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Contents

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Convergence in Information Technology

Mankind has always taken the assistance of technology and institutions to negotiate the barriers to human interaction posed by time, space and knowledge. The process has been a more or less continuous one ever since fire was discovered half a million years ago. But it is only since Joseph Schumpeter put forth his theory of the "Gale of Creative Destruction" that our understanding of the effects of new technologies on the economic processes has been incredibly enhanced. In spite of the significance of his theory, however, even Schumpeter could not devise a method for predicting the pace of technological change. That, as the revolution in communications technology has shown, still remains stochastic in nature. Convergence in information technology is an infallible proof of that. Even a decade ago, no one had expected it to gain the pre-eminent position that it has come to occupy today.

This issue of the Journal is devoted to a discussion of some of the key aspects of convergence and their implications. The first paper discusses the overall technological developments and establishes a framework on which the discussion is based. It outlines the manner in which communications technology has changed and the way it works to bring about convergence.

The second paper examines the link between convergence and some of the key institutions of governance and explores the relationship between transaction costs, information and their relationship to alternative structures of governance, namely, the executive, the legislature and the judiciary. In doing so, it explores the implications of changes in the technology of information processing and communication. The paper concludes by examining some issues in the reverse direction i.e. relating the implications of governance structures to the process of technological change. Thus, the paper explains how the interaction of convergence with institutions of governance is making us re-examine traditional notions of interests, rights, communities and nations.

The third paper focuses on the various aspects of regulation. It outlines some of the major issues that emerge when, on the one hand, the interests of service providers, consumers and society have to be balanced and, on the other,

the need for allowing technology the freedom to grow has to be fulfilled against the temptation to over-regulate it. In India, which has emerged as a major IT service provider, these issues assume great importance.

The fourth paper focuses on what the world may expect from the convergence revolution that is underway. It may cause social changes as profound as caused by the automobile and the telephone. A dissection of images culled from the popular imagination may provide interesting pointers to directions. The final paper points out some of the problematic clauses of the Draft Communication Convergence Bill, presented to the Parliament recently, which need to be reviewed. I am sure, the readers will find these essays of relevance and value.

K. L. Thapar
Director

TECHNOLOGY AND CONVERGENCE : AN OVERVIEW

RGS Asthana*

Convergence is made up of three supplementary convergences: content (audio, video and data); platforms (PC, TV, Internet appliance, and game machine); and distribution (how the content gets to your platform, i.e. terrestrial or wireless). True convergence is, therefore, the combination of audio, video and data communications into a single source, received on a single device, and delivered by a single connection. Convergence is the cherished dream of scientists and it is finally emerging, albeit in a chaotic way. The technologies common to such devices as personal computers, televisions, compact disc players, and telecommunications equipment are melting into a river of information comprising of one big stream of '0's and '1's that will transform social structures everywhere on earth. We will be able to watch movies, TV shows, Internet video, and music on our home theatre, computer, mobile phone or wristwatch wherever we are, whenever we want. However, the only prerequisite (but most difficult one) will be that equipment makers and standards bodies agree on such details as broadband distribution, copyright protection and compatible displays.

While converged voice/data networks have been a goal of forward-looking businesses for more than a decade, unproven technology, lack of robust applications, and fundamental concerns about reliability have kept a positive business case at an arm's length. However, the steady incursion of the Internet into all aspects of contemporary life and corporate adoption of e-Business Models, particularly in the US, coupled with significant advances in communications and information technology, have resulted in a new and compelling case for convergence. The time has now come for all enterprises – regardless of size – to accept the convergence challenge, integrate not only their voice and data networks but also the video network into a multi-service infrastructure, and start reaping the business rewards convergence can deliver.

Convergence is really about making a smart investment in a company's future. Today's best-of-breed solutions have flexible, adaptive architectures that let customers follow the particular implementation path that best suits them. They can just as easily start with their local area network (LAN) and implement IP-telephony telephony with a PBX-based voice network and IP-enable it. The best

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of the new converged solutions offer seamless flow of multimedia information, i.e., data, video and audio, and are equally comfortable in delivering across all transport mechanisms viz., frame relay, Asynchronous Transfer Mode (ATM), IP or TDM.

One of the main benefits of converged networks is business applications which conform to best-of-breed requirements, support e-business, can easily be implemented, and, at the same time, optimise investments. These are applications that directly speak to the forces impacting and challenging today's enterprise business. Customer relationship management (CRM), unified messaging, multimedia collaboration and IP-telephony help enterprises keep their business models ahead of the competition, enrich and deepen the customer relationship, and help drive new levels of internal productivity. With the workforce becoming increasingly mobile, convergence eliminates geography from the equation. Employees or agents can be anywhere and still leverage all the feature functionality that the headquarters-based team can access.

This paper reviews the spectrum of technologies pertaining to business and entertainment and also presents the technology applications and trends for the near future.

INTERNET COMPUTING

Digital convergence is the merging of digital communications technology, computing and digital media. In the first phase of this phenomenon, which we call Internet computing, the Internet has taken centre-stage in a new world of global interaction and information sharing, with an emphasis on the narrowband exchange of text, numbers and images. The Web, e-mail and databases are the foundation technologies of this phase of digital convergence.

The urgency to interconnect computers was felt by the scientific community as the population of computers crossed a critical mass. In 1968, U.S. government through ARPA (Advanced Research Projects Agency) started a project for establishing a communication network that could link the computers of some 20 universities. UCLA (University of California at Los Angles) developed software for testing and measuring network performance. This project was called ARPAnet and was commissioned in the year 1972. Some other agencies were also working to connect their computers in networks. A need was felt to connect all these networks to ARPAnet. The problem faced in interconnecting various networks was referred to as "internetting problem" which proved to be the origin of the term 'Internet'.

Internet became the first infrastructure that enabled integrating networks and resources worldwide and opened the floodgates for flow of digital information. In addition, Internet also successfully removed geopolitical boundaries worldwide. Electronic Mail (e-mail) was the first business-to-business killer application of the Internet. Today, it has become *de facto* user-to-user communication mechanism for not only sending text but also multimedia contents (pictures, audio and video clippings) over a single medium. Internet-enabled users and businesses have almost stopped sending routine letters and memos through normal post.

Web protocols were created by Tim Berners-Lee in 1990 and were introduced in Internet in 1991 using Nicola Pillow's line-mode browser and the existing Hypertext Markup Language (HTML). In 1993, combined with Mosaic, the second killer application – the present Web - was created. Later AOL's Netscape and Microsoft's Internet Explorer enhanced the functionality of the web. The real utilities of web began with the advent of search engines like Yahoo (Yahoo.com), Altavista (altavista.com) and Lycos (lycos.com). However, these and thousands of other search engines can only cover a small portion of web data. To help web surfers, one also needs to design innovative search engines to fetch results pertaining to the exact query and multimedia information based on some sort of template making.

Now comes the next phase, that of rich media, which incorporates broadband interactive multimedia as a fundamental feature. In this phase, sound and video join the Internet party. The IT infrastructure, support services and applications mix will ultimately empower the people within and outside an organisation to leverage the new capabilities for human interaction made possible by emerging digital-convergence technologies.

Internet has greatly accelerated the convergence of entertainment content. And yet the Web's rise has also brought the quick realisation that content should be scalable so that it can be delivered to all kinds of platforms, from wireless phones to TVs. This has prompted rethinking, and concern about who creates and controls the content itself, which depends on how it is packaged and delivered to us. For example, America Online (AOL), no more than an Internet packager and deliverer, is attempting to merge with Time Warner, one of the world's biggest media conglomerates.

COMMUNICATION

Converged networks are actually composed of two separate networks: a TDM or voice network, and an ATM, Frame, IP, or data network. The ATM,

Frame and IP networks are also referred to as "Broadband". Tables 1 and 2 give a few key differences between ATM, Frame Relay and IP technologies and circuit and packet switched networks. Frame Relay and IP use variable length frames and hence make efficient use of bandwidth, whereas ATM uses fixed size cells which are easy to process with predictable delays.

Table 1 : Key Differences between ATM, Frame Relay and IP

Feature	ATM	Frame Relay	IP
Generic packet format			
Payload	Fixed length cells	Variable frame	Variable size packet
Header	Connection oriented	Connection oriented	Connectionless
Address	Virtual circuit no	Virtual circuit no	Universal unique
Address space	Conserves	Conserves	Needs large

Voice when added to data network implies Voice over IP (VoIP), Voice over frame relay (VoFR) or Voice over ATM (VoATM). Further, voice over IP, frame relay and ATM implies packet voice and compressed voice. Today's compressed voice algorithms reproduce voice in less than 10% of traditional bandwidth and in excellent quality. There are packet telephony service providers (PTSP) who provide standard telephony services over a "Broadband Packet" infrastructure. PTSP are usually IP-telephony service providers giving VoIP or could be a frame relay or ATM service provider.

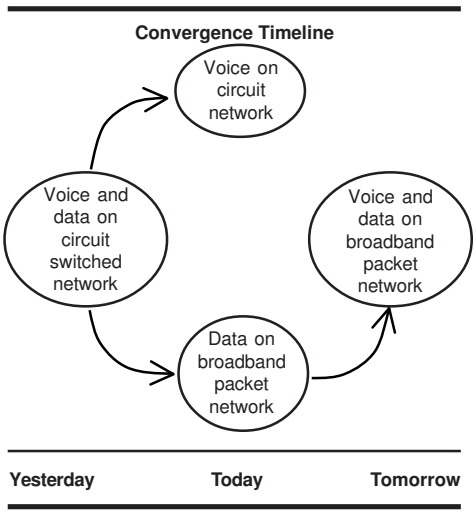
What makes a converged network work is its ability to control both networks from one platform simultaneously while being able to manage call-control and multiple protocols from different switch applications. The way to achieve convergence is through an open programmable architecture that accesses API libraries to control various interdependencies. For instance, suppose a customer wants to dial a client in another country. According to today's terms, it usually means dialing a 10-digit number that routes out to its destination. In a converged network, the call would route into a host facility, where the host would first check for validation and provide a branded prompt recording, receive the listed directory number, and route the call via least-cost routing methods to its destination. Based on costs, the call could route out a packet-switched gateway into an ATM cloud to the distance end, where another gateway would receive the call and send it via PSTN to its destination. This routing architecture cuts out the cost of the transcontinental connection.

Table 2 : Circuit and Package Switched Network

Feature	Circuit switched network	Packet switched network
Bandwidth	Dedicated to each connection or call	Shared from a dedicated pool as needed.
	Constant allocation	Part of time
Suitable for	PCM voice	Data

On the communication technology side and access side we have seen the beginning of high-speed access through DSL (digital Subscribe Line) modems, cable modems, wireless and the like. DSL is poised to offer voice and data over one connection. Voice over DSL functions similar to traditional circuit switched traffic where phone calls have been travelling over the same copper wires for the last ten decades. The difference is in the density that can be offered: DSL technologies would support over 16-voice line over a single copper pair. The bandwidth need in next ten years between two Internet Hubs may cross the physical limit of a single mode fiber, which is around 80-120 terabits. At the current pace of technology growth, it looks viable to develop a router, which can sink 100-terabit lines in next 8 to 10 years. DSL and radio technology would not allow reuse of an Internet address as is possible in case of dial-up users and we would run out of the Internet addresses sooner.

With IP-telephony being a key converged application, it would be time well spent to be sure that the proposed multi-service solution can, in fact, deliver the voice quality that your business has come to expect. Only the best technology can really deliver Five 9's (99.999%) reliability levels. Given the mission-critical nature of voice communications to your business, be certain that the technology you're considering can deliver the goods. Figure below depicts the timeline for the convergence of the Voice-data networks.



Widespread use of digital audio and video multimedia will increase the demand for network bandwidth considerably. Real-time interactive applications require a combination of low latency and uninterrupted transmission. Applications such as IP-telephony, streaming media, unified messaging, Internet videoconferencing, and real-time whiteboard and application sharing won't work without an infrastructure that includes policy-based networking with traffic management and greater amounts of bandwidth.

The promise of power-line communications is enough to draw the interest of some of the biggest firms in the world. Electricity wires are the most common form of home connections, more prevalent than cable TV lines or even telephones. If these could be used efficiently as an Internet and telephone connection, a vast

new communications infrastructure – and the financial valuation that comes with that – could be created virtually overnight. A German company, Enikia, says it will soon launch a service that permits the high-speed transmission of data over ordinary power lines.

SECURITY ISSUES

Intranets and extranets evolved based on the success of Internet and helped business in supply-chain management and services. Technological and market developments are pushing VPNs (Virtual Private Networks) into the next evolutionary phase. With improvement in security, more users are willing to place their data on VPN. One of the factors increasing this comfort zone is the wider acceptance of IPSec, a protocol that authenticates, encapsulates (tunnels), and encrypts traffic across IP networks. Other factors increasing user confidence in VPN security are enhanced firewall products and the increased availability of PKI-based key and certificate management offerings. Changes in US government policy restricting export of encryption software would pave the way for VPNs to go global on a mass scale.

E-COMMERCE

Many business houses now use Internet to disseminate company information, including products and services, customer management, job search and also for trading on the net. Internet has become the vehicle for development of many useful web tools to promote e-commerce, viz., on-line auctions, networked catalogues, portals, data mining and trusted brokers: the new value-added portals. The basic network trends, which accelerate the development and provisioning of services through the use of portal sites, are transparency, individualisation, integration, timeliness, simplification and stickiness. Portals are highly individualised systems that allow a user to customise a "daily me" view of the portal site.

Electronic Commerce (EC) systems have been in existence for many years. In the finance industry, electronic trading has been done for well over a decade. Realising the need to provide a policy for the growth of EC, the US government issued, "A Framework for Global Electronic Commerce" on July 1, 1997. The basic guiding principle in the framework was that the legal structure be minimalist and predictable. It covered aspects such as access to bandwidth, security and authentication, taxation, tariffs and customs, electronic payment systems, security and reliability of the Internet, universal access, privacy, consumer protection, content – related issues, intellectual property and role of government in R&D and

standards. The complete willingness to use the Internet for commerce evolved in 1998. Public has been willing to use the Internet-based systems for purchases, for network-based commerce, and for communication, despite security and privacy problems.

A necessary ingredient of e-commerce is user authentication to prevent fraud, as it has a major downside for users in the loss of privacy. Authentication allows service providers to log user activities. In addition, data warehousing and data mining potentially allow tracing and aggregation across a variety of service providers and suppliers. The main need is a definitive privacy policy framework to be set up by governments individually or through the WTO (World Trade Organisation). The convergence of content, commerce, communication and Internet along with a potential legal framework referred to, as 'e-commerce' would lead to the third killer application of the Internet.

Everything going on the Internet today is the result of research done 2 to 3 decades before, e.g. TCP/IP work done in the seventies exploded in the commercial world 25 years later. The work on the next version of Internet would be speeded up and Internet protocol like IPv6, which is slated to replace the present protocol, will be commercialised on priority. One is already running out of Internet addresses in places where Internet is deployed. U.S., at present, has the lion's share of Internet addresses, but developing as well as underdeveloped nations are exerting pressure to get additional addresses. It would, therefore, be necessary for ISPs to deploy IPv6 to get future business.

Application Service Providers (ASPs) Swell

ASPs, are the latest craze in the Web world and it is the emerging marketplace mainly due to convergence of software technology and Internet which provide the distribution platform for the services. ASPs take care of the hardware, software and technical staff so that a business unit can spend more time on its core business and less time on the nuts and bolts of Internet technology. ASPs host various types of software applications – also referred to as Virtual Private Applications or VPAs – on their servers and let their subscribers use them via the Web. VPAs take away the challenges and high costs of implementing and maintaining the best technology-based business solutions. They also let customers maintain control without retaining the hassles.

VPAs are generally mission-critical applications, ranging from e-mail and e-commerce to Enterprise Resource Planning. They allow you to stay on the leading edge of technology, without making costly investments in hardware. All such applications are available for a low fixed monthly cost.

Users can access, edit, and save their work anytime, anywhere, from any Internet-connected device. This model particularly benefits small to midsize businesses because it enables their employees to access a wide range of enterprise-level, collaborative applications, even if they don't have dedicated technical support staff and massive servers of their own.

ASPs host every type of application, from simple virtual office suites, such as MyDesktop.com and ThinkFree.com's ThinkFree Office, high-end customer relationship management (CRM) tools [such as LNS Communications' Neteos,full function, browser based, Internet ready CRM solutions (see: ActionWare.com)] to healthcare services (e.g. smed.com, golbalmedic.com and mednetservices.com).

Search Engines

Companies' effort to evolve beyond portal sites offering search engines, chat rooms, online news and free e-mail accounts is one of the most significant trends in the Net scene. Vertical portals tailored for particular niches are proving popular because of the convenience they offer to users who both browse for information and wish to make purchases online. This trend would lead to development of sites attracting and creating communities.

The increasing popularity of Internet and World Wide Web have made it possible to access large image and video repositories distributed globally. The areas that get benefited by such repositories are geographic information systems, medical information systems, surveillance, and distributed publishing. In all such applications, operations like search, retrieval, understanding, visualisation of large databases, become an essential part of research. Although only a few commercial products are in the market, there are lots of new issues for the user that need to be tackled.

Internet in a few years would offer down the line: clear and crisp audio and full-screen, high-quality, on-demand video. This would involve developing new audio and video compression algorithms, which would allow real-time audio and video transmission of data at low-bit rates with high quality.

New data-capable wireless networks will make it possible to trade from anywhere. The benefits of this approach are pretty obvious: If you leave your house after placing a limit order that you're already starting to regret, you'll be able to cancel it before the damage is done. You'll also be able to make a transaction when it first occurs to you, rather than wait till you get home. Wireless trading is the next step in the shift from traditional to alternative brokerages that place the power in the hands of the individual investor.

THE DELIVERY PLATFORM

Media convergence involves combining into a single new superappliance features commonly found in today's personal computers, televisions, compact disc players, and telecommunications equipment. Just what form such a superappliance will take remains to be determined. Will it be a smart computer? Or will it be a smart television? Perhaps one device will focus on work while the other will concentrate on leisure. One envisions the first such device as a combination of computer, television, telephone, CD and VCR which is not too far away from current technology. Such a system could easily handle video data streams, audio information, graphics, etc.

Besides PC, the first convergence appliance, the personal video recorder, or personal television, is a second promising convergence appliance that emerged in the year 2000. It is a massive-storage hard drive for TVs made by companies such as TiVo and ReplayTV. A broadcast is cached in MPEG-2 format to the hard disk. The viewer can pause and resume playback while continuing to record the live transmission in the background, allowing him or her to create instant replays—or skip over commercials.

An individual can programme viewing preferences, such as "live sports" or "opera," and the device will record such broadcasts in "virtual channels" that can be viewed later. The machine also can scan electronic listings for similar programmes and automatically capture them. This kind of "smart" recording, access to enhanced programme guides and "live pause" are three must-have functions for future d-entertainment (read digital).

The third forerunner of the ultimate d-entertainment platform is the widely popular video-game console. The release of Sega's Dreamcast in 1999, with its 56K modem, marked the debut of a game machine that allowed players to compete with one another over the Internet. Sony raised the stakes with PlayStation 2. It has a DVD drive, Dolby Digital and DTS sound, and a CPU and graphics processor rivaling those of today's PCs.

With 1-gigahertz CPUs entering the market, multi GB hard disk drives and powerful graphics processors to handle video manipulation and display, easy on-line interactivity, and rewritable DVDs just around the corner, the PC is ready to take its place as a d-entertainment platform. The argument over whether the PC or TV will lead to a convergent appliance resembles the "thin" versus "fat" network/client debate of the mid-1990s. In the d-entertainment world, the TV is a thin client, the entertainment-savvy PC the fat alternative. Which wins will rest

on the same unresolved issues: Where are media files stored? Do power and control reside in the hands of the consumer or the network?

Streaming audio and video, played "live" as the consumer receives it, has empowered online radio stations and a growing industry of companies such as Ifilm and Atomfilms that distribute films by small independent film-makers. Another problem is the proprietary architectures and codecs of software, such as RealVideo, QuickTime and Windows Media. If these advances occur, then an MPEG-4 stream coming to your PC over a broadband connection would be indistinguishable from cable TV- and you could store or edit those videos as well as distribute your own. The remaining roadblock could be the PC itself.

Table 3 : PC Versus TV

Areas of interest	Fat PC	TV
Creates, stores and shares media	Yes	No
Generic programmable standards	Yes, can support all TV standards	Competing standards
Produce and receive media streams over the Internet	Yes	No
Economies of scale in production	Lower price	Lower price
Crash or freeze	Yes	No

ENTERPRISE APPLICATIONS

There are several enterprise digital-convergence applications and technologies which you may want or need to deploy sometime soon.

Voice over IP (VoIP)

VoIP promises significant cost savings for your enterprise. By moving voice and data across a single infrastructure, you eliminate the need for dual service and support. IP-telephony technologies and applications run the gamut from end-user PC-based Internet phone services, such as Net2Phone, MSN, Yahoo AOL Messengers and Dialpad, to enterprise technology from the likes of Cisco and Avaya, which offer Ethernet phone handsets, IP-enabled PBXes, IP-telephony servers and PSTN gateways.

For organisations with geographically dispersed offices, VoIP offers a mechanism for bypassing the PSTN. In more ambitious enterprises, a move to IP-enabled PBXs can allow IP-telephony access via analog handsets. Large organisations can do this with an upgrade to the existing PBX, while smaller companies are often better off acquiring a pure-IP PBX. Enterprise IP-telephony is one application that makes sense to implement and support in-house. For many

other digital-convergence technologies and applications, outsourcing will be a viable option.

In case of Microsoft's MSN and also other vendors, users download the messaging software free. A box appears on their computer screen that includes their "buddies," a list of family and friends to whom they can send instant messages. An icon on the box launches the talk feature. One can use a plug-in microphone or the built-in microphone and speakers that come with PCs.

AOL, the leader in IP-telephony, has three offerings. First service is similar to the one described above. Second, IP-telephony service is in partnership with Net2Phone Inc. A user can download Net2Phone software on to his PC, which can then make a call to a regular telephone. In this case, the sound quality is better than PC-to-PC connection, but it still has sound delay problems and falls short of a regular telephone call. AOL's third IP-telephony service is in the form of phone card, which users can buy from the Web and get in the mail. It's like any other prepaid calling card, but it rides over Net2Phone's IP-telephony network. The sound is closer to that of a regular phone call because Net2Phone manages the quality by adding more computer servers and routers to handle the voice traffic.

While convergence has a clear, and highly visible impact on the end-customer, there are also tangible internal benefits to the enterprise itself. IP Telephony-enabled communications systems allow enterprise employees – wherever they are geographically located – to easily and seamlessly access the rich set of communications functionality previously available only at formal office locations.

Call-centre Technology

The most dramatic near-term business upside of convergence is likely to be seen in web-enabled customer contact centres. With the advent of CTI (computer-telephony integration), the call-centre function began to merge with the functions of IT. Now, in many organisations, the IT department has assumed full responsibility for telecom management, and must oversee call-centre operations and integrate call-center functions as part of a CRM (customer relationship management) strategy.

With the Web and e-mail now being widely used, and with various rich-media communication options gaining momentum, customer expectations for service or sales interactions that incorporate e-mail, chat and VoIP are rapidly evolving. Companies that don't establish an effective CRM strategy incorporating solid

call-centre technology will soon find themselves at a severe competitive disadvantage.

With customer expectations for individualised service at an all-time high, the converged contact centre is uniquely well positioned to meet this demand. Tight integration between the customer/agent voice conversation and back-office customer data bases – coupled with increasing adoption of CRM business practices – allow converged enterprises new opportunities to prioritise and personalise customer contacts. Internet-savvy customers can use IP-telephony to speak directly with an agent by pressing a web page "speak to" icon.

Streaming Media

At present, streaming media technology is primarily used at present for desktop Internet radio. However, the value of new e-learning content and services that integrate streaming audio and video could greatly improve employee and enterprise performance over the long haul. It is poised to become a prominent digital-convergence technology, with near-VHS video quality now possible via products from Apple, Microsoft and RealNetworks. Streaming media is also a great fit for packet-switched networks, since the buffered play masks network latency and jitter delay.

Streaming-media applications vary considerably, complicating the process of identifying them and developing an enterprise strategy. For example, streaming media can be live or on demand. It can take the form of video contained within an e-mail message, or it can appear as a stream of synchronised video, text and power point slides embedded in a Web page. Applications can vary from in-house training to external customer service, security monitoring, advertising, technical training, B2B telephone interviews, live seminars, and sophisticated rich-media content from e-learning providers.

You may want to do a live Webcast when you expect a large Internet viewership, pushing you toward an outsourced arrangement with an Akamai or a Digital Island. Or, if you're in a small company with limited streaming-media technical expertise, you may need to keep it simple and inexpensive. And you may be able to find a small studio with the appropriate streaming facilities and expertise to handle your application at a reasonable cost.

Internet Videoconferencing

It is a digital-convergence technology that looks promising, but has some serious hurdles to overcome before becoming a mainstream business application.

Although the technology has been around for many years, it has never caught on among business users, primarily because of the difficulties of ensuring reasonable-quality interactive video over the public Internet or across stressed corporate WAN connections.

While your enterprise LAN or intranet can support quality conferencing, this technology is all about overcoming distance barriers. The farther apart participants are, the more likely it is that they'll use the public Internet or a corporate WAN connection – where latency and traffic congestion occur. Internet QoS (Quality of Service) mechanisms must be in place and bandwidth less costly before Internet videoconferencing becomes a factor in the enterprise. The enterprise may not choose to implement Internet videoconferencing as a tool for conducting business, but there would be persons who regularly use Microsoft NetMeeting and other similar conferencing tools.

Wireless Ubiquitous Web

According to the Gartner Group, by 2005, the world will have a billion mobile phone users. By 2008, many more people will access the Internet from a wireless device than a wired one. Cell Phones are likely to outnumber PCs around 2005; as such devices will be in 45 million cars, 300 million homes, and numerous other nonofficial locations. Therefore, it's the new wireless telephone companies, not the computer industry that will bring a wireless, ubiquitous Internet.

The two main limitations of cell phone as on date are the interoperability and ridiculously low bandwidth. Interoperability pertains to problems like European cell phones won't work in US, particularly, due to free development of mobile communications protocols in US – two users connected to different service providers can talk to each other only if their service providers use the same protocol. The Global System for Messaging (GSM) protocol enables cell phone users to talk to each other regardless of the service provider. The second problem pertains to the fact that GSM and other protocols do not support enough bandwidth to enable effective use of Internet. Cell phones, typically, support 19.2 Kbps or often only 9.6 Kbps. Some protocols in US support 56 Kbps with scalability of up to 128 Kbps in the near future.

Both the problems are being addressed as Nokia, Ericsson and Motorola have agreed to adopt a variation of QualComm's Code Division Multiple Access (CDMA) protocol for wireless communication. This is referred to as 3G or third generation cell phone standard and is likely to bring ubiquity in the mobile standards. 3G wireless technology aims to increase wireless access speeds to 2 megabits per second.

Third-generation wireless services are expected to drive new multimedia applications for handheld devices as entertainment firms like Sony or Sega plan to build interactive games for the small devices. Motorola, for example, has developed new cell phones that will allow consumers in the future to connect to the Internet, check email, send faxes, and view streaming video.

The MPEG-4 video and audio compression standard will be key to the development of wireless-video applications. The standard permits data compression of as much as 200:1. This enables wireless video transmission over relatively low-speed networks. Packet Video is the first company to release software for encoding, transmitting, managing and viewing video and audio over wireless telecommunication networks using MPEG-4.

Currently, wireless video can work on network devices running Windows CE (e.g. Pocket PCs), the Epoch OS (on Nokia 9210 and 9220 cellular phone) or the Palm OS for which necessary codec is available. Microsoft has released a version of its Windows Media Player recompiled for the Pocket PC platform. However, Real Networks and Apple Computer who are the two key players on PC-based streaming-video technologies have not adapted their Real Video or QuickTime for wireless devices.

Advances in such areas as data compression and multimedia chips have helped promote wireless video. Nonetheless, the technology has been hindered by mobile devices' limited processing capabilities, small screens, and restricted battery life, and by wireless networks' low bandwidth.

By 2005, stationary users will get 2 Mbps connectivity, pedestrians will download banner advertisements at 384 Kbps, and automobile passengers will have 144 Kbps. The seamless connectivity and bandwidth will enable content provider to deliver movies to homes, low quality video teleconferencing to users on foot, and business travellers to receive e-mail with attachments.

If it's not ASPs, it's wireless that lets you carry the Internet with you and read Web pages on devices no bigger than your Palm device. For example, GoAmerica, a wireless ISP, converts Web sites on the fly so that you can read them on mobile devices – even if the site doesn't have a wireless version. Oracle's new Portal-to-Go software will allow service providers to offer Internet services on handheld devices, such as personal digital assistants. Portal-to-Go will let users access Web-based applications through the Palm VII handheld computing device and through cell phones.

AOL and Gateway announced a partnership designed to create wireless, Internet-enabled appliances for the home. Wysdom – a wireless ASP offers instant messaging and office suites specifically designed for mobile devices. For those of you who do everything on the go, stay tuned: CyberBills has developed a new wireless service prototype that will let you pay your bills from your Palm. As if that weren't enough, the Brave New Unwired World fashion show displayed a whole mess of wearable wireless products: mini eyepiece screens, wristwatch phones, even neck charms with email.

Talking Web

In fact, many manufacturers see voice-enabled wireless handheld devices as a logical solution to awkward mini-keyboards and styluses. They offer products which allow development of voice-enabled services, such as e-mail reading over the phone, unified messaging services, talking web, and a screen reader. Companies, such as IBM, AT&T, and Motorola are hard at work on this problem, and will soon bring voice-enabled wireless devices so many of us crave.

In the meantime, InternetSpeech.com has already introduced netEcho, an audio ISP that lets you use simple voice commands to surf and search the Web, check e-mail, and conduct e-commerce, all from your cell phone. And One Voice Technologies' myIVAN (Intelligent Voice Animated Navigator) software lets people talk to their computers as if they were speaking to a friend, and navigate the Web using natural-language commands.

TRENDS

Convergence of technologies, convenience of operations and quality of customer services are the buzzwords for the success of any business paradigm and the same now applies to e-commerce also. Technology improvements have introduced new features in the communication networks and a number of new devices into the commercial world.

The convergence of the Internet and television has been predicted for years, but now companies are actually introducing products. Get used to names like TiVo, WebTV and Replay TV: all are systems that bring features of the Net to TV. Within the next year, about 11 per cent of U.S. households are expected to purchase "PVRs" (personal video recorders) that download TV programmes, allowing you to rewind or pause even shows that are live. Many of these devices will also let users surf the Web or check e-mail from a TV.

The products, such as, a PDA that displays Web content, a cell phone that not only reads you the online version of a newspaper but also enables you to sell and buy shares, and a kitchen appliance that lets you surf the Web while you cook, have fulfilled the promise of an anytime, anywhere or ubiquitous Web and its services.

Peer-to-peer technologies developed for handheld devices would enable file swapping among smart phones, PDAs, and other small devices with Internet or network-access capabilities. Mobile P2P technology will expand as handheld devices communicate directly using additional protocols including Bluetooth, IrDA, and third-generation wireless technologies.

Compaq, Sun Microsystems, Intel, Microsoft, Philips, and 3COM are among the companies with home-networking visions: Dwellings will be programmed to set the lights, temperature, security, and entertainment to each individual's tastes. In the next few years, home appliances would become super intelligent and would directly communicate with the Internet. You would not only be able to load new recipes in your microwave oven from your favourite site but also microwave would be programmed by the site to cook the selected recipe. You will be able to remove difficult stains from your clothes by going to your detergent supplier's site, selecting model and make of your washing machine, identifying type of stain, and your machine would be programmed to clean the stain. You only need to put clothes and the detergent in the machine and run it. Similarly, your alarm clock may decide to wake you up earlier or later with respect to the time set for the alarm based on traffic pattern around your home based on the data it would have acquired from the Internet. No more anyone will be lost on the road looking for an address as cars will download relevant site maps over mobile Internet and locate the address.

You shouldn't have to learn to drive the technology; the technology will be driven to learn about you. Ideally, one even does not want to read the screen but would like the data transmitted to brain electronically. Let us look at a scenario, the leisure box snaps on as you enter the room. It has already captured and downloaded the types of programmes you normally watch. Now, it is preparing to present them in the exact order you prefer. First, it plays the video message left for you. Next, comes your favourite financial news, including details of your stock portfolio at market close, followed by your mail – which it presents while softly playing your favourite CD. Finally, the box activates a work-related documentary you had asked it to record from the cable channel. It is time to unwind after a hard day at your workbox – which is in another room. You sink back into your favorite easy chair, which instantly reclines to your personal pre-

set preferences. You do not think about the fact that the thermostat used just-in-time technology to achieve your preferred post-work temperature or that the lights activated perfectly just as you walked into the room. The best part of all this convergence of technologies is that you do not push a button or say a word to make any of these things happen.

As wireless access becomes seamless, fast and cheap, the mobile phone will pose as a credit card. It would make buying things much easier as compared to the browser. For example, in France Tele Vend Technology (televend.com) sells cold drinks and beverages following a method in which customers dial the vending machine and charge the cost of beverages to their telephone bill. Thus, Telephone Company replaces the credit card and becomes the infomediary. Given that this scenario will become a reality sooner than expected, you can guess the future of m-commerce and the established businesses it is likely to ruin.

It would soon become an old-fashioned way to pass Internet over the telephony but telephony would ride over the Internet. Speech recognition would enable even those people to use Internet freely who are not keyboard and mouse savvy. Issues like quality of service and multicast would be addressed more rapidly. Good news is that long distance and international calls would legally become a lot cheaper. Internet worldwide has over 220 million users today and this number would grow very fast. Internet and the web are going through rapid evolution and flow of digital information would change the way we live, work, play, interact, learn and involve ourselves in various spheres of endeavour in the 2000s.

Many publishers have stopped printing paper editions and publish these magazines only on the Internet. Others, like IEEE publications are available on the Internet, but they have not yet discontinued printing paper editions. However, in ten years, Internet is likely to become the de facto first choice platform for publication of books, newspapers and magazines.

NASA (National Aeronautics and Space Administration) and DARPA (Defense Advanced Research Projects Agency) of U.S.A. have plans to extend Internet off the earth to Mars in the near future. This would enable flow of images, sounds, and measurements from the Mars's surface to the earth. The scientists would be able to control the artificially intelligent rover's movement and the experiments can run at a much faster speed. One day, interplanetary network will be used by people mining for asteroids or living in research outposts on the moon or in orbit around Mars.

In his book "Business @ The Speed of Thought," Mr. Bill Gates, Microsoft chairman, states that the 2000s will be about velocity, and how the flow of digital information will alter the way business is transacted and how information will change lifestyles and expectations. The information flow will speed up production of goods and delivery of services, creating improvements and new opportunities, which managers and professionals must exploit to stay ahead and thrive on the information age.

SUMMARY

Digital convergence is reshaping the way individuals and organisations collaborate and share information. Audio, video, animations and other kinds of rich media enhance existing digital communications and enable new forms of human interaction. We're talking about a new platform for communication that will change not only how we conduct business, but how we learn and entertain ourselves as well. As we approach towards convergence, the boundaries will progressively dissolve. Computers, networks, telephones, televisions, PDAs and pagers will all blend. Each day seems to offer us a better way to analyse, store, or transmit information. And the interactions surprise us, at times outpacing our ability to foresee the impact on our culture, our economy, and our polity.

Convergence is also leading to the dissolution of traditional industry boundaries. Telephone and cable TV companies are merging or entering each other's markets. Computer manufacturers and software companies are probing new markets, such as entertainment media, content, and banking/finance. While most analysts tend to focus almost exclusively on the convergence between Telecoms and IT, the other facets, particularly those concerning energy and security are just as important. The central focus of development should be the global convergence between telecommunications, information technology (IT), information and entertainment sectors, energy supply and distribution, security, insurance, financial exchanges, and commerce.

Convergence will allow us to become active – rather than passive – information consumers. This means we will choose both the topics that interest us as well as the level of detail we want on each. We will also choose when we want to get that information, and what – if any – types of advertising we are willing to view. Sitting through an entire general news programme will become obsolete.

Vendors and service providers are all realising that supporting voice, data, fax, video – all kinds of traffic – on a network in a cost-effective manner is the

crux of the whole thing. Most experts predict that homes and offices will have to be wired with cable or fiber optic lines before convergence is truly viable. The problem is that few companies would – or could – commit the astronomical financial resources it would take to wire a city like Delhi. The basic challenge of convergence isn't technological; it's economical. Most of the technology is already here.

CONVERGENCE AND INSTITUTIONS OF GOVERNANCE

TCA Anant*

The barriers of time, distance and knowledge have restricted human interactions since the beginning of civilisation. To negotiate these barriers we have sought the help of technology and institutions. Consider the evolution of money. Direct exchange between individuals is hampered by the requirement of double coincidence of wants. The creation of an acceptable medium of exchange facilitates transactions over time and space. The evolution of instruments from cowry shells to gold to slips of paper, is a story in the development of technology and associated institutions.

We tend to think of the growth of technology as an autonomous process, but fail to realise that this growth both enables and is enabled by facilitating institutions. Think of the problem of using paper money without the facilitating agencies of banks; or of airline travel without airports, air traffic controllers and so on. Every wave of innovation has led to associated changes in the growth of institutions. At times, the use of a particular technological option has had to wait for the necessary development in institutions before it has had its impact and at times premature developments have languished for want of "demand'. An example of this is the fax machine: the basic technology has been around for over a 100 years, but it became the ubiquitous office equipment of the 1990s only with the growth in telecommunications, the evolution of common standards of transmission, the experience of its use in journalism and, of course, the technological evolution of the integrated circuit and the microchip. To quote Prof. Oettinger, "Useful technologies encompass both instruments and people in systems and organisations. In the real world, technology, economy and polity are inextricably intertwined by their interactions."[1]

Thus, any study of technological innovation would be incomplete without an analysis of the associated process of institutional change. Governance in its broadest sense is simply the systematic ordering of the thought and behaviour of economic agents (both organisations and people). Governance, in this perspective, is a rather complex, intangible and dynamic concept. It involves a wide range of institutions, including the market, the media, and, of course, the state.

In this paper, we examine the link between convergence and governance. Convergence has been defined in a variety of ways, but for our purposes, it is

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best to think of it as the changes in technology of information processing that are transforming the structures of broadcasting, communications and computing. While governance is a complex, multifaceted concept, in this essay, we examine the link between convergence and some of the key institutions of governance.

TRANSACTION COSTS

As we have noted, human interactions are limited by time, distance and knowledge. Transaction costs are the costs associated with mediating these barriers. The literature in economics has taken two approaches to the term. The first associates transaction costs with property rights while the second with the costs of trading across the market. The distinctions are important in terms of what is being focused upon. An essential element to all formulations is the fact that property rights have to be clearly delineated and protected.[2] The transaction costs that arise in the context of spatial and temporal barriers to human interaction are easily comprehended and not really relevant for our current discussion. It is the last category, i.e. knowledge or its progenitor information and its link with transactions costs that needs description. For an economist, perfect knowledge or information has a stylised meaning i.e. it has to be free, complete[3] , and universally available. This is taken as one of the preconditions for a "perfect market"[4] . However, imperfections in information can occur because of failings in any of these characteristics. Further, informational failures create the need for non-market institutions to mediate the resulting transaction costs

Informational failures can be in a variety of forms, though for purposes of our exercise, we will classify them into two broad categories.

The first is in the form of uncertainty. In this case, the Knightian distinction between risk and uncertainty is important. It is not always appreciated that incomplete knowledge is not sufficient for transaction costs. The mere presence of risky events, which can be dealt with through contingent claim contracts, does not create any additional burden on transacting. In addition to costly information we require an additional factor. There are different ways to illustrate this, Frank Knight was the first to outline it with his distinction between risk and uncertainty. It is the latter form of lack of knowledge which requires institutions of entrepreneurship: "The essence of enterprise is the specialisation of the function of *responsible direction* of economic life, the neglected feature of which is the inseparability of these *two* elements, *responsibility* and *control.*[5]" But, more generally, it is the presence of such uncertainty that creates the need for a specialised executive decision-making body which processes data by drawing upon scientific, epidemiological and statistical information. The organisation of the

body is to meet Knight's twin requirements i.e. 'responsibility and control' in the face of uncertainty.

The second form of informational failure arises in the context of private knowledge or what is described in the literature as asymmetric information. The problem is that, in such a case, it is difficult to design first the best rules of allocation as their outcome depends on the specific knowledge held by different people. Under such informational constraints, we can identify two classes of problems: the first is an ex-post problem of dispute settlement where allocation of responsibility and liabilities depends on the private information of the parties in conflict. The second is an ex-ante problem of allocation of resources, benefits or rights. The allocation will depend on the distribution of private attributes, which again are known perfectly by the holder but only imperfectly by everyone else. The two situations call for different institutional mechanisms to resolve the problem of inefficiency. In the first, we conceive of a 'judicial system', which elicits private information and announces decisions based on considerations of burden of proof and rules of evidence. The second seeks to remedy the problem through 'legislatures', which capture distribution of population preferences through representative voting mechanisms.

While these descriptions are stylised and do not seek to be a comprehensive description of the role of the fundamental institutions of governance, the description is adequate for our purposes, as it links the institution to the nature of imperfect information. Here, it may be pointed out that the information revolution does not alter the basic cost imposed by informational imperfection, nor does it eliminate the source of information, namely, complexity and private knowledge. Thus, the need for institutions that mediate these barriers will remain. However, changes in technologies associated with information processing and dissemination have profound implications to the basic structure of the institutions comprising the state.

LEGISLATURE

Representative governance is widely recognised as a cornerstone of effective governance. The form this has taken has varied over the years in response to changing technology and social norms. Thus, the sabha of the traditional society gave way to the modern elected legislature. The evolution was largely in response to the growth in the size of the state from the level of village or city to larger geographical entities.

"In the ancient world, though there might be, and often was, great individual or local independence, there could be nothing like a regulated popular government

beyond the bounds of a single city-community; because there did not exist the physical conditions for the formation and propagation of a public opinion, except among those who could be brought together to discuss public matters in the same agora. This obstacle is generally thought to have ceased by the adoption of the representative system."[6] Thus to Mill, representative governments were desirable because they enabled responsiveness to public interest and opinion.

While the structures of legislatures vary considerable across countries, especially in their mode of election and tenure, a common characteristic of all of them is the use of geographic constituencies. The growth in information technology will help in the process of creating a more representative system because it reduces the gap between the government and the governed. IT makes it easier for the public to stay informed about the actions/inaction of its governors. Further, the public can express and communicate its opinion more effectively and faster. The developments in Information technology have, however, created a challenge to this pattern based on the ability of interest groups to organise themselves into 'virtual communities'. Thus, a perspective, which may not have importance in any one geographical region, can through the use of communication technologies present itself as the perspective of a large national community deserving a voice. Unlike geographical communities, these groups do not articulate a compromise over different local objectives and thus tend to be more inflexible in their demands. Further, ensuring an agreement on such diverse communities becomes a bigger challenge as they are more difficult to be reduced into small representative legislatures. Thus, while improvements in information technology help in creating a more informed public, they also create conditions for a more fractious order. The challenge before representative democracies is to provide a space for the voice of these newer 'communities' without abandoning governance itself.

EXECUTIVE

The executive in a system of government has the central role of making decisions. The key characteristic of decisions is the incompleteness of information and thus the need to process scientific, statistical or epidemiological knowledge. Further, the ability to process such information lies in specialised skills which need to be harnessed in a system of responsibility and incentives. In the traditional governments, this has been done through the agency of administrative bureaucracy, a stylised description of which can be found in the works of Max Weber:

- There are fixed jurisdictional areas, which are generally ordered by rules, that is, by laws or administrative regulations.

- There is a clear hierarchy with levels of graded authority and a supervision of the lower offices by the higher ones.
- The management of the modern office is based upon written documents ('the files').
- The management of the office follows general rules, which are stable, exhaustive, and can be learned. Knowledge of these rules represents a special technical learning, which the officials possess.

While information technology does not reduce the incompleteness of information or the nature of skills required to process available information, it does change the abilities and structure of the bureaucracy. The shift from written to electronic records, or the use of stable rules are not critical. What is critical is that knowledge of these rules becomes difficult to limit to a small group of officials. Further improvements in communications and information processing imply more flexible multitasking networks replace hierarchies and functional segregation.

A second consequence of the IT revolution has been to shift the focus of control. Through wider dispersal and access to knowledge, it becomes possible for the consumer, or public, to monitor and regulate the performance of the bureaucracy. Secondly, increased access to control also improves the effectiveness of the political representative to keep track of the executive. While details are not available, it is learnt that in Andhra Pradesh, the chief minister regularly grills local officials on their performance, as the data is available to him through the net. Both these trends weaken the strict hierarchical nature of control exercised in traditional bureaucracies. While these trends have manifested themselves in India with limited penetration of the information revolution, they have as yet not resulted in a thorough revamp of the structure of governance.

JUDICIARY

The fundamental character of the judiciary, as an institution for dispute resolution, is unaffected by the information technology revolution. This is because the need for an external arbiter in disputes arises due to private knowledge. Further, rules to elicit and evaluate such information will continue to be the cornerstone of judicial functioning. There is, however, a distinct change in the nature of the parties to the dispute and some of the issues that now crop up.

The Internet extends beyond the boundaries of any of the states, and the effects of state regulation will likewise spill over state borders. Further, transactions

on the net have virtually no geographic link.[7] Besides, laws of different countries/ regions are not harmonised. To illustrate, in a recent virus attack affecting a number of computers in the USA and around the world, the creator of the virus was a Filipino student immune from effective prosecution because Philippines had at that time no law on cyber crimes. Even if countries create conformable laws, different judicial traditions on liability, responsibility and evidence create hurdles that are qualitatively different from those in ordinary international transactions.

In addition, the information revolution has thrown up a number of new issues in matters related to traditional concerns of privacy and freedom of speech.[8] As with our institutions of governance, the private world of the family and the home are also defined in part by the idea of an entitlement to withhold information or privacy. The new technology presents serious challenges to these concerns. The early concept of privacy was based on the inviolability of a physical or spatial domain. However, the growth in communications technology has meant that a good deal of an individual's activities now occur over a virtual domain. An early form of this type of concern arose with the possibility of telephone wire-tapping. The computer revolution, however, raises a number of qualitatively different problems. Corporates can and do build vast personal databases on individuals based on their shopping pattern or Internet browsing behaviour. The databases in themselves are not more serious than a shopkeeper keeping track of the preferences of his regular customers. The possibility of different shopkeepers sharing their information, however, leads to an entirely different perspective on individual privacy. In dealing with these issues, courts will have to innovate in their understanding of constitutional rights. The requirement to innovate in interpretation is not novel, however, the requirement of extending conventional concepts of liberty, speech, movement and privacy in the virtual domain raises conceptual problems of definition and bounds. As with any exercise in the determination of appropriate boundaries to rights, the court will need to explore tradeoffs between the rights and needs of the individual as against its costs to society. Assessing the cost will require a greater awareness of technology on the part of the court.

While the need for different structures of government will continue to be driven by the basic structures of information, they will need to adapt in order to meet the challenges posed by the new technology.

MARKETS, PROPERTY RIGHTS AND THE REGULATION OF INFORMATION

Thus far, we have explored the implications of the information revolution to the institutions of governance. In this section, we will explore some of the issues that arise in the reverse direction, i.e. the governance of information.

There is a legendary story about Sri Ramanuja, who apparently after much effort persuaded his Guru to part with the basic mantra to ensure moksha. The Guru imposed the condition that he must not disclose it to others. Sri Ramanuja, however, climbed to a high point on the temple and broadcast it so that all could hear him, as it was for the common good of humanity. In doing so, Ramanuja disobeyed an explicit order from his Guru, a serious sin. On the other hand, his act of publicity sought the greater good of the mankind.

In an odd sense, this tale exemplifies our dilemma with property rights in the area of information[9]. As we have noted earlier, a requirement of perfect markets is the presence of free, complete, and universal information. On the other hand, recent developments have tended to view information as a commodity, thereby pointing to the role of incentives and effort in the production and distribution of information. Information production and distribution can be left to the market only if we assume that markets are efficient, but that would imply universal availability of information. This paradox reveals itself in all the discussions, which take place on intellectual property, privacy and the public and private domains in cyberspace.

An economist would argue that this reflects public good character of information. Even though characterising information as a public good resolves the problem of classification, it brings the issue of regulation and state intervention to the fore. The basic problem is to find a balance between the incentives to create vs. efficiencies generated in promoting its flow. Posed in this way, the dilemmas are not unusual in law and are dealt with by seeking to find a compromise between incentives and efficiency. Thus, for instance, we seek to promote limited property rights in information goods as against absolute rights in physical goods.

The above discussion makes it clear that unlike most other economic goods and services, information, and its associated technologies, need "regulation" but in stating this we run up against one of the basic ideological premises of the new technology: "The single unifying force is that we don't want the government running things."[10] This premise is stated at times as a principle and at times as

a necessity. In part, this is true given the nature of the medium, its geographic spread and the technology. Thus, while Napster struggles to comply with the court ruling on protecting copyright, other less regulable, peer-to-peer services prepare themselves to take its place. The battle is not entirely one-sided; technological developments also seek to enhance regulatory power. Software and hardware developments make it possible to identify and authorise users on the basis of commercial considerations. The state can assist such developments by making their use mandatory. However, the nature of the internet and its geographical spread implies that traditional modes of governance by the nation states will have to be replaced by more complex coordination across nations through either international private bodies like the ICANN or some other multinational public fora.

NATIONS: SOVEREIGNTY AND PRIVATISATION

The current technology revolution is taking place in the context of rapid globalisation. Two distinct processes have driven the globalisation witnessed to date. In the aftermath of the Second World War, we see nation states cooperating to pursue common goals. There have been mutual agreements in the spheres of taxation, telecommunications, human rights, and so on. A common feature of all these processes has been their complementarities to the power of the nation states. Further, we find that in addition to this, countries have agreed to cede national power or rights in the interest of the larger good. An illustration of this latter process is the formation of the European Union by the member states or the decision to create the WTO. In the latter case, early rounds of GATT with their emphasis on tariff harmonisation and reduction were more in the spirit of the first process. However, in the case of WTO, the countries with their commitment to lower barriers to trade and agreement to abide by an international forum for dispute settlement, have clearly agreed to surrender some of their sovereignty in return for faster economic progress. It is true that, in a strict sense, neither the WTO nor the EC represent a diminution of the nation states, but they put bounds on the concept of unbridled sovereignty.

However, as noted in our discussion on the legislature, we find that the communications revolution has created the possibility of large single-interest virtual communities. The power of these communities was seen in the recent Seattle round where they were clearly asking for a more significant voice in the negotiations. In a number of areas, groups pushing for animal rights, human rights, etc. have been able to significantly alter the agenda of the dialogue. As pointed out in our earlier discussion, accommodating such groups in the global

dialogue raises serious issues of representativeness and accountability, which as yet have not been discussed.

The communications revolution, in addition to facilitating the formation of virtual communities that challenge national sovereignty, has also raised several issues. The Internet, for instance, is largely regulated through a private non-profit making body, the ICANN. This has happened in part for reasons of history and in part in response to the nature of the underlying technology. However, when governments step aside in favour of private bodies, concerns of respresentativeness and equity do come to the fore. In the case of Internet, till now, this has been tackled largely due to the dominant role of one country i.e. the USA. However, as the usage widens and deepens, this arrangement will become unsustainable. In this scenario, governing the net will require cooperation amongst governments, corporations and civil society. The challenge will have to be met by modifying traditional notions of sovereignty and recognising the rights of the nations to address concerns of common good. While an agency like the WTO can be a model for this arrangement, it will need to provide voice to a larger set of constituents than the member states only.

CONCLUSION

The ongoing technological revolution poses considerable challenges to the process of governance. The challenge will have to be met by introducing flexibility in the basic institutions, while retaining traditional concerns of representativeness and rights. The challenge will have to be met by questioning and modifying our notions of sovereignty and the community. The technological change implies that spatial notions of rights, communities or interests will have to be modified to take account of the new virtual domain.

Notes

1. 'Information Technologies, Governance and Government: Some Insights from History' by Anthony G. Oettinger presentation at Visions of Governance for the Twenty-First Century seminar, http://siyaset.inet-tr.org.tr/Harvard/mainpv.htm
2. For a comprehensive survey see 'Transaction Costs' by Douglas W. Allen in *Encyclopedia of Law and Economics*, Bouckaert, B. and De Geest, G. (eds.), Edward Elgar.
3. 'Complete' is technically defined as all information relevant to payoffs or benefits.
4. Absence of spatial or temporal barriers to movements of goods, services or agents.
5. *Risk, Uncertainty and Profit,* Frank Knight.

6. *Representative Government*, J.S. Mill.

7. 'Jurisdiction in a World Without Borders' by Dan L. Burk, *Virginia Journal of Law and Technology*, *http://vjolt.student.virginia.edu/graphics/vol1/home_art3.html*

8. *Reading The Constitution in Cyberspace*, Lawrence Lessig.

9. 'A Theory of Law and Information: Copyright, Spleens, Blackmail, and Insider Trading' James Boyle(1) 80 Calif. L. Rev. 1413 downloaded from *http://www.law.duke.edu/boylesite/law&info.htm*

10. *Jefferson's Nature*, Lawrence Lessig.

ASPECTS OF REGULATION

Rajat Kathuria*

I. INTRODUCTION

The pace and extent of ongoing developments in telecommunications is rapidly forcing service providers, consumers and regulators to redefine their activities. The cumulative impact of previous and ongoing technological advances has stimulated fundamental changes in technology, product combinations and the price at which services are provided. The convergence that is taking place in telecommunications services and technologies is also affecting the area of policy-making and regulation related to this sector.

This paper brings together regulatory and policy issues that are likely to be relevant to convergence. The objective is to focus on the opportunities and challenges for the telecom sector against the background of the rapidly changing domestic and international telecom scene. The last decade has witnessed a sea change in the telecommunication scenario in India. During this period, several milestones were crossed including passing the critical threshold of a teledensity of 1, connecting the ten millionth home with a telephone and the issuance of two National Telecom Policies within five years of each other. At present, there are over 30 million fixed lines, about 3.5 million cellular customers, more than 180 registered internet service providers and a rapidly increasing country-wide cable network which is gearing up to provide internet access through set top boxes. As in the rest of the world, in India too, the convergence in technologies of broadcasting, telephony and computers has thrown up opportunities for growth in several sectors and also regulatory and other social challenges.

Due to its great importance as an enabling infrastructure, good telecommunications policy and regulation are vital for creating a suitable framework for the development of this service industry. Professor T.N. Srinivasan's observation on Indian Telecommunications (Srinivasan, 2000) that 'in the present regime nothing is ever decided, and all decisions are provisional because they are constantly up for revision' is intended to be an indictment of policy-making and implementation in the telecom sector. But it seems necessary that on the doorstep of convergence, the relevant regulations and policies are suitably modified. Thus, in terms of the

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commitment-flexibility trade-off, we need to see if there are ways to make regulation and policy more effective. This paper also provides a brief background of certain regulatory and policy issues that have been the focus of debate since telecom reform started in India in 1994. The first step in this direction was announcement of the National Telecom Policy in 1994 (NTP 94), which fashioned the introduction of private sector in the telecommunications market. This provided for the opening up of the telecom sector to competition in basic services as well as value added services like cellular mobile services, radio paging, VSAT services, etc. It also set targets for provision of telephone on demand and opening up of long distance telephony. This was followed by a New Telecom Policy declaration in March 1999 (NTP 1999), to remove some of the bottlenecks and take the liberalization process forward.

NTP 1999 recognised that there have been far-reaching developments in information technology (IT), consumer electronics and media industries across the globe. The document states that 'convergence of both markets and technologies is a reality that is forcing realignment of the industry. At one level, telephone and broadcasting industries are entering each other's markets, while at another level, technology is blurring the difference between different conduit systems such as wireline and wireless'. Like elsewhere, the telecom sector in India too has witnessed rapid changes in the last six years. As in the case of most countries of the world, separate licences have been issued in India for basic, cellular, internet service providers, satellite and cable TV operators, each with a distinct industry structure, terms of entry, and varying requirements to create infrastructure. Thus, one feature of telecom policy has been the fragmentation of the new entrants on the basis of geographical and lines of business constraints. The result has been that many licences have been awarded, in certain cases, in small markets and under service limitations. The existing structure of Indian telecommunication has not been conducive to the exploitation of the network externalities available as a result of convergent technology. Adding more licences on the basis of basic, mobile, long distance services, etc. is likely to be a more expensive route to introducing competition in the telecom sector. In this background, and the sometimes controversial policy climate, the proposed Communications Commission of India (CCI) presents an opportunity to address these issues and create an environment that can harness technology for maximising benefits to all stakeholders in the sector. One way to achieve the goals stated above will be to entrust the proposed 'super-regulator' of the communications sector, i.e. CCI all major tasks relating to policy and regulation with negligible intervention from exogenous agencies.

The paper has been divided into six sections. While Section I is introduction in nature, Section II provides a brief regulatory overview of India's

telecommunications sector. Section III briefly analyses the telecom regulatory and policy reform that has taken place in India. This includes the establishment of an independent regulator, and the main thrust of the New Telecom Policy 1999. Section IV examines crucial policy issues that have assumed importance in the context of NTP 99. In this context, Section V addresses prospects and challenges of the proposed 'super-regulator', namely, CCI. This implies a need to focus on certain important policy areas, such as interconnection among various networks, a level playing field, fair and reasonable policies, and other terms and conditions of operation, including those relating to the independence of the regulator and the role of the regulator in promoting competition. Section VI contains concluding remarks.

II. OVERVIEW OF REGULATORY FRAMEWORK

India's telecommunications sector is regulated by the Ministry of Communications through three government bodies — the Telecom Commission, the Department of Telecommunications (DoT), and the Telecom Regulatory Authority of India (TRAI). Telecom Commission performs the executive and policy-making function, DoT is the policy-implementing body, while TRAI performs the function of an independent regulator.

Department of Telecommunications

The Department of Telecommunications (DOT), Ministry of Communications, is the authority in India that looks after the licensing and overall policy-making in the sector. Till recently, DOT was also the main service provider. However, the service provider section has since been separated from DOT, and is now functioning as a corporate body, Bharat Sanchar Nigam Limited (BSNL). There are two other government corporations which are important service providers. Mahanagar Telephone Nigam Limited (MTNL) operates in Mumbai and Delhi as a service provider with licence for, *inter alia,* basic service, cellular mobile, and internet. Videsh Sanchar Nigam Limited (VSNL) has a monopoly in the international call segment, and has a licence for providing some other services including internet. The government is a major shareholder in both MTNL and VSNL, and has substantive control over the decisions of these service providers. In course of time, MTNL and VSNL may end up competing with each other for the same market. In fact, this has already started happening in the case of internet market. The competitive situation would, however, require greater autonomy for MTNL and VSNL.

Telecom Regulatory Authority of India

Under the Telecom Regulatory Authority of India Act 1997, the Telecom Regulatory Authority of India (TRAI) was established in January 1997, with a view to providing an effective regulatory framework and adequate safeguards to ensure fair competition and protection of consumer interests. To achieve the objectives of the TRAI Act, TRAI was given powers to issue directions to service providers, make regulations, notify tariffs by order, and adjudicate disputes arising between government (in its role as service provider) and any other service provider.

An ordinance issued on 24th January 2000, has amended the TRAI Act 1997 and altered a number of its aspects. For example, the adjudicatory role of the TRAI has been separated and has been given to a Telecom Dispute Settlement and Appellate Tribunal (TDSAT)[1] . This Tribunal has been provided the powers to adjudicate any dispute.

i. between a licensor and a licencee;
ii. between two or more service providers;
iii. between a service provider and a group of consumers

TDSAT has since been given additional powers compared to the powers that had been given to the erstwhile TRAI. For example, it can settle disputes between the licensor and the licencee. Besides, its decisions may be challenged only in the Supreme Court.

The remaining functions of TRAI have been better defined and also increased. For instance, TRAI now has the power to 'fix the terms and conditions of inter-connectivity between the service providers' (TRAI (Amendment) Act 2000), instead of 'regulating arrangements between service providers of sharing revenue from interconnection' (TRAI ACT 1997). The new legalisation has signalled an attempt to re-establish a credible regulator. The government would be required to seek a recommendation from TRAI when issuing new licences. The adjudication of licensor-licencee disputes would be undertaken by an independent tribunal specialised in telecom. In terms of interconnection arrangements, TRAI was given the powers to override the provisions of licence agreements signed with DoT. However, while there has been an increase in the powers of the Authority (other than dispute settlement), the Ordinance has led to a weakening of the guarantee that was provided in the Act with respect to the five year working period for the TRAI Chairman and Members. This statutory guarantee was done away with by the Ordinance, which provides for less stringent conditions for

removal of any Authority Member or Chairman. To that extent, the independence of the Authority has been whittled down.

III. CERTAIN REGULATORY AND POLICY ISSUES

A fundamental objective of regulation is to ensure that everyone has access to reasonable service at a reasonable price. The objective could be further broken down into two components, one economic and the other social. From an economic perspective, the services should satisfy the full range of consumer demand to be supplied under conditions of optimal efficiency. From a social perspective, the service should be made available to everyone on reasonable terms whether or not it is profitable to do so. The telecom network should be extended not just to the limit of economic efficiency but to the limit of social need. Both these aspects underlie the current policy for telecom – from an economic perspective, the intent is to transform India into an IT superpower, while from a social perspective, the policy clearly highlights the need to improve teledensity in rural areas and provide connectivity to all villages.

Regulation, however, is not an end in itself. Instead, it is simply a tool, alongside the use of market forces, for achieving wider social, economic and general policy objectives, such as consumer choice and efficiency. This principle applies equally to all areas of convergence. The fundamental objectives underpinning regulation are not undermined by convergence. These objectives are varied and tailored to the specific needs of different segments, but also include the goals stated above, such as promoting efficiency, economic welfare, and the public and consumer interest.

Nevertheless, the nature and characteristics of convergence which are examined below, as well as the perceived need of industry actors for regulatory intervention to be limited and closely targeted, necessitates an examination of the role and weight of regulation in a converging marketplace. Three key issues can be highlighted[2] :

i. *The role of market forces*. Some commentators lay particular stress on the need to place greater reliance on the ability of market forces to ensure regulatory objectives. Others are doubtful about the ability of market forces to provide adequate *ex ante* guarantees for consumers, and recognise an important role for regulation in safeguarding public interest objectives.

ii. *The balance between sector-specific regulation and competition*

rules. A further key issue is the balance between competition rules and sector-specific regulation, with many arguing for a preference to be given to the application of competition rules to individual cases within a converged environment, rather than the further development of extensive regulation.

iii. *Finding workable solutions*. Where regulation is in place, it must apply in a workable and timely manner.

A key feature of a converged environment is the possibility that any network can be used to deliver a much wider range of services than is currently the case. Rapid changes in technology have largely diluted the monopoly characteristic of telecom service provision, thereby opening up avenues for improved efficiency. Competition is now viable in a range of services, including long distance transmission of voice and data. Facilitating effective competition among the various players is, therefore, a key policy issue. This has been acknowledged in NTP 1999. In a multi-operator environment, interconnection is a crucial regulatory issue for telecommunications policy. No new entrant into the market will be able to compete effectively unless it is able to interconnect its network with the facilities of the incumbent operator either directly or indirectly via the network of another competitive entrant. In the course of transition to competition, a pivotal issue is how best to meet the requirements of interconnection of each of the service providers. For most telephone users, the services offered by the new entrant will be almost useless unless the entrant could enable its subscribers to communicate with the large number of subscribers of the incumbent operator. Consequently, competition in the market can flourish only if entrants are able to interconnect their facilities with those of the incumbent at terms that allow the entrant to provide the service at competitive levels of price and quality. A 'fair and reasonable' interconnection policy is a critical input to foster competition in telecommunication markets. The necessity of providing a 'level playing field' for public and private operators is thus a key policy issue. Two basic requirements emerge from this: (i) the dominant incumbent operator must take on new entrants on competitive instead of monopolistic terms, and (ii) autonomous regulation should be vested with requisite authority.

Linked to interconnection and competitive efficiency is the issue of tariffs and tariff policy. Traditionally, incumbent tariffs have cross-subsidized the cost of access (as reflected by rentals) by domestic and international long distance usage charges. In order to promote desired efficiencies, 're-balancing' of tariffs is a necessity and therefore, an important policy issue. Re-balancing of tariffs involves reducing tariffs that are above costs while increasing those below costs. Thus, re-

balancing implies a reduction in the extent of cross-subsidisation in the fixed services sector. Such rationalization is required as a condition precedent to the conversion of a single operator system to a multi-operator one. Through the first Telecommunications Tariff Order (TTO) of March 1999, Telecom Regulatory Authority of India (TRAI) has commenced this process of 're-balancing'.

Two more issues that should be of high policy concern deserve note. In order to become globally competitive, India has to keep pace with the world-wide developments in telecommunication services and technology. Accessing related technologies and promoting needed investments in a competitive environment raise important policy concerns. On the other hand, as noted earlier, India's rural sector and sections of the urban population do not have access even to basic telecommunication facilities. Concerns of equity as well as economic efficiency call for clear policies to promote universal access to telecommunications.

IV. A BRIEF ASSESSMENT OF REGULATORY REFORM

Opening up the telecom sector to private participation was accompanied by the setting up of the Telecom Regulatory Authority of India (TRAI) in March 1997. Responsibilities entrusted to the TRAI included tariff fixation, access charge, revenue sharing between the incumbent and the private sector, dispute-settlement and consumer protection. The establishment of TRAI divests the DoT of several regulatory functions, which the latter exercised on behalf of the Government of India. However, the process has been far from being smooth, with a number of TRAI's decisions being challenged in the courts and TRAI itself being reconstituted in January 2000 with its adjudicatory functions entrusted to a separate body, TDSAT.

Since its establishment, the telecom regulator in India has taken a number of initiatives pertaining to tariffs, interconnection charge and revenue sharing, and has provided its recommendations on licence conditions/licence fee for certain service segments. As mentioned above, there is now a move by the government to replace TRAI with the CCI, a body that will have a wider ambit and more powers (see below). An overall perspective that would be important in this regard is to emphasise the establishment of a system which makes it possible to implement reform quickly. In this context, certain other features derived from the experience of regulatory reform across countries would be instructive.

In India, there is a major emphasis on expanding the teledensity in the next seven years, and the government has explicitly recognised the role of the private sector in meeting the targets. Delay in implementing the operations will create

problems in meeting the stated objectives. There is thus a need to begin operations in as many places as possible, and to infuse competition so that another objective of the government policy could can also be met with success through the market itself, namely, to provide the services at affordable prices. To that extent, any licence fees charged should be low, covering, for instance, contributions to the proposed universal service access levy, the cost of regulation, and some additional amount to meet other objectives, such as the creation of a Telecom Fund, together with some contribution towards revenue. It is also worth considering whether the revenue objective would be better met through a service tax.

Convergence of technologies not only implies a need to consider the appropriate method of charging licence fee, but also forces the policy-maker to review a number of other aspects, including whether to regulate and the nature and extent of regulation. The attempt of all the policy initiatives is to promote the flexibility of technology choice and service provision. Thus, neutrality of policies towards technology/platform is seen as a desirable attribute, not only because this enhances opportunities but also because the policy-maker is not in a position to anticipate the likely developments and fine-tune policy. Before considering these aspects with regard to the proposed CCI, it would be helpful to highlight the debate surrounding the provision of limited mobility services using Wireless in the Local Loop (WLL) technology by basic service operators.

NTP 1999 asserts that convergence of markets and technologies that is taking place is a reality forcing the realignment of Industry. It also mentions that convergence allows operators to use their facilities to deliver some services reserved for other operators necessitating a relook into the existing policy framework. The thrust of NTP 1999 is, therefore, not only to increase teledensity and encourage competition, but also to provide a level playing field while creating a favourable climate for induction of new technologies that provide cheaper communication services to the citizens.

Within the framework of NTP 1999, TRAI was asked to give recommendations on whether basic service operators should be permitted to offer limited mobility services using Wireless in the Local Loop (WLL) technology. In its recommendations to the government on WLL with mobility TRAI combined two principles. One, that customers should obtain benefits of technological development. Two, that to the extent the unanticipated policy change has an adverse effect on cellular mobile service providers, certain policy changes should be made to redress the situation.

In its recommendations to the Government, TRAI has stated:

> "The issue before us, therefore, is that a somewhat unforeseen market development viz. introduction of WLL with mobility, could be forcing the prices down at a pace faster than what competition at the earlier anticipated levels would have achieved. The precise task, therefore, is one of managing the unanticipated level of competition in the immediately forthcoming years….[BSNL and MTNL] are the ones likely to make a dent in the cellular mobile market in the country as a whole and increase their market power. The Authority, nonetheless, is recommending WLL with limited mobility because ultimately it will increase competition in both basic and cellular mobile segments and lead to a faster growth in tele-density. This will be to the considerable advantage of the customers. The Authority recognizes that immediately, the incumbents, who are the dominant basic operators, could gain a further competitive edge by this policy change. This will not be in keeping with the principle of providing a level playing field for all competitors and therefore, some steps will have to be taken to even out, as far as practicable, the effects of undue advantages/disadvantages caused by the policy changes. Whenever such differentials tend to hamper open competition, these need to be removed. The case for regulatory and policy interventions becomes stronger when undue differentials arise not because of market forces but as results of policy changes. Therefore, in the interest of promoting fair competition in the market the Authority is of the view that for the cellular services to maintain their competitive ability, some policy changes and ameliorative measures would need to be adopted."

The ameliorative step that TRAI recommended and which the government subsequently accepted was a lower licence fee revenue share for the cellular mobile service providers (CMSP). By reducing the licence fee revenue share from 17% of gross revenues to 12 per cent, which is the same as prescribed for the basic service operators in metros and category A circles[3], TRAI sought to address the concerns of CMSPs. TRAI also recommended that limited mobility be allowed to basic service operators restricted to a short distance charging area (SDCA) i.e. to areas that, on average, are reachable as local calls. The cellular operators contended, however, that the field was not level and appealed against the TRAI's decision to the Telecom Disputes Settlement and Appellate Tribunal (TDSAT). From the TDSAT the matter was referred to the Group on Telecom Information Technology (GoT-IT), which recommended that WLL with limited mobility could be offered as part of the basic service licence but stipulated conditions with respect to the rollout of WLL with limited mobility.

Although it is difficult to assess whether WLL with limited mobility will affect the cellular market and, more importantly, provide subscribers with affordable limited mobility service, the entire episode leading upto the introduction of WLL with limited mobility has highlighted the difficulty in demarcating services into different categories (licences) in the current convergence dominated environment.

'Encroachment' of services in a regime where services are classified into separate licences will perhaps become more common as technological advancement breaks down these artificial barriers. Already basic service operators have complained of CMSPs offering services, such as e-mail on phone, short messaging service, Internet, etc., which have not been envisaged in the licence for CMSPs nor have been permitted by TRAI.[4]

In this situation, the decision of the government to introduce Communication Convergence Bill with powers to give licences for network infrastructure facility, network service, application service and content application service is perhaps timely and will eliminate the artificial barriers between services enabling service providers to reap benefits of scope economies. The Commission's task will then be to ensure that such benefits are passed on to the consumer and also that there is level playing field between different service providers.

V. CONVERGENCE AND REGULATION

The future regulatory environment will be of crucial importance. The European Union has already developed a comprehensive framework for managing the transition in telecommunications from a monopoly to a fully competitive regime. The Green Paper published by the European Union analyses the convergence phenomenon and its implications for the existing regulatory systems governing the telecommunications, media and information technology sectors and provides a framework for discussion on the approaches towards regulation in a converged environment. It also argues that the development of new services could be hindered by the existence of a range of barriers, including regulatory barriers, at different levels of the market. There are, however, differing views on the adequacy of existing regulatory frameworks to deal with the changing environment. One view is that the development of new products and services is being held back by regulatory uncertainty. It is argued that while the existing rules were defined for a national, analogue and mono-media environment, the services increasingly cut across different traditional sectors and geographical boundaries and may be provided over a variety of platforms. Proponents of this view would argue that such regulatory uncertainty holds back investment and damages the prospects for the implementation of the Information Society. An alternative view would hold that the specific characteristics of the existing separate sectors will limit the scope for service convergence. It would further contend that the role of the media industry as the bearer of social, cultural and ethical values within society is independent of the technology relied upon to reach the consumer. This would mean that regulation of economic conditions and that of the provision of information services should be separated to ensure efficiency and quality.

In considering possible approaches, a successful formula is likely to require more than just the creation of a flexible framework for new types of services. The speed and manner in which change is managed are at the heart of the transitional issues. Three basic options for regulatory developments have been discussed in the Green Paper, though it acknowledges that such a list is neither intended to be comprehensive nor closed.

Option 1: Build on current structures: In this situation, current vertical regulatory models would be left in place. This means that different rules would apply in telecommunications and audiovisual/broadcasting sectors, and to a lesser extent in publishing and IT.

Option 2: Develop a separate regulatory model for new activities, to co-exist with telecommunications and broadcasting regulation : This option would mean that new services and activities would be "earned out" which would cross traditional boundaries, placing them under a distinct set of rules, if rules are needed at all.

Option 3: Progressively introduce a new regulatory model to cover the whole range of existing and new services : This option would call for a fundamental reassessment and reform of the regulatory environment. This does not necessarily imply developing a whole new set of laws, but rather seeing how existing frameworks can be adapted to promote flexibility, remove inconsistencies, avoid discrimination within and across sectors and continue to ensure the achievement of public interest objectives.

Across the globe, convergence is changing the role of regulation and at the same time making it more important. A proper regulatory framework is the first step towards effective regulation in a converged environment. The recently released Draft Communications Convergence Bill (See Appendix) aims to provide a regulatory framework for telecommunications companies confronted with the convergence of telecom, Internet and broadcasting services and broadly fits in with the third option defined in the Green Paper. This new legislation has been drafted along the lines of an amendment to the US Telecommunications Act 1996 and Malaysian Communications and Multimedia Commission Act 1998. If the Bill is passed, India will become the second country in the world after Malaysia to adopt legislation covering the convergence of high-tech media.

The commission will be established as the regulatory authority in convergence of IT, communications and broadcasting, and will be responsible for managing spectrum, granting of licences and enforcing their conditions, determining tariff rates and ensuring a competitive marketplace. The proposal comes at a time

when several countries have been or are in the process of introducing changes in their regulatory environments. Table 1 provides a summary of the recent legislative and regulatory developments in a few selected countries.

Table 1: Recent Legislative and Regulatory Developments
Selected examples from end 1998-99

Country	Year	Law	Brief description
Albania	1998	Law Nos.8287 and 8288	Amends the telecommunications law and establishes the Telecommunications Regulatory Authority.
Armenia	1998	Telecommunications Law	Establishes a legal framework for telecommunications, including powers and responsibilities and the protection of those enjoying them. Also provides for rules on providing telephone services and licensing procedure.
	1999	Ministry Decrees	
Bulgaria	1998	Telecommunications Law	Provides for the creation of the State Telecommunications Commission and the National Radio and Television Council, governing the radio and television activities of Bulgaria.
	1998	Media Law	
Burundi	1998	Presidential Decree	Establishes an independent regulator.
Chad	1998	Law No.009 on Telecommunications	Regulates telecommunications activities and prepares reform of the sector.
China	1997/ 1998	Regulations	Covers radio television, and film. Provides interim provisions for the management of computer information networks; and on the security of computer networks and the Internet.
Dominican Republic	1998	Telecommunications Law	Liberalizes the market and creates a regulator.
Ireland	1999	Broadcasting Bill	Includes provisions on infrastructure, digitisation, content management, codes and standards. The bill provides for the establishment of a new broadcasting infrastructure and the establishment of a new commercial entity to operate and manage the transmission of digital terrestrial television services.
Kenya	1998	Kenya Communications Act	Separates postal and telecommunication service creating Telecom Kenya Limited and the Postal Corporation of Kenya and establishment of the Communications Commission of Kenya.
Lithuania	1998	Telecommunications Statute	Provides the basis for the regulation of telecommunications services. Establishes the Communications Regulation Service.

Contd...

Country	Year	Law	Brief description
Malawi	1998	Communications Act, No.41	Provides the basics for the regulation of telecommunications and broadcasting. Separates postal and telecommunications services creating Malawi Posts and Malawi Telecom. Allows privatisation of Malawi Telecom. Establishes Malawi Communications Regulatory Authority (MACRA). Reconstitutes Malawi Broadcasting Corporation.
Malaysia	1998	Communications and Multimedia Act	Establishes a regulatory framework in support of national policy objectives for the communications and multimedia industry.
	1998	Communications and Multimedia Commission Act	Establishes the Communications and Multimedia Commission with powers to supervise and regulate the communications and multimedia activities, and to enforce the communications and multimedia laws.
Mauritius	1998	Telecommunications Act	Provides for the establishment and management of a Mauritius Telecommunications Authority and the setting up of a Telecommunications Advisory Council.
Nigeria	1998	Wireless Telegraphy (Amendment) Decree No.29	Transfers the power to regulate frequency spectrum at local and international levels to the NCC. It also regulates the sales and operation of wireless telegraphy equipment and ensures the competence of personnel.
Qatar	1998	Law No.21	Transforms Qatar Telecom into a stockholding company.
Singapore	1998	Electronic Transactions Act	Enacts a commercial code to support e-commerce transactions, providing for a public key infrastructure, enabling electronic applications and licences, and clarifying network service providers liability for third-party content.
	1999	Electronic Transactions Regulations	Creates a voluntary licensing scheme for Certification Authorities (CAs). Stipulates the criteria for licensing and the operational requirements after obtaining a licence.
Slovak Republic	1998	Act No.52	Protection of personal data in information systems.
Thailand	1999	Corporatisation Law (passed July, 1999)	Allows State agencies to become private limited companies.
	1999	Frequency Bill (passed 1st reading on 7 April, 1999 - currently in Committee)	Establishes a regulatory body to manage frequencies and negotiate concessions.
United Kingdom	1998	Competition Act	This is a general competition law based on Articles 85 & 86 of the EC treaty.
	1999	Licensing Directive	Provides for PTOs to be able to convey entertainment services (provision is regulated by the Independent Television Commission).

Source : ITU World Telecommunication Regulatory Database.

Some countries with established regulators have chosen to build on current structures rather than to set up new entities. This is exemplified by Australia where it was decided not to create a new regulator, or even a new model, but to merge certain aspects of existing regulatory authorities. The Australian Communications Authority (ACA) was established on 1 July 1997 by merging the Australian Telecommunications Authority (AUSTEL), without its competition regulation function, with the Spectrum Management Agency (SMA). The administration of competition regulation was transferred to the Australian Competition and Consumer Commission (ACCC). While the regulator is still responsible primarily for telecommunications, this merger was the first step in addressing convergence issues. Some countries have already taken up the option for progressively introducing a new regulatory model to cover the whole range of existing and new telecommunications, broadcasting and Internet services. In Malaysia, the Telecommunication Act of 1950 remained virtually intact until it was overhauled in 1998 by the Communications and Multimedia Act (CMA) and the Malaysia Communications and Multimedia Commission Act (MCMCA). Now, the Malaysian Communications and Multimedia Commission is the sole regulatory authority for telecommunications, broadcasting and computing (See Box).

Malaysia has a Single Converged Multimedia and Communications Regulator

The Malaysian Communications and Multimedia Commission (MCMC) was formed on 1 November 1998 beginning its operations on 1 April 1999. The Commission is also charged with overseeing the new regulatory framework for the converging industries of telecommunications, broadcasting and on-line activities. The commission reports to the Malaysian Telecommunications Ministry and may undertake a policy advisory role, while policy decision-making is vested with the Minister. The Minister may also give policy directions to the Commission.

The policy objectives are to:

- establish Malaysia as a global center and hub for communications and multimedia,
- promote a civil society on a basis of information-based services,
- grow and nurture local content,
- regulate for the long-term benefit of the end-user,
- promote a high level of consumer confidence,
- ensure equitable provision of affordable services to all,
- create a robust applications environment for end-users,
- facilitate the efficient allocation of resources,
- promote the development of capabilities and skills within Malaysia's convergence industries; and
- ensure information security and network reliability.

Source: Malaysian Communications and Multimedia Commission http://www.cmc.gov.my/legisframe.htm

In India, the CCI is intended to be independent and autonomous with a major change proposed from the current legislation in that licensing powers are sought to be transferred to the Commission. This is a positive move and will make the licensing process more efficient. Independence of the Commission is also necessary, as it is not likely to gain domestic and international credibility without it. Since one of the main objectives of the Commission will be promotion of the principles of a level playing field for all operators, even the slightest reservation about its independence and autonomy could adversely affect the competitive climate and constrain its regulatory efforts. The task of creating credible commitment by the creation of a framework for regulatory governance must focus on three complementary mechanisms restraining arbitrary administrative action: (a) substantive constraints on the discretion of the regulator; (b) formal or informal constraints on the discretion of the regulator; and (c) institutions that enforce the formal constraints.[5] The ICICI Report (1994) on "Entry Conditions for Basic Telecom Services" has also emphasised that "In an emerging economy, great amounts of discretion lie with the sector managers of the Government. If such discretion is unlimited or unrestrained and vests in a single person or office at any time, it is unlikely to command the level of comfort that is mandatory for attracting substantial private investment. The discretion should be so hedged that the decision-making process becomes tolerably predictable and reliable and transparent". Exercise of discretion, by any one person or institution, including the regulator, could deviate from the public policy goals. It must, however, be mentioned that independence of the regulator is not in conflict with constraints on the discretion of the regulator.

The proposed Bill provides for funding of the Commission by way of grant of such sum or sums of money as the Central Government thinks fit for being utilized for the purpose of the Act separately for the Communications Commission and the Appellate Tribunal respectively[6] . This is a provision, which is likely to result in loss of independence of the Commission and the Appellate Tribunal. The current thinking on the regulatory provisions across the world recommends independent funding of such regulatory commissions preferably from its own fees and from revenue receipts in the segment. The amount required out of the licence fee for the administrative expenses of the regulator will be a small portion of the fee and could be provided in the interests of the growth of a suitable regulatory climate in the country. In terms of the proposed Bill, one of the functions of the Commission would be to report and make recommendations on such matters as may be referred to it by the Central Government. Since the Commission is to be an expert body, it is also desirable for the Commission to make recommendations to the Government *suo moto* on any issue/matter that it may consider of importance and in public interest.

Another objective of the Bill is to create a regulatory environment "which does not aim to predict the future, but aspires to be flexible enough to accommodate and propagate any permutation and combination of technologies and services." In order to achieve a technology-neutral and service sector-neutral environment, the Bill outlines the creation of four categories of licences that include network infrastructure facilities, network services, application services and content application services.. However, the Bill does not attempt a precise definition of the above four categories in the main body of the Bill. There is a need to clearly define the four categories of licences so that the existing licences for Basic, Cellular, PMRTS, VSAT, ISPs, National Long Distance Operators, etc. may indisputably fall within the scope of one of the four categories.

As stated at the end of the previous section, convergence, will eliminate the existing barriers between different types of services, for example, between basic and cellular, and allow service providers and consumers to benefit from scale and scope economies. Naturally, competition policy issues will need to be addressed more frequently in the converged environment, and together with the growing consolidation of the telecom industry, this will engage the regulatory resources more than in the current environment. Thus, convergence may also often result in issues falling within the competence of more than one regulator. Issues relating to competition and competition policy could fall under the jurisdiction of either the proposed Competition Commission of India or the Communications Commission of India.

A liberalised, privatised and converged communications sector will be subject to a number of different types of anti-competitive conduct, including abuse of its dominant position in determining an anti-competitive interconnection charge regime, or anti-competitive technical arrangements with another service provider. Likewise, anti-competitive pricing policies may be combined with certain other initiatives in a joint-product situation where it may not be easy to untangle the effects of one action (e.g. Anti-competitive price) from another action (e.g. Revenues earned through bundled services). New entrants will regard effective controls on anti-competitive conduct as essential and will often be deterred from entering the market unless such controls are in place. Even if a law on general application exists, the telecommunications law should address certain key technical matters, such as interconnection, frequency allocation and numbering plan, as well as cross-subsidy among different licenced services provided by the same operator.

In view of the above, it would be appropriate if the CCI is given adequate powers to resolve all issues in the telecom sector, including those relating to competition and observance of level playing field. This, in fact, should be applicable

to all industry-specific regulators, for in practice, it would be extremely difficult to segregate competition issues from issues specific to the given industry. In case there is overlapping jurisdiction on competition policy related issues between the CCI and the industry-specific regulatory body, the time required to resolve issues would increase, thereby decreasing the effectiveness of the process. Further, a hybrid structure will allow the possibility of 'forum shopping', which could lead to increasing the resources and time expended towards resolving issues. To achieve consistent and clear handling of sector specific problems including those relating to anti-competitive action, it is better that such problems be handled by the sector-specific regulator.

Regulator's Role in Promoting Competition

The goal of reforms that identify competitive segments, open them up to competitors, and deregulate prices is predicated on the assumption that these segments will, in fact, be reasonably competitive. However, there may be good reasons to believe that they will never be perfectly competitive and market power could indeed be a major problem, at least in the short run. The question is whether, once the initial structural and transitional mechanisms are in place, there is any continuing role for the regulator in promoting competition in the competitive segments or, alternatively, whether ongoing competitive issues should be left to the antitrust authorities. There is a delicate balance: on the one hand, the regulator continuing to play a role in monitoring the performance of the sector and implementing policies to fix serious performance problems and, on the other hand, his interfering excessively in the natural evolution of the competitive segments.

All things considered, there appears to be a useful ongoing monitoring role that is delegated to the regulatory agency. The regulator is likely to have the best information about the sector to monitor it, identify performance problems, and either fix the problems with the instruments at its disposal or make recommendations for action by antitrust authorities. The regulator's role is likely to be especially important in countries that do not have strong antitrust enforcement authorities. Some of the problems may be classic market power problems arising form market power or slow entry, while others may result from imperfect price and non-price conditions of access to the network or cross-subsidy problems that the regulator is in the best position to address. However, it is important for the regulator to focus on identifying long-term performance problems rather than to adopt unrealistic goals or become a micromanager of the segments. This aspect will be more crucial in the converged environment than in the prevailing situation.

VI. SOME CONCLUDING COMMENTS

While the increase in the number of regulators and development in the field of legislative reform are certainly encouraging, new technologies and services are moving faster than the bodies that regulate them. Already, regulatory uncertainty, some consumer protection legislation or some outdated law may be hampering convergence. Access issues and the large investments needed for meeting what may be uncertain demand may also be creating certain barriers. Convergence is not a simple issue for telecommunications' regulators. The challenge is to determine ways to regulate technologies that are continually evolving and, more importantly, to determine the role of the regulator in a converged sector. The challenge for regulators is to develop consistent and relevant regulations that do not inhibit the growth of the sector, but rather encourage technological innovation.

Common characteristics for the regulatory framework of the future are:

i. It should be balanced, clear, consistent, predictable, comprehensive and transparent;

ii. It should ensure consistent regulatory treatment of essentially similar services;

iii. It should be technology and platform neutral (non-discriminatory);

iv. It should be pro-competitive; and

v. It should be flexible enough to adapt to new development (in technologies and services) and to reflect the different perspectives of both providers and consumers.

In several countries that have implemented significant telecom liberalization, the focus now is on convergence of policies as well as on regulation that addresses "unfair competition". Further, the rapid developments in the area of internet are posing particular problems for the regulator. It is now evident that internet service providers will be increasingly able to use their technologies to provide competitive services in comparison to those provided by the main telecom service providers. The changes are also throwing up new regulatory issues, which may even lead to a recasting of the established principles in certain cases. There is now also a tendency for the service providers to bundle different services, thus creating difficulties in regulating them as separate entities. In a number of instances, convergence of services and technologies is also resulting in a convergence of regulatory authorities, or greater co-operation among the separate regulatory authorities handling the policy issues.

Overall, it is likely that this will mean decreased reliance on individual licensing of particular services and facilities and increased reliance on general rules. It will also involve greater coordination among authorities in different industry sectors. Telecommunications regulation will be less concerned with licensing and pricing and more concerned with adaptation of standards of reliability and interoperability to unrelenting technology changes, as well as with frequency allocation and assignment, dispute resolution and consumer protection. A lot more of the telecommunication industry will probably end up being regulated by the market (ITU, 1999).

Notes

1. In its present form, the CCI Bill also envisages the dispute settlement function to be performed by the Communications Dispute Settlement Appellate Tribunal (CDSAT)
2. See Green Paper (1997)
3. Service Areas are categorised into Metros and Circles. The Circles, which are roughly contiguous with state boundaries, are further categorised into types A B and C in diminishing order of attractiveness.
4. Standing Committee on Information Technology, Seventeenth Report (2001)
5. Brian Levy and Pablo Spiller, The Institutional Foundations of Regulatory Commitment: A Comparative Analysis of Telecommunications Regulation, Journal of Law, Economics and Regulation (1994)
6. The separation of the adjudicatory function of the proposed commission is keeping in line with the prevailing separation of such powers between the TRAI and TDSAT.

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CONVERGENCE AND EMERGING LIFESTYLE CHANGES

A Dissection of Popular Images

Devangshu Dutta*

INTRODUCTION

Convergence can no longer be described just in terms of the possible. An electronic nirvana, where every digital device communicates with every other digital device, is still a long while off. But much that was considered science-fictional conjecture has already become *passe*. Much more will become technically possible in the next few years.

How many of these new technologies and applications will transcend the merely possible and become essential constructs of the near future? Just how much will convergence change the actual tenor of our lives? The marketeers of the world are betting huge sums of money on the answers. Their efforts are likely to be hit and miss, as such attempts always are with any new technology. It is indisputable that the availability of broadband communication networks and the development of convergence technologies will make highly enhanced, completely new, digital products and services possible. But what exactly are the world's consumers prepared to pay for? This is the key issue, since research and development is heavily consumer-driven. The answers are more likely to lie in the behavioural quirks of the 21st century Zeitgeist than in electronic wizardry.

A dissection of images culled from the popular imagination may provide interesting pointers to directions. It is all too easy and tempting to categorise trends in genre fiction, advertising, popular cinema, TV, role-playing games, online gambling, etc as simply beneath serious notice. However, where the acceptance of new technology is concerned, the images of popular culture are quite likely to prove accurate mirrors. Innovations as diverse as rocket-science, cloning, the Internet and credit cards and their impact on society were predicted in imaginative depictions on-screen and in genre literature long before the technology in question turned into reality. What's more, it is evident that entertainment will generate a big component of revenues from convergence. The advent of convergence has already caused upheavals in the entertainment industry. So, an examination of the popular imagination's vision of convergence appears to be a useful approach.

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ASSUMPTIONS AND CAVEATS

Given below are four basic assumptions made in this context :

i. There is an implicit belief that most of the world will eventually access cheap broadband networks. Broadband penetration will have to reach critical levels before the true power of convergence is revealed.

ii. It is also assumed that Bluetooth or some successor technology will create common communication standards acceptable to competitors across many, currently separate, industry segments. This is the core of convergence. The end-user must be able to transact and receive input/ send output on a variety of devices.

iii. The availability of high-speed access on the fly is also assumed. Even if 3G fails, some successor technology must deliver fast data-access to mobile devices that can combine the current functions of laptops, PDAs, TVs and cellphones.

iv. Finally, it is assumed that the legal and administrative framework required to address the new issues arising will work effectively without causing excessive market distortion or hobbling possible technological advances.

There are obvious caveats attached to the above assumptions. A global consensus has to develop on regulation and that could prove as difficult as brokering peace in Kashmir. At the least, it could take years, which would equal many cycles at the cutting edge of innovation.

Convergence is also highly dependent on broadband networks that deliver unto the home. While enormous optic-fibre capacity now exists at many places, broadband penetration has been patchy because effective answers to the local-loop issue have not yet evolved. Where local-loop unbundling has occurred, as in Canada or Republic of Korea, broadband penetration has been markedly higher. Also critical to convergence is high-speed mobile data-access on the fly. Problems of a technical or financial nature could arise here. Current technologies aren't effective in the area of delivering high-speed data access or communicating with other devices. Additionally, most major telecom service providers have bid unrealistic amounts for licences to roll out 3G networks in Europe. Such financial profligacy is likely to cause a cellular market shakeout and that may lead to a slowdown in R&D. Funding for many current R&D programmes will cease if the

telecom industry's structure collapses. In that case, the entire M-commerce sector could disappear or be severely retarded in growth.

The assumption of universal standards amongst competitors appears reasonable but its contours are unclear. Eventually, companies competing in different market segments will develop communication standards as markets and devices merge. This may occur through *force majeure* in analogy to Microsoft's domination of the PC platform or IBM's control of the mainframe market. Or, it could occur by consensus and alliance, as happened at certain stages of Internet development. It may even occur because of government fiat or the creation of hybrid devices that combine currently separate functions.

We can't guess at the timeframes involved. The process is likely to cause enormous changes in the electronic chip industry along the way, however. There is a recent trend of unbundling chip manufacturing into boutique design centres and large manufacturing facilities. Chip design is likely to be a major growth area. A vast range of "unintelligent" devices, such as microwave ovens, automobiles, TVs and refrigerators will be upgraded and granted communication facilities at the same time as "more intelligent" devices, such as cellphones and PDAs are upgraded to greater computing resources and power.

A DISSECTION OF POPULAR IMAGES : JOYMAKERS AND RETINAL ID

Keeping all these assumptions and caveats in mind, let us look at some popular images. In 1976, Robert Sheckley wrote a science fiction novel about life in the 25th century. On Sheckley's Earth, all routine functions were performed by a global network of computers. Every citizen was identified by means of a unique retinal print and everybody carried a "joy-maker" keyed to work for him. The joymaker was a pocket-sized device that took care of personal needs. It combined the functions of a mobile phone, PDA, voice-messaging system, bank-teller, accounts clerk, medical practitioner and voice-activated web PC. It gave the holder access to the global web and allowed him to shop, order dinner, pay cab-fares, book tickets to Romeo and Juliet, and view the show holographically.

Sheckley's predictions were out by several hundred years because, in practice, this vision is already close to reality. For instance, retinal printing is already employed in certain high-tech areas where security is considered paramount – reportedly, at the CIA HQ in Langley, Virginia, for one. Retinal identification is possible by means of handheld scanners. There is no technical reason why it wouldn't become a universal method of identification that supersedes cumbersome

multiple IDs. As for the functionality of the fictional joymakers, except for holographic projections and medical services, mobile devices can perform all of the above functions, although much of the technology is still experimental and uncertain.

SMART PLACES

The "Smart Home", "Smart City" and "Smart Corridor" concepts developed almost contiguously in fiction and reality. Orlando, Florida and the new parts of Singapore are proto-smart cities where every new building is "smart", and everything is wired up to a local information grid. The Malaysian Cyber-Jaya corridor is another physical area with complete broadband penetration.

Bill Gates describes his vision of a future smart home in one of his books, "The Road Ahead". His imaginary smart home would have everything from the security system to the phones, fridges, computers, home theatre and the power and water supplies linked together. Again, Gates describes technology on the cusp of reality. Much of this has already become possible in wired homes, but how much of it would be popular? In Gates' smart home, humans would be identified by retinal printing and voice-recognition, and would give verbal orders, which would be interpreted and acted upon by the house. The refrigerator would inform the computer when it was time to replenish milk supplies; the computer would add that item to the weekly grocery list and pay the utilities bills online, etc. The lighting would intelligently respond to different human activities by dimming or increasing illumination as desired; the bathroom geysers would heat to the human's desired temperature; the washing machine would keep inventory of clothes, etc.

ENTERTAINMENT

Gates also dwels long and lovingly on his ideal of the smart home entertainment system. Indeed, convergence and the commoditisation of broadband will cause a sea change in the entertainment industry. Gates has put Microsoft squarely into the middle of this churn by the recent launch of the game-playing console X-Box coupled to an alliance with game-playing major Sega for software. X-Box has default-enabling for broadband access and is also DVD-enabled. This configuration explores the possibility of interactive role-playing games that utilise the full capacities of broadband. A multitude of crossover entertainment options from the currently more or less separate segments of print, web, TV, radio and big screen are also possible. Popular entertainment is likely to be transformed with the technology's ability to deliver incredibly realistic interactive crossovers

to a variety of devices. In an earlier era, Lion King, for example, transformed into a popular role-playing game (RPG) after the movie was a smash hit. Recently, Tomb Raiders has traversed the opposite route transforming from a popular RPG into a hit movie.

Entire concepts have also been adapted across platforms. For example, reality TV of the vastly popular "Survivor" genre is an extension of the Webcam concept popularised by sites like www.jennycam.com. Webcam itself was inspired by the success of avant-garde films, such as Andy Warhol's "Sleep". The consequences of reality TV were taken to a logical conclusion in the Hollywood film "The Truman Show", which features a central character who has unknowingly been on a reality TV show all his life.

Game playing in a "narrowband" universe is already an established industry with estimated annual revenues of $45 billion plus, according to USA Today. Approximately, $30 billion of this is in the form of PC-and web-based game software, while the specialised console industry generates $15 billion plus. The handheld (mobile and palmtop) industry is a nascent growth area for gameplaying and the ability to deliver games via the web to more sophisticated descendants of such devices could be a driver. Interactive gameplaying is also reckoned to be a big growth area. It will receive a big boost as broadband penetration increases and realistic real-time graphics and sound can be delivered across several platforms to geographically dispersed participants.

The advent of broadband and convergence could be a gold-mine for the role-playing game market. Just suppose that you could create a cricket game where a fan could adopt the role of Sachin Tendulkar, and "bat" in real-time against world-class digital bowlers who were completely indistinguishable on screen from their real-life persona? Again, let us assume a situation where a game such as this is playable simultaneously across many platforms by people scattered anonymously across the globe. Or, let us assume that it is now possible to generate a digital Lata Mangeshkar who sings a composition of the fan's choice in perfect harmony with a digital version of Placido Domingo? Or, Charlie Chaplin meets Madonna in a technicolour movie scripted on the fan's web-enabled home-theatre? The creation of all of this is now technically feasible. In the future, we envisage that a combination of high broadband penetration and convergence would allow such creations to be delivered at reasonable costs to the mass market – on mobile devices, web TV, PCs and even "thin" clients, which pull everything off the Web. The processing of such games would currently demand huge programming overheads and these services and products would be prohibitively high-bandwidth and hence practically impossible to deliver in real-

time. However, as broadband penetration increases, the market for such entertainment would expand. Soon, human ingenuity will redefine the very notions of entertainment as it exploits the extra power and thus forces re-examination of the current notions of intellectual property.

We can assume that licensing digital counterparts in fantasy roles will soon be a significant revenue source for performing artistes, sportstars and models. It is a logical progression from endorsement of a RPG to licensing a digital counterpart, who actually participates in such a fantasy.

ADVERTISING AND BROADCASTING

In the advertising industry, cybermodels are already causing some consternation. Cybermodels have become pretty common in the "bit-parts modelling" industry where, for example, a hand-cream is advertised by pictures that concentrate on the model's hands. Digital rendering does make it possible to dispense with flesh and blood and create virtual models entirely according to different anatomical ideals. The contours of advertising will be stretched further to exploit the enhanced possibilities of convergence once delivery of voice and video to all sorts of devices becomes a reality.

In news-casting, there have already been several follow-ups to the successful Ananova concept of a "universally attractive" newscaster. Ananova was digitally assembled from the physical characteristics of different people. In popular music too, at least two of the current US Top 100 hits feature cybermodels singing in computer-generated voices, while their computer-generated images sway in perfect rhythm to the computer-generated beat.

MUSIC, VIDEO AND CYBERSPACE

It is likely that digital music composition packages of the future will offer the option of libraries of licensed voices as well as orchestral music. We are also likely to see digital video composition libraries with licenced cybermodels available as stars.

In the cyberpunk novel "Idoru", William Gibson extrapolated this trend, now in its infancy, to a logical conclusion. The central character is a Japanese cyberstar (Idoru is the Nipponese corruption of "idol") who is actually a holographic virtual construct with a computer-generated voice. This is again technologically possible, but it would require prohibitive bandwidth to transmit. Gibson's tightly crafted novels of "cyberspace" (a word he coined) usually skate

on the thin edge between reality and the not-quite possible – "Neuromancer", for example, features Artificial Intelligences based on geostationary satellites. His imaginative stories are built around vision of a completely wired world, circa 2025, where gigabyte per second access is available everywhere and smart devices are common.

THE NAPSTER PARADIGM

Traditional methods of revenue generation across the entire entertainment industry will need rethinking as convergence develops. We may deduce this from analogy with the Napster situation in popular music. The recording industry majors have apparently succeeded in blocking Napster-Gnutella style downloads of copyrighted music. But the technology has forced them to consider micro-charging, that is, selling by single digitised song rather than album and also launching online "video-jukeboxes". Napster has also shaken the existing oligopoly by giving independent artistes a marketing channel that bypasses the recording industry's chain. As a result, royalties are rising as a percentage of cover-price, revenue break-up is shifting in the direction of micro-charged components and marketing structures are being altered.

Similar trends have shown up in publishing. Established authors such as Steven King and Frederick Forsyth have experimented with Web publishing, effectively bypassing the traditional marketing/ distribution structure of publishing houses. This has changed the rules of the entire industry, since an e-story can be delivered quicker and cheaper B2C on a variety of devices, with micro-charging possibilities as well. As e-book screens improve and direct text-translation-voice rendering hit acceptable quality, the e-publishing trend will accelerate. This will force traditional publishing into a review of its entire value-chain.

Napster-type peer-to-peer networks have already started developing across convergence platforms. Proprietary DVD-coding that protects digital movie recordings is just as open to widespread decoding as MP3 was shown to be. The inherent opportunities and threats are difficult to judge. But clearly, convergence will have a profound effect on the entertainment industry.

E-COMMERCE AND M-COMMERCE

The availability of broadband convergence may also provide a big boost to more mundane B2C e-commerce options, including the creation of several new service segments. E-commerce is a fast-growth industry. From $95 billion in 1999, e-commerce turnover reached $226 billion in 2000, according to

ActivMedia Research, and it should cross $1.3 trillion by 2003. More than 50% of e-commerce revenues came from retail and, in the USA alone, online retailing logs around $4 billion a month (May 2001) and the industry is growing at very high speed.

A lot of money is being invested in the development of the M-Commerce segment. Powerful multimedia experiences delivered via mobile devices may enable a whole new range of services as well as invigorate normal retailing. Financial transactions can also be enabled onto mobile platforms, as devices get more sophisticated. For example, third-generation mobiles can handle online stock-trading, and high-end game-playing as well as serve as Web radios. With extensible screens or the ability to seamlessly plug into larger screen devices, the capacity to display information will improve.

The ability to use global positioning satellite systems (GPSS) to apprise people of the move of their exact locations and the proximity of nearby services they may desire is another powerful driver for M-commerce services. A new generation of cars may be equipped with onboard computers and head-up displays where GPSS maps are projected onto windscreens as is the norm in aircraft displays. An amusing example of some of the possible new mobile services can be discerned in the popular Rapper hit "Wasn't me" by Shaggy and Rik. This video's central character is attempting to commit adultery while being stalked by his jealous spouse, who is tracking his every move via webcam to mobile links. At the same time, the adulterer's friend, is also overseeing the situation and warning him of his spouse's movements by using locational software based on GPSS.

This scenario is already possible in an Orlando-type Smart City where such capabilities could also be used for more mundane activities, such as locating the nearest laundry, or for local businesses to sell products and services online with greater efficiency, conceivably delivering even to roaming customers. Eventually, in a smart environment, it should be possible to programme smart vehicles to navigate themselves from Point A to Point B without human intervention.

DIGITAL TRANSACTIONS

Underlying all these possibilities is the ability to conduct secure financial transactions across a variety of digital platforms. The combination of convergence with public key encryption could enable the online use of credit cards from a great variety of devices with much lower chances of fraud than is currently possible on "narrowband" platforms. Convergence would enable a variety of

devices including medical dispensers, slot-machines, mobile phones, PDAs, "smart" supermarket counters to tot up bills, accept credit cards and other forms of electronic currency. The implications of paper currency being gradually replaced by electronic cash are huge and, again, difficult to predict.

Public key encryption (PKE) could provide greater security. PKE employs codes that are generated by multiplying and factoring large numbers. One of these factor numbers is known only to a single entity. Without that private key, the code cannot be unlocked. The use of PKE allows the creation of digicash or anonymous electronic cash. This is an option that is likely to prove popular. In circumstances where privacy concerns mitigate against credit card usage, or simply when credit card usage is deemed insecure, digicash is useful. Banks could issue digicash on demand to anybody who wished to convert paper notes or encash an online cheque. Digicash consists of PK Encrypted electronic banknotes, with a private key only provided to the carrier. In a manner analogous to credit card PINs, even the issuing entity is unaware of the private key. The digicash is impossible to forge and it can be circulated anonymously in a manner analogous to paper notes simply by passing on the private key.

PKE has already caused contentious debate. The USA, for example, views it as a weapon of war and has banned the export of high-end PKE programmes and computers capable of generating them. Most governments are wary of the possibility of big-number encryption, since a completely unbreakable system could facilitate selective assassination, money-laundering, etc. For example, Jim Bell recently outlined a plan where an anonymous cache of digicash could be left online for somebody who accurately "predicted" the date and manner of a given person's death. The prediction would also be encrypted and after the death had indeed occurred, the predictor could then supply the key to the prediction as proof and collect the key to the digicash.

However, the problem is that if PKE is at all breakable, privacy cannot be assured and the digital market could be flooded with forged notes. Since there are plenty of vested interests ranged on both sides, the PKE issue is likely to throw up further controversy. But given the need for digicash as a lynchpin of the digital economy, some form of it will undoubtedly gain popularity.

WORKPLACE SOCIETY AND HOME

It is likely that convergence will affect the way people live in an unpredictable fashion. It may cause social changes as profound as caused by the automobile and the telephone. The traditional office may cease to be a hub of

interaction. Since video-conferencing delivers near-reality fidelity on broadband, and instantaneous communication is now possible across disparate locations, it is less necessary to possess a real office. Non-manufacturing businesses would thus become less and less reliant on physical assets and as convergence delivers enhanced connectivity, more non-core functions would be outsourced.

Even in the case of hands-on professions, such as medicine, the creation of smart devices and the data-fidelity of broadband could enable the delivery of distant services. Waldo-enabled remote medical operations are already possible and certain forms of laser-assisted surgery are often effectively performed by a surgeon who doesn't need to be physically present. Routine examinations and pathological tests conducted at remote locations and prescriptions could also be issued assuming "smartness" from diagnostic machines that are also web-enabled and able to connect to human practitioners. Such procedures would obviously change the entire healthcare industry and lead to corresponding upheavals in related areas like insurance.

ARTIFICIAL NATIONS AND OFFSHORE DATA HAVENS

It has been postulated that this trend of deemphasising locations could impact national boundaries. In "Earth", David Brin postulates the creation of artificial nations consisting of highly-skilled, high-net-worth individuals who live on ships outside territorial waters, paying no taxes and carrying on all interactions via broadband. In "Cryptonomicon", Neal Stephenson suggests the creation of "offshore data centres", wherein small nations prosper by guaranteeing the privacy and integrity of data stored on their servers. Offshore banking has already showed that privacy can be an economic USP and data-storage out of reach of investigation would certainly attract customers.

HOT BOTS AND TURING

At the far edge of speculation is the world envisaged in movies like the "Matrix". Can a human personality be "uploaded" to data-servers in digital format? Will such a construct then be capable of independent thought and creative work? If so, humanity possesses a route to immortality, since it will be possible to preserve collective knowledge and individual personalities. This dream is well out of reach. But convergence would make passage of the Turing Test easier. The Turing Test is simply a measure of a computer's ability to fool an observer into thinking it is human. Currently, many of the "bots" on the Internet are clever, but they are scarcely capable of passing the Turing Test, much less of independent thought.

Personalities like the "John Lennon bot" and the "Jesus bot" are amusing to chat to on IRC, but are easily confused by "unprogrammed" questions. However, if such constructs were available in full video mode with access to more information and greater processing power, they could well be more realistic. For example, if the Lennon bot incorporated musical and verse composition programmes (which exist), and it wore granny glasses and spoke and sang in the trademark voice with the Liverpudlian accent, we might have a passage of the Turing Test.

The possibilities outlined above are only indicative. It is impossible to compute the full impact of convergence in a society where broadband access is widely available. It will obviously transform the way people live, but any extrapolation from current trends is prone to miss future reality by fairly wide margins.

COMMUNICATION CONVERGENCE BILL:
Some Comments

In-house Working Paper

For the last decade or so, we have been hearing about something called convergence. To all except those who are familiar with the technological aspects of information technology, this term has been something of a mystery. In fact, however, the idea is not all that hard to grasp. To understand convergence, let us take the example of roads in a country. All countries have different types of roads, such as high-speed highways, urban roads and rural tracks. It is common knowledge that only certain types of vehicles can travel on these roads, e.g. high-powered motorised ones on the highways and non-motorised ones on the rural roads. Of course, the former can, and do, ply on the rural roads and the latter on highways as well. But, as is well known, this leads to huge economic inefficiencies. It is for this reason that countries generally try to put some form of access control in place. The underlying idea is to ensure that road capacity is optimally utilised.

But just imagine that, due to some technological revolution, it becomes possible for all forms of transport to travel with equal efficiency down the highways which also happen to be the most expensive to build and maintain. In a sense, this technological revolution, should it happen, would be the counterpart of what has come to be known as convergence in modern, semiconductor driven, communications technology.

This is because there are, at the end of the day, only three forms of communication – audio, video and data. That is, messages can be sent in the form of sound (telephone), or pictures (television) or data (e-mail and so on). These correspond, in terms of speed of travel, almost exactly to the three categories of transport mentioned earlier. Previously, they travelled down different paths. Today, not only can all of them take the same path, namely, the cable that connects people's homes to the outside world, they are also sent down in the same guise, namely, a digitalised signal. In other words, communications technology has converged. Convergence has been defined in a variety of ways but for our purpose it is best to think of it as the changes in technology of information processing that are transforming the structures of broadcasting, communications and computing.

True convergence is, therefore, the combination of audio, video and data communications into a single source, received on a single device, and delivered by a single connection. In effect, this means that we will be able to watch movies, TV shows, Internet video, and music on our home theatre, computer, mobile phone or wristwatch wherever we are, whenever we want. The only thing that remains is for the equipment-makers and standards bodies to agree on such details as broadband distribution, copyright protection and compatible displays.

This development has thrown up a host of new issues which countries have sought to address by framing rules that need to be followed. The basic objective of these regulations is to ensure that major investments are undertaken in high-risk businesses. Regulation is indeed important if you want the industry to get organised in a professional manner. The time has now come for various enterprises – regardless of size – to accept the convergence challenge, integrate not only their voice and data networks but also video into a multi-service infrastructure, and start reaping the business rewards that convergence can deliver.

We tend to think of the growth of technology as an autonomous process, but fail to realise that this growth both enables and is enabled by facilitating institutions. Think of the problem of using paper money without the facilitating agencies of banks; or of airline travel without airports, air traffic controllers, and so on. Every wave of innovation has led to associated changes in the growth of institutions. At times, the use of a particular technological option has had to wait for necessary developments in the institutions before it has had its impact and at times premature developments have languished for want of necessary "demand'. India, which has been a relative latecomer to the marvels of convergence, has tried to begin the process of creating a regulatory and institutional framework through the Draft Communication Convergence Bill, 2000 (See Appendix).

Duties of the Commission

By and large, the bill is unexceptionable but there are a few clauses that need to be reconsidered. In this context, Clauses 20 and 21 are discussed below.

Clause 20 deals with the duties of the Commission and enjoins it to facilitate and regulate all matters relating to carriage and content of communications and further says that it will carry out management, planning and monitoring of the spectrum for non-strategic/ commercial usages. It is also empowered to grant licences and determine and enforce licence conditions and determine fees, including fees for usage of spectrum, and determine appropriate tariffs and rates for licenced services.

The Commission will also have the responsibility to ensure competition and efficiency in the operation of communication services and network infrastructure facilities; formulate and determine conditions for fair, equitable and non-discriminatory access to a network infrastructure facility or network services. It is also called upon to formulate programme and advertising codes in respect of content application services and lay down commercial codes.

A major policy issue is whether content services, that is, those who produce programmes, should be required to obtain a licence. In today's liberal and open environment, the requirement of licensing appears to be a negative approach. As a matter of fact, an open system should prevail, in which all channels are permitted except those that are banned. There should be no requirement of a licence or registration for any content provider. In this context, books may be cited as an analogy – in the case of books, everything is permitted unless it is specifically disallowed.

However, some form of licensing/registration is clearly needed for all "network facilities", including cable TV networks, radio/TV and other transmitters, satellite uplink stations, etc. All these use the radio frequency spectrum, which is scarce and licensing is, therefore, both necessary and appropriate for network facilities. Otherwise, there could be chaos, not unlike the one which is created when two vehicles try to occupy the same space on a road.

In Clause 21, the commission is asked to frame regulations to specify programme codes and standards to ensure that nothing is contained in any programme which is prejudicial to the interests of the sovereignty and integrity of India, the security of the state, friendly relations with foreign states and public order or which may constitute contempt of court, defamation or incitement to an offence. This clause also contains provisions for ensuring fairness and impartiality in presentation of news and other programmes and for enhancing general standards of good taste, decency and morality.

But this section is open to misuse as it harks back to a different era. It is retrograde for an authority to specify "programme codes and standards", especially on such ambiguous and vague themes as "public order", "good taste," "decency and morality" and "Indian culture." These are all subject to personal/subjective interpretation and it is most inadvisable for anyone to try and provide a standardised definition of these dynamic and evolving facets of our diverse and plural society.

The composition of the commission is also very important if it is to create the right climate. Its secretary general will be the key person. The commission

should be free to recruit the best secretary general it can find for the task. Such a person in all probability is unlikely to be from the government. The present draft, however, provides for a government officer of the rank of a Secretary. This requirement should be dropped. The core of the commission should be people from the industry. Whole-time members of the commission should at least partly be eminent professionals in the age-group of 40 to 50 years. But the draft stipulates that members who demit office will not be allowed to take up any commercial employment for a period of two years. Such a clause will ensure that the commission will only have only retired persons as members. Here it may be pointed out that the communication technology calls for younger people from the industry rather than older persons from outside it.

It is equally important to note that the work that the commission will be doing would be intimately linked to a technology that changes rapidly. This means that new legislation, too, should be rapid. This requires flexibility and a mindset that is able to appreciate the problems that newer forms of technology bring with them. It is too much to expect the Parliament to be able to respond to this legislative challenge and, therefore, the rule-making power should be delegated to a body of professionals from the industry, subject to some form of general oversight. If this is not done, there is an obvious risk that legislative changes will not keep pace with the needs of the industry.

Licences for Service Providers

Clause 26 empowers the commission to specify the eligibility conditions for issue of licences, cross-media restrictions, and restrictions on the number of licences or extent of accumulation of interest in such licences. It also allows the commission to determine the conditions subject to which a licence may be granted or transferred and to grant a licence to any person to provide or own network infrastructure facilities, provide network services, application services, and content application services.

The requirement for all foreign satellite broadcasting services to be free-to-air needs to be withdrawn. The reason is simple: whether a service is free-to-air or charges a subscriber fee is a business decision best left to the judgement of the broadcaster concerned. Again, using the analogy from roads, whether a road should be a toll road or a free one is a business decision to be taken by the investors and owners, and not by the government. Instead of making uplinking mandatory, the government may want to provide incentives for uplinking from India either through the provision of facilities, or lower customs/tax rates. DTH could be an exception since in this case mandatory uplinking is a means of regulation.

Again, there is the more tricky issue of advertising codes. Is it advisable for the commission to lay down programme and advertising codes? There are no easy answers to this question. Perhaps, the industry should be encouraged to evolve self-regulatory codes. It is only in situations where this does not happen or is not adhered to, that the commission should intervene.

Duties of Service Providers

The duties of service providers have also been covered by the bill. The universal service obligation that has been provided for under Clause 28 may prove difficult to implement. It is also difficult to agree with the stipulation that service providers shall endeavour to provide a suitable proportion of programmes of indigenous origin. This is a business decision and should not be dictated. Likewise, the stipulation about public broadcasting contains a potential for misuse by the government.

Clause 28 empowers the commission to determine the obligations, conditions, restrictions, tariffs, and rates. It also enjoins every service provider to provide such services to give effect to universal service obligations as may be prescribed and provide such life-saving services as may be prescribed. There is also a requirement to provide service to any person on demand (within a reasonable period of time) and on a non-discriminatory basis and to follow the codes and standards laid down and specified by the commission.

This clause also provides that every service provider shall provide a specified number and type of broadcasting services, including those of the public service broadcaster. Besides, he shall include only licensed service or registered services in his delivery package for the purposes of distribution. Also, he shall not use more than such number of channels as specified by regulations, out of the total channel capacity of the system, for providing his own programming.

All things considered, the Convergence Bill is a tidy piece of regulation with only a few exceptions mentioned above. If these can be sorted out, it is likely to be beneficial both for the regulatory authorities as well as for the communications industry.

Appendix

Draft Communication Convergence Bill

CHAPTER XVI
CHAPTER XVII
MISCELLANEOUS

CHAPTER XVIII
REPEAL AND SAVINGS

CHAPTER I
PRELIMINARY

Short title, extent and commencement.

1. (1) This Act may be called the Communication Convergence Act, 2000.
   (2) It extends to the whole of India.
   (3) It shall come into force on such date as the Central Government may, by notification in the Official Gazette, appoint and different dates may be appointed for different provisions of this Act and any reference in any such provision to the commencement of this Act shall be construed as a reference to the commencement of that provision.

Definitions.

2. In this Act, unless the context otherwise requires,-
   (1) "Appellate Tribunal" means the Communications Appellate Tribunal established under section 43;
   (2) "application service" means the service provided by means of one or more network services and includes such other services as may be prescribed.
   (3) "broadcasting service" means a content application service for providing television programmes or radio programmes, to persons having equipment appropriate for receiving that service regardless of the means of delivery of that service, but does not include :
   (a) a service (including a teletext service) that provides only data, or text (with or without associated still images); or
   (b) a service that makes programmes available on demand on a point-to-point basis, including a dial-up service; or
   (c) a service, or a class of services, that the Central Government may notify in the official Gazette, as not being a broadcasting service.
   (4) "channel" means a set of frequencies used for transmission of a programme;
   (5) "Commission" means the Communications Commission of India established under, sub-section (1) of section 6 ;
   (6) "communication" means the process of conveyance of content through transmission, emission or reception of signals, by wire or other electromagnetic emissions.
   (7) "communication service" means a network service or an application service; or a content application service.
   (8) "content" means any sound, text, data, picture - still or moving, other audio-visual representation, signal or intelligence of any nature or any combination thereof which is capable of being created, processed, stored, retrieved or communicated electronically".
   (9) "content application service" means an application service which provides content and includes such other services as may be prescribed;
   (10) "customer premises equipment" means any equipment, apparatus or instrument alongwith its connecting link upto the interface unit located at the customer premises connecting with the network infrastructure facility.
   (11) "encrypted" means treated electronically or otherwise for the purpose of preventing intelligible reception

by unauthorised persons;

(12) "frequency" means frequency of electro-magnetic waves used for providing a communication service;

(13) "foreign satellite broadcasting service" means a broadcasting service provided by using a satellite, uplinked from a foreign country and receivable in India;

(14) "free-to-air broadcasting service" means a non encrypted broadcasting service made available for reception by receiving equipment commonly available to the public without requiring payment of a subscription fee;

(15) "license" means a license issued by the Commission under Chapter VII or Chapter VIII of this Act;

(16) "licensee" means any person who has been granted a license;

(17) "licensed service" means a service licensed under this Act;

(18) "Member" means a Member of the Commission appointed under sub-section (3) of section 6 and includes the Chairperson;

(19) "network infrastructure facilities" means any element or combination of elements of physical infrastructure used principally for, or in connection with, the provision of network services, but does not include customer premises equipment and includes such other services as may be prescribed;

(20) "network infrastructure facility provider" means a person who owns or operates any network infrastructure facility;

(21) "network service" means a service for carrying communications by means of guided or unguided electromagnetic radiation and includes such other services as may be prescribed.

(22) "notification" means a notification published in the Official Gazette and the expression "notified" shall be construed accordingly;

(23) "post" means a post and includes a pole, tower, standard, stay, strut, cabinet, pillar or any above ground contrivance for carrying, suspending or supporting any network infrastructure facility.

(24) "prescribed" means prescribed by rules made by the Central Government under this Act;

(25) "programme" means - television or radio programme including advertising or sponsorship, whether or not of a commercial kind.

(26) "programme code" means the code specified under section 21;

(27) "public authority" means and includes -

- (i) the Central Government;
- (ii) a State Government;
- (iii) any statutory authority or corporation established by the Central Government or a State Government;
- (iv) any municipal committee, cantonment board, district board, port trusts, or other authorities legally entitled to, or entrusted by the Central or any State Government with, the control or management of any municipal or local fund.
- (v) any institution, concern or undertaking or body which is financed wholly or substantially by funds provided directly or indirectly by the Government that may be specified by notification in this behalf by the Central Government.

(28) "public service broadcaster" means any body created by Act of Parliament for the purpose of public service broadcasting;

(29) "registered service" means a foreign satellite broadcasting service registered with the Commission for its reception in India;

(30) "regulations" mean regulations made by the Commission under this Act;

(31) "Secretary-General" means the Secretary-General appointed under sub-section (1) of section 15.

(32) "service provider" means any person who provides a communication service;

(33) "spectrum" means a continuous range of continuous electromagnetic wave frequencies upto and including a frequency of 3000 giga hertz;

(34) "spectrum manager" means an officer of the Central Government notified as such under clause (3) of section 24;

(35) "subscriber" of a service means a person who subscribes to a communication service primarily for his own use;

(36) "subscription fee" means any form of consideration given by subscriber;

(37) "uplinking" with reference to satellite broadcast service means uplinking of programme transmitted from an earth station to the satellite.

(38) "wireless equipment" means any equipment in use or capable of use in wireless communication and includes any article or apparatus as may be so notified by the Central Government in this behalf.

(39) "Wireless communication" means any communication without the use of wire or cable.

CHAPTER II
REGULATION OF USE OF SPECTRUM, COMMUNICATION SERVICES, NETWORK INFRASTRUCTURE FACILITIES, AND WIRELESS EQUIPMENT.

Prohibition of use of spectrum without assignment

3. No person shall use any part of the spectrum without assignment from the Central Government or the Commission as provided for in this Act. Prohibition of provision of certain services without a license

4. (1) Subject to the provisions of sub-section (2) no person shall

- (a) own or provide any network infrastructure facility, or
- (b) provide any network service, or any application service or

any content application service, without a license granted under this Act:

Provided that the Central Government may, by notification exempt any person, or class of persons, from the provisions of this section.

Provided further that the Central Government may by Notification exempt any facility or service from the provisions of this section1.

Prohibition of possession of wireless equipment without a license

5. (1) No person shall possess any wireless equipment without obtaining a license in accordance with the provisions of this Act:

Provided that the Central Government may by notification exempt in public interest any person or class of persons or any wireless equipment or class or categories of wireless equipment from the provisions of this section.

(2) Nothing contained in sub-section (1) shall apply to any person or equipment already licensed under section 4.

CHAPTER III
COMMUNICATIONS COMMISSION OF INDIA

Establishment of Commission

6. (1) With effect from such date as the Central Government may by notification appoint in this behalf, there shall be established for the purpose of this Act, a Commission, to be known as the Communications Commission of India. The Head Office of the Commission shall be located at Delhi with Regional Offices at Calcutta, Chennai and Mumbai.

(2) The Commission shall be a body corporate by the name aforesaid, having perpetual succession and a common seal with power to acquire, hold and dispose of property, both movable and immovable and to contract, and shall by the said name sue and be sued.

(3) The Commission shall consist of the following Members, namely:-

(a) a Chairperson;

(b) seven persons to be appointed as Members.

(c) the Spectrum Manager, as ex-officio member.

(4) The Chairperson and not less than five Members, (other than the ex-officio Member), shall be whole-time Members.

Appointment of Chairperson and Members.

7. (1) The Chairperson and Members (except the ex-officio Member) shall be appointed by the Central Government by notification, from amongst persons from various specialised fields such as broadcasting, telecommunications, information technology, finance, management and law.

(2) Before appointing any person as Chairperson or Member, the Central Government shall satisfy itself that the person does not have any such financial or other interests as is likely to affect prejudicially his functions as such member.

(3) A person who is in the service of Government shall have to retire or resign from service before joining as Chairperson or whole time member.

Term of office of Chairperson and Members.

8. (1) The Chairperson and whole-time Members shall hold office for a term of five years from the date on which they enter upon their office. Provided that the Chairperson and Whole-time members shall not be eligible for re-appointment.

(2) The tenure of part time Members shall be such as may be prescribed.

(3) The Chairperson shall have powers of general superintendence and direction in the conduct of affairs of the Commission and shall, in addition to presiding over the meetings of the Commission, exercise and discharge such powers and functions of the Commission as may be assigned to the Chairperson by the Commission.

(4) The Chairperson or any Member of the Communications Commission may resign from his or her office by giving notice thereof in writing to the Central Government and on such resignation being accepted, the Chairperson or such other Member shall be deemed to have vacated office.

Removal from office of Chairperson and Members.

8(A). The Central Government may remove from office any member -

(a) who has been adjudged insolvent, or

(b) who in the opinion of the Central Government has become physically or mentally incapable of acting as a member, or

(c) who has been convicted of any offence which in the opinion of the Central Government involves moral turpitude or

(d) who has acquired such financial or other interest as is likely to affect prejudicially his functions as Chairman/ member; or

(e) who has so abused his position as to render his continuance in office prejudicial to the public interest.

No such member shall be removed from his office under clause (d) or clause (e) above unless he has been given a reasonable opportunity of being heard in the matter.

Salary and allowances of Chairperson and Members

9. The salary and allowances payable to, and the other terms and conditions of service of the Chairperson and

Members shall be such as may be prescribed:

Provided that neither the salary and allowances nor the other terms and conditions of service of the Chairperson or a Member shall be varied to their disadvantage after appointment

Vacancy or defect not to invalidate proceedings.

11. No act or proceeding of the Commission shall be invalidated merely by reason of-
    (a) any vacancy in, or any defect in the constitution of, the Commission; or
    (b) any defect in the appointment of a person acting as a Member; or
    (c) any irregularity in the procedure of the Commission not affecting the merits of the case.

Functions of Regional Offices.

12. The Regional Offices of the Commission at Calcutta, Mumbai and Chennai will perform such functions as may be determined by regulation .

Meetings of Commission.

13. (1) The Commission shall meet at such times and places and shall observe such procedure in regard to the transaction of business at its meetings as may be provided by regulations.
    (2) A Member (other than the Chairperson) shall be deemed to have vacated his or her office if he absents himself for three consecutive meetings of the Commission without the leave of the Chairperson.
    (3) The Chairperson or, if he is unable to attend a meeting of the Commission, any other Member nominated by the Chairperson in this behalf and, in the absence of such nomination or where there is no Chairperson, any other Member chosen by the Members present from among themselves shall preside at the meeting of the Commission.

Power of Commission to regulate its procedure.

14. (1) The Commission shall have, for the purposes of discharging its functions under this Act, the same powers as are vested in a civil court under the Code of Civil Procedure, 1908, while trying a suit, in respect of the following matters, namely:-
        (a) summoning and enforcing the attendance of any person and examining him/her on oath;
        (b) requiring the discovery and production of documents;
        (c) receiving evidence on affidavits;
        (d) issuing commissions for the examination of witnesses or documents;
        (e) subject to the provisions of section 123 and 124 of the Indian Evidence Act, 1972, requisitioning any public record or document or a copy of such record or a copy of such record or document, from any office;
        (f) dismissing an application for default or deciding it, ex parte;
        (g) setting aside any order of dismissal of any application for default or any order passed by it, ex parte; and
        (h) reviewing its decisions;
        (i) any other matter which may be prescribed.
    (2) All proceedings before the Commission shall be deemed to be judicial proceedings within the meaning of sections 193 and 228 of the Indian Penal Code, 1860;
    (3) The Commission shall be deemed to be a civil court for the purposes of sections 345 and 346 of the Code of Criminal Procedure, 1973.
    (4) The Commission shall not be bound by the procedure laid down by the Code of Civil Procedure, 1908, but shall be guided by the principles of natural justice and, subject to the other provisions of this Act and of any rules, the Commission shall have powers to regulate its own procedure including the fixing of places and times of business.

Secretary-General of the Commission.

15. (1) The Central Government shall make available to the Commission, a panel of not less than three officers of the rank of the Secretary to the Government of India and the Commission may appoint one of them as the Secretary-General of the Commission.
    (2) The Secretary-General shall be the Chief Executive Officer of the Commission and shall exercise such powers and discharge such functions of the Commission as may be delegated to him/her by the Commission.
    (3) The Secretary-General shall be appointed on deputation basis and on such terms and conditions of service as may be prescribed.

Delegation of powers

17A. (1) The Commission may by general or special order in writing delegate to the Chairperson or any other member or officer of the Commission subject to such conditions as may be specified in the order, such of its powers and functions under this Act as it may deem necessary.
    (2) The Commission may by general or special order in writing also form committees of the members and delegate to them the powers and functions of the Commission as may be specified in writing by the regulation.

Distribution of business and authorisation

18. (1) Except for the power of making regulations, the Commission may, by general or special order, and from time to time make provision for the distribution of business of the Commission amongst members of the Commission as may be considered appropriate and necessary.

(2) The Commission may by order in writing authorise any District Magistrate, or Sub-Divisional Magistrate in any area or any other officer of the Central Government or State Government or Union territory Administration to implement and ensure compliance of its directions and orders; and when so directed or authorised the officer so authorised shall be bound in law to implement and carry out such directions and orders.

CHAPTER IV
OBJECTIVES OF THE COMMISSION

Objectives and guiding principles

19. The Communications Commission of India while exercising its functions shall be guided by the following principles :
    (i) that the communication sector is developed in a competitive environment and that market dominance in a converged environment is suitably regulated;
    (ii) that communication services are made available at affordable cost to all uncovered areas including the rural, remote, hilly and tribal areas;
    (iii) that there is increasing access to information for greater empowerment of citizens and towards economic development;
    (iv) that quality, plurality, diversity and choice of services are promoted;
    (v) that a modern and effective communication infrastructure is established taking into account the convergence of information technology, media, telecom and consumer electronics;
    (vi) that defence and security interests of the country are fully protected;
    (vii) that introduction of new technologies, investment in services and infrastructure, and maximisation of communications facilities and services (including telephone density) are encouraged;
    (viii) that equitable, non-discriminatory interconnection across various networks are promoted;
    (ix) that licensing criteria are transparent and made known to the public;
    (x) that an open licensing policy allowing any number of new entrants (except in specific cases constrained by limited resources such as the spectrum) is promoted; and
    (xi) that the principle of a level playing field for all operators serving consumer interest, including existing operators on the date of commencement of the Act, is promoted.

CHAPTER V
POWERS, DUTIES AND FUNCTIONS OF THE COMMISSION

Powers duties and functions of the Commission.

20. (1) It shall be the duty of the Commission to facilitate and regulate all matters relating to carriage and content of communications.
    (2) Without prejudice to the generality of the provisions contained in sub-section (1), the Commission shall-
        (i) Carry out management, planning and monitoring of the spectrum for non-strategic/ commercial usages subject to the provision of section 24A;
        (ii) grant licenses for purposes of the Act, and determine and enforce license conditions and determine fees (including fees for usage of spectrum) wherever required;
        (iii) determine appropriate tariffs and rates for licensed services, wherever considered necessary and keeping in view the objectives and guiding principles in the Act;
        (iv) ensure that the grant of licenses will not result in eliminating competition or in one or more service providers becoming dominant to the detriment of other service providers or consumers;
        (v) promote competition and efficiency in the operation of communication services and network infrastructure facilities;
        (vi) formulate and determine conditions for fair, equitable and non-discriminatory access to a network infrastructure facility or network service such other related matters in respect thereof;
        (vii) take measures to protect consumer interests and promote and enforce universal service obligations;
        (viii) formulate and lay down programme and advertising codes in respect of content application services;
        (ix) formulate and lay down commercial codes in respect of communication services and network infrastructure facilities;
        (x) take steps to regulate or curtail the harmful and illegal content on the internet and other communication services;
        (xi) formulate and lay down codes and technical standards and norms to ensure quality and interoperability of services and network infrastructure facilities (including equipment);
        (xii) carry out any study and publish findings on matters of importance to the consumers, service providers and the communications industry;
        (xiii) institutionalise appropriate mechanisms and interact on a continual basis with all sectors of industry and consumers, so as to facilitate and promote the basic objectives of the Act;
        (xiv) report and make recommendations on such matters as may be referred to it by the Central Government;
        (xv) perform all or any functions in furtherance of the objects of this Act, or such as may be prescribed.

Codes and Standards

21. The Commission shall by regulations from time to time specify programme codes and standards which may

include inter alia practices -

(i) to ensure that nothing is contained in any programme which is prejudicial to the interests of the sovereignty and integrity of India, the security of State, friendly relations with foreign States, public order or which may constitute contempt of court, defamation or incitement to an offence.

(ii) to ensure fairness and impartiality in presentation of news and other programmes.

(iii) to ensure emphasis on promotion of Indian culture, values of national integration, religious and communal harmony, and a scientific temper.

(iv) to ensure in all programmes decency in portrayal of women, and restraint in portrayal of violence and sexual conduct;

(v) to enhance general standards of good taste, decency and morality.

Hearing of complaints and resolution of disputes by the Commission in certain cases

22. (1) The Commission shall -

(a) decide any dispute or matter -

(i) between two or more service providers on issues relating to spectrum interference, interconnectivity, denial of fair access and practices restrictive of fair competition; and

(ii) between a service provider and a group of consumers.

(iii) arising out of enforcement of any provision of this Act;

(b) hear and determine any complaint from any person regarding contravention of the provisions the Act, rules, regulations or orders made thereunder including contraventions relating to any formulated codes and technical standards, and of other terms and conditions subject to which any license or registration was granted; and if necessary refer the matter for adjudication under Chapter X.

(2) For purposes of sub section (1) the Commission shall pass such orders and issue such directions as it deems fit.

Directives by the Central Government.

23. (1) In exercising its licensing and regulatory functions the Commission shall follow such policy directives as may be communicated to it in writing by the Central Government from time to time. Such directives may include the route and the mode in which any services are to be licensed, whether by way of auction or in any other form.

(2) In framing the policy directives the Central Government shall take into account the objectives and guiding principles governing the administration of the Act.

(3) The decision of the Central Government whether a question is one of policy or not shall be final.

(4) The Commission may request the Central Government by means of a written communication for a review of any policy directive, and if any such request is made the Central Government will respond in writing to such request with all expeditious despatch.

CHAPTER VI
FREQUENCY SPECTRUM MANAGEMENT

Spectrum Management Committee

24. (1) The Central Government shall be responsible for coordination with international agencies in respect of matters relating to Spectrum Management and also for allocation of available spectrum for strategic and non-strategic/commercial purposes.

(2) For purposes of discharging the responsibility under sub-section (1) above the Central Government shall establish, by notification, a Spectrum Management Committee with the Cabinet Secretary as its Chairman and consisting of such other members as may be notified from time to time.

(3) The Central Government shall also notify an officer of that Government as "Spectrum Manager, Government of India", to act as Member-Secretary of the Spectrum Management Committee.

(4) Subject to general supervision and control of the Spectrum Management Committee the Spectrum Manager shall, inter-alia, perform the following functions :

(i) co-ordinate with international agencies matters relating to overall spectrum planning, use and its management;

(ii) carry out spectrum planning, and assign frequencies to the Central Government and to State Governments to meet their vital needs, including defence and national security.

(iii) allocate frequencies or band of frequencies including frequencies which are to be assigned by the Commission; and re-assignment of frequencies from time to time.

(iv) constantly review and make available as much spectrum as possible for assignment by the Commission, in particular by optimizing usages, and

(v) Monitoring, in consultation with the Commission, the efficiency of the utilization of the spectrum by all users including investigation and resolution of spectrum interference.

(vi) After meeting the requirements of the Central Government and of State Governments for fulfilling their vital needs - including defence and national security, the Spectrum Manager shall make the spectrum available (to the maximum extent possible) for assignment by the Commission, both in the shared as well as in the exclusive bands.

24(A) (1) The Commission shall be responsible for assignment of the non strategic/ commercial spectrum to various users.

Provided that the Commission shall assign such frequencies in case these are not exclusively allocated to it,

only with the prior approval of the Spectrum Management Committee.

(2) Whenever the Commission seeks allocation of additional spectrum for assignment (including in the shared bands) a process for mutual consultation between the Commission and the Spectrum Manager shall be initiated in such manner and within a specified time frame as may be prescribed.

Commission to notify schemes for assignment of spectrum

25. (1) Before assigning any part of spectrum, the Commission shall prepare and notify from time to time one or more schemes or plans for such assignment, after such public hearing as the Commission may consider appropriate.

(2) The Central Government may, by notification, determine the class or classes of persons or services for preferential assignment of any frequency or spectrum by the Commission.

CHAPTER VII
LICENSES FOR COMMUNICATION SERVICES AND NETWORK INFRASTRUCTURE FACILITIES

Licenses for service providers

26. (1) Having regard to the necessity of serving the public interest, ensuring competition and prevention of monopolies in the provision of communication services, the Commission may, by regulations specify, -

(i) eligibility conditions for issue of licenses;

(ii) cross-media restrictions having regard to accumulation of interest;

(iii) restrictions or otherwise on the number of licenses or extent of accumulation of interest in such licenses by a person; and

(iv) such other conditions as may be considered necessary from time to time.

(2) The Commission may by regulations determine the conditions subject to which a license may be granted or transferred.

(3) Subject to the provisions of sub-section (1), the Commission may grant license in such manner, subject to such terms and conditions, on payment of such fees and after following such procedures as may be determined by regulation.

(4) The Commission shall notify from time to time one or more schemes or plans for licensing containing such details as may be specified by regulations.

(5) Any scheme or plan referred to in sub-section (4) may provide for the eligibility conditions, the number, and scope of licenses and such other matters as the Commission may consider necessary.

(6) The Commission may grant license to any person :

to provide or own network infrastructure facilities,

to provide network services,

to provide application services, and

to provide content application services

(7) While granting a license for any one of the categories under sub-section (6) the Commission may confine or limit the scope of the service to be provided by the service provider.

(8) While granting a license under sub-section (6) the Commission may grant licenses either singly or jointly for one or more categories as may be prescribed.

Provided that no license shall be granted under this sub-section if it conflicts with the objectives and guiding principles set out in Chapter IV particularly in relation to ensuring fair access and promotion of competition.

Period and form of license

27. (1) A license shall be granted for such period as may be specified by regulations.

(2) A license granted under this Act shall be in such form and shall be subject to the payment of such fees as may be determined by regulations:

Provided that the Central Government may by notification, in public interest exempt any person or class of persons from payment of the license fee.

Duties of service providers

28. (1) The Commission may, from time to time, determine by regulations such obligations, conditions, restrictions, tariffs, and rates subject to which the service provider shall provide services.

(2) Without prejudice to the foregoing provision

(a) every service provider shall wherever required or applicable-

(i) provide such services to give effect to universal service obligations as may be prescribed.

(ii) provide such life saving services as may be prescribed;

(iii) provide service to any person on demand (within a reasonable period of time) and on a non-discriminatory basis;

(iv) follow the codes and standards laid down and specified by the Commission;

(b) every service provider of a content application service shall wherever required or applicable -

(i) endeavour to provide a suitable proportion of programmes of indigenous origin; and

(ii) ensure that no programme forming part of its services infringes any copyright.

(3) Without prejudice to the foregoing provisions of this Act, every service provider holding a license for providing distribution of broadcasting services shall, amongst others, -

(i) provide a specified number and type of broadcasting services, including those of the public service broadcaster, in such manner, as may be prescribed;

(ii) include only licensed service or registered services in his delivery package for the purposes of distribution;

(iii) use not more than such number of channels as specified by regulations, out of the total channel capacity of the system, for providing his own programming.

Certain Agreements to be registered with the Commission

29. Every agreement entered into or made by any service provider falling under one or more of the following categories shall , within sixty days from the making of such agreement, be registered with the Commission namely:-
    (a) Shareholders or promoters agreements ;
    (b) Interconnectivity agreements;
    (c) Such other agreements as may be specified by regulations.

CHAPTER VIII
LICENSING OF POSSESSION OF WIRELESS EQUIPMENT

License for wireless equipment

30. (1) Subject to the provisions of sub section (1) of section 5, any person who intends to posses any wireless equipment shall make an application to the Commission for the grant of a license.
    (2) Every application shall be in such form and shall be accompanied by such fees as may be determined by regulations.
    (3) The Commission shall on receipt of an application under sub-section (1), after making such enquiries as it deems fit, grant the license or reject the application:

    Provided that no application shall be rejected unless an opportunity of being heard is given to the applicant;
    Provided that no application for a license shall be rejected except on grounds of security of State, public order or other public interest.
    (4) Every license issued under this section shall be subject to such conditions and restrictions as the Commission may by regulations determine.

CHAPTER IX
SPECIAL PROVISION IN RESPECT OF CERTAIN SERVICES

Provision for live broadcasting of certain events.

32. (1) For the purpose of ensuring widest availability of viewing in India of national or international events held in India, no person shall carry a broadcast of any such event in India, as may be previously notified by the Central Government, unless simultaneously the public service broadcaster (and/or any other broadcaster as may be notified by the Commission) have also been offered the broadcasting rights by the organisers of such event, on such terms as determined by the Commission in advance of the bidding for the event.

CHAPTER X
PENALTIES AND ADJUDICATION

Penalty for breach of terms and conditions of license.

33. If any licensee commits breach of or fails to observe any terms and conditions subject to which a license was issued or fails to observe any rule, regulation and order made under this Act, the licensee shall be liable to a penalty not exceeding rupees fifty crores.

Penalty for wilfully or negligently damaging network infrastructure facility and causing interruption.

34. (1) If any person damages, displaces or destroys any cable or any part of the network infrastructure facility laid, established or placed in accordance with the provisions of this Act, or if the communication service by reason of the damage or displacement so caused is interrupted, such person shall be liable
        (a) where the act is wilful and deliberate to a penalty which may extend to rupees five crores and where the actual loss or damage caused is more than rupees five crores then to a penalty upto that extent;
        (b) where the act is not wilful or deliberate, to a penalty not exceeding the actual loss or damage caused.
    (2) Out of the penalties specified in sub-sec. (1) of Sec. 34 such sum as may be determined by the Adjudicating Officer shall be payable to the licensee concerned as reasonable compensation for damage to the cable or any part of the network infrastructure facility.

Penalty for transmission, distribution etc. in contravention of the provisions or without license.

35. If any person transmits or distributes any communication or performs any service incidental thereto by the use of a network infrastructure facility, communication service or wireless equipment which is not licensed or which has been established or maintained or operated in contravention of the provisions of the Act or any rules, or regulations made thereunder, such person shall be liable to a penalty which may extend to rupees ten crores.

Penalty for delivery of content through facilities or equipment not licensed under the Act.

36. If any person delivers any content for transmission or accepts delivery of any content sent by the use of network infrastructure facility, communication service or wireless equipment knowing or having reason to believe that such facility, service or equipment has been established or has been maintained or operated without a license or in contravention of the provisions of this Act or any rules or regulations made thereunder, such person shall be liable to a penalty which may extend to rupees ten crores.

Penalty for failure to Register Agreements

37. If a service provider who fails without reasonable excuse to register an agreement which is required to be registered as provided for in section 29 he shall be liable to a penalty which may extend to ten lakh rupees.

Penalty for failure to comply with the decision, direction or orders of the Commission.

38. If any person wilfully fails to comply with any decision, direction or order of the Commission, such person shall be liable to a penalty which may extend to rupees five crores, and in case of a second or subsequent failure with a further penalty which may extend to rupees ten crores, and in the case of continuing failure with an additional further penalty which may extend to rupees two lakhs for every day during which such failure continues.

Filing of complaint, limitation, form, reference for adjudication including suo motu reference by Commission.

39. (1) A complaint may be filed before the Commission alleging that a service provider or any other person has incurred a liability to a penalty under this Chapter.

(2) Every complaint under sub- section (1) (except a complaint under section 33) shall be filed within sixty days from the date on which any act or conduct constituting the contravention took place and shall be in such form as may be prescribed:

Provided that the Commission may entertain the complaint after the expiry of the said period if satisfied that there was sufficient cause for not filing the complaint, within the time stated or pass such other order as it deems fit.

(3) On receipt of a compliant under section (1) if the Commission is of the opinion that there is a prima facie case for referring the matter for adjudication under this Chapter it may refer the same to the Adjudicating Officer having jurisdiction in the matter for adjudication; in all other cases the Commission may summarily dismiss the complaint or pass such other order as it deems fit.

(4) Notwithstanding anything contained in this section the Commission may at any time refer suo motu any contravention of any of the provisions of this Act or of any rule, regulation direction or order made thereunder, to the Adjudicating Officer for adjudication in accordance with the provisions of this Chapter.

Power to adjudicate.

40. (1) For the purpose of adjudging whether any person has committed a contravention of any of the provisions of this Act or of any rule, regulation, direction or order made thereunder or is liable to a penalty under this Chapter, the Commission shall, subject to the provisions of sub-section (3), appoint an officer of the Commission as Adjudicating Officer for holding an inquiry in the manner provided for herein and in the regulations.

(2) The Adjudicating Officer shall, give the person referred to in sub-section (1) a reasonable opportunity for making a representation in the matter, and if, on inquiry, the Adjudicating Officer is satisfied that the person has committed any contravention, and is liable to a penalty then such penalty as may be determined by order shall be levied on such person.

Provided that where the Adjudicating Officer is satisfied that there has been no contravention he may pass such orders as he deems fit.

(3) No person shall be appointed as an adjudicating officer unless he or she possesses such experience as may be prescribed.

(4) Where more than one adjudicating officers are appointed, the Commission shall specify by order the matters and places with respect to which such officers shall exercise their jurisdiction.

(5) For the purpose of discharging his powers and functions, every Adjudicating Officer shall have the same powers as are vested in a civil court under Code of Civil Procedure, 1908 in respect of the following matters namely :

(a) summoning and enforcing the attendance of any person and examining him on oath;
(b) requiring the discovery and production of documents;
(c) receiving evidence on affidavits;
(d) subject to the provisions of section 123 and 124 of the Indian Evidence Act, 1972, requisitioning any public record or document or a copy of such record or a copy of such record or document, from any office;

issuing Commissions for the examinations of witnesses or for production of documents;

dismissing an application for default or deciding it ex parte;

setting aside any order of dismissal of any application for default or any order passed by it, ex parte;

reviewing its decisions;

any other matter which may be prescribed.

(6) All proceedings before the Adjudicating Officer shall be deemed to be judicial proceedings within the meaning of sections 193 and 228 of the Indian Penal Code; 1860

(7) The Adjudicating Officer shall be deemed to be a civil court for the purposes of sections 345 and 346 of the Code of Criminal Procedure, 1973.

Factors to be taken into account by the adjudication officer.

41. While adjudging the quantum of penalty under this Chapter, the Adjudicating Officer shall have due regard to the provisions of this Act, and also to the following factors, namely:-

(a) the amount of revenue loss to the Government;
(b) the amount of disproportionate gain or unfair advantage, wherever quantifiable, made as a result of the default;
(c) the amount of loss caused to any person as a result of the default;
(d) the repetitive nature of the default;

(e) that the amount of the penalty shall be such as may act as a deterrent even though no financial loss may be caused by such contravention.

Breach of terms and conditions of license

42. (1) Without prejudice to the foregoing provisions of this Chapter, in case of breach of any of the terms of the license or failure to comply with any decision, direction or order of the Commission, the Commission may, after providing an opportunity to the licensee of being heard, do any one or more of the following, namely:-
    (a) direct the licensee to do or abstain from doing any act or thing;
    (b) suspend the license for a specified period;
    (c) curtail the period of the license; or
    (d) revoke the license.

(2) If the Commission has reason to believe that the terms and conditions of a license for providing a service have been or are being breached by a licensee, the Commission may authorise the seizure of the equipment being used for provision of such service, and for this purpose the Commission may by order in writing, authorise any District Magistrate, or Sub-Divisional Magistrate in any area, or any other officer of the Central Government or State Government or Union territory, to implement and ensure compliance of its directions and orders; and when so directed or authorised the authorities or officers concerned shall be bound to carry out such directions and orders.

(3) Any person aggrieved by such seizure may appeal to the Appellate Tribunal within thirty days of the seizure and the Appellate Tribunal may pass such orders as to the disposal of the property so seized as it may deem fit.

Provided that no such equipment shall be retained by the Commission or the authorised officer for a period exceeding ninety days from the date of its seizure without the approval of the Appellate Tribunal on a report to be made by the authorised officer.

CHAPTER XI
COMMUNICATIONS APPELLATE TRIBUNAL

Establishment of Communications Appellate Tribunal.

43. (1) The Central Government shall by notification, establish an Appellate Tribunal to be known as the Communications Appellate Tribunal.

(2) Any person aggrieved by any decision or order of the Commission may prefer an appeal to the Appellate Tribunal:

(3) Every appeal under sub-section (2) shall be preferred within a period of sixty days from the date on which a copy of the decision or order made by the Commission is received by the person aggrieved and it shall be in such form, verified in such manner and be accompanied by such fee as may be prescribed:

(4) Any person aggrieved by an order of penalty imposed by the Adjudicating Officer may prefer an appeal to the Appellate Tribunal within sixty days from the date on which such order is received. Such appeal shall be in such form, verified in such manner and accompanied by such fee as may be prescribed.

(5) On receipt of an appeal under sub-section (2), or (4) above the Appellate Tribunal may after giving the parties to the appeal an opportunity of being heard, pass such orders thereon as it thinks fit.

(6) The Appellate Tribunal shall send a copy of every order made by it to the parties to the appeal and to the Commission or to the Adjudicating Officer, as the case may be.

(7) The Appellate Tribunal shall endeavour to deal with and dispose of every appeal preferred under sub-section (2) and (4) above as expeditiously as possible; and all parties appearing before the Appellate Tribunal shall actively assist in ensuring that the appeal is determined and disposed off not later than ninety days from the date of filing of the appeal:

(8) The Appellate Tribunal may, on its own motion or otherwise for the purpose of examining the legality, propriety or correctness of any order or decision of the Commission or of the Adjudicating Officer, call for all relevant records and make such orders as it thinks fit, provided that the power under this sub-section shall not be invoked after the expiry of six months from the date of such order or decision.

Composition of Appellate Tribunal.

44. (1) The Appellate Tribunal shall consist of a Chairperson and not more than six Members to be appointed, by notification, by the Central Government:

(2) The appointment of Chairperson and Members of the Appellate Tribunal shall be made by the Central Government in consultation with the Chief Justice of India.

(3) Subject to the provisions of this Act, :
    (a) the jurisdiction of the Appellate Tribunal may be exercised by Benches thereof;
    (b) a Bench may be constituted by the Chairperson of the Appellate Tribunal consisting of two or more Members as the Chairperson may deem fit;

Provided that every Bench shall be presided over by a Judicial member.

Explanation: For the purposes of this section “Judicial Member” means any person who has been a judge of a High Court in India.

    (c) the Benches of the Appellate Tribunal shall ordinarily sit at New Delhi and also at such other places as the Central Government may notify, in consultation with the Chairperson of the Appellate Tribunal;
    (d) the Central Government shall notify the areas in relation to which each Bench of the Appellate Tribunal may exercise jurisdiction.

(4) The Chairperson of the Appellate Tribunal may from time to time (according to the exigencies of business) request a Member sitting on one Bench to sit on another Bench.

(5) If at any stage it appears to the Chairperson or a Bench of the Appellate Tribunal that the case or matter is of such a nature that it ought to be heard by a Bench consisting of more than two or more Members, the case or matter may be transferred by the Chairperson to a Bench of more than two Members.

Qualification, tenure, salary and allowances, vacancy of the Chairperson and Members of the Appellate Tribunal.

45. (1) A person shall not be qualified for appointment as the Chairperson or a Member of the Appellate Tribunal unless -

(a) in the case of the Chairperson, he is, or has been, a Judge of the Supreme Court of India;

(b) in the case of a Member, he is or has been a Judge of a High Court in India, or has held the post of Secretary to the Government of India or any equivalent post in the Central Government or the State Government for a period of not less than two years, or he is a person who is proficient in the field of information technology, telecommunication, broadcasting, law, industry, or administration.

(2) The Chairperson and every other Member of the Appellate Tribunal shall hold office as such for a term not exceeding five years from the date on which he or she enters upon his or her office;

Provided that no Chairperson or other Member shall hold office as such after he or she has attained-
in the case of Chairperson, the age of seventy years;
in the case of any other Member, the age of sixty-five years.

(3) The salary and allowances payable to and the other terms and conditions of service of the Chairperson and other Members of the Appellate Tribunal shall be such as may be prescribed:

Provided that neither the salary and allowances nor the other terms and conditions of service of the Chairperson or a Member of the Appellate Tribunal shall be varied to his or her disadvantage after appointment.

(4) (a) If, for reason other than temporary absence, any vacancy occurs in the office of the Chairperson or a Member of the Appellate Tribunal, the Central Government shall appoint another person in accordance with the provisions of this Act to fill the vacancy.

(b) When the Chairperson of the Appellate Tribunal is unable to discharge his functions owing to absence, illness or any other cause, any member of the Appellate Tribunal, (as authorised so to do by the Central Government), shall discharge the functions of the Chairperson until the day on which the Chairperson resumes charge of his functions.

(5) Before appointing any person as Chairperson or Member, the Central Government shall satisfy itself that the person does not have any such financial or other interests as is likely to affect prejudicially his functions as such member.

(6) A person who is in the service of Government shall have to retire or resign from service before joining as Chairperson or whole time member.

Removal and resignation

46. (1) The Central Government may remove from office, the Chairperson or any Member of the Appellate Tribunal, who -

(a) has been adjudged an insolvent; or

(b) has been convicted of an offence which, in the opinion of the Central Government, involves moral turpitude; or

(c) has become physically or mentally incapable of acting as the Chairperson or a Member; or

(d) has acquired such financial or other interest as is likely to affect prejudicially his functions as the Chairperson or a Member; or

(e) has so abused his position as to render his continuance in office prejudicial to the public interest.

(2) Notwithstanding anything contained in sub-section (1), the Chairperson or a Member of the Appellate Tribunal shall not be removed from his office on the ground specified in clause (d) or clause (e) of that sub-section unless the Supreme Court on a reference being made to it in this behalf by the Central Government, has, on an enquiry, held by it in accordance with such procedure as it may specify in this behalf, reported that the Chairperson or a Member ought on such ground or grounds to be removed.

(3) The Central Government may suspend from office, the Chairperson or a Member of the Appellate Tribunal in respect of whom a reference has been made to the Supreme Court under sub-section (2), until the Central Government has passed an order on receipt of the report of the Supreme Court on such reference.

Distribution of business, transfer of cases, difference in opinion by Members.

47. (1) The Chairperson of the Appellate Tribunal may, from time to time, by order, make provisions as to the distribution of the business of the Appellate Tribunal amongst the Benches and also provide for the matters which may be dealt with by each Bench.

(2) On the application of any of the parties and after notice to the parties, and after hearing such of them as may desire to be heard, or suo motu without notice, the Chairperson of the Appellate Tribunal may transfer any case pending before one Bench for disposal, to any other Bench.

(3) If the Members of a Bench consisting of two Members differ in opinion on any point, they shall state the point or points on which they differ, and make a reference to the Chairperson of the Appellate Tribunal who shall hear the point or points, and thereafter such point or points shall be decided according to the opinion of the majority who have heard the case, including those who first heard it.

Procedure and powers of a civil court.

49. (1) The Appellate Tribunal shall have, for the purpose of discharging its functions under this Act, the same powers as are vested in a civil court under the Code of Civil Procedure, 1908 while trying a suit, in respect of the following matters, namely:-

summoning and enforcing the attendance of any person and examining him on oath;
requiring the discovery and production of documents;
receiving evidence on affidavits;
subject to the provisions of sections 123 and 124 of the Indian Evidence Act, 1872, requisitioning any public record or document or a copy of such record or document from any office;
issuing Commissions for the examinations of witnesses or documents;
dismissing an application for default or deciding it ex parte;
setting aside any order of dismissal of any application for default or any order passed by it, ex parte;
reviewing its decisions; and
any other matter which may be prescribed.

(2) The Appellate Tribunal shall not be bound by the procedure laid down by the Code of Civil Procedure, 1908, but shall be guided by the principles of natural justice and, subject to the other provisions of this Act, the Appellate Tribunal shall have powers to regulate its own procedure.

(3) Every proceeding before the Appellate Tribunal shall be deemed to be a judicial proceeding within the meaning of sections 193 and 228, and for the purposes of section 196, of the Indian Penal Code, and the Appellate Tribunal shall be deemed to be a civil court for the purposes of section 195 and Chapter XXVI of the Code of Criminal Procedure, 1973.

Representation before the Appellate Tribunal

50. An applicant or appellant may either appear in person or authorise one or more chartered accountants, or company secretaries, cost accountants or legal practitioners, or any of his or its accredited officers to present his or its case before the Appellate Tribunal.

Explanation: For the purpose of this section-

(a) "Chartered accountant" means a chartered accountant as defined in clause (b) of sub-section (1) of section 2 of the Chartered Accountants Act, 1949 and who has obtained a certificate of practice under sub-section (1) of Section 6 of that Act;

(b) "company secretary" means a company secretary as defined in clause (c) of sub-section (1) of section 2 of the Company Secretaries Act, 1980 and who has obtained a certificate of practice under sub-section (1) of Section 6 of that Act;

(c) "cost accountant" means a cost accountant as defined in clause (b) of sub-section (1) of section 2 of the Cost and Works Accountants Act, 1959 and who has obtained a certificate of practice under sub-section (1) of section 6 of that Act;

(d) "legal practitioner" means an advocate, vakil or an attorney of any High Court, and includes a pleader in practice.

Appeals

51. (1) Notwithstanding anything contained in the Code of Civil Procedure, 1908 or in any other law, an appeal shall lie against any order, not being an interlocutory order, passed by the Appellate Tribunal to the Supreme Court of India on one or more of the grounds specified in section 100 of that Code.

(2) No appeal shall lie against any decision or order made by the Appellate Tribunal with the consent of the parties.

(3) Every appeal under this section shall be preferred within a period of ninety days from the date of the decision or order appealed against:

Provided that the Supreme Court of India may entertain the appeal after the expiry of the said period of ninety days, if it is satisfied that the appellant was prevented by sufficient cause from preferring the appeal in time.

Execution of orders.

52. (1) An order passed by the Appellate Tribunal under this Act shall be executable by the Appellate Tribunal as a decree of a civil court, and for this purpose, the Appellate Tribunal shall have all the powers of a civil court.

(2) Notwithstanding anything contained in sub-section (1), the Appellate Tribunal may transmit any order made by it to a civil court having local jurisdiction and such civil court shall execute the order as if it were a decree made by that court.

Explanation - The expression "civil court having jurisdiction" shall mean, the civil court within whose ordinary civil jurisdiction the licensee or judgement debtor as the case may be resides or has a place of office or business and also within whose jurisdiction any property belonging to the licensee or judgement debtor is located.

Penalty for failure to comply with the decision or orders of Appellate Tribunal.

53. If any person wilfuly fails to comply with any decision, direction or order of Appellate Tribunal such person shall be liable to a penalty to be imposed by the order of Appellate Tribunal which may extend to rupees five crores, provided that no such penalty shall be levied without giving any opportunity to party concerned.

CHAPTER XIA

Officers and employees of Commission and Appellate Tribunal

53A. (1) The Central Government shall appoint such officers and other employees of the Commission and Appellate Tribunal as are required by the Commission and the Appellate Tribunal for the efficient discharge of their respective functions.

(2) The salaries and allowances payable to and the terms and conditions of service of the officers and employees of the Commission and of Appellate Tribunal shall be such as may be prescribed;

(3) The officers and employees of the Commission shall discharge their functions under general superintendence and control of the Chairperson of the Commission and the officers and employees of the Appellate Tribunal shall discharge their functions under general supervision and control of the Chairperson of the Appellate Tribunal.

CHAPTER XII
FINANCE, ACCOUNTS AND AUDIT

Proceeds of Licence Fee.

54. The proceeds of the licence fee shall be credited to the Consolidated Fund of India.

Formation of Communications Commission and Appellate Tribunal Fund.

55. (1) There shall be a fund to be called Communications Commission and Appellate Tribunal Fund and there shall be credited thereto any sum of money paid or any grants made by the Central Government for the purpose of this act.

(2) Fee and levies receivable by the Commission as also the Appellate Tribunal as per the Act shall also be credited to the Fund.

Grants

56. The Central Government may, after due appropriation made by Parliament, by law in this behalf, credit to the Fund by way of Grant such sum or sums of money as the Central Government thinks fit for being utilized for the purposes of this Act, separately for the Communications Commission and the Appellate Tribunal respectively.

Applications of Funds.

57. The funds shall be applied for -

(a) The salaries and allowances payable to the Chairperson and members and the administrative expenses including the salaries, and allowances payable to or in respect of officers and other employees of the Commission;

(b) The salaries and allowances payable to the Chairperson and members and the administrative expenses including the salaries, and allowances payable to or in respect of officers and other employees of the Appellate Tribunal; and

(c) The expenses on objects and for purposes authorized by this Act.

Accounts and Audit

58. (1) The Commission as also Appellate Tribunal shall maintain proper accounts and other relevant records and prepare an annual statement of accounts in such form and in such manner as may be prescribed by the Central Government in consultation with the Comptroller and Auditor General of India.

(2) The Accounts of the Commission as also as Appellate Tribunal shall be audited by the Comptroller and Auditor General of India at such intervals and as may be specified by him and any expenditure incurred in connection with such audit shall be payable by the Commission as also Appellate Tribunal to the Comptroller and Auditor - General;

Explanation:

For removal of doubts, it is hereby, declared that the orders and decisions of the Commission in discharge of their statutory functions (which are appealable to the Appellate Tribunal are not subject to audit under this Section.)

(3) The Comptroller and Auditor-General of India and any person appointed by him in connection with the audit of the accounts of the Commission as also of the Appellate Tribunal shall have the same rights and privileges and authority in connection with such audit as the Comptroller and Auditor-General has in connection with the audit of Government accounts and, in particular, shall have the right to demand the production of books, accounts, connected vouchers and other documents and papers and to inspect any of the offices of the Commission as well as Appellate Tribunal.

(4) The accounts of the Commission as also of the Appellate Tribunal as certified by the Comptroller and Auditor General of India or any other person appointed by him in this behalf together with the Audit Report thereon shall be forwarded annually to Central Government and that Government shall cause the same to be laid before each House of Parliament.

Annual report and its laying

58A. (1) The Commission shall after the end of each financial year, submit to the Central Government a report on their activities during the preceding financial year and containing such information relating to the proceedings and policy, as may be prescribed from time to time. Such report shall also contain therein the statements of annual accounts of the Commission as also the Appellate Tribunal.

(2) The Central Government shall cause such report to be laid before each House of Parliament.

CHAPTER XIII
RIGHT OF WAY FOR LAYING CABLES AND ERECTION OF POSTS

Users rights over land

59. (1) Subject to the provisions of this Act any licensee of a net work infrastructure facility (hereinafter called "a facility provider") may from time to time lay, and establish cables and erect posts under over along across in or upon any immovable property vested in or under the control or management of a public authority.

(2) Any public authority under whose control or management, any immovable property is vested shall, on receipt of a request from a facility provider permit the facility provider to do all or any of the following acts namely :

(a) to place and maintain underground cables or posts,

(b) to enter on the property from time to time, in order to place, examine, repair, alter or remove such cables or posts.

(3) The permission mentioned in sub section (2) above shall be promptly given and shall not be unreasonably withheld or denied.

Provided that in case of an emergency the facility provider may at any time for the purpose of examining, repairing altering or removing any cable or post enter upon the property for that purpose without first obtaining such permission.

(4) Nothing in this section shall confer any right upon any facility provider other than that of user for the purpose only of laying underground cables or erecting posts or maintaining them.

(5) The facility of right of way for laying underground cables, and erecting posts, shall be available to all facility providers without discrimination and subject to the condition that this right of way facility shall be available to facility providers to the extent of the provisions contained in their respective licences and subject to the obligation of reinstatement or restoration of the property or payment of reinstatement or restoration charges in respect thereof at the option of the public authority:

(6) Where any shifting or alteration in position of the underground cable or post is required due to compulsive causes like widening of highways and construction of flyovers or bridges, the said facility provider shall shift or alter the same at his own cost within the period indicated by concerned authorities.

(7) The rights conferred under this section shall be exercised by the said facility provider strictly in accordance with the terms and conditions subject to which the license was granted.

(8) For the purposes of speedy clearance of requests for laying cables or erecting posts on any property vested in or under the control or management of any public authority, high powered committees, or other appropriate mechanisms shall be promptly set up by the Central and/or State Governments in the manner prescribed, they shall in each State act as a single nodal agency to co-ordinate all activities in this regard; and the Central Government may prescribe appropriate guidelines in this behalf.

Rights of public authority to grant permission subject to conditions.

60. Any permission granted by a public authority may be subject to such reasonable conditions as that authority thinks fit to impose as to the time or mode of execution of any work, or as to any other matter connected with or related to any work under taken by the facility provider in exercise of those rights.

Special provision for removal or alteration of cable or post

61. When under the foregoing provisions of this Act, any cable or post has been placed by any facility provider under, over, along, across in or upon any property and the public authority having regard to circumstances which have arisen since the cable or post was so placed, considers it necessary and expedient that it should be removed or its position should be altered, it may require the concerned facility provider to remove it or alter its position as the case may be and it shall then be so removed or altered without any delay.

Disputes between the service provider and public authority

62. (1) If any dispute arises under this Chapter the same shall be referred to the District Court within whose jurisdiction the property concerned is situated for determination by that Court.

(2) Every such determination shall be in accordance with the provisions of this Chapter and such determination will be deemed to be a decree of the District Court and be for all purposes treated as such.

(3) The provisions of the Code of Civil Procedure, 1908 will apply to adjudication of all disputes under this section.

(4) Pending disposal of any application the District Judge may pass such interim orders preventive or mandatory for the doing of any act under this Chapter on such terms and conditions as may be provided for.

Use of private land

62A. (1) A facility provider may make use of private land for constructing or laying of cables or erecting posts only with the consent of the owner of the land.

Provided that where in the opinion of a facility provider consent to the reasonable use of any land is not forthcoming such facility provider, may, on application to and with the approval of the Commission, take steps authorised by the Commission for use of the land for constructing or laying cables or erecting posts on such terms as the Commission may deem fit.

(2) Subject to clause (1) above and only where absolutely necessary the facility provider may with the approval of the Commission approach the concerned Government for acquisition of the land required for

the purpose and such Government shall there upon take appropriate action under the Land Acquisition Act 1896 and take steps under that Act to acquire the same.

(3) After receiving requests from the facility provider as provided in sub-section (1) above, and with the approval of the Commission, the Government shall acquire such land or interest in such land for use by the facility provider after following such procedures and after determining such compensation to be paid by the facility provider as provided for under the Land Acquisition Act 1896. Such acquisition shall be deemed to be for public purposes under the Land Acquisition Act.

Power of Commission over property not vested in or under the control or management of a public authority

62B. (1) The Commission may, by order, require or permit any network infrastructure facility to be provided, constructed, installed, altered, moved operated, used, repaired or maintained on any private land or property and may by order require any such property to be acquired (if and where necessary) or any system of method to be adopted by any person interested in or affected by the order, and at or within such time subject to such conditions as to compensation or otherwise and under such supervisions as the Commission may determine to be just.

(2) The Commission may specify by whom, in what proportion and at or within what time the cost of doing anything required or permitted to be done under sub-section (1) shall be paid.

(3) Orders of the Commission under Sub-section (1) and (2) above shall be enforceable under Chapter X of this Act.

CHAPTER XIV
INTERCEPTION OF COMMUNICATION AND PUNISHMENT FOR UNLAWFUL INTERCEPTION

Interception of communication and safeguards against misuse

63. (1) Notwithstanding anything contained in Section 69 of the Information Technology Act, 2000 and subject to the prescribed safeguards, the Central Government or a State Government or any officer specially authorized in this behalf by the Central Government or a State Government, if satisfied that it is necessary or expedient so to do in the interests of the sovereignty and integrity of India, the security of the State, friendly relations with foreign States or public order or for preventing incitement to the commission of an offence, may direct:

(i) any agency of that Government to intercept any communication on any network facilities or services;

(ii) any service provider that any content brought for communication by or communicated or received by him shall not be communicated or shall be intercepted or detained or shall be disclosed to that Government or its agency authorized in this behalf:

Provided that press messages, data or information intended to be published in India of correspondents accredited to the Central Government or a State Government shall not be intercepted or detained:

(2) The service provider shall, when called upon by any agency, which has been directed to carry out interception under sub-section (1), extend all facilities and technical assistance for interception of the content of communication.

(3) Any service provider who fails to assist the agency referred to in sub-section (2) shall be punished with imprisonment for a term, which may extend to seven years.

(4) Save as otherwise provided under this section any person who intercepts any communication or causes any communication to be intercepted or discloses to any person, any content shall be punishable with imprisonment which may extend to five years or with fine which may extend up to ten lakh rupees and for a second and subsequent offence with imprisonment which may extend to five years and with fine which may extend up to fifty lakh rupees or with both.

(5) For the purposes of this section 'intercept' means the aural or other acquisition of the contents through the use of such devices or means as considered necessary.

CHAPTER XV
OFFENCES AND PUNISHMENT

Punishment for provision of unlicensed services

64. (1) Save as otherwise provided in this Act, any person who, without a license, owns or provides any network infrastructure facility or provides any communication service or knowingly assists in the transmission or distribution of such service in any manner including,-

(a) collection of subscription for his principal,

(b) issuing of advertisements to such service,

(c) dealing in or distribution of equipment for decoding programmes,

shall be punishable with imprisonment which may extend up to five years, or with fine which may extend up to rupees five crores and in subsequent offence such fine may extend to rupees ten crores, or with both.

(2) Any person who, without the permission of the service provider and with the intent to defraud, diverts any signal or decodes any content or deals in decoding equipment for such purpose shall be punishable with imprisonment which may extend upto five years, or with imprisonment which may extend to five years and with fine which may extend upto rupees five crores and in subsequent offences to a like term of imprisonment and to fine which may extend to rupees ten crores.

(3) Any person who, knowingly benefits from any unauthorised diversion or tampering with any communication service or network infrastructure facility with the knowledge that such service or facility is unauthorized

or tampered, shall be punished with imprisonment for a term which may extend to two years, or with fine which may extend to rupees two crores, or with both.

(4) Any person who, abets or induces the making of any unauthorised diversion or tampering with any communication service or network infrastructure facility shall be punished with imprisonment for a term which may extend to two years, or with fine which may extend to rupees two crores or with both.

(5) Any person who, having already been convicted of an offence under sub-section (3) or sub-section (4) is again convicted thereunder, shall on every such subsequent conviction, be punished with imprisonment for a term which shall not be less than six months but which may extend to five years, and with fine which may extend to rupees five crores or both.

Punishment for possession of wireless equipment or use of spectrum in contravention of the Act

65. (1) Any person,-

(a) who possesses any wireless equipment in contravention of the provisions of section 5;

(b) who uses a radio frequency which he is not authorised to use under this Act,

shall be guilty of an offence and shall be punishable with imprisonment which may extend to three years or with fine which may extend to rupees two crores, or with both.

(2) When any person is convicted for an offence punishable under this section, all wireless equipments or any part thereof in respect of which the offence has been committed, shall be forfeited to the Central Government.

(3) Any wireless equipment confiscated which has not been claimed by anybody shall be the property of the Central Government.

(4) Any officer specially authorised by the Central Government or the Commission in this behalf may search any building, vehicle, vessel or place in which he has reason to believe that any wireless equipment in respect of which an offence punishable under this section has been committed is kept or concealed and take possession thereof.

Punishment for sending obscene or offensive messages

66. Any person who-

(a) sends, by means of a communication service or a network infrastructure facility, any content that is grossly offensive or of an indecent obscene or menacing character; or

(b) sends by those means, for the purpose of causing annoyance, inconvenience or needless anxiety to another, content that he knows to be false or persistently makes use for that purpose of a communication service or a network infrastructure facility,

shall be punishable with imprisonment for a term which may extend upto three years or with fine which may extend to rupees two crores or with both.

Attempt to commit offences

67. Whoever attempts to commit or abets the commission of any offence, under Chapter XIV or under this Chapter shall be deemed to have committed such offence and shall be punished with the same punishment provided for such offence.

Court competent to try offences.

68. No court inferior to that of a Court of Session shall try any offence under this Act.

Offences to be cognizable.

69. Notwithstanding anything contained in the Code of Criminal Procedure 1973 every offence punishable under this Act shall be cognizable.

CHAPTER XVII
MISCELLANEOUS

Taking over control and management of Communication Service or network infrastructure facility in public interest.

72. (1) In the event of war or any calamity of national magnitude, the Central Government may by notification for a limited period, in public interest, take over the control and management of any communication service or any network infrastructure facility connected therewith, suspend its operation or entrust any agency of that Government to manage it in the manner directed by the Government for such period as provided for in the notification.

(2) If it appears necessary or expedient to do so, the Central Government may, in public interest, at any time request the Commission to direct any licensee to—

(a) transmit in its broadcasting service specific announcements, in such a manner as may be considered necessary;

(b) stop any broadcasting service which is prejudicial to sovereignity or integrity of India, security of the State, friendly relations with foreign States, or to public order, decency or morality, or communal harmony.

(3) On the issue of such directions by the Commission it shall be the duty of the licensee to ensure strict observance of such directions.

Obligations of licensees.

73. (1) Every licensee shall.-

(a) commence operation of his service within such period as may be specified by the Commission

(b) maintain such documentary records and transmission schedules as may be specified by the regulations;

(c) allow inspection of such facilities and such documentary records and transmission schedules as may be specified by the Commission or by any person authorised by the Commission.

(2) The Commission may call for any information from the licensee including information necessary for ensuring transparency or for ascertaining the true ownership of the license or licensee.

(3) The Commission or any officer authorised by the Commission shall have power to inspect and obtain information, wherever necessary, from programme producers, distributors and advertising agents.

(4) For effective enforcement of the terms and conditions of licenses, the Commission or any officer authorized by the Commission for that purpose, shall have all the powers of an inspecting officer as provided under Section 209A of the Companies Act, 1956.

(5) It shall be the duty of every licensee to carry out the directions of the Commission given under this section.

Offences by companies

74. (1) Where a person committing a contravention of any of the provisions of this Act or of any rule, regulation direction or order made thereunder is a company, every person who, at the time the contravention was committed, was in charge of, and was responsible to, the company for the conduct of business of the company as well as the company, shall be guilty of the contravention and shall be liable to be proceeded against and punished accordingly:

Provided that nothing contained in this sub-section shall render any such person liable to punishment if he proves that the contravention took place without his knowledge or that he exercised all due diligence to prevent such contravention.

(2) Notwithstanding anything contained in sub-section (1), where a contravention of any of the provisions of this Act or of any rule, regulation, direction or order made thereunder has been committed by a company and it is proved that the contravention has taken place with the consent or connivance of, or is attributable to any neglect on the part of, any director, manager, secretary or other officer of the company, such director, manager, secretary or other officer shall also be deemed to be guilty of the contravention and shall be liable to be proceeded against and punished accordingly.

Explanation. - For the purposes of this section, -

(i) "company" means any body corporate and includes a firm or other association of individuals; and

(ii) "director", in relation to a firm, means a partner in the firm.

Licenses to operate wireless equipment on board ships and aircraft

75. (1) No person shall operate any wireless equipment on board any ship or aircraft registered in India without a license granted by such authority or agency as may be notified by the Central Government.

(2) The Central Government may by rules provide for an authority for the grant of license to operate wireless equipment on board, ships and aircraft.

(3) The Central Government may prescribe qualifications and conditions regarding conduct of examinations, the grant of license for the purpose of sub section (1) and also for charging of fees and for other matters connected therewith.

Recovery of penalty

76. Without prejudice to other modes of recovery, any penalty imposed under Chapter X, shall if not paid, be recovered as an arrear of land revenue, and the Commission shall suspend the license till the penalty is paid.

Supply of information to investigating agencies

77. Notwithstanding anything contained in any other law for the time being in force, every application service provider shall furnish such information, document or record relating to any service availed by any consumer or subscriber when so directed by an officer specially authorised in writing by the Central or State Government in this behalf, if such Government is satisfied that such information, document or record is necessary to be furnished in relation to some pending or apprehended civil or criminal proceedings.

Act not to apply in certain cases

78. Subject to the provisions contained in Chapter VI (Frequency Spectrum Management) nothing contained in this Act shall apply to network infrastructure facilities or communication services owned, and operated by the Central Government or any State Government for their own use.

Civil courts not to have jurisdiction

79. No civil court shall have jurisdiction to entertain any suit or proceeding in respect of any matter which an Adjudicating Officer or the Appellate Tribunal or the Commission is empowered by or under this Act to determine, and no injunction shall be granted by any court or other authority in respect of any action taken or to be taken in pursuance of any power conferred by or under this Act.

Chairman, Members etc. to be public servants.

80. The Chairperson, Members and other officers and employees of the Commission, the Appellate Tribunal and every Member of any Committee or Bureau thereof shall be deemed to be public servants within the meaning of section 21 of the Indian Penal Code.

Protection of action taken in good faith.

81. No suit, prosecution or other legal proceeding shall lie against the Commission, any Member or officer or other employee thereof for anything, which is in, good faith done or intended to be done in pursuance of this Act or of any rules or regulations made thereunder.

Overriding Provision

82. The provisions of this Act shall take effect notwithstanding anything inconsistent or contrary therewith in any other law for the time being in force.

Power of Central Government to make rules.

83. (1) The Central Government may by notification make rules for carrying out provisions of this Act.

(2) In particular and without prejudice to the generality of the foregoing power, such rules may provide for all or any of the following matters, namely.-

(a) the tenure of other Members under sub-section (2) of section 8;
(b) the salary, allowances and other terms and conditions of Chairperson and Members under section 9;
(c) any other matter with respect to which the Commission may exercise powers under clause (i) of sub-section (1) of section 14;
(d) the terms and conditions of service of the Secretary-General under sub-section (3) of section 15;
(e) the fees and allowances of the Members of the Committee or Bureau under sub-section (3) of section 17;
(f) functions which the Commission may perform under clause (xv) of sub-section (2) of section 20;
(g) the manner and time frame within which consultation may be initiated between the Commission and the Spectrum Manager under clause (c) of section 24;
(h) the services to give effect to universal service obligations under sub-clause (i) of clause (a) of sub-section (3) of section 28;
(i) the life saving services which a service provider shall provide under sub-clause (ii) of clause (a) of sub-section (2) of section 28;
(j) the manner in which the number and type of broadcasting services which every service provider shall provide under clause (i) of sub-section (3) of section 28;
(k) other conditions subject to which an authorized satellite broadcasting services may be registered under4 section 31;
(l) the form in which a complaint may be filed under sub-section (2) of section 39;
(m) any other matter with respect to which the adjudicating officer shall exercise his powers of a civil court under clause (i) of sub-section (5) of section 40;
(n) the form in which and the fee for filing of appeal and the manner in which an appeal shall be verified under sub-section (3) of section 43'
(o) salary, allowances and other terms and conditions of service of the Chairperson and other Members of the Appellate Tribunal under sub-section (3) of section 45;
(p) the procedure in accordance with which enquiry shall be conducted under sub-section (1) of section 46;
(q) the officers and employees to be provided to the Appellate Tribunal under sub-section (1) of section 48;
(r) salary, allowances and other terms and conditions of service of the officers and employees of the Appellate Tribunal under sub-section (3) of section 48;
(s) any other matter with respect to which the Appellate Tribunal may exercise powers of a civil court under clause (i) of sub-section (1) of section 49;
(t) the form and manner in which the annual statement of accounts and other records shall be maintained by the Commission under sub-section (1) of section 57;
(u) the information relating to the activities of the Commission under sub-section (1) of section 58;
(v) the mechanism to provide speedy clearance of request of laying cables, erecting poles under sub-section (8) of section 59;
(w) the safeguards subject to which any communication for network infrastructure facilities or services may be intercepted under sub-section (1) of section 63;
(x) any other matter which is or may be required to be provided by way of rules.

Power of the Commission to make regulations

84. (1) The Commission may by notification make regulations consistent with this Act and the rules made thereunder to carry out the purposes of this Act.

(2) In particular and without prejudice to the generality of the foregoing power such regulations may provide for all or any of the following matters namely:-

(a) the places and the functions which a regional officer of the Commission may sit and perform under section 12;
(b) the procedure and the time and places at which the Commission shall meet under sub-section (1) of section 13;
(c) the method of appointment, scale of pay, allowances and other conditions of service of the officers and employees under section 16;
(d) the programmes, codes and standards to be specified under sub-section (1) of section 21;
(e) the conditions subject to which a license may be granted under sub-section (2) of section 26;
(f) the procedure to be followed, the terms and conditions and payment of fees under sub-section (3) of section 26;
(g) schemes or plans for licensing under sub-section(4) of section 26;

(h) the period of license under sub-section (1) of section 27;
(i) the form of license and the fees thereof under sub-section (3) of section 27;
(j) obligations, conditions, tariffs and rates subject to which the service provider shall provide services under sub-section (3) of section 28;
(k) the maximum number of channels out of the total channel capacity to be provided for the programmes of the service provider under clause (iii) of sub-section (3) of section 28;
(l) agreements to be registered with the Commission under clause (c) of section 29;
(m) the form of application and the fees thereof under sub-section (2) of section 30;
(n) the conditions and restrictions subject to which the license may be issued under sub-section (4) of section 30;
(o) the manner in which the enquiry may be held under sub-section (1) of section 40;
(p) the scale of charges or compensation for user rights under sub-section(5) of section 59;
(q) the documentary records and transmission schedules to be maintained by a licensee under clause (b) of sub-section (1) of section 73.

Provided that regulations under clause (c) shall be made with the prior approval of the Central Government.

Laying of Rules and Regulations

85. Every notification issued under clause (40) of section 2, sub-section (1) of section 5, sub-section(2) of section 25,sub-section (1) of section 72 and every rule and regulation made under this Act shall be laid, as soon as may be after it is made, before each House of Parliament, while it is in session for a total period of thirty days which may be comprised in one session or in two or more successive sessions, and if, before the expiry of the session immediately following the session or the successive sessions aforesaid, both Houses agree in making any modification in, the rule or regulation or both Houses agree that the rule or regulation should not be made, the rule or regulation shall thereafter have effect only in such modified form or be of no effect, as the case may be; so, however, that any such modification or annulment shall be without prejudice to the validity of anything previously done under that rule or regulation.

Power to remove difficulties.

86. (1) If any difficulty arises in giving effect to the provisions of this Act, the Central Government may, by order published in the Official Gazette, make such provisions, not inconsistent with the provisions of this Act, as it may deem necessary, for the removal of the difficulty:

Provided that no such order shall be made after the expiry of a period of three years from the commencement of this Act.

(2) Every order made under this, section shall be laid, as soon as may be, after it is made, before each House of Parliament.

CHAPTER XVIII
REPEAL AND SAVINGS

Repeal of certain Acts, saving of licenses and dissolution of certain Authorities.

87. (1) The Indian Telegraph Act, 1885, the Indian Wireless Telegraphy Act 1933, Telegraph Wire Unlawful Possession Act, 1950, and the Telecom Regulatory Authority of India Act, 1997 are hereby repealed.

(2) Notwithstanding such repeal, a licensee under the repealed Acts may continue to provide his services, if he has made an application to the Commission for the grant of a license under this Act within six months from the date of commencement of this Act or where he has already made such an application, until the disposal of such application, whichever is later.

(3) The Commission shall, on receipt of an application under sub-section (2) grant a licence subject to fulfillment of such eligibility and other terms and conditions as may be determined by regulations.

(4) During the six-month period mentioned in sub-section (2) or till his application is disposed off whichever is later, the applicant licensee will continue to be governed by and shall observe the provision of the Indian Telegraph Act 1885, the Indian Wireless Telegraphy Act 1933, Telegraph Wire Unlawful Possession Act, 1950 and the Telecom Regulatory Authority of India Act, 1997, as the case may be, as if these Acts had not been repealed.

(5) Save as otherwise provided with effect from the date of the establishment of the Commission under sub-section (1) of section 6, the Telecom Regulatory Authority established under sub-section (1) of section 3 of the Telecom Regulatory Authority Act 1997 and the Telecom Disputes Settlement and the Appellate Tribunal established under section 14 of that Act shall stand dissolved.

Repeal of Act 7 of 1995 and transitional provisions.

88. (1) Subject to the provisions of this section, the Cable Television Networks (Regulation) Act 1995 is hereby repealed.

(2) Notwithstanding such repeal, any cable operator registered under the repealed Act, may continue to provide his cable services, if he has made an application to the Commission for the grant of a license under this Act within six months from the date of the commencement of this Act or where he has already made such an application, until the disposal of such application, which ever is later.

(3) The Commission shall, on receipt of an application under sub-section (2) grant a license subject to fulfillment of such eligibility and other terms and conditions as may be determined by regulations.

(4) During the six-month period mentioned in sub-section (2) or till his application is disposed off whichever is later, the applicant cable operator will continue to be governed by and shall observe the provisions of the Cable Television Networks (Regulations) Act, 1995 as if that Act had not been repealed.

Amendment to Act 2 of 1974

89. In the Code of Criminal Procedure 1973,-

(a) in section 91, in sub-section (3), in clause (b), for the words "telegraph authority" the words "any service provider holding a license granted under the Communication Convergence Act 2000" shall be substituted;

(b) in section 92-

(i) for the words "telegraph authority" wherever they occur the word "licensee" shall be substituted.

(ii) the following Explanation shall be inserted at the end, namely:-

"Explanation.- For the purposes of this section licensee means any service provider holding a license granted under the Communication Convergence Act 2000".

APPENDIX I

STATEMENT OF OBJECTS AND REASONS

One of the basic objectives of this Act is to provide for a regulatory mechanism, which facilitates convergence and therefore, remains valid over a period of time. Convergence in this context means convergence of mediums or technologies facilitating provision of all services by using a given facility or network and vice versa. It also means convergence of services at the provider's end as well as the consumer's end, meaning, thereby, a service provider should be able to provide a whole range of technologically feasible services and a consumer should be able to receive all services through a given terminal at any time and place of his choice. These objectives are intended to be achieved by providing for licences in the following four categories, namely;

(a) Network infrastructure facilities;

(b) Network services;

(c) Application services; and

(d) Content application services.

The above classification is technology-neutral and service sector-neutral. Setting up an infrastructural facility and its use is not linked to the provision of a particular service by using a particular technology. Similarly, services can be provided by using any facility and any technology. Thus the classification of licences under these four categories aims to achieve the basic objective of convergence.

CONVERGENCE

Convergence commonly refers to the provision of different kinds of services over the existing infrastructure and the enhancement of existing technologies so as to provide a wide variety of services. This results from the blurring of borders between telecommunications, computing and media. The continuous development of new technologies results in an inability to predict the future evolution of convergence viz. the development of new services like web-casting, Internet Telephony etc. resulting in the need for regulations which does not aim to predict the future, but aspires to be flexible enough to accommodate and propagate any permutation and combination of technologies and services.

The licensing structure has hence been broken into its different elements which leads to a four layered hierarchical structure where each layer is dependent on one or more of the earlier layers for the provision of services. The structure results in four different service providers namely;

* Network infrastructure facility provider;
* Network service provider;
* Application service provider (ASP), and
* Content ASP

Network infrastructure facilities refer to the provision of physical infrastructure which would be utilised by other licences for providing various services. The infrastructure set up by any network facility provider could cut across the infrastructure set up by various licences as they exist today (i.e across the basic, cellular, VSAT, satellite and other forms of infrastructure).

The network service provider utilises the infrastructure set up by one or more network facility providers to carry various kinds of services. The network service provider would have the flexibility to carry the application/content of various ASPs and also be flexible to utilise the infrastructure set up by one or more network facility providers (and thus carry the application/content across one or more of the different types of networks).

The application services provider (ASP)/ content providers services to the end consumer using the services of one or more network service providers.

The proposed Bill envisages that in an era of convergence, an ASP/ content ASP could utilise the services of any network service provider for carrying their application/content. In turn, the network service provider would have the flexibility to utilise the infrastructure provided by any network facility provider and to carry application/content from any ASP/content ASP. Similarly the network facility provider can provide the infrastructure to any network service provider.

APPENDIX II

Description of network infrastructure facilities and communication services covered under various categories of licences

(1) Network infrastructure facilities include all of the following network facilities:

(a) earth stations;

(b) fixed links and cables;
(c) public payphone facilities;
(d) radio-communications transmitters and links;
(e) satellite hubs; or
(f) towers, poles, ducts and pits used in conjunction with other network facilities.

(2) Network services may include all of the following network services.
(a) bandwidth services;
(b) broadcasting distribution services;
(c) cellular mobile services;
(d) customer access services; or
(e) mobile satellite services.

(3) Applications Services include or all of the following applications services.
(a) PSTN telephony;
(b) Public cellular telephony services;
(c) IP telephony;
(d) Public payphone service; or
(e) Public switched data service.

(4) Content applications services may include all of the following content applications services.
(a) satellite broadcasting;
(b) subscription broadcasting;
(c) terrestrial free to air TV broadcasting;
(d) terrestrial radio broadcasting.