THE INSTITUTION OF ELECTRONICS AND TELECOMMUNICATION ENGINEERS
(IETE)

RECOMMENDATIONS OF
IETE APEX FORUM
ON
INTERNET GOVERNANCE

Proceedings and Recommendations

of

IETE APEX FORUM

on

Internet Governance

held on
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Organised by

**THE INSTITUTION OF ELECTRONICS AND
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Contents

1. Introduction

3. Proceedings

4. Appendices

1. Introduction

About IETE

Founded in the year 1953 by a team of dedicated professionals, the Institution of Electronics and Telecommunication Engineers (IETE) is a leading non-profit professional society devoted to the advancement of Science and Technology of Electronics, Telecommunications and Information Technology. It serves more than one lac and twenty-five thousand members through 64 Centres, spread across the country including one at Nepal. The Institution provides leadership in scientific and technical areas of direct relevance to the national development and its economy. The Government of India has recognised IETE as a Scientific and Industrial Research Organization (SIRO) and also notified it as an educational Institution of national eminence. The objectives of IETE focus on advancing electro-technology. The IETE conducts and sponsors technical meetings, conferences, symposia, and organises exhibitions all over India. IETE Apex forum is one such event that promotes issues of national interest through a common platform. IETE also publishes technical journals and provides continuing education to working professionals as well as career advancement opportunities to its members.

IETE Apex Forums

One of the objectives of the IETE Apex Forums is to bring policy makers, policy implementers, academicians, researchers, practicing engineers and industrialists on a common platform for meaningful exchange of ideas and suggestions on the current specific issues of national interest. Meaningful debates and discussions are held, views are exchanged to achieve the aim of

the forum. The recommendations /outcomes resulting out of the forum are actively pursued for advancement of the profession. This Forum addresses important issues with the participation from Govt Departments also like Deity, DST, DoT and leading academic institutions.

The following are some of the Round Table Conferences under the Apex Forum held in the recent past.

- **"Smart Cities"** as organized on 26 July 2014 at India International Centre, New Delhi.

- **"Geo Spatial Technologies"** was organized on 24 May 2014 at Hyderabad Centre at the Mekaster Auditorium of the Institution.

- **"Vocation and Skill Development Perspective-Current Scenario**" held on 28 Feb 2014 at IETE HQ, New Delhi.

- **"DRM Technology"** as held at IETE HQ on 6 May 2013

- "**Road Ahead for LTE in India- Opportunities and Challenges**" held on 11 Sep 2012 at Hyderabad.

- **The Cloud Computing in India** – The Road Ahead" as held on 3 Jul 2012 at IETE HQ, New Delhi.

- **"e-Education Paradigms-Indian Scenario & Challenges**" as held on 23 Dec 2011 at IETE HQ, New Delhi.

Objectives of the Apex Forum on Internet Governance

The objectives of this IETE Apex Forum on "Internet Governance" were to discuss the following issues:

- *Scope of Internet Governance.*
- *Structure of Internet and Governance framework.*
- *Issues which are often raised at global level.*
- *Various aspects of Internet Governance and their specific relevance and implication in Indian context.*
- *Key role played by Internet in the country`s economy.*
- *China`s approach to Internet and Internet Governance.*
- *Network Neutrality importance and imperatives.*
- *Challenges at national, regional, and global levels.*
- *Issues with ICANN.*
- *Any other related issue.*

2. Executive Summary

IETE Apex Forum was held on 24th July 2015 at IETE HQ, New Delhi to deliberate on the theme "Internet Governance." A background paper containing key issues/focal information on the topic was distributed to the participants. Three hours of intensive presentations and discussions were held among the members. The salient recommendations emerging out outcome of the Forum based on detailed deliberations, are highlighted below:-

1. The digital revolution has provided better and cheaper access to the world of information. Digital technology is the medium through which knowledge & information can spread faster to more users in lesser time. The information available on the internet is voluminous and full of varied opinions by the people who share their personal and professional data, which can exert both good and bad influences on an individual. While on one hand the internet can make people well informed on the other, if it goes unchecked can create adverse user behaviour. The speakers were of the view that such technology mediums should be harnessed to create positive attitude to facilitate personal growth and social harmony.

2. There is need to exercise control on unethical/ sensitive sites by the Government, in a matured manner by taking general consensus of the public to arrive at a decision which is in the overall interest of the nation.

3. Social media is a useful tool to keep in touch and interact with one another. It should be a platform where the users can share, connect, receive the required information or any help or opinion. Generally, the social media platform should be used as a means to frame the conversation around specific issues so that it could be of general interest to the masses. i.e. for meaningful exchange of information.

4. The speakers opined that the political and social laws should be reviewed for efficient implementation/regulation of the social media. The social media policies should address all the key elements towards its healthy use.

5. Developing nations still have to embrace more of the internet, because they still have a limited reach. Once these people gain access to this digital revolution they can integrate it into national mainstream gradually.

6. Internet plays a vital role in the development of the country`s economy. This can only be achieved by introducing more Internet users from the rural parts of India. Motivated digitally skilled people can make the campaign of 'Digital India' successful.

7. In rural areas, multipurpose hall with high speed broadband connectivity can be setup as "Broadband Square" with public private partnership to encourage more Internet users for the implementation towards Digital India.

8. To engage more Multi-stakeholders like Academia, Industry, and Technical Community in the policy making. The policy making process should be open, transparent, democratic, and collaborative.

9. Initiatives may be taken up for a fair and neutral digital ecosystem to ensure Net Neutral services. The active discrimination of users by the network operators for monetary gains can be detrimental to the very survival of neutral internet. The national policy may allow the wireless internet to remain a social force of unrestrained information exchange.

10. India should emulate China by having its own firewall, social sites and search engines. Contents should be developed in local languages for more usage in villages.

11. Strategy of India towards I-Governance may be more visible and effective by managing the Internet through a multi-stakeholder approach and the governments should have "supreme right and control" on matters relating to national security.

12. Academia, civil societies, and the Govt should collaborate and invest more towards R&D, innovations, scholarships & fellowships for the skill development programmes to facilitate Digital India and effective Internet Governance.

3. Proceedings

Opening Remarks

The Apex Forum on **Internet Governance** was held at IETE Headquarter, New Delhi on the 24th July 2015 (1630 hrs to 1930 hrs). Smt Smriti Dagur, President IETE presided over the forum. Lt Gen (Dr) SP Kochhar, AVSM and Bar, SM, VSM (Retd), CEO, TSSC and Co-Chairman of Skill Development & Industrial Coordination Committee (SD&ICC), chaired the forum in absence of the Committee Chairman, Dr Pawan Kapur.

The complexity and significance of Internet governance necessitated IETE to take up this theme and address some of the difficult issues in this domain. The challenges, issues, roles played by inter-governmental and governmental stakeholders in collaboration with Internet service providers, technical professionals, private sector businesses and other non-governmental stakeholders were concentrated on. The issue of what could be done to bridge the Internet governance knowledge gap in terms of resourcing, scaling, and awareness building exchange information on the subject etc were intensely deliberated by the expert speakers. Suggestions were given on the important aspects that required connecting several disparate areas of technology, policy, development, and civil society to work on solutions and act in concert to ensure collaborative stewardship of the Internet.

Prior to Apex Forum, a background paper was designed and circulated to all invitees. Copy of this is placed at Appendix 'A'.

Talks and Recommendations given by the Guest Speakers

❖ Prof M P Gupta – IIT Delhi on "Internet Governance: from India's perspective"

The talk include

• **Scope of Internet Governance** encompasses management and coordination of the technical underpinnings, such as domain names, addresses, standards, and protocols that enable the Internet to function, and variety of broader Internet policy, such as IPR, privacy, e-commerce or cyber-security

• **Who should manage these?**
Multi-stakeholder model, such as ICANN,IGF, IETF, IRTF, ISOC, W3C etc

OR shall it be integrated in the UN (e.g. ITU) where all countries can play a more important role in controlling it.

• To know various aspects of Internet Governance, there is a need to understand the genesis of it.
It was born in R&D setting and is so far managed by brilliant technology professionals. It has evolved so far without much governmental interference. But as the landscape is expanding covering billions of users worldwide, it raises certain concerns that have started bothering governments of nations.

These are:-
   o Economic potential, e-com etc (4% of GDP)
   o Social media (sharing & collaboration)
   o Cultural integration
   o Cyber Crime
   o Cyber security
   o Location of data
   o Trans border data issues
   o Pricing of information highway by prioritizing data packets (net neutrality)
   o Wiki leaks & NSA (Snowden), has opened up the need to revisit IG
   o Voice came from BRICS countries

•Structure of Internet - 3 layers of governance

Infrastructure layer	Logical layer	Content layer
3 Tier structure: Tier-1 (large international backbone operators); Tier 2 (national or regional backbone operators); and Tier 3 (local ISPs). In most countries, there is some regulation of interconnection at national and local levels (for Tiers 2 and 3 ISPs)	Development of standards becomes key requirement at this level to allow diverse devices shake hands. TCP/IP, HTTP, HTML, EXL etc are example that made internet a reality. Governance at this level is largely guided by bodies like W3C consortium.	For average users, the content layer is their only experience of the Internet. Issues here are: Internet pollution (spam, viruses, spyware, phishing attacks, pornography and other harmful content
Internationally, there is no regulation, and the terms of any interconnection agreement are generally determined on the basis of negotiation and bargaining. In theory, this allows the market to determine interconnection in an efficient manner. In practice, however, unequal market position, and in particular the important positions occupied by Tier 1 providers, means that the larger providers are often able to dictate terms to the smaller ones, which in turn must bear the majority of the costs of connection	Issues being deliberated at this level: standards need to be updated to accommodate new technologies privatization of standards was resisted TCP/IP require additional mechanism to tackle new security threats introduction of Quality of Service (QOS) standards to prioritize certain packets (to differentiate email & a phone call over internet	GoI, in 2011, has made provisions to remove content, within 36 hours upon complains of any offensive content, which are:- ["disparaging," "harmful," "blasphemous," "pornographic," "encourages gambling," "infringes proprietary rights," or "threatens the unity, integrity, defense, security or sovereignty of India, friendly relations with foreign states or public order."] Cyber crime is complex subject where often difficulties found in securing evidence; it gets further complicated if crime crosses the border. IPR infringement is another challenge

Issues at tier-1

- Countries have regulation of interconnection at national and local levels but the developing countries, generally lack ownership of Tier 1 infrastructure, and are often in a poor position to negotiate favourable access rates.
- By some accounts, ISPs in the Asia-Pacific region paid companies in the United States US$ 5 billion in reverse subsidies in 2000; in 2002, it was estimated that African ISPs were paying US$ 500 million a year.
- Existence of these reverse subsidies is the single largest factor contributing to high bandwidth costs.
- Other reason for high local access costs is also due to general lack of good local content in many developing countries.

Universal Access

- Realization of universal access is not easy.
- Connecting geographically remote customers is financially un-remunerative.
- Governments have to come forward to subsidize as there is no clear incentive for private players otherwise. e.g. NOFN.

Indian Perspective

- Universal service obligation has been articulated in National Telecom Policy 2012 (NTP 2012), the internet and broadband are now recognised as key drivers of economic and social development & India as lead player in global knowledge economy, the Policy specifically seeks to deliver Broadband access to all village panchayats through a combination of technologies by 2014 and progressively to all villages and habitations by 2020.
- The Government of India has committed an investment of roughly Rs. 20,000 crores by 2014 for the achievement of this target. Close and immediate engagement of all stakeholders in the internet policy field is vital in order to maximise this important emerging opportunity of making internet access for all a reality.

Next-generation Technologies

- Next-generation technologies (broadband wireless technologies 3G/4G, WiMax etc.) also require governance to ensure that they are

deployed in a manner that is harmonious with pre-existing (or legacy) systems.

- Standards and other technical specifications are compatible with existing networks.

- India's 3G/4G penetration & migration from IP4 (with 32 bit address scheme can have 4.2 billion unique IP) to IP6 (with 128 bit address scheme can have 340 undecillion addresses) is very low. IPv6 also introduces a range of additional features not currently supported in IPv4, including better security, and the ability to differentiate between different streams of packets (e.g., voice and data).

Issues with ICANN

- A non-profit organization under MoU with DoC for managing DNS & allocation of IP addresses.

- ICANN holds an extraordinary position in controlling internet.

- Its structure is such that it is managed by professionals but has no shareholders to which it is accountable and no government agency to which it is answerable.

- There are worries due to this, as ICANN assumes a monopoly in managing internet.

- In the wake of the recent revelations of NSA spying, and of undermined internet security, Russia and Brazil are calling for a complete overhaul of how the internet is run, suggesting it should be put under UN auspices.

Internet Governance Forum (IGF)

A multi-stakeholder forum for policy dialogue on issues of Internet Governance

Govt of India stands by freedom of Internet (Kapil Sibal in 2012)
"*Any nation which wants to be a stakeholder and a key player in the 21st century must come to terms with the cyber world.*

GoI does not want control over the internet...

There should be no formal government interference in the dissemination of information through a media which is perhaps is the quintessential representative of democracy in the world.

It is also clear that we need a modicum, if not of governance then of consensus and that consensus must evolve through honest, open, dialogue with all the key stakeholders."

China's approach to Internet

- China has built its Web infrastructures (National Internet backbone, Great firewall).
- Great firewall is the world's most advanced national firewall, having evolved from crudely blocking entire web domains to blocking just particular pages within websites.
- Controlled by China Telecom (PSU).
- This opened opportunities for local players.
- Adopts a multi-layered censorship approach, from blunt suppression of dissidents, Internet policing, content removal, discipline of cyber cafes, to more subtle forms- regulation of ISPs, promotion of self-censorship among users, and employment of cyber commentators to shape public opinion.
- Major Internet services like Twitter, Facebook, YouTube, Google and Blogger are still blocked.
- These including 56 other major Internet companies continue to comply with Chinese regulations and offer censored search engines.
- They use DNS Poisoning, Blocking Access to IPs, Analyzing and Filtering URLs, Inspecting and Filtering Packets, Resetting Connections, & Blocking VPNs.

Network Neutrality

- It is the principle that all Internet traffic should be treated equally. Net Neutrality is the Internet's guiding principle: It preserves our right to communicate freely online. This is the definition of an open Internet.

- This is in response to initiative of FCC Chairman Tom Wheeler, to discriminate online and create pay-to-play fast lanes ISPs are by definition the gatekeepers to the Internet, and without Net Neutrality, they would seize every possible opportunity to profit from that gatekeeper control. Without Net Neutrality, the next Google would never get off the ground.

- Net Neutrality means an Internet that enables and protects free speech. It means that Internet service providers should provide us with open networks — and should not block or discriminate against any applications or content that ride over those networks. Just as your phone company shouldn't decide who you can call and what you say on that call, your ISP shouldn't be concerned with the content you view or post online.

- Without Net Neutrality, cable and phone companies could carve the Internet into fast and slow lanes. An ISP could slow down its competitors' content or block political opinions it disagreed with. ISPs could charge extra fees to the few content companies that could afford to pay for preferential treatment — relegating everyone else to a slower tier of service. This would destroy the open Internet.

- DoT Bhargav Committee (July 2015) on net neutrality unhesitatingly recommends that "the core principles of Net Neutrality must be adhered to." It also recommended to licence domestic internet telephony like WhatsApp, Viber and Skype is widely seen as a fair step to create a level-playing ground between these services and domestic telecom operators as it adheres to the principle of "same service, same rules."

- A regulatory and licensing regime on internet telephony in the domestic market is expected to help telecom operators provide legitimate revenue from voice and allow them to provide affordable internet as well as invest in mobile infrastructure and spectrum.

Conclusion

For Internet Governance
- Reconstituting ICANN as an international agency, perhaps as part of the United Nations, such as the International Telecommunications Union (ITU).
- From India's perspective, if ICANN becomes part of UN then it has its own pros and cons.

- Security Council members will be pivotal decision maker.
- Keeping in view changing scenario where development is taking centre stage, it is prudent to ally with major technological powers –USA, China etc.

For connectivity and universal access (bridge digital divide), India must:
- Expedite the work of expansion of infrastructure in rural areas for eg. Laying of the optical fibre network.
- Provide the subsidized connectivity to rural areas.
- Promote local content on internet in order to entice the rural users to subscribe the broadband.

To address the issue of Logical layer:
- India must enhance its IPv6 deployment capabilities.
- Also much support IOT & smart city projects.
- Early adoption of IPv6 gained China a significant position in the future development of internet.

To address the issue of Content Layer:
- India should come up with some firewall system as China's to enforce security measures.
- India must come up with its own OS (as DRDO is already working on) in order to minimize the Cybercrimes like phishing, spamming, email theft etc.

Additional points

-India to develop its own OS.

-Scale up data storage capability.

-To deal with MNC on trans-border data issue, their data centre may be encouraged to have mirror sites on Indian soil.

-Within IOT scenarios, intranet concept may give some choice of safety from mischief.

-IOT is going raise serious security challenges (remote control)- traffic diversions, critical infrastructure havoc, personal damage (car) etc.

-NSA spying (bias in random number generator for cryptographic key to break the password; companies work in tandem with US Govt; Iran nuclear power program was breached by offline intervention).

-Developing own OS may be politically correct but may not be viable option; you begin from scratch or build from some base platform (android is built over Linux; Linux is built over Unix).

-Risk of open source: code is available for improvement; any insider can plant a bug and programmed for fatal accidents. e.g. INMARSAT (British satellite telecommunications company, offering global mobile services) hired by Indian defence.

❖ Shri S K Prusty, Director, International Cooperation, DoT

Highlights of his talk include-

• The speaker touched upon the objectives of the Internet Governance, the global trends, benefits of Internet Governance, the actions to be taken and the standards process which should be timely and effective for all concerned.

• His main view was that Internet is like an ocean of information but the children and the students who have less experience of life are vulnerable to unethical stuff. There is plenty of information available on the internet but all may not be conducive to their mental growth.

• Need to attract people from cities to invest in villages because of its immense potential. Multipurpose hall with high speed broadband connectivity can be built in villages for information exchange. Well structured layout which can be developed in to form which may be called "Broadband Square" with public private partnership.

❖ Lt General Nitin K Kohli, AVSM, VSM, Colonel Commandant & Signal Officer in Chief (Guest of Honour)

Highlights from his talk-

• Internet is a fast evolving encompassing global resource. Internet has become now a backbone of our economic growth and the governance. For every 10% growth in Internet base there is 1.8% growth in GDP.
• Multilevel approach should be adopted for Internet.
• India needs to have strategy to bring Internet governance.

- DietY's involvement in the Internet Governance and attending various meeting in this regard.
- More Investment in ICT Sector.
- Cyber laws reviewed as per the national policy, should be adequately supported by the technology.
- India's participation at WSIS, WCIT, IGF, International level conferences, and meetings to forward IG issues.
- National Internet Exchange should be setup in India.
- Issues like power balance, increasing trade partnership for data sharing, a composition of bodies and committees for policy making, to be considered.
- Coordination of various departments working on Internet Governance.
- Other essentials emphasized for the achievement of Internet Governance included:

  -Multi-stake Approach

  -Foster Participation Approach

  -International Approach

  -Technology Neutral Approach

  -Maintain Original Architecture

  -Submission of Laws

❖ *Prof Huzur Saran, IIT Delhi*

Highlights from his talk -
- One needs to know the nature of Internet in India and how to control it.
- Best way to control can be a lesson from China`s approach.
- Most of the countries are forced to accept the rules governed by Internet because there is no legal structure in the form of legal treaty.
- Terms and Conditions are good enough for all as no one checks the rules/laws governed by the Internet.
- ICANN may include technical standards like HTML protocols, security flaws into its review.
- National Policy may be more refined enabling more discussions on the Internet subject through symposia, forums, conferences which are required to propagate its importance and impact.

▪The Internet is the backbone of future projects towards the building of Smart City too.

❖*Shri Vimal Wakhlu, CMD-TCIL on "Machine to Machine (M2M) and Internet of Things (IoT)"*

The speaker illuminated the importance of Internet of Things (IoT), through his talk, which he believes is the future. He strongly feels that we are living in a Universe where M2M communication is happening on a large scale, without us being aware of it. He connects it to the mechanism of telepathy and cybernetics – topics that intrigues him a lot. He suggested developing a small Intranet hub and having a good debate on Net Neutrality with implementable result. The essence of his talk include:-

- What is Machine to Machine(M2M) and Internet of Things (IoT) ?

The new buzzwords in the ICT domain are **M2M** and **IoT.** A lot of interest has been generated recently, while there has been a talk on 5G Networks in Telecom. M2M stands for Machine to Machine and IoT for Internet of things. While this M2M Technology in the current form might be new, but the fact remains that applications linked to this have been in use for quite some time.

-Why M2M and IoT ?

 In the developed world the struggle is how to keep the economy moving to ensure that the quality of life of the citizens remains in place, and the unemployment percentages are minimized. Rest is a luxury. However, developing nations like India are faced with a lot of challenges, practically on every front. Quality of air is a problem. People are forced to inhale contaminated air due to vehicular and industrial pollution. Improper solid waste management pollutes the ground water, which as it is scarce. Food production and distribution not being in tune with the mouths to be fed results in hunger, malnutrition, pre-mature deaths. A majority of the people live in slums with not adequate protection from the vagaries of nature. Health is a challenge with limited number of health centres, particularly in the rural areas, where having a doctor too is a big

luxury. In absence of good quality teachers and school infrastructure, even education is a luxury. A good number of people fall victims to the plots of terrorists making security also a challenge. To top it all high level of corruption makes the things even worse.

Is there no redemption for the people living in these developing nations? Yes, there is, provided we follow out of box solutions for solving the problems faced by people in these countries. Use of ICT in the delivery of various services can bridge this divide. Now let us see how some of issues that have been flagged in the opening paragraph can be addressed.

- **How can M2M and IoT help mitigate these challenges?**

  The challenges to our **environment** including **air and water** can be addressed using Machine to Machine/ Internet of Everything (M2M/ IoE). Air quality monitoring transducers in various parts of cities, with a centralized monitoring and control arrangement can ensure that air quality can proactively be monitored and finally controlled. Instead of having PUC centers wherein people manage to get PUC certificates by just paying a little extra money, it would make sense to have chemical transducers fitted in the exhaust pipes of all the vehicles mandatory, which through a M2M system can be monitored from a central location. For polluting vehicles, an SMS would be automatically generated conveying the warning, and in case of repeated offenders, the registration can be put on hold till the vehicle is rectified.

  Water distribution can be controlled electronically to ensure a proper quality, and also an equitable distribution, and that every drop of this absolutely essential and scarce commodity is properly accounted for. This can be done using ICT technology, where the complete control of distribution and accounting is automated rather than at the whims and fancies of a handful influential people who tend to get more of it and that too free.

The basic source of **pollution of Ganga** is the untreated effluents from the industry and the sewage from all the municipalities along the route. To mitigate this challenge Government has made it mandatory to have STP (Sewage Treatment Plant) for municipalities and the effluent treatment plant for the industries.

Monitoring to ensure that industries and municipalities release clean water into Ganga is an important step. This can be done utilizing M2M technology. At every outlet point of industrial units and the sewage plants of municipality that goes into Ganga, a chemical transducer that checks various parameters of water quality. With a Data logger and the existing mobile network, the status would be updated online, to a centralized server and the regulator/authority incharge of monitoring would immediately get an alert that a particular industrial unit has violated the norms. An automated SMS would also be generated immediately, warning the company of the violation, and revocation of the license on the next default. This type of monitoring would ensure that untreated effluents are not released into the river, and this system would act as a deterrent. Once this control is in place, **Ganga will clean itself**. In the course 3-4 years this would become effective, and the same solution could be extended to other rivers, including Yamuna.

We produce a lot of **food,** yet we are always short of food in our country. Many of our people do not get a square meal. At the government level, a lot of food grains are procured from the farmers at the minimum support price. However, these food grains are stored in humid conditions, leading to early decay. In case all the warehouses are fitted with monitoring devices for the environmental parameters, and this information is available in a central location online, a lot of food grain wastage can be taken care of, and the vulnerable sections of the society can be provided proper food grains at affordable cost to them.

For **agriculture,** we need water, which is quite scarce in the country. We can conserve on this water by implementing drip Irrigation based on the temperature and humidity conditions,

which can be controlled electronically using the M2M concept, so as to minimize wastage of this invaluable natural resource.

India is vulnerable to **disasters**. Coastal areas of Andhra Pradesh, Orissa, and Tamil Nadu are susceptible to Tsunamis. A lot of mineral rich states like Jharkhand a large number of mines, which often prove to be graveyards for the workers over there. Some of the northern states are often subject to Seismic activity, besides also being flood prone. In the Urban areas, including some of our prestigious cities, we have challenges of building collapses, collapse of flyovers etc. It is possible to mitigate these challenges by a **proactive monitoring of infrastructure** including old and vulnerable buildings, and also monitoring the activity of the sea bed, and also the seismic areas, to generate a centralised monitoring and control system based on M2M concept, which can warn the citizens in advance in areas likely to get affected.

Smart Ambulances through online monitoring and control from the main hospitals, can help save precious lives, wherein the paramedic accompanying the patient can be guided by the doctor from the main hospital, based on the live online feedback he/she is getting from the gadgets attached to the patient inside the ambulance. Besides this, **Remote Patient Monitoring** in chronic diseases like Epilepsy etc, Heart Patients, Mother and child care etc. is possible using this technology.

Road Safety is of a great significance in a country like India where there are 2,25,000 deaths and 7,50,000 injuries every year. With Smart Vehicles in place, it is possible to reduce vehicular accidents in the country. There is a possibility of e-call from Vehicle to emergency Centre in case a distress situation, Smart Signalling System to ensure optimum utilisation of road space during peak periods. The vehicles can be fitted with radars and intelligence, which would prevent head-on collisions.

Homeland security is a major concern in developing nations, and more so in vulnerable countries like India. For this, exchange of

information in an automated manner is of prime importance. It is possible to develop a Grid for Homeland Security using various devices, which can exchange and also store information.

Defence sector can benefit in a big way from M2M. Unmanned vehicles, Automated reconnaissance, placing sensors on barbed wires, sensors on the ground near the borders, can help ensure that we do not get surprises the way we have been getting on the North Western borders in the recent past also. Similarly, we can leverage this technology for monitoring body conditions of soldiers in areas like Siachen so that we do not lose our brave men to frost and cold.

Energy Sector holds promises in terms of Smart Grids, Smart metering and Street light automation when it comes to the M2M/ IoT.

Financial inclusion is a big challenge India is faced with. It is intended to use **Rural ICT project** of Department of Posts for this. This would entail use of handheld devices by the postmen. These devices in turn would be communicating with a central server on their own for authentication of these financial transactions. Thus there would be a semblance of a banking system, without having any bank branches in the rural areas, these would not be commercially viable.

Non Clonable ID can help control of fake drugs and also the fake IDs. This technology was used effectively in Delhi police during the Common Wealth games to prevent suicide attacks.

Home Automation is another area where it can empower the working women, who can finish most of their household chores including cooking, washing etc. on their way back from work. Besides this, security system monitoring from remote locations is possible, to prevent burglaries etc.

Manufacturing sector is in for a paradigm change. With **3D Printing** entering the scene various domains including

manufacturing, are witnessing amazing changes. While in the health sector tooth replacement and dentures are being fabricated using 3D Printing technology, design corrections using M2M and IoT, has resulted in reducing the prototype to full development cycle . Space station of US used a similar concept in fabricating a tool in space.

Software coding using IoT ensures less human intervention and better efficiency ,cheaper software   and higher speeds

-Challenges posed by M2M/ IoT

With all that we have discussed above, the estimates are that data growth by virtue of the increase from the current levels of 4.5 Billion Devices to 29 Billion by 2024, would be from 300 Pentabytes of Data to 3200 Pentabytes. This would put a huge demand on the Network Reliability, and also improved Network Planning for the service providers. This puts a lot of onus on the Service providers.

There could be serious challenges to Connected cars running through these Networks in case the proper SLA conditions are not met. It could lead to serious accidents.

There is definitely a need for strengthening the existing telecom infrastructure to meet the bandwidth requirements for M2M application. India lives in villages. Nearly 900 million of 1.25 billion people are in spread over 6,40,000 villages. For any technology deemed to be successful in India, uptake in the rural areas is essential. The current position of band-width available in these areas is far from satisfactory.

However, Government has initiated the **National Optical Fibre Network** (NOFN), which would ensure 100 Mbps of bandwidth initially for 2,50,000 villages with Gram Panchayats. Besides that, with 4G technology picking up in the country we can expect even the adjoining villages to these Gram Panchyats get sufficient bandwidth through the wireless mode with the Mobile Service Providers finding new subscribers to these services in these areas.

With 4G technology being deployed world over including India, and the 5G technology on the anvil, the future with M2M and IoT looks very exciting

Security of the IoT based systems could pose a Security threat to the country. **Wars can be won or lost on the battle front, but through IoT** Power Grids can be paralyzed; Weapons system can be paralyzed by the enemy. Hence there is a lot of scope for working on this front before we take a big leap forward in this direction-

Standards and Technology

For any technology to be to be successful and proliferate, it is essential that Universal Standards are adopted to ensure seamless interoperability. This applies to M2M and IoT as well. There is need for collaboration among stakeholders in the ecosystem in formulating standards for the industry. Of course, they have to be in tune with the International standards in the field, and we see a lot of work having been done by organisations like ETSI. Any technology in this domain has to be **Open, Modular** and an **Extendable Platform** approach.

❖ *Dr Govind, CEO-NIXI (Chief Guest)*

To orient the audience to his topic, the speaker explicitly explained his presentation slide by slide. He pinpointed the nature, importance, distinctness, facts and figures, ecosystem of Internet Governance. The major functions according to him were: Setting technical standards; operation, management, allocation and assignment of resources and formulation and implementation of policies including dispute resolution

The issues of Internet Governance for different clusters like- Infrastructure and Standardisation Cluster, Security Cluster, Human Rights Cluster, legal cluster, economic cluster, development cluster, and Socio-economic cluster were elucidated. The speaker also touched upon ICANN (Internet Corporation of Assigned Names and Numbers) functions, responsibilities, its supporting organizations, advisory committees and other affiliated bodies within the ICANN

framework. The Regional Internet Registries that was responsible for equitable distribution of internet protocol and other number resources amongst regions.

The initiatives required according to Dr Govind were: I-, M- and E-Governance Initiatives; National Optical Fibre Network, Digital India Programme etc; Legal Reforms Initiatives like recent Judgment on Section 66A of the IT Act; Initiatives for Complete Shift from IPv4 to IPv6; Initiatives for localization by launch of IDNs like .Bharat; Initiatives in relation to Net Neutrality and Initiatives to enhance India's participation. Example: Indian IETF Capacity Building Program (IICB) of ISOC, Kolkata.

Giving the back history of NIXI - National Internet Exchange of India, he explained how in 2003 it was set up as an internet exchange to facilitate exchange of domestic Internet traffic between the peering ISP members. How during 2004, India was provided .IN domain as its country code top level domain name. NIXI is managing the .IN domain. He also apprised that that a National Internet Registry (NIR) was approved for India by APNIC in 2012 and had become functional from March, 2012. It is managed by NIXI and entrusted with the task of coordinating IP Address allocation with other Internet resource management functions at national level in the country. It has been named as Indian Registry for Internet Names and Numbers (IRINN).

Dr Govind's Recommendations for Industry: Invest in R&D and Innovation, Information Mapping, Capacity Building, granting scholarships and fellowships with a view to collaborate with academia, societies and the Government.

Recommendation for Professionals, Scholars and Students: Stay interested and get updated to engage in important areas like encryption, IPv6, DNS Sec, Open Net Standards, etc; participate in IETF, RIRs, ICANN, IEEE and ISOC mailing lists and events, research and writing extensively to share experiences to reach industry and government for necessary financial support.

Questions/Answers

The following were some of the questions put on the floor after the presentations:

Question: How issues like data manipulation is addressed by participating in forums?
Answer: Participation in various forums will bring clarity of discussion, which will help in standard building.

Question: Will Ministry support any course on I-Governance?
Answer: Everybody have to know about I-Governance. Conducting Lecture(s) on the theme is really a good idea to spread awareness about it. Before starting a degree/diploma level course on I-Governance designing of syllabus, credit distribution, time span of the course has to be worked out.

Question: Why we are not following the same approach like China?
Answer: Data Centres of India are much smaller than those of China. The largest data centres in India are situated in maximum of one building. Firstly, we need to address the issue of scalability before following the other nation's policies.

Question: Considering the concern for Cyber Security issue wherein everyone is sharing their data, bank details, credit card information online for various transactions, what is to be done to safeguard the interest of Indian Consumers?
Answer: According to WTO, Telecommunication Services have strict guidelines on the location of servers but as per IT/ITES Services there is flexibility to locate their servers anywhere, provided the matching infrastructure is available. The Department of Commerce is serious about the issue and lot of consultations are going in this area.

Question: How Government of India promoting "Made in India" in the domain of Technology?
Answer: Creativity and Innovation has to be encouraged in India to create an environment for R&D & establishment of technology infrastructure in the country. In the absence of progress in R&D, the Govt of India is propagating Made in India.

Conclusion

Lt Gen (Dr) SP Kochhar, AVSM and Bar, SM, VSM (Retd), CEO, TSSC, summing up the forum hinted at not having sufficient discussion on regulation aspects of Internet Governance. He expressed that like its various governance issues the regulation issues should have covered in depth by the expert speakers. He agreed with the opportunities and the challenges that were being faced in Internet Governance by the country. He advised that India should be realistic about its capabilities and should not compete with developed countries or China who for instance are capable of creating their own search engines/social networks. India needs huge investments and is still dependent on developed countries for such services. There was a unanimous view that there may be control on unethical/Government sensitive sites but in a balanced way. There should be consensus of the majority on such issues. The eventual outcome of the judgment should be in the interest of the nation.

He said that IETE Apex forum provided a useful opportunity to discuss I-Governance issues. All the speakers from different backgrounds put up their concerns for net neutrality and highly recommended that government should form a policy like China. ICANN as an international agency should come under United Nations, like the International Telecommunications Union (ITU). Security Council members will be pivotal decision maker.

By looking forward to Internet of Things, Internet users should increase from every parts of the country. Early adoption of IPv6 will help in the future development of internet. Participation by technical representatives to International Workshops, Standard formation will be able to put up its view points at global level. There is a need of infrastructure development looking at the scale; level of investment should also be increased. Recommendations are made to Industries, Professionals and Students for further advancement of knowledge and active participation.

The forum ended with vote of thanks to the Chair.

4.Appendices

Internet Governance

The Internet- Background

Evolution of Internet is largely organic with no single owner. It is network of networks connected globally with different components owned and maintained by different entities. Originally designed for defense communications, and later for academia and research activities, today the internet is available for all types of applications. Free and open nature of Internet along with minimal regulation attracted investments and innovation. Internet is a Collaborative engagement model involving researchers, business, civil society, government, which is transparent and decentralized based on multi-stakeholder involvement (the "Internet Ecosystem").

The Internet has broad layers such as: physical infrastructure layer, logical layer & content layer. The subject which was initiated by the U.S. Department of Defense for its limited use later taken over by the U.S. National Science Foundation and went through various transformations to ultimately going to the hands of the private sector today. Nearly 3 billion users across the globe are both- creators and users of this huge facility. Started as student activity, the subject evolved into huge networks like Google, Facebook, YouTube, Twitter and what not.

The Internet is a globally distributed network comprising many voluntarily interconnected autonomous networks. It operates without a central governing body. However, to help ensure interoperability, several key technical and policy aspects of the underlying core infrastructure and the principal namespaces are administered by the Internet Corporation for Assigned Names and Numbers (ICANN), headquartered in Marina del Rey, California. ICANN oversees the assignment of globally unique identifiers on the Internet, including domain names, Internet Protocol (IP) addresses, application port numbers in the transport protocols, and many other parameters. This seeks to create a globally unified

namespace to ensure the global reach of the Internet. ICANN is governed by an international board of directors drawn from across the Internet technical, business, academic, and other non-commercial communities. However, the National Telecommunications and Information Administration, an agency of the United States Department of Commerce, continues to have final approval over changes to the DNS root zone. This authority over the root zone file makes one of a few bodies with global, centralized influence over the otherwise distributed Internet.

Governments are using internet to deliver services and levy taxes and choose to enable citizen to elect, petition, and oversee their governance on – line.

The multi-stake holder model based on collaboration, consensus and partnership building has ensured that the Internet continues to be dynamic, innovative and robust, which will ever continue.

On 16 November 2005, the World Summit on the Information Society, held in Tunis, established the Internet Governance Forum (IGF) to open an ongoing, non-binding conversation among multiple stakeholders about the future of Internet governance. The term "Internet governance" has been broadened beyond narrow technical concerns to include a wider range of Internet-related policy issues.

Internet Governance- A Definition

Internet governance is the development and application by Governments, the private sector and civil society, in their respective roles, of shared principles, norms, rules, decision-making procedures, and programmes that shape the evolution and use of the Internet.

Globalization and Internet Governance

The position of the US Department of Commerce as the controller of the Internet gradually attracted criticism from those who felt that control should be more international. A hands-off philosophy by the US Dept. of Commerce helped limit this criticism, but this was undermined in 2005 when the Bush administration intervened to help kill the .xxx top level domain proposal. When the IANA functions were given to a new US non-profit Corporation called ICANN, controversy increased. ICANN's decision-making process was criticised by some observers as being secretive and unaccountable. When the directors' posts which had previously been elected by the "at-large" community of Internet users were abolished, some feared that ICANN would become illegitimate and its qualifications questionable, due to the fact that it was now losing the aspect of being a neutral governing body. ICANN stated that they were merely streamlining decision-making processes, and developing a structure suitable for the modern Internet. Other topics of

controversy included the creation and control of generic top-level domains (.com, .org, and possible new ones, such as .biz or .xxx), the control of country-code domains, recent proposals for a large increase in ICANN's budget and responsibilities, and a proposed "domain tax" to pay for the increase. There were also suggestions that individual governments should have more control, or that the International Telecommunication Union or the United Nations should have a function in Internet governance. One such proposal, resulting from a September 2011 summit between India, Brazil, and South Africa (IBSA), had sought to move Internet governance into their sphere of dominance. The move is a reaction to a perception that the principles of the 2005 Tunis Agenda for the Information Society have not been met. The statement calls for the subordination of independent technical organizations such as ICANN and the ITU to a political organization operating under the auspices of the United Nations.

The growing complexity and significance of Internet governance necessitates addressing the difficult issues that impact, or are impacted by the continued evolution of the global Internet.

Capturing these issues requires that the roles played by intergovernmental, and governmental stakeholders in collaboration with Internet technical professionals, private sector businesses and other non-governmental stakeholders be better understood.

Broad components of Internet Governance

> ➢ Infrastructure and standardization issues, like-telecom, Critical Internet Resource, network neutrality, security and standards, technology, convergence, etc
> ➢ Legal and Administration matters, like-jurisdiction and arbitration, intellectual property rights, Cyber Laws and ethics etc.
> ➢ Economic affairs like e-commerce, Consumer protection, digital signature, etc
> ➢ Political and socio-cultural affairs like human rights, local laws, contents, privacy of people with disabilities, digital divide, universal access, social media, etc.

There is already work under way in this regards:

- The Internet Governance Forum (IGF) plays a valuable role in bringing together a broad range of stake-holders to discuss issues of common concern.
- UN Commission on Science and Technology for development has established a Working Group to look at how "enhanced cooperation" with governments can work & adapt.
- ICANN is also attempting to internationalize its presence & work together.

UN is conducting a 10 year review in its 2015 meeting of the World Summit on "Information Society" to deliberate on various issues towards mutual consent

Successfully dealing with these all-important Internet governance aspects requires connecting several, sometimes disparate areas of *technology, policy, development and civil society to work on solutions and act in concert to ensure collaborative stewardship of the Internet* continues.

The IETE Apex Forum on Internet Governance

Today's IETE Apex Forum is a step in this direction to create awareness and discuss a range of public policy issues, including freedom of expression, trade, privacy, cyber security, and sovereignty for Internet Governance.

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