MESSAGE

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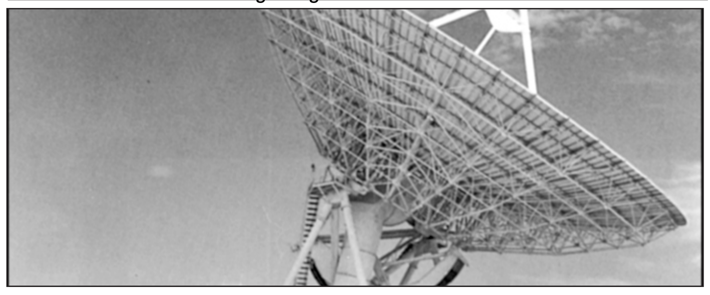
adopted so that the Internet can be made available for all segments of society. For example, low-cost Internet access can be provided to schools, universities, libraries, multipurpose community telecentres or public service institutions to stimulate wider usage and "wire" rural communities.

Programmes should be developed to increase technology and computer skills among young people so as to build, from an early age, an Internet culture. Greater awareness of the benefits of on-line access to information, goods services must be actively pursued throughout society and in particular in small and medium enterprises. These are only some of the challenges raised by the growing popularity of the Internet. But perhaps the most fundamental issue is to ensure that the Internet does not become yet another element in a widening "digital divide". This is one of the key issues on the agenda of the world community today.

Turning the "digital divide" into "digital dividends" is at the heart of ITU's work. While ITU all by itself cannot bridge this divide, we can play a leading role in reaching out to all potential stakeholders and partners in an effect to achieve progress. We are committed to do so and, together with positive action by governments and business, we can.

The Internet is like a seed; with the right approaches we can plant schools with Internet access, grow web-enabled business, fertilize the public's imagination, and watch the buds of innovation blossom so that healthy fruits of products and services can ripen to enrich the lives of all citizens.

Yoshio Utsumi
Secretary-General
International
Telecommunication Union



Satellite Communications Business in Asia Pacific Region and Launching of Bangladesh's own Satellite

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large, high-income markets to competition.

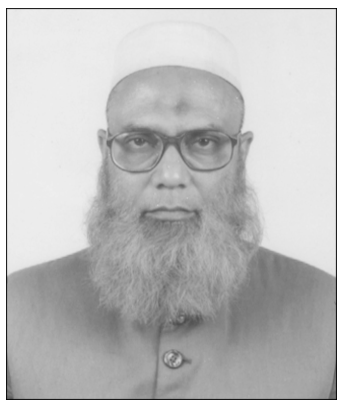
The needs of most of the countries for basic telecommunications and television services being satisfied, Asia-Pacific operators are now moving on to specialized services such as mobile and personal communications, digital audio broadcasting and high-power direct broadcasting.

The forces of globalisation, liberation and privatisation are forcing operators in the Asia-Pacific region to consolidate their position in the market. This trend is likely to lead to a growing number of partnerships and mergers and, in ultimate analysis, to a reduction in the number of operators in the market. The latest news item regarding one of these 'cooperation initiatives' is about a joint-venture between APT Satellite Holdings Ltd. (APT Satellite) of Hong Kong Special Administrative Region (SAR) and Singapore Telecommunications Ltd. (Sing Tel).

Effects of the prevailing trends: The first trend is adverse to further market growth, since domestic systems will now probably support only a replenishment market. However, the region's replenishment market is already vigorous: out of the 77-100 geo-stationary satellites to be delivered over 1998-2005, 38-42 will replace spacecraft to be retired from constellations already in operation today, while 39-58 would be new entrants or extensions of existing systems. Japan, in particular, has become entirely a replenishment market, since the licensing of a third private operator is considered an unlikely prospect. The Asia-Pacific market is thus expected to pause briefly from 1998-2004, as the market absorbs the massive influx of transponder capacity of the mid-1990s, at least assuming that current launch manifests are verified: it is not clear that commercial launch service providers can cope with the high level of demand from Asia-Pacific operators, and it is likely that the peak of 11-17 launches forecast over 1995-97 will actually stretch over a longer period.

Other constraints: The frequency co-ordination process is not expected to significantly constrain the market. New systems have appeared so rapidly in recent years that some satellites have been launched without completing this process, which has also become extremely complex and time-consuming, creating concern that the geo-stationary are may be coming close to saturation over the Asia-Pacific region. Technical and procedural remedies exist, however, and, despite some high-profile disputes, there is no evidence that orbital crowding will cause appreciable prejudice to Asia-Pacific operators. Given design lifetimes of 10-13 years for most of the satellites launched from 1988-94 and 13-15 years for most of those launched from 1995, the market may be expected to peak again from 2005-2010. However, the evolution of satellite technology and of competition with terrestrial solution becomes too uncertain to allow more precise forecasting beyond 2005.

Other aspects of satellite to be launched: Once a comprehensive business plan is made after an extensive survey, other aspects of satellite to be launched may easily be fixed or ascertained. The performance of commercial satellites, measured for example by transponder power and total usable bandwidth, is expected to follow about the same trends in the Asia-Pacific market as in North America and Western Europe, at least through the year 2001. The average number of equivalent 36-MHz transponders per satellite, constrained by competition, power and spectrum availability, should remain in the range of 20-25 for private and domestic systems. INTELSAT, with 70-80 transponders per satellite, has been an exception so far, and is not necessary representative of the future evolution of commercial systems; only Nippon Telegraph and Telephone Corp's NStar system is dimensioned to provide as much bandwidth as current INTELSAT satellites. Digital compression may



also incite some commercial operators focusing on the television market to downsize their satellites. Not withstanding the above satellite size, price for launching a satellite of that size without any back-up unit is not negligible, but an amount more than US $120 million.

Actions to be taken for proposed Bangladesh Satellite: Given the above facts and the recent failures of some commercial satellites projects like Iridium and uncertainty developed in launching communication geo-stationary Paksat satellite (as revealed in discussions with officials of Alcatel Space Industries, the company responsible for manufacturing and launching of the said satellite), the consultants as well as some manufacturers opined that Bangladesh should, before going forward to launch a geo-stationary communication satellite, initially take the following actions: (a) Identification of one or more orbital slots, (b) Market and competitive assessment, (c) To ascertain commercial viability of the project, and (d) If viable, development of overall business plan and registration of orbital slots and associated co-ordination procedures.

Conclusion: Like many other countries of the world, Bangladesh also is to develop and expand its telecommunication infrastructure. The adoption of modern technologies and the associated benefits on economic development, are extremely dependent not only on nationwide inland communication network but also on overseas communication network at large. Although worldwide submarine cable network is gradually going to be the most efficient and effective large scale communication means, the necessity of communication through satellites will never vanish. Rather in addition to being the only communication means for inaccessible and remote areas, it will ever act as back-up arrangement for submarine cables as well. Under the circumstances, the idea of Bangladesh's having a geo-stationary communication satellite is appreciative indeed especially when efforts are being taken worldwide regarding how to use satellite as an internet platform, internet being the ITU theme of this year's World Telecommunication Day (WTD'2001). But at the same time, pragmatic thinking demands that rational approach should be taken to bring this into reality so that resources in terms of manpower, money and time spent in this regard get their worth. So it would be wise on our part (i) to first engage an international consultant to prepare a feasibility report based on market survey and (ii) to form a national expert group consisting of 4-5 persons to assist in and verify the works of the consultant. It is satisfying to note that the authority concerned is prudently proceeding in the direction as suggested.

The writer is the Managing Director, TSS

Universal Access and Internet: Bridging the gap

S M MUNIR AHMED

INTERNET boom threatens to widen rich-poor gap. The Internet industry leaders in the World Economic Forum (WEF) annual meeting of 2000 in Davos, Switzerland, admitted that the world's poor will not be benefited if they don't even had a phone. America Online (AOL) chief Steve Case and Microsoft's Bill Gates agreed that the Internet revolution has only just begun -but said coming years will determine if the "digital divide" between rich and poor will narrow or widen. Gates also admitted that, while in the wealthy West, cable companies are frantically digging up roads to provide high speed Internet access, that is just a dream in poorer continents.

The risk of the Internet widening the gap between rich and poor was underlined in a survey of corporate bosses' views unveiled at the Davos meeting, which gathered more than 1,500 business and political leaders. The survey by consultants Pricewaterhouse Coopers indicated that 50 percent of business bosses say the Internet risks widening the gap, while only 38 percent see it narrowing the divide.

Only five percent of the world's population use Internet. 85% of these users are in developed countries where 90% of all Internet hosts are also located. While it took the telephone close to 75 years to reach 50 million users, it has taken the World Wide Web (WWW) only four years to reach the same number and by July 1999, the figure stood at 190 million, the increasing trend has since then never stopped. In the backbone market, the top three providers control more than 70 percent of the market while the market leader in the retail service provision business. AOL, has more subscribers than its top ten competitors world wide added together.

Internet users are, on average, wealthy and educated as well as young, urban and male suggesting that wealth and education are major factors driving Internet diffusion. The real problem is turning this "digital divide" into "digital dividents".

In relation to Bangladesh, the scenario is not altogether different and certainly not irrelevant. It may not be talking tall when we talk about "Global Village". But with an average telephone density of about 0.5% and insignificant penetration of personal computer (PC) and Internet, which is again mostly concentrated in urban area, we have to go a long way to achieve the goal of universal access to not only urban population but also to 68 thousand villages.

Universal access is to be aimed in bridging the gap in urban area an also between urban and vast rural population in the spirit of pubic-private initiatives in Bangladesh.

Access to Telecommunication facility is regarded as a basic human right. Universal service is desirable for social and political reasons, as well for equity. Lack of access to telecommunication services or their non-affordable prices diminish the opportunities for a person to participate in the mainstream and in a socially significant sense deprived. The nature and impact of this deprivation is quite complex. However, the social and political arguments for universal access are both powerful and convincing. With a suitable regulatory framework, the benefits of both liberalisation and universal access could be realised in a transparent non-discriminatory and competitively neutral manners.

Telecommunication in Socio-Economic Development in rural areas: As an instrument of development and as an essential infrastructure, the important role that telecommunication plays, particularly in rural backward and remote areas can be foreseen in relation to:

- the flexibility in locating industries, warehouses, retail outlets etc. for their more economic, efficient, and effective functioning;
- Employment generation in industries located in rural areas resulting in enhancement of rural resulting in enhancement of rural economy, which at the same time will help in controlling rural to urban migration;
- improving the efficiency to transport system,
- interactive and real time means for information on market conditions to enable the best terms to the rural buyer or seller.
- Economic advantage in opportunity cost by obviating the need to travel for seeking information and consequent conservation of fuel and environment;
- facilitating good public administration, specially for quick access to local district, divisional and central authorities, maintenance of law and order;
- fostering cohesion in the society by bringing the remote communities into the national mainstream;
- its utmost need in times of emergencies like natural calamities, epidemics, personal accidents, illness, etc.;
- rural income generation and employment opportunity to disadvantaged groups, such as the disabled, women as resellers of telecommunication service through franchised public telephones;
- building up of rural commercial networks;
- access to Internet and to multimedia application services, e.g. tele-medicine, tele-education etc.

Universal Service Policy and Objectives

Universal service concept comprises nation-wide coverage, non-discriminatory access and wide-spread affordability. Nation wide coverage requires huge investments and also entails high operating cost. Affordable pricing, on the other hand, may generate lower revenues. The Universal Service policy has to reconcile the three contending criteria, i.e. availability of services, accessibility and affordability.

Objective of Universal service, generally, is to have a telephone in every household. This objective has to a great extent been achieved in developed countries where the ratio of telephone charges to total household expenditure is less than 2%. The objective of the Universal service in developing countries has to be related to local socio-economic conditions. The common approach to Universal Service in developing countries is that of providing plain ordinary telephone service to as many household as possible thereby increasing telephone penetration (tele-density) and shared access to basic telecommunication service through public telephone/call centre in urban and rural areas.

In the context of information infrastructures and multimedia applications, Universal service could mean that subscriber could access besides telephone service, a number of other useful information services requiring a certain bandwith, quality etc.

Universal service applies to the entire population with special attention or non-discrimination provision of service to the low income customers, customers living in rural remote and high cost areas, the physically disadvantaged and elderly customers. In some of the developed economics, the universal service programme also caters to the needs of libraries, schools, health care service providers and disadvantaged persons.

In other words, Universal service may be perceived to mean:
Universal geographic access;
Universal affordable access;
Universal service quality;
Universal access to the disabled.

Access to telecommunication in rural areas is defined on the basis of three criteria, viz:

- Population A telephone for every permanent settlement with a certain population (e.g. One village One telephone)

- Distance A telephone within certain kilometres of a habitation.
- Time A telephone within certain minutes of travelling distance from a habitation.

Bangladesh Scenario of Universal Access: Bangladesh is extended over an area of 147,570 sq. km with a population of around 130 million. The telephone density of the country is about 0.5% with 2.5% penetration in the capital city while the average percentage in the rural areas is only 0.026%.

The Government through Ministry of Posts and Telecommunications (MOPT) and Bangladesh Telegraph and Telephone Board (BTTB) had been providing rural telecommunication through age old technology since long past. The public monopolistic mode of service and technology started changing gradually. Two local private operators were given licence in early Nineties to install and operate digital exchanges in rural areas. Another local company was given licence for operating paging, radio trunking, riverine communications and cellular radio telephone, in private sector. Later on, 3 more private companies were given licence for operating cellular mobile telephone services in late 1996, which brought a major a break through in this field towards open competition. BTTB is also processing Tender under suppliers credit for installation and operation of cellular mobile telephone. This will create further avenues for better services in a more competitive environment.

BTTB has undertaken various programmes to install digital exchanges in rural areas. Installation of digital exchanges in 92 upazillas are in progress. 26 exchanges have already been commissioned and the rest will be in operation very soon.

Digital exchanges will also be installed in 83 more upazillas under a development project. These two projects are adding 55,600 digital Telephones in upazillas. A project is also under process to install new digital exchange in the remaining upazillas adding 72,000 digital telephones.

BTTB has already connected the upazillas with district level exchanges long time ago through digital Radio links. Steps are under way to upgrade/replace these radio links BTTB is installing digital exchanges in all the district headquarters, so far installed in 36 district headquarters and the rest are under installation and will be completed in phases within 2 years. The district exchanges have the provision of wireless Local Loop (WLL) telephone connection within a radius of 20km creating access network is rural areas independent of wire-line. To provide at least one telephone every Village, BTTB has taken up a project for which international Tender has been floated.

Since 1996, private Internet Service Providers (ISP) are operating on competitive basis in Dhaka, Chittagong and Sylhet through V-SAT. BTTB is providing Internet service with Internet backbone speed of 2 Mbs in Dhaka, Chittagong, Khulna and Bogra through its own infrastructure and satellite.

BTTB is modernizing its transmission system by installing high capacity Microwave and optical fibre link and it is expected that more than 90% of the switches and transmission system will become digital by the year 2002.

After completion of the ongoing projects, BTTB's connectivity with remaining districts will have complete digital environment through Microwave and optical fibre links.

In order to provide high speed data communication required by commerce, particularly software development and data entries BTTB has installed Digital Data Network (DDN) with speed upto 2Mbps, in Dhaka and 3 other major cities.

As a commitment to Universal access and in order to expand Internet service in all the 64 district headquarters BTTB has prepared a PCP for establishment of Info-Carrier, which is awaiting consideration by the government. This will enable to bring the districts under Broad Band Communication Network and flourishing of software and data entry business. Broad band Connectivity with Information super high way will be achieved through submarine optical fibre links and 4 satellite Earth stations.

Conclusion

Rural communication is a vital element of universal service obligation in Bangladesh. Very recently law has been enacted forming Telecom. Regularly Commission (TRC). As a Regulator, TRC is to ensure transparency in the calculation of claims, liabilities, and the settlement procedures among operators for which purpose certain uniform accounting principles and procedures, and suitable organizational setup should be established. The scope of rural communication services would need to be reviewed as more advanced services, like Internet, become available to a vast majority of the population in the country.

With the advances made in the Cellular Mobile technologies and their declining prices, it is now possible to cost effectively use these technologies for fixed wireless application. The incremental cost of providing a public Telephone in a village in the vicinity of national highway that can be covered by a Cellular Mobile Telecom. Service provider is low enough to make it the most cost-effective option. Bangladesh, through Public and Private sector initiatives combined are on the road to achieving significant success in proliferation to telecommunication service in rural areas.

BTTB as a Government body may pioneer a pilot project to extend the Internet facilities to educational institutes, libraries, hospitals and commercial pockets at village level by establishing Internet Users' Centre (IUC) and leasing them to individuals for operation on commercial basis.

The writer is the General Manager, BTTB

IP and quality of service in telephony

What will happen if a major part of the world's telephone traffic is shipped over IP technology?

G FAKHRUDDIN AHMED CHOWDHURY

THERE is enormous pressure on the providers of telephony to reduce cost, due to the increasing competitiveness in the industry. With revenue from calls falling, it is inevitable that the technology to deliver calls will need to become more cost effective than the current infrastructure of circuit switches, plesiochronous TDM, and fixed routing between carriers. The cost benefit and flexibility of router technology has been demonstrated many times in the world of private data network. It was therefore inevitable that carriers would start to look at using this technology to deliver voice calls.

The problem with this scenario is not that voice cannot be shipped as IP packets. Rather the question is "will such a strategy scale" and will it deliver sufficient quality of call so that customers will still be willing to pay for this service? For the purpose of this paper, it is assumed that carriers will want to continue to charge for calls, and the scenario where telephony is a 'free' service, with other services being used to generate revenue will be ignored for now.

To fully understand the issues that arise in carrying telephony over IP based networks, it is essential to have a clear concept of what IP is, and its original design goal, and how IP is used to carry voice, in point to point links and in networks, both private and public. In principle, voice can be viewed as just another application. However voice service has different requirements from other more typical applications of IP. The main difference is that voice service is isochronous, and the voice stream from a call has to be delivered in the same of order as it was shipped. It's not sufficient just to deliver a stream of IP packets containing the voice call.

The Nature of IP

Internet protocol (IP) was designed as part of a suite of protocols for delivery of text messages in situations where there is serious damage to the network infrastructure. It is part of a set of layers of software which break up a data stream into packets, each with a specific network address attached, and delivers these packets across a set of connected networks. Since its original implementation, IP has become the de facto standard for interconnection of data networks irrespective of the individual network architectures. The flexibility of this approach has led to the growth of the Internet, an interconnection of many networks across the globe, providing access to a World Wide Web of information servers.

IP is a connectionless protocol, which does no error checking or flow control. Being connectionless, it relies on attaching an address to each packet, and the network gateways, the routers, work out the best path to the destination. Packets may get lost, or arrive in a different sequence from that shipped. IP does nothing about this, and as a result, it is impossible to guarantee that IP packets will arrive.

To achieve some measure of end to end service, IP relies on the protocol layer above it, called TCP.

This is a connection oriented transport protocol, which takes care of breaking up the data stream into packet sized fragments, and ensuring that the fragments are delivered, as packets, to the remote machine and reassembled. TCP also manages the flow of packets between the machines, forcing retransmission of any packets which do not arrive, or which are corrupted. This architecture is quite adequate for most data applications. It has, of course, been used successfully to deliver all manners of information services, both in private networks and on the Internet. It is the basis of the emerging global e-commerce applications, and its flexibility, in terms of deployment of routers, and the ease with which new applications can be delivered globally is well known. It has also been used in trials of high-speed applications, such as video conferencing, telemedicine and teleteaching. It should be noted here that some of these applications place severe demands on IP technologies, and success has required a major expenditure of manpower to configure and manage the network infrastructure.

Using IP for Voice

Treating voice as just another application adds significant complexity to the infrastructure. In a voice application, the first requirement is to make provision for dealing with the features which are normally delivered by the present switched infrastructure. Analogue to digital conversion, by some codec, echo cancellation, and call control have been engineered to very high standards in the switched network, and need to be handled by the voice over IP application. The H.323 standards provide the framework for this, but as always there are good and not so good products available.

In telephony, the accepted standard for voice sampling is PCM or variations thereof. The sampling rate and coding leads to the need for 64kb to carry each second of a call. It is on this basis that the transmission systems are designed and engineered, and each 64kbps channel is further multiplexed to the E1/T1 digital hierarchies. However, 64kbps is not essential.

Since 70 per cent of any given call is essentially silence or pause, the opportunity for compression of the voice data stream is relatively large. In effect compression removes this silence, and as a result less bandwidth is needed for the call. This is common in the GSM network, where it is needed for maximum utilization of scarce radio frequencies in use. RPE/LTP coding can reduce the bandwidth requirement to 13kbps, and there are other codecs which can get voice as low as 4kbps.

While this is good news for the transmission engineers, it is not so good news for the people using such compressed channels. As the voice is compressed it loses substantial "information content" and the result is that the quality of the resulting transmitted voice can be distinctly poor. To make matters worse, compressed voice suffers much more from other impairments in the network, such as echo and delay. In effect, the more the voice is compressed, the more the voice quality suffers from any defects in transmission.

This of course is the critical problem in voice over IP applications. By its nature, IP is 'lossy' in that packets can get delayed, rerouted, lost, and may not arrive in the same sequence as they were sent. Additional delays can be caused by looking up routing tables, TCP fragmentation and reassembly operations, retransmission of erred packets, and the totally variable delay caused by possible network congestion. In some cases, it has been reported that the sending of a single e-mail along the same network link as a voice call can result in loss of a substantial portion of the voice stream.

Are We Heading for Meltdown?

There are applications for IP in the global information highway. Carrying traffic in point to point applications can be engineered for the bulk transport of carrier or toll quality calls. There will be some loss of quality, but this can be acceptable in situations where there are few other viable alternatives. The same is true in private network, where with a suitable investment in engineering, an 'acceptable' level of call quality can be achieved. It has to be said that in both these scenarios, the cost savings may not be as large as they might seem at first sight, if the engineering effort to maintain the call quality is included over the lifetime of the service.

The global delivery of voice calls has until now been the exclusive monopoly of a relatively small number of companies. This situation has now changed. There is a huge range of possible options for the delivery of call traffic, based on both commercial and technical factors. There is increasing discussion of a business model for calls based on a reduction in the price for call, in return for acceptance of a substantial lowering of call quality. One example is the insertion of advertising into each call. Another is the use of IP technology.

As always in telephony, the matter of scale has to be addressed. Laboratory experiment, demonstration of capability, and trial on the small to medium scale are not sufficient in themselves to ensure that large scale deployment will work. At present, about 4 per cent of the world's telephony traffic is delivered at least in part using IP technology. Others may wish to comment on the quality of such calls.

What however cannot be assured is that the shipping of the vast bulk of today's telephony traffic over current IP technologies will not lead inevitably to substantial degradation of the quality of the calls, from the perspective of the quality of current voice calls. In addition, although routers are used routinely to move large quantities of data around the world, data managers know very well the difficulties which users can have with this and how to deal with these problems based on past experience.

Voice is unlike any other application, in that it is isochronous. There is no point in delivering lost voice packets at a later time. Voice needs dedicated bandwidth. Will users accept that some of the call was lost because of traffic congestion, since TCP/IP has no means to manage the congestion? Is it good engineering practice to move large volumes of voice traffic onto IP before being sure the IP can handle the traffic, and in the present carrier market, across multiple transport networks?

IP technology may be cheaper than circuit switches. How much will it cost to reengineer the world's networks if the quality of calls falls so low that nobody makes calls anymore?

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IP Features

- IP is an addressing technology
-Communication between routers
- IP is not a transmission technology
-TDM, PDH, SDH, SDH/SONET, Ethernet
Nor is it a multiplexing technology
- IP is a connectionless datagram protocol.
- It can lose datagrams or they can arrive in the wrong order.