

...around the world

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Source: Avaya Inc.



This article outlines the situation of IP telephony in six countries in different parts of the world. IP telephony is used as a generic term for the conveyance of voice, fax and related services, partially or wholly over packet-switched IP-based networks. The countries were examined as part of the ITU Internet Country Case Study Project (see www.itu.int/ti/casestudies). They are Bolivia (South America), Egypt (Middle East), Hungary (Central Europe), Nepal (South Asia), Singapore (South East Asia) and Uganda (East Africa).^{*} The countries vary widely in socio-economic and telecommunication development. They range from least developed nations (Nepal and Uganda) with low telephone densities to Singapore, the eighth richest country in the world (measured on a GDP per capita basis), where almost every household has a telephone (see Table 1).

Overview

The status of IP telephony varies throughout the countries (see Table 2). In four of the countries described in this article (Bolivia, Egypt, Nepal and Uganda), only licensed telephone operators are legally allowed to provide IP telephony. The rationale is that IP telephony is a voice telephone service for which incumbent operators have exclusive licences. In Hungary, IP telephony was legalized in mid-1999 and

by the end of that year, there were 40 licensed providers. In Singapore, the IP telephony market was opened in April 2000 when a new *Internet-Based Voice and/or Data Service* licence was created. Any company can provide IP telephony provided they have a licence and abide by a minimum quality of service. By mid-September 2000, 70 companies had been licensed to provide IP telephony in Singapore.

Incumbent IP telephony

Even though incumbent operators in all six countries are theoretically allowed to provide IP telephony, some do not. For example, the incumbent operators in Bolivia, Nepal and Uganda do not provide the IP telephony service. This is understandable considering that the main reason for launching an IP telephony service is that it tends to offer cheaper prices than the existing international voice tariffs. Since they

^{*} The six country studies summarised here looked at the diffusion of the Internet in different sectors of the economy. A further six country case studies that looked specifically at IP telephony were also carried out in preparation for the third ITU World Telecommunication Policy Forum. These studies, which cover Canada, China, Colombia, the Republic of Korea, Peru, and Thailand, are available on the website at: www.itu.int/wtpf/ and are summarised in chapter five of *ITU Internet Reports: IP Telephony 2001*.

have a monopoly, there is little incentive to undercut their existing prices.

In Egypt, the incumbent has an agreement to deal with United States IP telephony carriers to provide voice through a direct private IP link with the US. There is a PC-to-phone service provided through Telecom Egypt's website (www.support.idsc.gov.eg) at a rate equivalent to around 20 US cents per minute. In addition, incoming IP telephony traffic is terminated by Telecom Egypt at a lower settlement rate than for PSTN calls.

In Hungary, the initiative to carry international voice traffic over IP came from the mobile operators who saw this as a way of bypassing the monopoly of MATÁV, Hungary's incumbent phone operator. Rather than miss out on this lost traffic, MATÁV itself started an IP telephony service in December 1999. It uses a prepaid calling card named *Barangoló*. Calls can be made from any phone in Hungary to around 40 countries. Prices are HUF 80 (USD 0.28) per minute to Europe and HUF 90 (USD 0.32) to North America. MATÁV also acts as a wholesaler of IP telephony traffic for other carriers, including its competitors. While the service has proved very popular, users have reported a number of problems with misdirected calls and wrong numbers.

Singapore Telecom (SingTel) has launched a couple of IP telephony services that are significantly cheaper than its normal inter-

national tariff (see Figure 1). *eVoiz* allows users to make a call from their PC to telephone subscribers in selected countries. A one-minute call to the US costs 9 Singapore cents (5 US cents) compared to 30 Singapore cents (22 US cents) for international direct dialling (IDD). SingTel estimates that *eVoiz* will add 10 million minutes per year of international traffic. SingTel's *V019* service, launched in August 2000, allows a telephone user to make an international call over IP-based networks. For example, a one-minute call to the US costs 19 Singapore cents (11 US cents), almost half the normal IDD charge. SingTel acknowledges that the quality of

Table 1 — Basic indicators (1999 fiscal year)

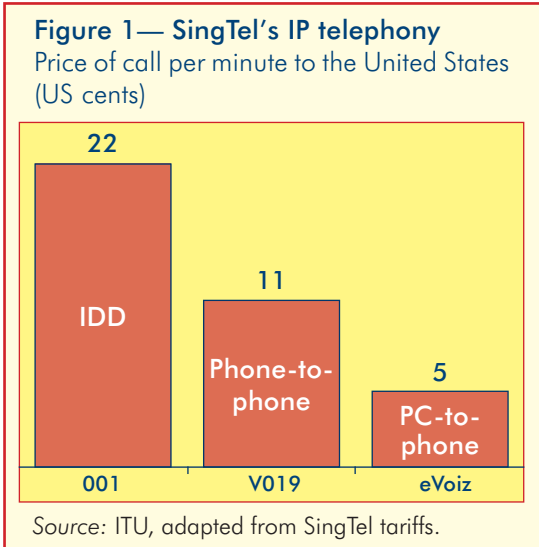
Country	Population (millions)	GDP per capita (USD)	Telephone density	Mobile-phone density	PC density	Internet density
Bolivia	8.14	2 193	6.17	5.16	1.23	0.96
Egypt	62.43	3 303	7.51	0.77	1.20	0.32
Hungary	10.04	10 479	37.09	16.21	7.47	5.97
Nepal	22.37	1 219	1.13	0.02	0.27	0.16
Singapore	3.89	27 024	48.20	41.88	43.66	24.40
Uganda	21.62	1 136	0.26	0.26	0.25	0.12

Source: ITU World Telecommunication Indicators Database.

Table 2 — IP telephony status

Country	Legal status	Situation
Bolivia	Forbidden except for licensed operators	Licensed operators not providing this service. Use is limited
Egypt	Forbidden except for licensed operator	Licensed operator recently launched this service
Hungary	Allowed for international traffic	40 licensed IP telephony providers by the end of 1999
Nepal	Voice over IP, forbidden except for licensed operator. Fax over IP allowed	Licensed operator not providing this service. Use is prevalent for both outgoing and incoming traffic
Singapore	Allowed	70 licensed IP telephony providers by the end of September 2000
Uganda	Forbidden except for licensed operators	Licensed operator not providing this service. Use is prevalent for both outgoing and incoming traffic

Source: ITU, 2001.



IP-based calls is inferior but notes in a press release that “while the V019 call quality may be somewhat below our 013 BudgetCall service, our target customers will still find it acceptable and very much value-for-money”.

Where is it coming from?

Despite the official ban against IP telephony in Bolivia, Egypt, Nepal and Uganda, it is used to varying degrees (see Figure 2). While the ban is typically enforced by blocking Internet traffic to popular IP telephony sites (in Nepal, the dialpad.com site, which offers free calls to the United States is specifically blocked), the majority of IP telephony traffic in those countries is probably incoming. That is because IP telephony companies can strike deals with local Internet service providers (ISP) who have their own international Internet gateways, for instance over VSAT (very small aperture terminal) satellite dishes. The IP telephony companies provide ISPs assistance

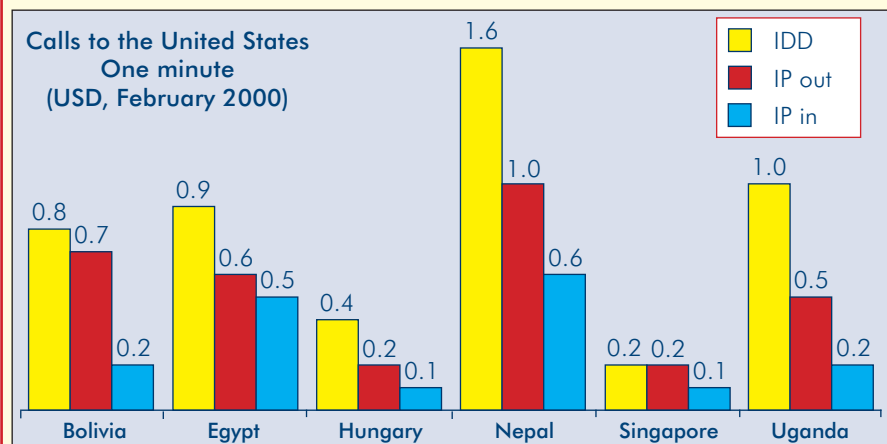
for purchasing equipment, allowing them to route international calls coming in over the Internet to the public telephone network.

In Bolivia, the telecommunications regulator has been called upon several times to warn cyber cafés about offering IP telephony. However, the current low level of Internet quality in the country mitigates against widespread use. As one user stated, IP telephony works at 3 o'clock in the morning but not during office hours.

There is some evidence to suggest that in Egypt also, incoming IP telephony traffic is more significant than outgoing traffic. For example, although Telecom Egypt's PSTN settlement rate with the United States is USD 0.35 per minute, telephone minutes to Egypt can be purchased from an exchange for USD 0.25 per minute. This lower rate reflects the special settlement rate for incoming IP telephony traffic offered by Telecom Egypt. This company also offers a wholesale IP telephony service for outgoing calls to the country's 60 or so ISPs, but it is likely that many of Egypt's ISPs have made their own deals for IP telephony traffic with other carriers. There are an estimated 3000 to 5000 users.

In Nepal, IP telephony is officially illegal as it is viewed as impinging upon incumbent Nepal Telecommunication Corporation's (NTC)

Figure 2 — Comparing prices



Note: IDD refers to international direct dialling. “IP out” refers to using Net2Phone IP telephony service within the country. “IP in” refers to using Net2Phone in the United States to call the country.

Source: ITU, adapted from PTO and Net2Phone tariffs.

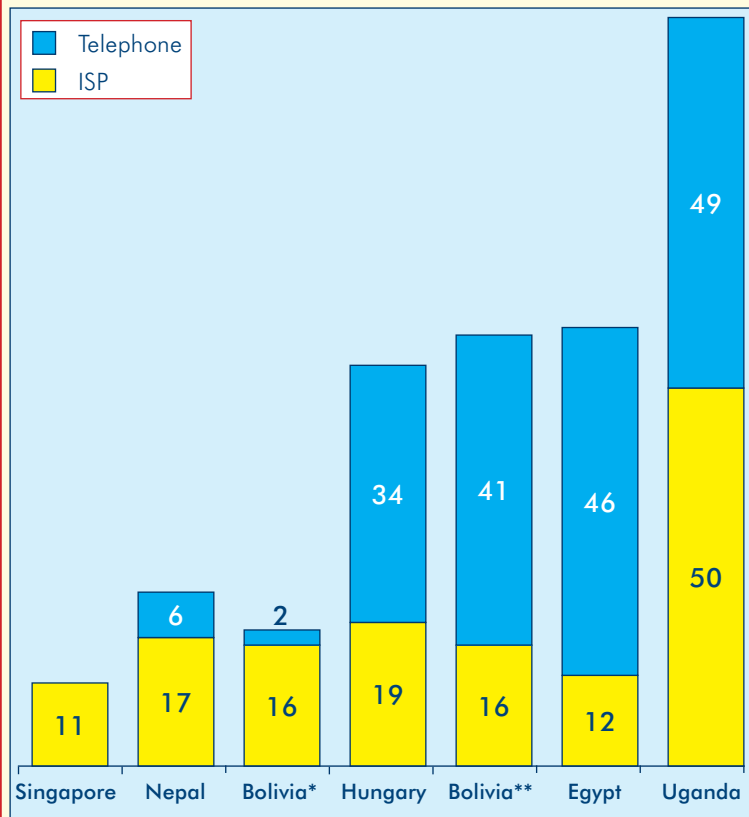
international voice service monopoly. The regulator takes a neutral view on the matter, arguing that IP telephony is almost impossible to block. However, the Ministry of Communications has obliged the regulator to notify ISPs that IP telephony is illegal. In January 2000, the regulator sent a notice to all ISPs instructing them to block access to applications such as *Dialpad*, an IP telephony service which offers free calls to the United States. However, given that fax over IP is allowed, as long as one obtains a licence, and that it is virtually impossible for ISPs to distinguish between VoIP and fax over IP, it would be surprising if the ISPs were able to enforce the ban. ISPs in Nepal argue that the ban on IP telephony is similar to an earlier one on fax machines. According to *The Kathmandu Post* of 29 January 2000: "Operator(s)

argue that NTC is doing the same [thing] it did to fax some years ago. NTC tried to block the use of fax machines fearing decline in revenue from telex. Years later, much of their income on international calls [was derived] from the use of fax machines by customers." In January 2001, the regulator called a meeting of all interested parties to discuss a new policy towards IP telephony.

As in other countries, the main usage of IP telephony may not be outgoing traffic from Nepal but rather incoming international calls. While it is difficult to obtain concrete evidence, it appears to be the case that incoming international voice traffic is coming in over the Internet and then breaking out into the PSTN locally. This service is relatively easy to provide now that VSAT data services have been liber-

alized and more than 5Mbit/s of international Internet capacity is available to ISPs. One contact described being offered tens of thousands of US dollars to host such a service, an offer which was refused, though others may not have been so circumspect. Given that the lines rented by ISPs are likely to show large volumes of incoming traffic, it would be relatively easy to hide incoming voice traffic, worth around a hundred times more per minute, mixed in with incoming IP data and fax traffic. Thus the *official* position on IP telephony becomes hard to justify when one considers that by blocking outgoing IP telephony while being unable to block incoming IP telephony, Nepal is suffering twice over: NTC is losing out on valuable incoming net settlements while the Nepalese are losing out on the chance to make low-cost foreign calls.

Figure 3 — Dial-up Internet prices (USD)
30 hours per month (December 2000)



Note: Telephone usage charges are averaged over peak and off-peak rates. The ISP prices for Nepal and Uganda are for unlimited usage. For Bolivia, telephone tariffs are for Santa Cruz* and La Paz.**
Source: ITU, adapted from PTO and ISP tariffs.

Like Nepal, Uganda's VSAT data market is liberalized. Consequently, there is more scope for bringing in IP voice traffic than is the case among Uganda's neighbours. The official situation is that only the two national telephone operators are licensed to use IP telephony. Neither claims to be actually doing so and in fact appear unaware that they are allowed to provide IP telephony. No Ugandan ISP admits to using IP telephony, though there are rumoured to be franchisees for US IP telephony companies which are active in the country. The regulator has not taken an aggressive stance against IP telephony, unlike those in other African countries.

Threat, challenge or opportunity?

It is interesting to speculate about the financial impact of IP telephony. It depends on several factors. One is how dependent operators are on international voice traffic — the main target of IP telephony. To this might be added the amount of traffic with the United States, the main source of incoming IP telephony. Another factor is the spread between local and international tariffs. This is relevant because an IP telephony call either originates or termi-

nates over the local access network so a local call charge must be paid to the incumbent operator. If the spread between the international and local tariff is not great, then there is not much margin for IP telephony to be cost effective. Another factor is quality of service. The quality of IP telephony can vary dramatically and its usage will be influenced by how much users are willing to trade off price for quality. Here developing countries are often at a disadvantage because of poor quality.

The sound quality of an IP telephony call may be just as good as a conventional one and you might even get through more easily. For example, in Uganda, only 57 per cent of international calls went through in December 1999. Some developing country PTOs continue to block outgoing PSTN calls in order to maximize net settlements. Finally, access to infocommunications equipment will have a bearing. In countries like Nepal and Uganda, where most homes do not have electricity, let alone a telephone, citizens cannot readily avail themselves of IP telephony services. A related issue is that some nations require a deposit in order to dial international calls directly. In Uganda, less than 1000 of the 60 000 or so fixed-telephone subscribers can place direct international calls. This could encourage those without this ability to use IP telephony.

Table 3 shows the volume of international calls and dependency on international traffic of the six countries. The most vulnerable countries would appear to be

Nepal and Singapore, where international revenues account for a significant proportion of total telecommunication revenue. If there was an immediate switch to IP telephony, the impact could be staggering. In Singapore, SingTel sent 885 million minutes of traffic abroad in the year ending 31 March 2000. At an average retail rate of SGD 1.21 (USD 0.70),

this traffic generated USD 618 million in revenue, some 22 per cent of the company's turnover. Assuming that all of Singapore's outgoing traffic was priced at an IP telephony rate, SingTel would lose USD 521 million of revenue, an amount more than its capital expenditure

Table 3 — International traffic (millions of minutes)

Country	Outgoing	In-coming	Total	Per inhabitant	Per main line	As percentage of revenue
Bolivia	32	88	120	15	239	35
Egypt	149	532	681	11	145	25
Hungary	229	441	670	67	180	8
Nepal	25	23	48	2	190	55
Singapore	1 350	1 080	2 430	624	1 295	39
Uganda	10	19	29	1	509	23

Source: ITU World Telecommunication Indicators Database.

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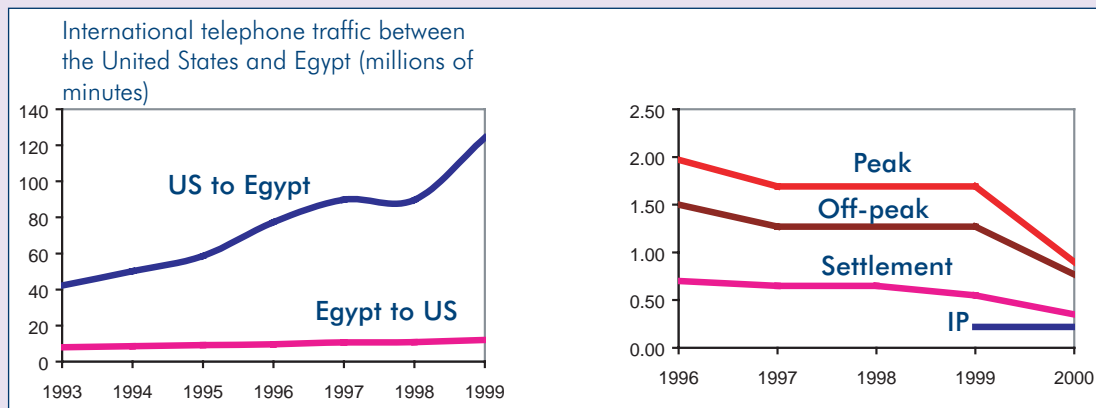
Telecom Egypt: If you can't beat them, join them!

Ties between Egypt and the United States are significant. There are over 100 000 Egyptians living, working and studying in North America. At the same time, Egypt is the second largest recipient of US-foreign assistance. Thus, there is considerable potential for international telephone calling between the two destinations. While outgoing traffic from Egypt to the United States has increased modestly since the mid 1990s, incoming traffic to Egypt increased dramatically, at least until 1998, when it stabilized (see Figure below). In 1998, US carriers started routing their traffic via alternative routes, which resulted in lower settlement payments, including refile via third countries, routing via "leaky PBXs" and, increasingly, via the Internet.

The reason that US carriers have been shifting traffic away from the direct route is due to mounting settlement payments to Egypt, which reached some USD 80 million in 1999. Egypt has been reducing its settlement rate with the United States by an average of 12 per cent per year, and has agreed to come down to US benchmark rates on schedule. This is not enough to placate US carriers, nor to offset the increasing effects of asymmetry in the traffic balance. It is estimated that around 30 million minutes of traffic from the United States was diverted in 1998. It is not possible to know what proportion of this went via the Internet, but it is thought to be a considerable amount.

Traffic and tariff trends between Egypt and the United States

The left chart shows international telephone traffic from 1993-1999 (millions of minutes). The right chart shows tariffs for 1996-2000 (USD per minute)



Source: ITU World Telecommunication Indicators Database.

Net2Phone, an IP telephony company, is known to have been particularly active in Egypt. Early in 2000, Telecom Egypt convinced the government to block Net2Phone's traffic. This has had mixed success since users can try any of the other dozen or so IP telephony services. So Telecom Egypt decided if it cannot beat IP telephony it might as well join in. In March 2000, it signed a deal with eGlobe of the US to market retail IP telephony service. The press release for the agreement shows support from the highest levels, quoting Egyptian Minister of Communications and Information Technology, Ahmed Nazif, as saying "I am pleased to offer the newest of technologies allowing our people to more efficiently and economically access the global marketplace".

Telecom Egypt is offering the new IP telephony service at 80 piastres (21.6 US cents) per minute for calls to the United States, compared to the published rate for PSTN calls of EGP 3.50 (USD 0.95) per minute. In order to promote the service, Telecom Egypt is offering ISPs and other resellers a 10 per cent discount. Even so, Telecom Egypt reports that the majority of traffic is incoming rather than outgoing, suggesting that it is being less successful than it had hoped in marketing the service nationally. One reason may be that the website it established to market the service, www.commegypt.net, is regularly congested and works only sporadically.

Telecom Egypt's rate of 21.6 US cents per minute for IP telephony is considerably below the official settlement rate with the United States, which is currently 35 US cents per minute. It is not known what Telecom Egypt is receiving for incoming calls terminated over its IP telephony service. The main point is that, at least Telecom Egypt is now gaining some revenue from what would otherwise be lost traffic. n

for the year. SingTel is hoping that most of its customers will value the quality of conventional circuit-switched calls over IP telephony. It is also aggressively branching out into Internet activities and has one of the largest Internet backbones in the world. Its fastest growing revenue stream is from Internet and other data networks which account for 16 per cent of total turnover, up from 13 per cent a year earlier.

While much concern has been on the impact of IP telephony on international revenue, price distortions in other market segments are becoming even more pronounced. Take mobile for example. In Uganda, mobile generates more revenue than fixed. Mobile pricing in that country is such that it costs as much for someone in the capital Kampala to call a mobile down the street as it does to call neighbouring Kenya. Another area is domestic long distance. In Bolivia, it costs less to call border regions in Peru than it does to call from one end of Bolivia to another. The implications of IP telephony for fixed to mobile calls or domestic long distance may be more interesting than international telephony.

Tariff rebalancing — which typically involves lowering international tariffs and raising local ones — may be seen as one solution to minimizing IP telephony. However, users will have to pay more for dial-up Internet access, which will inhibit access. The portion spent on local telephone usage charges is a significant amount (see Figure 3). The impact of local call charges is striking in Bolivia. Unlike the rest of the country, residents of Santa Cruz department pay a flat fee telephone usage charge independent of the length of the call. This is cited as one reason why Internet access is higher in Santa Cruz than other parts of Bolivia. At the other extreme is Uganda, where telephone usage charges add significantly to the Internet access bill. Users pay almost USD 100 per month for 30 hours of dial-up access spread through the day. They would pay one-third more if they access the Internet during peak times. As a result, ISPs are becoming telephone operators. Intense users are finding it is cheaper to get rid of their telephone lines and fax machines and instead subscribe to wireless connections to ISPs. They then carry out all their communi-

cation over the Internet: e-mail, IP telephony and IP fax.

Another IP telephony issue is the cost of international Internet bandwidth. This is a significant expense for ISPs outside of the United States since they must bear the full cost of the connection. IP telephony will be constrained as long as the cost of international bandwidth remains high. On the other hand, ISPs and IP telephony companies in the United States get free Internet connections to other countries. This is one reason why IP telephony prices are so much cheaper from the United States to other countries. On the other hand, IP telephony could benefit Internet development. For example, if foreign IP telephony companies forge deals with developing country ISPs that include the provision of Internet backbones and VSATs, this will add to the bandwidth of the country and enable better quality access. Local partners can also benefit from training in the deployment of IP-based networks.

The legal ban on IP telephony will disappear as countries progressively liberalize their telecommunication markets. That is because the legal ban is almost always based on the premise that IP telephony is a voice service, the exclusive right of incumbent telephone operators, rather than as a data service or an application. This premise is becoming harder to sustain, particularly as voice functions become integrated into other Web-based applications, such as e-mail or “click-to-talk” websites.

In Singapore, telecommunication markets were fully opened in April 2000. In Hungary, markets will be opened from January 2002 and in Bolivia they are scheduled to be fully opened from November 2001. Although full market opening is not foreseen in the short-run in Uganda, there are nonetheless two competing full-service private operators who have an incentive to provide low-cost service to users in order to gain market share. That leaves Egypt and Nepal where IP telephony is bound to be controversial for the next few years. In Egypt, the operator has chosen to embrace IP telephony but in Nepal the operator continues to try to suppress it. Six different countries, six different approaches! ■