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5. Author (s)

1. Nathaniel B. Clarke
- 2.
- 3.

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In Indonesia the proposal to limit the growth of phone-to-phone IP telephony and to implement an interconnection charge to avoid uneconomic arbitrage does not appear to be unreasonable. Growth of IP telephony in Indonesia may reflect real or perceived discrimination in interconnection among carriers. Such factors can impede the development of a broadband market. The major conclusions and recommendations of this report are as follows: 1) Computer-to-phone IP telephony appears to be a small threat to the incumbent's revenue base, however, bright line distinctions between IP telephony classifications will be difficult to control, and the government may face a tradeoff between stimulation of computer network use that is likely to stimulate Internet development, and protection of incumbent revenue. Computer-to-computer IP telephony raises negligible concern. 2) Internet telephony development may be a source of new revenues for incumbents as well as a spur to development, and the treatment of IP telephony should avoid retarding introduction of IP networks. As noted, phone-to-phone IP telephony is not significantly cheaper than circuit switched telephony. Predictions of IP telephony growth and traffic diversion were vastly overstated. 3) IP telephony growth may reflect perceived inefficiencies in carrier industry structure and discrimination in financial settlements rather than its viability as a standalone service. Selective licensing of IP telephony providers may be perceived as discriminatory. The goals of interconnection and settlements need to be established. 4) The purpose of establishing a "Clearing House" for IP telephony is unclear, and the objectives need to be clearly defined.

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Technical Report

Internet Telephony in Indonesia with Recommendations on Policy

By Nathaniel B. Clarke



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Introduction and Background

During the past decade, a growing number of countries have begun to implement reforms in their telecommunications sectors. These reforms reflect a greater reliance on private capital in developing the sector and the need to increase flexibility in adapting to tremendous technological advances. In developed countries, the goal has been to modernize telecommunications infrastructure and to facilitate the development of value added services. One motivation for modernization has been to foster competition in the domestic market for telecommunications. Another motivation reflects the emergence of the Internet and the desire to develop an infrastructure and domestic market for broadband communications.

In developing countries such as Indonesia, there is the additional goal of increasing the availability of telecommunication services. The result is that the outside observer can detect several contending objectives within the government communications initiatives. Internet Protocol (IP) telephony is seen as a way to liberalize the international services market, as an opportunity to facilitate the development of a national broadband market, and as a spur to domestic market development in the face of increased international competition. However, it is also seen as a threat to the existing telecommunications revenue base that is necessary to support investments in new infrastructure. Telecommunications also has been an important source of revenues to governments which policy makers understandably are reluctant to lose.

A modern telecommunications infrastructure will be critically important to Indonesia's future competitiveness. In addition to basic telephone services, communications plays a vital role in linking international financial markets and will play an ever more important role in linking domestic and international enterprise supply chains. This could be particularly important in a country like Indonesia where geographical barriers to trade in goods pose higher costs than in other countries. Information technology has the potential to reduce these costs.

Many countries, including Indonesia, had already committed themselves to free trade in value-added telecom services during the Uruguay Round. In 1997, WTO member countries extended that agreement to basic telecommunications -- local, long-distance, and international voice and data transmission. Indonesia is a signatory to both the WTO Agreement on Basic Telecommunications and the Annex, and appears committed to greater competition.

Implementation of the WTO Agreement is embodied in Indonesia's Telecommunications Law (no. 36) of 1999, while policies are discussed in the *Blue Print of the Indonesia Government's Policy on Telecommunications* of July 1999. The Telecommunications Law actually became effective in September 2000, but is general in scope and requires additional implementing regulations. The Ministry of Communications set up special teams to develop these regulations.

One area where the Government has requested assistance concerns its policies on IP telephony.² New technologies, such as IP telephony, have the potential to undercut policies based on older technologies. Early in 2002, the Government issued licenses to limited number of companies to offer VoIP services. Licenses were granted to PT Telkom, Indosat,

² Using the ITU definitions, Internet telephony and voice over private IP networks are both included under "IP telephony". The ITU reserves VoIP to describe voice over private IP networks. Indonesia commonly uses VoIP to apply to IP telephony generally. This report uses the ITU definitions as indicated in Appendix II.

and several new companies, but not to Indonesia's other Internet service providers. This gave rise to much criticism from the Indonesian private sector. In response, the Government argued that it needed to regain some control of the IP telephony market in order to allow existing state-owned companies time to adjust.

If Indonesia is to develop the necessary domestic broadband market and spur domestic manufacturers then it recognizes that it should not simply shut down the IP telephone market. The Indonesian government also believes that it cannot allow its protected telecommunications services market to be instantly opened to international competition. The government's response--offering a limited number of licenses to leading domestic companies--reflects a trade-off between control and market growth. IP telephony service is viewed by some as a possible low-price means to rapidly increase Indonesia's universal access to basic communications. The government has chosen a slower, more orderly development of the market, rather than a fully competitive market-driven approach.

Scope of this study

The government promised to evaluate the IP telephone licensing situation this fall. It requested assistance for this evaluation and for other IP telephony policy issues, such as the establishment of a clearinghouse.

This report follows round table discussions and presentations on VoIP conducted during October 14-18 in Jarkarta and Bandung. An outline of the presentation appears in Appendix I. This report is limited to the status of IP Telephony in Indonesia, including policy recommendations, based on information gained during these discussions. As noted in the report, the growth of IP telephony may be influenced by the present industry structure and interconnection arrangements. A detailed analysis of these factors is beyond the scope of this report.

Regulatory framework

The Ministry of Transport and Telecommunications formulates telecommunications policy and regulates the state-owned telecommunications companies; the Directorate General of Posts and Telecommunications formulates technical policy, grants licenses and carries out technical regulation. The regulators are independent of the operators.

Telephone Industry Structure

Basic local, long distance and international telephone service have been provided under exclusive licenses. PT Telkom has an exclusive license for domestic long distance service and local fixed line service. PT Indosat and its affiliate PT Satelindo have exclusive licenses for international calling service PT Telkom and PT Indosat are government entities that have minority private ownership interests. Local service fixed line penetration is less than four percent, and PT Telkom partners with external foreign investors under several joint operating and revenue sharing agreements (called KSOs) in regions other than Jakarta and East Java in order to finance infrastructure expansion. These arrangements are being replaced by joint venture arrangements.

Because GDP per capita is low, local rates are kept below cost (e.g., as low as 150 Rp per month), and local service costs are thought to be subsidized by domestic and international

long distance revenues. Domestic long distance telephony service local access is approximately \$0.08 per minute. International long distance domestic origination and termination is approximately \$0.22 per minute from the PT Telkom's international gateway.

In contrast to fixed line service, the fast growing wireless market is competitive with three national GSM providers led by PT Telkom's affiliate Telkomsel with a 51% market share, Indosat's affiliate Satelindo with a 25% share and Excelcomindo at 16%. Other wireless companies include three AMPS operators—Komselindo, Metrosel and Telesera—and seven holders of regional operator licenses for Digital Cellular System (DCS), only one of which is operating Lippotel commercially.

This framework is being changed by Indonesia's new Telecommunications Law No. 36/1999. The Law distinguishes between basic and non basic services. The Law phases out the exclusive rights of PT Indosat and Satelindo and PT Telkom for domestic long distance service and local fixed line service and creates a duopoly. Local fixed line telephone service in Jakarta and Surabaya—the two biggest cities in Indonesia--became open to PT Indosat in August 2002. The domestic and international long distance providers are scheduled to lose their exclusive rights in August 2003.

Non Basic Services Framework

Non basic services include those classified as multimedia services and those classified as value added data services. To get a license among other requirements, ISPs must provide business plans to the government. Internet users that connect to the Internet have to pay both telephone charges to PT. Telkom and Internet service charges to ISPs. The Internet charges vary from one ISP to another ISP.

The government has set a certain range for the Internet connection charge. But since the economic crisis, and devaluation of the rupee against the US dollar, many ISPs have charged their customers above the ceiling rate set the government. Some ISPs are offering IP telephony services to their customers. Other private companies are offering devices, such as Infotalk and other brands, that enable their customers to make long distance calls with lower rate through the Internet network without using PC.

Public phone-to-phone voice IP telephony is classified as non-basic multimedia service. Providers are defined as ITSPs. Providers of computer-to-phone and computer-to-computer IP telephony are not treated as ITSPs. Other Internet services and providers (ISPs) are classified as value added and are not regulated. Both ISP and ITSP customers pay metered local rates to reach their provider, and both ISPs and ITSPs are assigned switched access codes.³ ITSPs pay local basic rates rather than basic service access charges on calls that terminate in the local exchange.

IP telephony regulatory framework

PT Telkom, PT Indosat and PT Satelindo and several other companies provide Internet Protocol Telephony and are classified as ITSPs. Prior to a recent decision, there were approximately sixty five⁴ companies that offered Internet telephony service, and twelve ITSP

³ It is not clear whether access codes were used to overcome limited access capacity so that some ISP/IPSP subscribers were not required to dial long distance to reach their ISP, or for other reasons.

⁴ "Twelve Internet Service Providers (ISPs) Enter VoIP Business", DC/ICN No.342—June 25, 2002, p 43.

providers. PT Telkom, PT Indosat and PT Satelindo and several other companies provide Internet Protocol Telephony and are classified as ITSPs. These providers bypassed the international and domestic long distance basic services and originating/terminating service using the relatively inexpensive basic local service rates. This bypass is said to have cut Indosat's first quarter 2002 revenues by 4.1% over 2001 first quarter revenues⁵. In addition, bypass is reported to have caused a loss of Rp 75 billion in connection fees to PT Telkom, and Rp 32.5 billion in taxes to the state.⁶

A second concern is that phone-to-phone IP telephony operating through public switched network gateways will affect the continuity of local telephone infrastructure development in building more telephone lines. Because basic service local tariffs have been kept low relative to costs, local infrastructure expansion must be funded from long distance service revenues. IP telephony would eliminate this source of local line expansion, damage Indonesia's state-run basic service providers and limit their ability and motivation to invest.

Communications Minister Decision No. 21/2001 enacted June 1, 2001 revoked the licenses of the twelve ITSPs and declared public phone-to-phone Internet protocol telephony services provided by ISPs to be unlawful. Five companies have been licensed as ITSP providers to offer IP telephony on a temporary basis⁷ until a decision is made on a permanent regulatory framework which is expected in one year. The twelve previously licensed ITSPs can resume operations by obtaining local access through one of the five licensed providers.

ITSPs provide IP telephony retail service under tariffs regulated by the Post and Telecommunications Directorate General to gain some control over this market. Retail tariff ranges for the five licensed IP telephony providers will be established to avoid competition among the ITSPs. An interconnection tariff will apply to the ITSPs leased line connection from their local point of presence to the PT Telkom local networks. This tariff will be evaluated every three months during the trial period. Each ITSP is required to build in a minimum number of locations and connect on an E-1 basis where available from PT Telkom.

⁵ First quarter 2001: Rp 545, first quarter 2002: Rp 522.3. But as noted below, it may be that some of the revenue shortfall reflects Indosat's own bypass of Indonesian domestic fixed and mobile carrier terminations by routing traffic through its domestic IP telephony affiliate.

⁶ Op. Cit., DC/ICN No.342, p. 43.

⁷ The five included PT Telkom, PT Indosat, PT Satelindo and two other companies that had not previously provided VoIP. They are PT Atlasat Solusindo and PT Gaharu Sejahtera.

Summary of Roundtable Discussion⁸, Recommendations

IP telephony policy concerns, considerations and options vary by offering

Most countries have broad national concerns regarding the treatment of IP telephony. Should IP telephony providers be licensed? Should they be subject to the same regulatory regime as other telephony providers? Should they be required to contribute to universal service obligations? Should they be subject to broadcasting regulations? (e.g., on advertising, decency, content filtering etc) Should their operations be taxed? Most countries have taken a “wait and see” approach. Variations in country IP telephony requirements in Asia Pacific are summarized in Appendix III. Appendix IV provides case studies for the Philippines, Pakistan, China, Peru and Columbia.

Countries may distinguish between telephony and IP telephony by the nature of the offering: Is it real time or lower quality store-and-forward? Is the use of IP transparent to the user or is it packaged as a unique offering? Is it provided on a limited “closed user group” basis or offered “to the public” generally? Is it offered as bundled or composite multi-media offering or stand-alone? Countries may distinguish IP telephony from traditional telephony based on how it is provided: Is it provided only over an on-net Virtual Private Network (VPN)? Does it interface with the Public Switched Telephone Network (PSTN)?

IP telephony generally has been classified into three categories: phone-to-phone, computer-to-phone, and computer-to-computer.

Phone-to-phone--from any phone to any phone--from a technical perspective, requires a IP telephony gateway on both sides, a gateway manager, and a billing system (unless free). Latency and a wide variation in quality of service is an issue over the public Internet. Sometimes it takes 24 digits to reach a subscriber. From a policy perspective it circumvents lawful regulations and tariffs for origination and termination of domestic and international long distance telephone traffic, bypassing the accounting rate system and /or access tariffs.

Computer-to-phone--from multimedia PC to any phone--from a technical perspective, requires a IP telephony gateway on the phone side, a gateway manager, and a billing system (unless free). There are issues of software compatibility between PC and gateway software, and latency and quality of service over public Internet. From a regulatory perspective it involves possible by-pass of tariffs for origination and termination of international telephone traffic and bypass of accounting rate system, and possible misuse of private leased line for connection to public switched telephone network in a country where it is not allowed. While computer-to-phone IP telephony appears to be a small threat, it will increasingly raise difficult questions as to what is a computer once intelligent devices become widely available which enable phones to provide voice over the Internet. While computer-to-phone IP telephony cannot be combined with other multimedia applications, it serves to stimulate computer network use that is likely to stimulate Internet development.

Computer-to-computer IP telephony may be provided through dial-up connections to ISPs via Microsoft NetMeeting or a similar widely available software client. All IP telephony

⁸ This section is drawn from and summarizes presentations and presentation materials provided during the week of October 14-18 in Jakarta and Bandung.

processing is in the PC and no special infrastructure is required. Issues include software compatibility and latency over public Internet. Computer-to-computer IP telephony raises negligible concern to regulators. It is likely to remain as a “minor” market that is unlikely to substitute for voice traffic to impact on telephone network traffic or usage or be a threat to competition policy.

Internet telephony development may be a source of new revenues

Internet telephony may be an important source of new revenues rather than diverting existing revenues. First, Internet voice providers may stimulate new demand that from consumers that are willing to accept lower quality service at a much lower price. This market is likely to be very responsive to lower prices and would not necessarily compete with existing carrier services. Second, IP telephony may stimulate the demand for second lines. Typically, carrier local loops to customer premises contain multiple wire pairs in order to avoid the cost of “pulling” additional loops. Second lines can be activated at the customer’s serving central office at almost zero additional cost. U.S. carriers that initially vigorously opposed the use of low cost local service for ISP-originated traffic discovered that Internet traffic resulted in the demand for second and third lines which created a new revenue source at a very low incremental cost. IP telephony that stimulates demands for other applications is also likely to spur second line growth. Finally, Indonesian local rates are metered rather than flat rate. This means that the more use of the lines for additional traffic generates additional revenues.

Treatment of IP telephony should avoid retarding introduction of Internet Protocol which is a technically and economically superior path to the next generation networks.

Broadband networks provide transport efficiencies over circuit switched networks that is motivating telecommunications carriers to deploy Internet Protocol in the core of their networks. In addition, IP enables the transmission of multiple applications over a single transport infrastructure. It also is the unifying protocol that enables interoperability among corporate intranets and extranets, value-added IP transport (e.g., VPN providers), public backbone (e.g., carrier) IP networks, and single and multiple retail ISPs. It allows access to private corporate networks, public access through the Internet and access to a wide variety of IP networks. By defining interconnection at a software layer, IP networks avoid the need for end-to-end standards and enable IP telephony to be provided over any broadband access technology, such as over cable broadcast facilities, and a variety of other VoIP endpoint technologies. Examples include the Cisco SoftPhone and IP Phone, the Nokia 3G IP Concept phones, and the Microsoft Windows XP Messenger Client.

For enterprise customers, the attraction of IP telephony is the ability and cost savings to operate one network for voice and data; the ability to both offer inexpensive low-bit-rate voice, and more complex services e.g., multimedia, multiport calls, and Intelligent terminals (e.g., PC) with a better (graphical) user interface. The enterprise market must replace legacy PBXes to gain significant savings and increased functionality, such as an integration of voice and email. Content providers are integrating IP telephony applications into instant messaging, web pages and other applications. IP telephony offers the potential to better support new features and to be more flexibly integrated within new applications than traditional telephony. For example, IP telephony enables features and applications provided from multiple sources integrated by the user or for the user’s customized environment. Finally, broadband access is driving the IP telephony rollout. Cable, DSL, and 3G Wireless are completely bypassing the PSTN using IP phones or other IP devices to provide IP telephony.

Early Internet telephony providers recognized that their value add was in integrating voice applications with email, instant messaging and other applications, but consumers were only willing to pay for a discounted voice service. The promotion of a more rapid IP telephony roll out may facilitate the more rapid development of a next generation broadband infrastructure. Limiting ITSP licenses and imposing higher interconnection charges will slow the roll out of IP telephony and may slow broadband development.

Voice provided over IP networks has not proved to be significantly cheaper than circuit switched telephony

IP telephony and circuit switched costs are essentially similar as measured in fractions of cents per minute. Moreover, transmission is the smallest cost component of voice, and the savings are very small. Network costs (transmission and switching costs) contribute only 10-30% of overall costs for PTT calls. The lower bandwidth required for IP telephony is offset by the need for over-provisioning bandwidth to ensure quality. TDM switch costs in traditional the traditional PSTN are replaced by costs of routers, the gateway, the gateway controller plus cost of new billing, provisioning and other back office functions. Moreover, IP transport savings accrues to PTTs. Transport savings are achieved from a large scale of operations that works in favor of the incumbents.

The most frequent use of IP telephony today has been for international arbitrage. IP telephony is only one of several arbitrage schemes. Others include refile and callback. Rate arbitrage means that IP telephony is cheaper chiefly as a means for circumventing private and government monopolies that are charging high non cost based domestic and international long distance rates. The solution that developed country and regions have followed in response to arbitrage has been to drive access costs and settlement rates to cost. This elimination of arbitrage opportunities occurred in both Europe and North America. The result has been that in developed countries you cannot build a business plan based on arbitrage. As noted in Appendix IV, after the initial rapid growth of IP telephony in China there are indications that it will not survive as a standalone service.

Early predictions of IP telephony growth and traffic diversion were vastly overstated

IP telephony operators initially sought to promote their services with integrated e-mail , voicemail and other value added features. Neither enterprise customers nor consumers were ready for these services. In addition, the Internet infrastructure proved inadequate as a platform for voice, which required IP telephony providers to incur significant network build out costs. Finally, arbitrage opportunities were significantly reduced as tariffs were rebalanced and cross subsidies eliminated in many countries, particularly in developed countries. Most IP telephony providers (PSINet, Global Crossing, and Genuity) are bankrupt. because the arbitrage model was simply not profitable.

IP telephony growth reflects inefficiencies in segmentation of the Indonesian carrier industry and financial settlements arrangement among carriers

International carriers worldwide have found that they could avoid payments of international settlements under accounting rates by handing off their originating traffic to IP telephony providers to bypass settlements. In Indonesia IP telephony may be used as a form of general domestic and international bypass that appears to be practiced by all carriers. PT Telkom

appears to use IP telephony to bypass the international provider carrier Indosat. Indosat may use IP telephony to bypass both PT Telkom and wireless companies for the termination of inbound international traffic. Wireless operators have their own domestic backbones but in the past they had been required to pay PT Telkom for the long distance portion of the call. This arrangement appears to have been replaced by an interconnection tariff but prior to the change it undoubtedly motivated wireless providers to use IP telephony providers for terminations.⁹

Wireless providers pay interconnection charges for calls that originate on their networks and terminate on PT Telkom's network. It has been suggested that they are not compensated by PT Telkom for calls in the reverse direction. Wireless providers have an incentive to use IP telephony to avoid actual or perceived discriminatory settlements, as well as to avoid the high costs of international interconnection through Indosat. It appears, therefore, that IP telephony providers have become partners of different segments of the Indonesian carrier industry.

Selective licensing of IP telephony providers may be perceived as discriminatory

The government has allocated licenses to the three incumbent operators, as well as to two domestic companies that currently do not provide IP telephony services. Given the perception that carriers utilize IP telephony in order to avoid interconnection and settlements, the preferential license process could also be viewed as discriminatory. If the incumbents do use IP telephony to avoid settlements, then the selective licensing would increase the incumbents ability to discriminate and exert market power over competitors. The use of Class License procedures, rather than selective licensing would ensure neutral, transparent procedures and avoid the charges of discrimination, non neutrality and the lack of transparency.

Clear goals of interconnection and settlements need to be established

The proposed interconnection charge that will be imposed on ITSPs is designed to avoid uneconomic arbitrage, and allow a transition from internal subsidies to cost-based settlements. Subsidies promote inefficient consumption, depress elastic demand for desirable service, and may easily be used as a way for incumbent monopolists to deny consumers the benefits of efficient competition by foreclosing potential competitive entry. The interconnection charge may be set to (1) cover the costs of interconnection, (2) recover the incumbent's revenue foregone as a result of ITSP entry, or (3) promote ITSP entry and reflect the lower retail value of IP telephony service.

The goal of a cost-based local access tariff is to promote ITSP entry only where it offers cost savings over the incumbent's service. A charge that is too low will stimulate overuse of the carrier's local facilities and deter use of alternative facilities, such as cable or wireless. A charge too high will deny consumers access to services that could be efficiently provided at reasonable costs. Costs should be forward-looking and reflect efficient capacity utilization.

⁹ There are indications based on a brief conversation that one or more wireless providers continue to believe that the present arrangements are discriminatory. This may also be reflected in Indonesian Telecommunications Industry Workshop: Best Practices and Globally Competitive Rules, Regulations, and Policy. Jakarta, Indonesia May 15, 2001. (<http://www.us-asean.org/ctc/telecomworkshop/>).

An alternative goal of an interconnection charge may be to recover carrier net revenues lost or forgone as a result of ITSP entry. ITSP entry would only be practical provided ITSPs enjoyed a significant cost advantage over the incumbents. Based on the conclusions noted above, a charge based on foregone revenue would most likely make ITSP entry unprofitable. The one exception is the possible savings on outbound international traffic from avoiding foreign settlements and accounting rates. Where high long distance and international rates are used to subsidize below-cost local rates, an “access deficit charge” (ADC) may be imposed to prevent uneconomic traffic diversion. An ADC essentially enables the maintenance of the internal subsidy by imposing the same subsidy per minute on ITSP long distance minutes. Interconnection based on foregone revenues or ADC is not always transparent and neutral and is inconsistent with the efficient development of a competitive market. The incentive will be for incumbents to use ADC charges to protect their profitable markets from competitive entry.

If an ADC is imposed, it should be allocated among ITSPs and PT Telkom’s services on a neutral basis, such as relative minutes. In addition, interconnection access costs and the ADC should be kept separate. This will facilitate the goal of eventual eliminating the subsidy and migrating to a neutral and transparent universal service charge.

Finally, an interconnection charge could be discounted to reflect the lower retail “price points” necessary for ITSP entry. Phone-to-phone VoIP is inferior to carrier grade voice service. Consumers will buy lower quality service only at a lower price. Retail prices must be discounted also to overcome other inherent limitations, such as two-stage dialing, as well as to overcome the incumbent’s inherent advantages.

“Clearing House” objectives should be clearly defined

IP Telephony providers found that the Internet infrastructure would not support real time voice communications and they were forced to build or lease a private infrastructure to connect the cities they wished to serve. As noted above, this made the widespread deployment of IP telephony networks costly. Establishing “clearing houses” enabled IP telephony providers to avoid having to build out their networks to all locations by facilitating trading between interconnected partners. The government had great success in establishing a domestic Internet exchange which facilitated domestic interconnection and the growth of domestic Internet infrastructure based on peer-to-peer settlements. The exchange consolidated international bandwidth which enabled domestic ISPs to avoid duplication and to obtain more favorable terms for international circuits. It may have similar goals in establishing an ITSP clearing house, e.g., facilitating the development of a domestic IP infrastructure for IP telephony, negotiating international bandwidth, and promoting the development of peering arrangements with international IP telephony providers. Smaller regional ITSPs may use the clearing house model to compete against national ITSP and to promote the rapid growth of national Indonesian networks. On the other hand, the purpose may simply be to exert control over market development by tracking traffic and revenues. The government should more clearly define its objectives.

Arbitrage between IP telephony classifications will be difficult to control

As noted, there appear to be several conflicting objectives that need to be reconciled. Internet Protocol telephony is seen as lever to liberalize the international services market, and as an opportunity to facilitate the development of a national broadband market. However, it is also

seen as a threat to the existing telecommunications revenue base that is necessary to attract the necessary investment to deploy a new infrastructure. Telecommunications has been an important source of revenues to the government. The government plans to treat phone-to-phone under its ITSP regulations applying an interconnection charge with an ADC. On the other hand, computer-to-phone VoIP and computer-to-computer IP telephony are treated as unregulated Internet service. This distinction appears to reflect an admirable effort to reconcile the conflicting goals of IP network development and competition promotion while protecting the incumbents' revenue base.

Because the proposal is to apply an interconnection/ADC tariff only on phone-to-phone IP telephony, ISPs providing computer-to-phone or computer-to-computer IP telephony will have a competitive advantage. This will create strong incentives to terminate phone-to-phone traffic under the computer-to-phone classification.¹⁰ Just as both PT Telkom and PT Indosat are bypassing domestic and international regulations using IP telephony, carriers in other countries are using providers classified as ISPs to bypass terminating carriers in their countries or in other countries. This suggests that arbitrage between classifications will be difficult to stop. Once ISP traffic—whether data or voice—is handed off through the local ISP gateway, it will not be possible to separate traffic from these different classifications.

Conclusions

There appear to be conflicting objectives with regard to IP telephony. On the one hand, it may be viewed as a way to liberalize the international services market; as an opportunity to develop a national broadband market; and as a low-price way to increase universal access to basic communications. However, it is also seen as a threat to the existing telecommunications revenue base necessary to support the necessary to attract new investment. Developing countries often are characterized by low GDP per capita, low line penetration and the need for significant infrastructure development. Other sources of revenues to support basic local service subsidies are often not available. Under such circumstances it is understandable that IP telephony raises valid concerns that rate arbitrage may retard infrastructure development.

In countries with local, long distance and international rates properly aligned, phone-to-phone IP telephony has not proven to be cheaper than telephony or profitable as a stand-alone service. That Indonesia seeks to control the growth of phone-to-phone IP telephony should not, by itself, impede development of a national broadband market. IP telephony provides value add to users when combined with other valued applications that the telephone network cannot provide. Thus, the proposal to limit the growth of phone-to-phone IP telephony and to implement an interconnection charge to avoid uneconomic arbitrage does not appear to be unreasonable.

Growth of IP telephony in Indonesia may reflect real or perceived discrimination in interconnection among carriers. Such factors can impede the development of a broadband market. The major conclusions and recommendations of this report are as follows:

Computer-to-phone IP telephony appears to be a small threat to the incumbent's revenue base, however, bright line distinctions between IP telephony classifications will be difficult to control, and the government may face a tradeoff between stimulation of computer network

¹⁰ See Appendix IV, which describes a computer-like terminal device used in Peru which made the clear distinction between phone-to-phone and computer-to-phone difficult to implement.

use that is likely to stimulate Internet development, and protection of incumbent revenue. Computer-to-computer IP telephony raises negligible concern.

Internet telephony development may be a source of new revenues for incumbents as well as a spur to development, and the treatment of IP telephony should avoid retarding introduction of IP networks. As noted, phone-to-phone IP telephony is not significantly cheaper than circuit switched telephony. Predictions of IP telephony growth and traffic diversion were vastly overstated.

IP telephony growth may reflect perceived inefficiencies in carrier industry structure and discrimination in financial settlements rather than its viability as a standalone service. Selective licensing of IP telephony providers may be perceived as discriminatory. The goals of interconnection and settlements need to be established

The purpose of establishing a “Clearing House” for IP telephony is unclear, and the objectives need to be clearly defined.

Appendix I. VOIP Presentation

I. Introduction and Overview

Internet

Non Internet IP networks

Broadband Access technologies

Internet Telephony vs. IP Voice

PSTN v Internet

II. IP Telephony

Internet Telephony v IP Voice

PC-PC

PC- Phone

Phone-Phone

Voice to IP to Voice: translations,

Gateways: PSTN/IP to IP/PSTN

III. IP Telephony/PSTN Interoperability

Addressing/ Routing/Numbering

DNS v PSTN Numbering/Routing

Network Transition

IV. IP Telephony Business Model and Trends

Internet v PSTN

Costs: arbitrage (accounting rates, access charges),

Broadband savings: integrated voice data (e.g., IP PBX)

Service savings: multiple applications call centers, enhanced applications

Size of market and growth

V. Regulatory and Policy Issues

Convergence

Regulatory Parity and Licensing

Infrastructure Support

Legacy Costs

FCC IP Telephony Policy

EU IP Telephony

Survey of other countries

Appendix I1 ITU Definitions

Internet Protocol (IP) Telephony: The transmission of voice, fax and related services over packet-switched IP-based networks. Internet Telephony and VoIP are specific sub-sets of IP Telephony:

Internet Telephony: IP Telephony, in which the principal transmission network is the public Internet.

Voice-over-IP (VoIP): IP Telephony, in which the principal transmission network or networks are private, managed IP-based networks (of any type).

Different types of IP Telephony can be identified according to the type of terminal used, where gateways are located, and the underlying transmission means. The major types discussed in the background paper are **PC-to-PC**, **PC-to-Phone** and **Phone-to-Phone**.

The **Public Internet** (also referred to as *the* Internet): The global, public, IP-based meta-network created by the interconnection of many public and private IP-based networks.

Appendix III VoIP Regulation in Other Asia Pacific Countries

<i>Country</i>	<i>Regulatory requirement to provide VoIP service</i>	<i>Can VoIP be provided today?</i>	<i>Comment</i>
Australia	Provision of ISP services does not require any regulatory filings (class license regime).	Yes	Interconnection to the PSTN authorized at both ends for domestic calls, at one end only for international calls.
China	100% Foreign Ownership Restriction	No	New policy likely in the course of 2000.
Hong Kong	Provision of VoIP requires an international simple resale license.		PSTN interconnection authorized at one end only.
India	Prohibited	No	-
Japan	There are no specific policy governing VoIP, but MPT has expressed support to “data based networks integrating telephone, ATM and IP systems”. Provision of ISP services requires a Special Type II license (for international non-facilities based services)	Yes	Interconnection to the PSTN authorized at both ends.
Korea	Provision of VoIP requires “specific telecommunications services” and registration	No.	-

Malaysia	Grey area. Provision of ISP services (including access services) requires a VAS license.	Yes	VoIP offering should be limited to CUGs. No interconnection to the PSTN (ON-ON only)
New Zealand	Provision of ISP services requires a notification	Yes	
Philippines	The regulator is allowing duly registered VAS providers to offer VoIP on an experimental basis only, and provided the provider does not get additional profit from providing the service.	Yes (See restrictions and comments)	The provider of the VoIP service shall: <ul style="list-style-type: none"> - not charge a separate telephone usage fee similar to international direct dial charges. - Ensure that subscribers use computers as terminals (not ordinary telephone sets). - Not allow subscribers to resell the service
Singapore	Provision of ISP services (including VoIP) requires a SBO (Service Based Operator) license	Yes	-
Taiwan	Grey area. Provision of ISP services requires a Type II non-facilities based license.	Yes (See comment)	VoIP offering limited to CUGs. ON-ON only (No interconnection to the PSTN).
Thailand	Grey area. Requires locally-owned entity to form a JV with CAT (CAT owns a minimum of 33% in the JV)		Interconnection to the PSTN is prohibited (ON-ON only)

Appendix IV: VoIP Regulatory Case Studies

Pakistan

Internet is a de-regulated sector in Pakistan and currently there are no restrictions or limitations governing its user access. A license is required. No foreign ownership limits apply. ISPs in Pakistan are not allowed to provide telephony and facsimile services as they have a direct impact on the revenues of Pakistan Telecommunication Corporation Limited (PTCL)-- a state-owned monopoly. PTCL offers a standard, non-negotiable tariff rate to all the ISPs.

Voice telephony over the Internet is presently not allowed. However, the PTA is reviewing its policy regarding the transmission of facsimile messages through the Internet as this mode does not involve any real time communication.

Officially none of the ISPs in Pakistan offer or advertise IP telephony services; however, out of the total 80,000 Internet users in Pakistan less than 5,000 are known to be sending voice messages from computer to computer.

PTCL, which has the sole monopoly for fixed line telephony in Pakistan, presently does not have any plans to develop or test IP telephony services. However, after the year 2003 this may change as PTCL will no longer enjoy its present monopoly status and, in light of added competition, may seriously consider this option.

Philippines

The National Telecommunications Commission (NTC), the Philippine regulatory body, considers the Internet to be a value-added service (VAS) with no license requirement. A VAS is a deregulated service and can be provided by both the public telecommunications entities (PTE) and non-PTE. A private company interested in being an Internet Service Provider ISP or a VAS provider must register with the NTC and must secure a certificate of registration. Prospective non-PTE providers do not need a legislative franchise as long as they do not construct their own telecommunications networks. VAS providers must rely on the transmission, switching and local distribution facilities of local exchange carriers (LEC), inter-exchange carriers (IEC) and international gateway facility (IGF) operators. An ISP can only lease the transmission or distribution networks of duly authorized telecom carriers. Non-PTE VAS providers duly registered with NTC include about 140 ISPs, Edinet Philippines, Inc., audio text service and voice mail service.

NTC considers Internet as part of the telecommunications industry and it is subject to the constitutional ownership rule of no more than 40 percent foreign equity share. There is no defined list of services which an ISP can provide. The NTC, however, allows all ISPs to provide all types of value added services except telephony or voice services which can only be offered on an experimental basis. Further, ISPs are not allowed to gain profit from this service.

Leased line connection tariffs provided by authorized carriers to the ISPs are regulated by the NTC. Aside from the Philippine Long Distance Telephone Company (PLDT), there are other local exchange network operators in different service areas of the country. Monthly tariffs for their dial up line do not vary that much. ISPs can lease dial up lines from PLDT or other local

exchange carriers, depending on which areas the ISPs wish to operate in.

The NTC, cognizant of the fact that the demand for Internet telephony is increasing, is allowing duly registered VAS providers to offer Internet fax and Internet telephony on an experimental basis only. The NTC, however, clearly stated that VAS providers should not gain additional profit from providing these services, and Internet telephony is subject to the following conditions:

- A. ISPs shall not charge a separate telephone usage fee similar to international direct dial charges;
- B. ISPs must have an agreement with the authorized PTE for offering the service;
- C. VAS providers shall also ensure that users are subscribers of existing ISPs which are duly registered with the commission.
- D. VAS providers shall ensure that subscribers use computers as terminals (not ordinary telephone sets) for Voice over IP; and
- E. VAS providers shall not allow subscribers to resell the service.

China

In the late 1990s, small computer shops used the Internet to provide domestic and international long distance calls, at significant cheaper prices compared to China Telecom. The Ministry of Information Industry (MII) initially resisted the proliferation of IP telephony and tried to arrest and close down violators. However, prosecution was overturned by the courts and government officials at the MII created a new licensing framework for Internet telephony operators, limited initially to the government-affiliated telecom bodies – China Telecom, China Unicom and Jitong.

China's IP telephony market in April, 1999, with MII issuing licenses to begin six-month trial, later extended to one year, in a limited number of cities. The participating companies issued IP telephony phone cards that contained a unique account number. China's official licensing and commencement of IP telephony was expected to begin sometime early in 2000. However, in reality it had already been launched by the end of 1999 with four trial operators building networks and marketing their services.

MII had conflicting objectives in promoting IP telephony. One was the threat of IP telephony on the state's revenues. A second was whether to emphasize control or market growth. On the one hand, IP telephony was seen as a way to quickly achieve universal access recognizing that cheap access and high-speed connectivity would result in China being positioned to participate more effectively in international commerce. On the other MII wanted to prevent the results of chaotic market competition, partly to manage domestic market development in the face of increased international competition. However, by 2000, with the PSTN telephone rates more aligned with costs, the IP telephony business model looked increasingly unprofitable.

Peru

OSIPTEL, the Peruvian regulatory body, initially supported complaints by the principal telecommunication operator Telefónica del Perú (TdP), the sole operator for local and long-distance fixed telephony prior to August 1998, against ISPs providing IP telephony for offering long-distance national and international telephone service without a license.

An ISP, the Peruvian Scientific Network or RCP was authorized to provide value-added services. However, OSIPTEL subsequently ruled that no license was required for marketing an intelligent computer device designed to transmit telephone calls via the Internet using the Internet Protocol (IP). Numerous other companies began offering voice over IP (VoIP) services. A large group of those firms are new license holders for long-distance or local telephony. These companies opted to play it safe by obtaining licenses to provide the service. The emergence of many new licensees, especially for long-distance telephony, has been made possible by the Ministry of Transport and Communications' policy of granting licenses since the full liberalization started. As of May 2000, OSIPTEL stated that it will issue an interconnection mandate, will set the new rate for local interconnection expected to be below the current rate of \$0.029.

IP telephony development is closely related to the Peruvian telecommunication market. Telecommunications vertically integrated companies, as in the case of TdP, which enjoyed temporary monopoly conditions until 1998, and FirstCom. These companies, both competitors and suppliers of the specialized, non-vertically-integrated competitors, such as RCP, attempted to discriminate by employing price squeeze or exclusionary tactics.

Columbia

Telecommunication is competitive in Columbia. By 2000 there were over 50 operators providing basic local telephone service, four cellular telephone operators, and over a 100 value-added operators. In December 1998, Colombia became the first LA country to have IP telephony provided by wireless operators apparently due to a lack of clear regulations governing Internet telephony provider. These operations were subsequently closed down by the national administration to deter the expansion of unauthorised IP telephony services in the country. In response to allegations by authorized long-distance operators that unauthorized international voice transmission services were being provided, authorities investigated more than 20 value-added service operators. Some were closed down. The authorities are pursuing conflicting objectives. On the one hand they are promoting the development of broadband communications and information technology as laid down in the National Development Plan. On the other hand they are being required to determine whether value-added service providers can provide IP telephony.