child abuse.

- The Author has very vividly used Illustrations, examples, case studies to explain various threats children face on Internet such as cyberbullying, cyber grooming and child pornography.
- Author has practical tips on how to prevent and combat threats children face online.
- The book discusses the existing Indian laws that protect children in cyberspace, particularly POCSO Act, 2012 and IT Act, 2000 and the National initiatives adopted in India to protect children from online abuse.
- The author draws examples from other countries such as US and Europe including U.K and initiatives made by International organizations to combat online child abuse.
- The Author has made some pertinent recommendations on various techno- legal and social measures that can be adopted for safeguarding children on Internet.
- There is a cyber glossary created for explaining technical jargon

Our initiatives for Digital empowerment and protection of children

- Ms. Seth wrote this book with key objective of creating digital empowerment through cyber awareness aimed at protecting children in the virtual world. This book will go a long way in meeting objectives of Digital India as it is being adopted by many schools across India for cyber awareness among all stakeholders.
- Working towards Digital India initiative, Lex cyberia, specialized cyberlaw practice of Seth Associates, where Ms. Seth is the Managing Partner has also developed an Application on Cyberlaws aimed at spreading cyber awareness 'IT Act & Cyberlaws'
- A dedicated website childprotectionindia.com elucidating cybersafety tips for children has also been made operational under the guidance of Ms. Seth where content is available for free.
- Ms. Seth has also founded a Non profit Company, Foundation for Institutional

Reform & Education (FIRE) through which educational cyber awareness initiatives are being implemented in schools and other educational institutions.

About the Author

Karnika Seth is an internationally renowned cyber law expert, and Advocate practicing in the Supreme Court of India since year 2000. She is the Founding Partner of Seth Associates, an established Indian law firm and heads Lex Cyberia, the cyberlaws practice division of Seth Associates. Ms.Seth is also a renowned speaker and Visiting Faculty to law enforcement authorities in India, the National Judicial Academy, the National Police Academy, Central Bureau of Investigations and the National Investigations Agency. Ms. Seth believes in spreading cyber awareness among all sections of society specially Children, parents, educators, schools, government and non government organizations and law enforcement entities who benefit deeply from her vast knowledge and practical experience in cyberlaws. In 2012, she authored a comprehensive book titled 'Computers, Internet and New Technology Laws' that elucidates the key developments in the field of Cyberlaws across many important jurisdictions, India, United States and European nations and was conferred the Law Day Award on the Law Day from the Chief Justice of India in 2012.

Ms. Seth is the Principal legal advisor to many multinational groups and government entities. She has actively resolved many Cybercrime cases in conjunction with the law enforcement authorities in India. Ms. Seth is empanelled as legal expert to advise National Internet Exchange of India and the office of Comptroller of Certifying Authorities constituted under the IT Act, 2000. Her views have been solicited by the Parliament and the Ministry of Information Technology for strengthening the cyberlaws in India. She was a member of the Expert Consultation Group constituted by the Kerala State Commission for the Protection of Child Rights in 2014 for making recommendations on Legislative and Executive Action required to Improve Security of Children in Cyberspace. Ms. Seth regularly contributes her expert views on Cyberlaws in Expert Consultations/ Conferences, Print & Electronic Media & television.

RURAL BROADBAND ACCESS INNOVATION-HOTSPOT AS A MANAGED SERVICE

Satya N. Gupta
BlueTown, Denmark



INTRODUCTION

BlueTown is a Denmark based innovative technology company, focused on rural area communication solutions. BlueTown has developed an end-to-end communication platform, specially designed for the needs and conditions in rural villages of the developing nations. The solution provides out-of-the-box access to the Internet, via a low-cost mobile telephone without the need of a SIM card, or any other IP device. The solution is based on cost efficient standard technology with low maintenance, which is easy and fast to deploy, and includes own power supply based on solar panels and rechargeable batteries.

BlueTown has developed an integrated, miniaturized, low-powered low cost Wi-Fi Access Point Controller. It is powered by solar panels and re-chargeable lithium-ion batteries. With the power requirement of the complete setup of less than 20 Watts this setup can provide un-interrupted broadband access for up-to 30 hours without any charging.

Salient Features

The AP controller provides functionalities of power control, charge control, RF control, RF control, bandwidth management, quality, security and authentication management as well as POE for APs. In its functionality it is similar to BSC of a cellular network and facilitates the creation of a managed Wi-Fi Hot-spot, while utilizing off the shelf outdoor Aps.

- BlueTown platform will be connected to existing infrastructure (mast or fiber), and a partnership with local service and infrastructure providers
- Users connect to the BlueTown Base Station via Wi-Fi with more than 1 km in range
- Users connect via traditional handsets or the BlueTown dedicated handset
- BlueTown engages with local micro-operators to take care of the base station, selling prepaid broadband coupons and acts as BlueTown/ISP agent; thereby generating employment opportunities.

Support for Digital India Mission

“To Create an inclusive knowledge society through proliferation of affordable and high quality Broadband services across the Nation”

- Digital India Mission envisages to connect the Rural India on optical fibre; from Block Level to Gram Panchayat Level
- Missing Link is access to “Hand Deliver” the services to rural India (Bharat)
- BlueTown wants to play a major role in “Hand Delivery” of broadband service to Rural masses
- BlueTown with its innovative solution will create public Wi-Fi hotspots and deliver the High Speed Internet Access in the hands of rural countrymen

CASE STUDY – Blue Town– Denmark

BlueTown Business Model and Project Details

BlueTown is focusing on a innovative business model with the ISP/Telco. BlueTown shall partner with the ISP/Telco as a Managed Hotspot Service Provider (MHSP) and provide "Last Mile as a Managed Service" without any CAPEX requirement from ISP/Telco.

With the introduction of such concept the ISP/Telco can focus on their core areas and additionally utilizing their existing infrastructure to provide end to end high speed broadband access for end users in cost effective, timely and affordable manner; whereas BlueTown shall invest in the creating the last mile access for Broadband in the rural parts of the country. The ISP/Telco can ride on BlueTown's last mile and provide broadband services to the end user in a cost effective manner without any CAPEX.

When we talk about the potential of this business case in Rural India, it has got immense potential. About 70% of the population in India resides in the rural part of India and there is no data connectivity option available in rural India.

Pilot Project Description

Last-mile Broadband Access through Wi-Fi based solution in two Gram Panchayats of Ajmer i.e. Arian and Dadiya at NOFN pilot project sites were implemented using innovative solution of BlueTown consisting of miniaturized Access Point Controller powered by Lithium-ion batteries and outdoor Access Points. The existing mobile tower of BSNL which were around 250-500 meter in the vicinity of NOFN fiber termination location were used. The billing and authentication server was installed at the BSNL datacenter at Ajmer. A range of radius around 1 km could be achieved while complying with the transmitted power restriction of WPC. The requisite security and authentication conditions were met in all respects.

Comments on Scalability

Facility of Wi-fi off-loading and Wi-fi roaming(Hotspot 2.0) can also be implemented in the Wi-fi Access Point Controller to de-congest the scarce 2G/3G spectrum.

Challenges Faced

- The NOFN fiber termination room not co-located with BSNL towers and hence needing back-hauling of NOFN connectivity to the BSNL tower (through 5 Ghz Wi-Fi unlicensed link)
- Local power supply very erratic and hence need for solar backup

Best Practices

- Use of miniaturized Lithium-ion batteries in the project having 30 hours capacity without charge.
- Miniaturized, integrated and PCB based Wi-Fi access point controller powered by solar power and supporting the functionality of Web Camera.
- Extremely low voltage (16V) and power consumption (20W) for Access Point Controller and outdoor Access Points.
- Use of existing infrastructure of BSNL/BBNL/CSC to reduce the CAPEX.

Lessons Learned

- As power supply is the major issue and concern in the villages we learned that solar panel is the best solution for powering up our low energy miniaturized solution with Lithium-ion battery backup.
- Need for remote access of Controller to avoid need for local O&M at each Gram Panchayat.

Live Case Study

- BlueTown have already successfully conducted trials of this solution in partnership with BSNL & BBNL
- Trials have been running successfully at 3 locations (Arian, Dadiya & Tilonia)

Way forward-Recommendations

- Deploy more and more Managed Hot-spots in Rural areas on Revenue-share basis by using existing infrastructure to provide carrier grade public broadband access.
- Make more Wi-Fi spectrum unlicensed in 5.1-5.3 GHz band.
- Allocate trial spectrum for White-Spaces (Digital-Dividend)

CASE STUDY – Blue Town– Denmark

- Provide VGF (Viability Gap Funding) for rural access network in line with National Backbone Network (NOFN) and mobile telephony in NE/LWE areas.
- Involve local bodies (GPs, Municipalities) as stakeholders.
- Facilitate “ Make in India” of Wi-Fi Access Point Controllers and other modules.
- Create a Social Business for “ Blue-Collared Job Factory” to train VLE.
- Let us “Make It Happen” together (USOF, PSUs, Industry), PPPP (Panchayat, Public, Private Partnership)



BBNL CMD Mrs. Aruna Sundarajan experiencing the BlueTown Wi-Fi access from rural roadside



SKILL DEVELOPMENT AND DIGITAL INDIA

Skill Development and Digital India

The Digital India programme is a flagship programme of the Government of India with a vision to transform India into a digitally empowered society and knowledge economy

Digital India is a broad based term to leverage the power of digital technology to deliver government services to the citizens and in the process bring the government and the people of India closer.

It aims to ensure seamless delivery of government services to the people and reduce paperwork and make the whole delivery mechanism more systematic and able to reach the remotest region of the vast country. The government has several plans riding on the concept of Digital India and includes among others an ambitious plan to connect the 600000 villages through high speed internet.

The main components of the Digital India are:

- The creation of digital infrastructure
- Delivering services digitally
- Digital literacy

The whole programme is being monitored and controlled by the Digital India Advisory group which is chaired by the Ministry of Communications and IT and has been accorded the status of one of the flagship projects of the government of India in its endeavour to reach to the citizens of the country.

Digital India is an umbrella programme covering multiple Government Ministries and Departments. It seeks to integrate several ideas and thoughts into a single comprehensive vision so that each of them can be implemented as part of a larger goal. Each individual element stands on its own, but is also part of the larger picture.

Digital India aims to provide the much needed thrust to the nine pillars of growth areas, namely:

- Broadband Highways
- Universal Access to Phones
- Public Internet Access Programme
- e-Governance – Reforming government through Technology

- e-Kranti – Electronic delivery of services
- Information for All
- Electronics Manufacturing – Target NET ZERO Imports
- IT for Jobs
- Early Harvest Programmes

The above pillars portray the comprehensive picture of what the Digital India seeks to achieve in wide areas to make the country a truly Digital Nation of digitally empowered society,

The Electronics Manufacturing is accorded a key importance in the whole scheme of things as that is one area which is critical to the success of the overall programme riding on technology and services. The ubiquity envisioned can only be achieved if the delivery is ensured across the country with a wide range of devices and electronic systems being made in India though manufacture friendly policies, thrusts and incentives.

India is one of the fastest growing markets for electronics. The demand is projected to reach USD 400 Billion by 2020. The electronic market is slated for a unprecedented growth and the demand for electronic goods is increasing with a Compound Annual Growth Rate (CAGR) of 22% and is expected to touch 400 Billion USD by 2020. Indian government is therefore taking several steps to promote manufacturing and investment in this sector, which puts India high on the list of potential places to invest.

Government of India (GoI) has launched the National Policy on Electronics 2012 (NPE 12) with the vision to make India a globally competitive destination for Electronics System Design and Manufacturing (ESDM). Besides, India has large young talent, low wage costs.

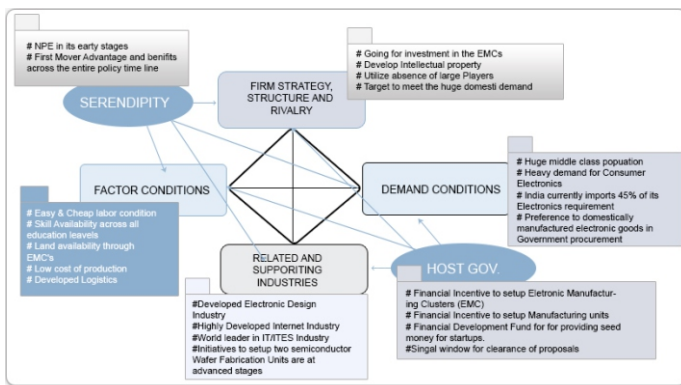
The National Telecom Policy 2012 (NTP, 2012) works in conjunction with NPE, 2012 and provides for creating a design and manufacturing ecosystem for telecom equipment

The government is striving to give a boost to the electronics sector manufacturing in India and has developed a comprehensive plan to realise the vision of making the country self-reliant and with

a target NET ZERO Imports by 2020 demonstrates the intent of the Government of India.

Several policy and regulatory initiatives has been taken in this direction and the electronics industry is geared towards meeting the challenges of the USD 400 Billion market by 2020.

The government has taken several decisions and made plans for meeting the manufacturing targets and goals. The diagram below shows the policy initiatives and programmes taken by government to wards achieving the Zero Import intent by 2020.



The above is intended to give a boost to the complete eco system and all the sub-segments in the electronics sector are being supported to contribute not only towards making the country self-reliant but also to give a boost for the exports. The National Policy on Electronics 2012 focusses on the following:

- Attract investments of 100 Billion USD in Electronics manufacturing
- Reach a turnover of 400 Billion USD
- Create employment of 28 million
- Enhance exports form 8 Billion USD to 80 Billion USD
- Grow the chip design / embedded software industry to 80 Billion USD

The target of achieving 28 Million jobs in the ESDM sector by 2020 is an ambitious one and the government in order to fulfil the vision has embarked upon an ambitious drive of skill development to a large population. The jobs in the electronics sector require specialised skills and training infrastructure to provide skills in various job roles to the people seeking jobs in the sector.

The government is committed to skill over 500

million people in the country and has formed an effective framework for meeting the vision. The ministry of Skill development and entrepreneurship is the driving ministry and the government has formed the National Skill Development Corporation in a unique Public Private Partnership format to lead the government initiative to Skill the nation.

It aims to promote skill development by catalysing creation of large, quality, for-profit vocational institutions.

NSDC provides funding to build scalable, vocational training initiatives. Its mandate is also to enable support systems such as quality assurance, information systems and train the trainer academies either directly or through partnerships. NSDC acts as a catalyst in skill development by providing funding to enterprises, companies and organisations that provide skill training. It will also develop appropriate models to enhance, support and coordinate private sector initiatives. The differentiated focus for the 21 sectors under NSDC's purview and its understanding of their viability will make every sector attractive to private investment.

NSDC is focusing on 21 high priority sectors and the unorganized sector. However the focus is not limited to these sectors alone but any area which could be a potential for skill development which may be used to contribute to the building of the nation are considered and encouraged.

The Electronic Sector skill Council of India (ESSCI) is the sector council in the electronics sector.

Electronics Sector Skills Council of India (ESSCI) is a Not for Profit Organization, registered under the Indian Companies Act, 1956. The Council has been promoted by six Associations i.e. CEAMA, ELCINA, IESA, IPCA, MAIT & ELCOMA, with financial support by National Skill Development Corporation (NSDC).

The ESSCI's focus is on establishing an effective and efficient ecosystem for developing and imparting of outcome oriented skills for the Electronics Systems, Design and Manufacturing Industry (ESDM).

ESSCI's mandate comprises plethora of deliverables including development of curriculum, courses, information database, delivery system. ESSCI is responsible for

standardization, accreditation and certification processes to enhance the employability of the Indian workforce globally.

ESSCI envisions to enable a world class electronics manufacturing industry with an ecosystem for skill development and enhance employability of the large number of Indian human resource.

ESSCI strives to establish a structured mechanism wherein ESSCI will facilitate & collaborate with NSDC in strengthening the existing vocational education system for skills development in electronics sector & upgrade vocational training system for the industry to achieve global standards in manpower productivity.

The approach of ESSCI is to build a robust eco system of partners and knowledge contributors leading to research and analysis and developing a training mechanism leading to accreditation and certification of trained resources. The diagram below demonstrates the integrated approach followed by ESSCI.



ESSCI has over 60 training partners having over 750 training centres across the country and are well equipped to undertake skill development across job roles in all segments of ESDM. ESSCI has developed 139 Qualification Packs (QPs) and 229 National Occupation Standards (NOS) to cater to skill enhancement across the electronic sector segment eco system. The following are the top twenty

Our Qualification Packs cover all the segments of the Electronics Sector and given below are the list of the most popular courses developed by ESSCI for skilling in the Electronic Sector:

- TV Repair Technician
- Field Technician: Air conditioner
- Field Technician: Refrigerator

- Field Technician - Washing Machine
- Field Engineer - RACW
- Assembly Operator - Television
- Performance Tester - RACWO
- DTH Set-top-box Installer and Service Technician
- DAS Set-top-box Installer and Service Technician
- Handset Hardware Repair Technician
- Installation Technician - Computing and Peripherals
- Field Technician - Computing and Peripherals
- Field Technician - Networking and Storage
- CCTV Installation technician
- Service Engineer IT Hardware
- Field Technician - UPS and Inverter
- Solar Panel Installation Technician
- Circuit Imaging Operator
- Through Hole Assembly Operator
- Pick and Place Assembly Operator
- VLSI Verification Engineer
- Embedded Software Engineer
- PCB Design Engineer
- Mechanical Assembly Operator

ESSCI has been an active participant in the government schemes for skill development. The following government schemes have been supported by the ESSCI

1. Skill Development in ESDM sector
2. Pradhan Mantri Kaushal Vikas Yojana (PMKVY)
3. Deen Dayal Upadhyaya Grameen Kaushalya Yojana
4. UDAAN
5. Standard Training Assessment and Reward (STAR) Scheme
6. Uttar Pradesh Skill Development mission

ESSCI has trained over 40000 candidates in the above schemes so far and endeavours to rain over 250000 candidates in the coming two years.

The government has set up ambitious targets to enable the citizens in Skill and ESSCI is committed to support the country in Skilling in the electronics sector to help millions of citizens secure employment and make the Make in India vision a reality.

Govt Scheme /Policy on Digital India-1

National Telecom Policy-2012

VISION:

To provide secure, reliable, affordable and high quality converged telecommunication services anytime, anywhere for an accelerated inclusive socio-economic development.

To read about the policy, please visit

<http://www.trai.gov.in/WriteReadData/userfiles/file/NTP%202012.pdf>

Govt Scheme /Policy on Digital India-2

National Policy on Electronics

VISION:

To create a globally competitive electronics design & manufacturing industry to meet the country's needs and serve the international market

To read about the policy, please read

http://deity.gov.in/sites/upload_files/dit/files/NPE_Notification.pdf

Govt Scheme /Policy on Digital India-3

National Cyber Security Policy-2013

VISION:

To build a secure and resilient cyberspace for citizens, businesses and Government

To read about the policy, please read

[http://deity.gov.in/sites/upload_files/dit/files/National%20Cyber%20Security%20Policy%20\(1\).pdf](http://deity.gov.in/sites/upload_files/dit/files/National%20Cyber%20Security%20Policy%20(1).pdf)

Govt Scheme /Policy on Digital India-4

National Policy on Skill Development & Entrepreneurship -2015

VISION:

To create an ecosystem of empowerment by Skilling on a large Scale at Speed with high Standards and to promote a culture of innovation based entrepreneurship which can generate wealth and employment so as to ensure Sustainable livelihoods for all citizens in the country.

To know more about the policy, kindly read

<http://www.skilldevelopment.gov.in/assets/images/Skill%20India/policy%20booklet-%20Final.pdf>

Govt Scheme /Policy on Digital India-5

MODIFIED SPECIAL INCENTIVE PACKAGE SCHEME (M-SIPS)

VISION:

To promote large-scale manufacturing, to offset disability and to attract domestic and global investments into the Electronic System Design and Manufacturing (ESDM) sector in India.

To know more about the policy, kindly refer to

<http://deity.gov.in/esdm/incentive-schemes>

Govt Scheme /Policy on Digital India-6

Electronics Development Fund Policy (EDF Policy)

VISION:

EDF Policy provides a framework to set up a Electronic Development Fund which will foster R & D & innovation in Electronics & IT

To know more about it, please refer to

http://deity.gov.in/DeitY_e-book/edf-book/index.html

Concluding Note



On the occasion of the First Digital India Conclave organised by Broadband India Forum (BIF), it is indeed with great pleasure and with lot of pride that we dedicate the Digital India Guidebook-the first of its kind to the nation.

The Guidebook which has unique collection of experiences of government-industry partnerships, corporate & academia initiatives, pure government initiatives and case studies which bring out various facets of Digital Technologies and Digital empowerment of all citizens and its impact on every section of the society .

This Guidebook, we hope will serve as a beacon light for future generations who shall be the real benefactors of Digital India and will be required to use this digital platform and take it to the next level for ease and benefit of delivering a plethora of enhanced e-services to the masses.

I take this opportunity to thank my colleagues in the Content Management & Editing team comprising of Ms Roshmi Priya, Ms. Monissha & Mr. Saleem. I also wish to thank our BIF Chairman-Shri Shyamal Ghosh ji, President-Shri Mahesh Khara ji and our Secretary General-Shri Anil Prakash ji for inspiring and guiding us to put this document together.

Debashish Bhattacharya

Chairman-Digital India Guidebook committee

Disclaimer: -

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