Voice Over Internet Protocol:
Status and Industry Recommendations

Presented as Guidance to the U.S. Department of State
By the Advisory Committee on International Communications and Information Policy

I. Introduction

A broad range of services, including voice, video, and data, can be enabled to ride on Internet Protocol ("IP") networks. These digital networks require less financial investment, are cheaper to build and operate than traditional circuit-switched networks, and are better suited to provide a range of improved, innovative, and economic service offerings to users of all kinds.

There are many benefits to IP networks, and, in particular one of its applications—Voice over IP (VoIP). First, IP networks are cheaper to deploy. One key benefit that is driving widespread adoption is the tremendous cost savings realized by these networks, which may use both wireline and wireless infrastructure. Second, because of the architecture of IP networks, digital packets of information move in an efficient manner (as opposed to in the end-to-end circuit model), more effectively utilizing the capacity of the network. Third, the multifunctional nature of IP networks allows the cost of the network to be spread more widely since the same network is used to provide all kinds of services (voice, video, data, etc.). Providers of networks and businesses who are adopting IP are already realizing these savings and efficiencies.

IP networks and the applications that run on them provide more choices to users. For example, purchasers of VoIP service may be able to choose to receive their messages in written or voice form, or use their phone number even when they are traveling. VoIP is just one application on an IP network that can support many different applications. Because a company can offer VoIP services without owning its own network, there are fewer barriers to competitive entry, enabling a multitude of competitors to offer consumers more choice and lower prices, and even integrate aspects of video and data services that ride on the same network, to create exciting new products.

Given all of the economic and consumer advantages that VoIP and other IP-enabled services offer, a country will be at a disadvantage if it does not embrace VoIP. Countries that require all voice traffic to be carried over circuit-switched networks and delay adoption of IP networks are committing their future to networks that are becoming obsolete and dooming their country to incur greater expenses for fewer capabilities than other countries. Countries that follow this course will increasingly fall behind, depriving their citizens and businesses of the opportunity to share the benefits of rapid innovation, more competition and lower prices. Indeed, IP networks are already in wide use for the carriage of international traffic, including voice.

Countries are finding ways to embrace the opportunities that VoIP and other IP-enabled technologies provide. Many countries are trying to create a flexible regulatory environment that facilitates investment, competition, innovation and the deployment of IP networks and applications like VoIP. A few others are moving in a different direction, paying less attention to the tremendous benefits, opportunities and savings from this technology and more attention to

how to ensure that VoIP calls do not undermine revenue from high international charges, which is harder to do over IP networks because of their architecture.

This paper is intended to review briefly the technology and its benefits, policy recommendations for how countries should treat both the IP technology and its applications, and how countries and multi-national policymakers are approaching IP-enabled technologies, particularly VoIP, and the policy issues surrounding VoIP.

II. The Shift to IP In Networks

The shift to IP-enabled services represents the most fundamental shift in communications networks in recent years. Today, IP is driving the same kind of revolution in voice and other applications that IP provided in the data-networking world thirty-five years ago. This revolution in technology is enabling new kinds of Internet services, including VoIP.

VoIP is delivered as an application. Many of the VoIP service providers today are providing only the application, while an entirely different provider may provide the infrastructure. IP enables this separation of infrastructure and application.

The history of VoIP usage began with early conversations over the Internet by some computer users. In its early stages, VoIP required a headset plugged into users' computer systems, and users could only communicate with others with a similar set up, whom they phoned ahead or sent a text message to, alerting them to the upcoming voice exchange at a particular time. The various ways IP have been used to support voice communications have changed rapidly over the last few years; this is shown in Figure 1 below.

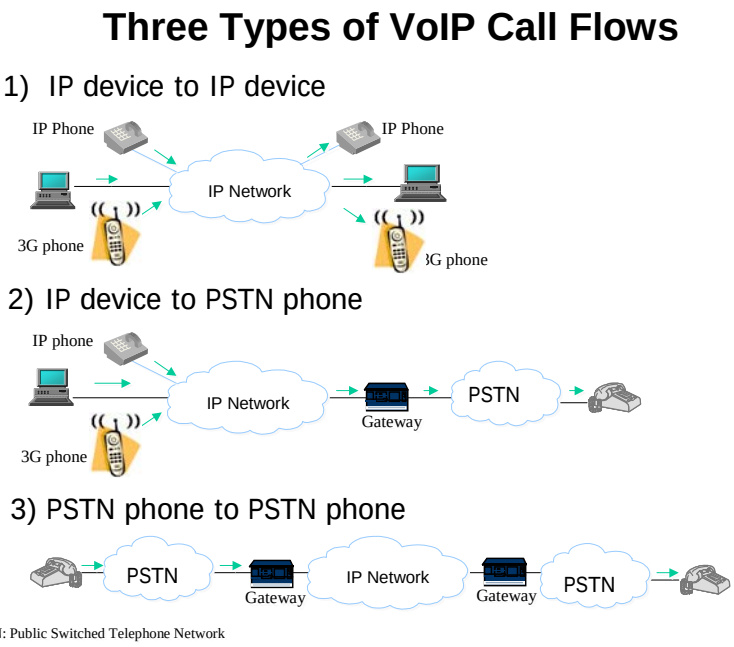

Figure 1

Today, the phrases "IP Telephony," "Internet Telephony" and "VoIP" are all used, in some cases interchangeably, and in other cases, with distinct meanings. Newton's Internet Dictionary defines these phrases as follows:

Internet Telephony: "In the beginning, Internet telephony simply meant the technology and techniques to let you make voice phone calls—local, long distance, and international—over the Internet using your PC…the definition of Internet telephony is broadening day by day to include all forms of media (voice, video, image), and all forms of messaging and all variations of speed from real-time to time-delayed."

IP Telephony: (As defined by Microsoft) "IP Telephony is an emerging set of technologies that enables voice, data, and video collaboration over existing IP-based LANs, WANs and the Internet. Specifically, IP Telephony uses open IETF and ITU standards to move multimedia traffic over any network that uses IP (the Internet Protocol)."

Voice over IP (VoIP): "The technology used to transmit voice conversations over a data network using the Internet Protocol. Such data network may be the Internet or a corporate Intranet, or managed networks typically used by long distance and local service traditional providers and ISPs that use VoIP."

More recently, voice over Broadband (VoB) has been introduced as a descriptive phrase by the DTI and UK regulator. This phrase, while potentially "catchy" hasn't received much recognition outside of the UK regulatory environment. The ITU Telecommunications' Sector Study Group (SG-2) responsible for developing definitions for ITU T's work has so far not defined VoIP. They have provided definitions for IP Telephony and Internet Telephony[1]. While the communications network providers and their suppliers are moving rapidly to adopt IP in the communications networking infrastructure, enterprise users are also beginning to adopt IP throughout their complex systems and networks used for private business networks. This can enhance corporate efficiencies by facilitating communications among employees whether working at corporate locations, working at home, or traveling. Most enterprises are experimenting with VoIP in small doses, by first installing a remote office with VoIP, doing a trial, or engaging in incremental upgrades. The typical multinational corporation's perspective could be paraphrased as: It isn't a question of "if"; it is a question of "when" we will move fully to VoIP.

Government agencies in many countries are already embracing IP networks and adopting VoIP along the way. In addition, individual users are increasingly looking for the kind of advanced applications that can be provided in an all IP-enabled world. IP networks provide distributed intelligence throughout the networks, smart end points and smart applications. Also, IP networks are capable of delivering voice communications, as well as the seamless convergence of data, voice, and video applications, across multiple and diverse devices. The benefits of IP in the networks also extend to the cost of developing and upgrading applications; upgrades in an IP network are easier and less expensive to make, thus enabling the development of new innovations more rapidly, and at lower cost. Benefits also exist in the life cycle of IP systems and networks, with feature enhancements; updates and maintenance of these systems

[1] International Telecommunication Union at http://www.itu.int/home/.

made electronically, thus improving the performance, and lowering the maintenance costs over the life of the system.

Even as this migration is taking place, the full adoption of IP in the communications networks will take several years to complete, with the co-existence of the Public Switched Telephone Network (PSTN) and IP networks expected to continue through the transitional period. At the same time, new broadband wireless capabilities are emerging in the marketplace. Indeed for many countries, wireless provides a new, exciting, and affordable approach to bringing communications technology to their citizens, who today lack landline access. The developing countries offer exciting adoption of wireless in all flavors, and indeed 3G wireless will continue to advance most rapidly in Africa, Latin America, and the Asia Pacific. IP will be the bridge between the PSTN, wireless and the new broadband IP world.

With the new capabilities supported in the IP enabled world, new services are more easily provided to the end user, both in the enterprise and in the publicly offered services. Voice is now integrated with other applications; some of the new services are:

- Presence detection (instant messaging, "find me" services);
- One number/"follow me" services;
- Universal messaging;
- Virtual meetings/collaboration at the individual and enterprise levels;
- Real time language translation;
- Multi-Point Video Conferencing;
- Push-to-talk cellular; and
- Voice chat.

Now that voice can be just one more application in an IP network, innovation is rapidly occurring. Users are finding VoIP services attractive, regardless of their country or region. Recognizing that the first benefit that users experience is lowered cost, VoIP for some users is merely a way to avoid the traditionally high cost of some network communications services. But, the greatest benefits occur when there is a broadband architecture at the ends of the networks—or the so-called "last mile." Therefore, users who already have high speed Internet—whether broadband wireless, Digital Subscriber Line (DSL) or cable—are now able to subscribe to a high quality VoIP service and get the benefits of "all distance" calling: new integrated features formerly reserved for business enterprises, such as personal conference bridge services and "follow me" services. Thus, for some broadband users VoIP has emerged as a driver of the rollout of broadband at the ends of the networks. At the same time growth of broadband deployment is encouraging the adoption of VoIP.

But VoIP is sometimes perceived as a threat to the traditional incumbent telecom services of many developing countries. While there is much discussion about lost revenue and threats to the present providers, the facts tell a different story. First, while VoIP is real competition and is growing rapidly, according to *Telegeography 2005*, today only 7 percent of the public Internet traffic is VoIP, and overall, approximately 11-12 percent of the total voice traffic in the world is VoIP. Second, in some developing countries incumbent providers have embraced VoIP and are offering it themselves. But it is understandable that some governments are concerned when the

highest uses of VoIP exist in developing countries with the highest settlement fees. These governments fear the continued loss of telecom settlement fees. Of course, VoIP actually is a whole new paradigm about networks and applications, but getting to that discussion can be challenging for many national regulators.

Even as users embrace VoIP, it actually is the IP technology that allows voice to be just one, among a multitude of applications, like Instant Messaging, text messaging, video, and so on. This is a new and complex world. It isn't simple any longer. Countries, whether in the developed world, or in emerging economies, or in the least developed regions have questions about how to treat IP networks, and VoIP.

III. Benefits of VoIP: Case Studies and Success Stories

The benefits of VoIP to users and providers include increased access to information, elimination of boundaries, reduction of costs, consistent quality of service, and enhanced revenue. Specifically, in promoting access to information, VoIP:

- Enables growth in penetration of information services to the home whether via cable, DSL, or other emerging access technologies;
- Is media independent;
- Promotes social development through access to an integrated IP network that facilitates distance learning, telemedicine, and e-government; and
- Promotes economic development through access to new markets.

VoIP technology eliminates boundaries by giving users the flexibility to use one or more communications devices, such as a PC, telephone, PDA, wireless phone, or even a TV set-top box. In addition, VoIP integrates voice in other services that can be offered cost effectively since the network operation is streamlined. Furthermore, VoIP eliminates boundaries between wireless and wireline devices and facilitates interconnection. VoIP technology also can permit geographic independence, mobility, and the potential for convenience of access via one number anywhere.

Costs are reduced in a number of ways when VoIP technology is deployed. For voice traffic, data is compressed and transmitted over an IP-based computer network, which means that VoIP uses up to 90 percent less bandwidth than a traditional PSTN call. Installing a packet-switched network costs about a third of a circuit-switched system and can save about 50-60 percent in operating costs.

IP networks can be specifically designed to deliver quality of service for VoIP. Managed "IP" networks support the capability to prioritize the voice and ensure prompt and consistent communications regardless of how congested the network. In that environment the user does not distinguish a difference in quality between a managed VoIP call and a traditional POTS call.

Finally, VoIP enhances revenue by bringing in new revenue sources, even where there is a drop in traditional revenue sources. Enhanced revenue includes:

- Extra local traffic because VoIP increases total traffic carried over local networks;
- Second lines to homes and more leased lines;
- Growth in backbone traffic;
- New services, such as call transit service through VoIP gateways, unified messaging services, IP virtual private networks for businesses, and VoIP clearing house services for ISPs.

A. Developing Country Government Agencies using VoIP

Developing country government agencies are beginning to use VoIP. The following examples illustrate recent programs funded by the ITU. The lack of examples emphasizes the need for further development in this area.

Bulgaria

Bulgaria's ITU-funded e-government project enables highly secure, efficient and cost-effective interaction between government officials from a selected number of government departments thereby supplementing face-to-face meetings and creating efficiency in the exchange and transmission of documents. This project addresses the challenges of building security and trust on public networks. Ministers and senior Government officials of the Bulgarian Government are able to use ICTs for the exchange of sensitive messages and documents using digital signatures and strong encryption and digital certificates stored on smart cards. Each government entity will be provided the hardware and software to interoperate with existing IT infrastructure (software applications and hardware) used today.

Cameroon

Cameroon currently is implementing an ITU-funded e-government project: "Enhancing Government Services Through the Use of Secure and Trusted Internet Infrastructures and Applications: To Assist and Facilitate Government Efficiency in Cameroon by Providing Internet-Based Services and e-Applications to its Citizens." According to the ITU, this initiative will be achieved by enabling cost-efficient and secure communication and exchange of information for the inter-governmental agencies using ICTs. Information and communications technologies through e-government services could play an important role in extending Cameroon’s government services to citizens in most urban areas where the physical administrative infrastructure does not exist. Funded mostly by the European Commission and by ITU, the implementation and coordination of this project will be carried out by the ITU in 2005.

Rwanda

Rwanda currently is implementing an ITU-funded e-government project: "Enhancing Government Services Through the Use of Secure and Trusted Internet Infrastructures and Applications: To Assist and Facilitate Government Efficiency in Rwanda by Providing Internet-Based Services and e-Applications to its Citizens." According to the ITU, this initiative will be fulfilled by enabling cost-efficient and secure communication and exchange of information for the inter-governmental agencies using ICTs. Information and communications technologies

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B. Consumer and Business Uses of VoIP

There has been some deployment of VoIP by consumer and enterprise users, although examples are limited. It is likely that there will be increased growth in this area in 2005.

Australia

In Australia, Telstra, the incumbent local and long distance service provider, introduced IP telephony service in 2003. In February of 2004 wholesale bandwidth giant Comindico launched a wholesale VoIP service, eCall, which weighs in at just 8 cents for untimed local calls, 6 cents per minute for national calls, and an 8-cent flat rate for untimed calls between eCall customers anywhere in Australia. An added benefit of this service is that virtually any ISP will be able to bundle Comindico voice calling with their broadband services at very little incremental cost—and also offer online service configuration, call forwarding to hunt groups, and unified messaging.

With over 700 ISPs currently operating in Australia, competition over VoIP customers will be intense. Nearly any company could theoretically resell wholesale VoIP services to its customers—opening up tremendous possibilities for large retailers with equally large numbers of customers.[2]

Hong Kong

Hong Kong Telecom introduced VoIP for its local and long distance telephony services. Although revenue from traditional international voice traffic decreased by 18 percent, revenue from VoIP increased by 145 percent.

Korea

For Korea Telecom, revenue from Internet services increased 10,000 percent from 1999 to 2003, accounting for 13 percent of total revenue.

Romania

The incumbent operator, Romtelecom, which has a penetration of around 20 percent, has only deployed VoIP through ARTelecom, its ISP business division. However, the number of new entrants has grown rapidly. There are two different approaches: one based on the Romtelecom's infrastructure, used for some operators mostly for prepaid and postpaid calling services. The other approach is based on those operators that already have a CATV network

[2] David Braue, "VoIP: Great Equaliser or Great Threat," Voice and Data Online, Feature Articles 2004, http://www.voiceanddata.com.au/vd/feature_article/item_072004b.asp

(CATV in Romania has a great penetration in urban areas—more than 1.5 million households). There are more than 100,000 subscribers connected, and the forecast for 2005 is good.

These new entrants focused mostly on providing international service, which in turn led to a steady decrease of these prices (e.g. 30 percent for Romtelecom). As an example, the prices for international call using VoIP are as low as 0.072euro/min (U.S. Destinations). In the past few months the interconnection agreements between the new operators, Romtelecom, and mobile led to a decrease in prices also for national calls (0.0395euro/min), but here Romtelecom, due to its huge subscribers base, can still control the prices.

Singapore

Singapore Telecom is realizing its fastest growing revenue stream (now 16 percent) from Internet and other data services.

Thailand

Thailand CAT Telecom introduced free, unlimited-based domestic long distance telephone calling to all household and corporate customers.

Zambia

Zambia Telecommunications Company Limited will be installing new equipment for VOIP in 2004-2005. IP Planet of Israel is supplying the equipment. In addition, regarding VOIP policy, it is undergoing development by the Zambian government. Updates may be obtained at the web site at: www.caz.gov.zm.

IV. Emerging Global Policy Issues:

Public policy makers around the world are facing a similar set of questions regarding VoIP, its benefits, its role in bringing more affordable communications services, how and whether to have a licensing regime; whether to treat it as an information service or as a telecom service. Policy issues that are presently under discussion include the following:

- Numbering
- Emergency Service Access
- Universal Service
- Network Security
- Law Enforcement Access

Each of these policy issues presents unique challenges both to governments seeking to serve the public interest while also encouraging competition, as well as to VoIP service providers seeking to keep costs to a minimum while providing seamless, competitive, and efficient services. The purpose of this section is to raise awareness of some of these potential policy issues and identify the challenges they present.

Numbering

Even though in the future different types of addressing, such as Session Initiated Protocol (SIP) addresses, "handles," may be used to access different IP-enabled devices—including those that provide voice communications—today and for the near future, telephone numbers are an essential element to VoIP's use and success. With respect to numbering, governments may consider whether reasonable and efficient access to telephone numbers is essential for VoIP Service providers. The primary argument in favor of allocating geographic numbers to VoIP services is that these numbers may be considered to support competition, particularly if they are combined with number portability. Some governments may decide to open new number ranges for movable VoIP services (see Germany, Section VI below). VoIP service providers may oppose number ranges that are distinct from existing number ranges for traditional circuit-switched voice services as these may hinder competition.

Number portability is also a primary enabler of competition by allowing users to retain their telephone numbers when changing service providers. Governments may view number portability as a tool to reduce market entry (if prohibited) or, other the other hand, as a key facilitator of consumer choice and competition. Governments will need to consider whether number portability is possible for all services.

Emergency Service Access

Governments generally view access to emergency services as extremely important for their citizens, regardless of how a telephone service may be classified for regulatory purposes. From a public interest viewpoint, governments like to ensure that access to emergency services is available from as wide a range of electronic communications services as possible. However, governments, when setting VoIP policy, may need to consider whether the infrastructure presently in use to provide emergency services to users of traditional telephone services is compatible with the provision of some types of VoIP services. In particular, the market has not yet resolved the practicalities of call routing and handling and, consequently, it may not be feasible for governments to mandate emergency service access to IP network services, such as VoIP, as has been done with other voice services. Nonetheless, governments could consider requiring VoIP providers that include access to the public telephone network to give precise information to users on how the VoIP providers deals with access to emergency services or caller location. In the future, once fully IP-enabled systems and networks are deployed, VoIP providers can be expected to provide emergency communications that are equal or superior to those provided through traditional voice services.

Universal Service

Universal service is generally determined to be the provision of a defined minimum set of services to all users at an affordable price. Governments may determine that this minimum set of services includes connection to the public telephone network and access to publicly available telephone services at a fixed location. It may also include directory inquiry services, public pay phones, and special measures for disabled users. In order to ensure that all consumers have access to this minimum set of services, governments may designate one or more operators to

provide different elements of universal service and/or to cover different parts of the country at an affordable price. Unless exempted under the threshold of the defined minimum set of services, governments may determine that providers of VoIP services may be required to contribute to the cost of Universal Service. However, VoIP providers may argue that their services are exempt from the minimum set of services and, therefore, Universal Service obligations do not apply. On the other hand, some hold the view that all communications service providers, and possibly all information service providers, should have universal service obligations.

Network Security

Governments consider that providers of publicly available communications services should take appropriate measures to safeguard the security of their services. For VoIP services, this could include measures to protect against viruses and denial-of-service attacks. Governments may also require VoIP providers to inform their users of possible security risks.

Law Enforcement Access

The ability for law enforcement authorities to access communications networks (often referred to as Lawful Intercept) also is an issue of great concern to governments. VoIP providers and industry analysts point out that due to the differences between the protocols used in packet-based networks such as the Internet and circuit-switched telecommunication networks such as the PSTN, a requirement that VoIP providers provide the same type of access to voice traffic would inhibit innovation. VoIP providers may need to work with governments and law enforcement authorities to develop common standards for lawful intercept of VoIP services. Common standards would also make it easier for equipment manufacturers to develop the necessary products and procedures to support lawful intercept from the start instead of trying to develop bolt-on solutions to this difficult problem later.

V. Recommendations

The following are recommendations concerning the role of government in the development of VoIP policy and regulation from U.S. industry for the U.S. Government to use in bilateral discussions with other governments.

- Decision-making processes must be transparent. Regulation should foster deployment, capital investment, and competition. Regulatory decisions should be made in a timely fashion and incorporate flexibility, and should encourage innovation and competition.
- Avoid imposing legacy regulations on VoIP and IP networks, including today's international telecommunications settlement regime. A light regulatory approach is appropriate, especially where competition takes root. Greater regulation is appropriate to protect users and competitive opportunity where competition is not taking place, but should be reduced as competition is established. As in all markets, competition law should also remain available to guard against anti-competitive behavior.
- Work to promote achievement of social policy objectives such as law enforcement, emergency services and other national interests—but drive these objectives in an evolutionary manner, relying whenever possible on industry-developed standards, moving

toward achievement of these goals consistent with the capabilities of the technology without stifling the service in the meanwhile.

- Users should be able on a non-discriminatory basis to run applications of their choice and to attach any devices that they may choose on underlying networks—particularly broadband connections since those are typically necessary for VoIP to work today—consistent with the user's service plan, unless there would be harm to the network, or theft of service would be enabled.

VI. Survey of State of Policy Today[3]

A. Background on Policy Status

As countries formulate technology policy it can be helpful to consider the potential influence of the policy on the development and implementation of technology and services. Internet-based technologies, such as VoIP in particular, have the potential to communicate across the globe without regard for physical boundaries between countries. A general survey of the current state of policy development pertaining to VoIP may assist countries as they consider how best to approach the policymaking process.

B. Survey of Different Approaches Underway by Countries

This paper presents a general survey of VoIP policies under development from 2004 to early 2005 and attempts to gather information from both developed and developing countries while also providing a regional perspective. The following examples illustrate the varying state of policymaking with respect to VoIP, ranging from countries that have no specific policy, to those with precise and even restrictive regulations. This is not an exhaustive survey. As will be seen, many developed as well as developing countries have not begun to consider how to approach VoIP and may still be in the early stages of implementing telecommunications liberalization policies. Even developed countries, such as European Union member countries, are still in the policy development consultation process, or have formulated only very specific regulations. The following summaries by region give some indication of the development of VoIP policies and regulations in developed and developing countries. This section includes some comments on the advantages or disadvantages of some of the policies with respect to the recommendations provided in Section V above.

C. Summary of VoIP Policies and Regulations by Region

1. North America

<u>United States</u>

On February 12, 2004 the FCC initiated a major proceeding to examine opportunities that allow users greater choices created by voice services provided over the Internet. According to the FCC the ruling is also designed to provide a measure of regulatory stability to the

[3] Survey text and data compiled by Hedlund Global Consulting as part of a private project.

communications marketplace and to further promote the development of these Internet-based services. The *Notice of Proposed Rulemaking*[4] adopted recognized not only that Internet services should continue to be subject to minimal regulation, but also that mechanisms to implement important social objectives, such as public safety, emergency 911, law enforcement access, consumer protections and disability access, may change as communications migrate to Internet-enabled services.

Canada

In the preliminary view of the Canadian Radio-television and Telecommunications Commission (CRTC), issued on April 7, 2004, voice communications services using IP that provide universal access to and/or from the Public Switched Telephone Network and utilize telephone numbers that conform to the North American Numbering Plan (referred to in the CRTC Public Notice as VoIP services) have characteristics that are functionally the same as circuit-switched voice telecommunications services. As stated by the CRTC, it is the Commission's preliminary view that its existing regulatory framework should apply to VoIP services, including the CRTC's determinations related to forbearance.

This preliminary view appears to go beyond minimal regulation of VoIP and could result in regulations that constrain service providers, both incumbents and new entrants, from deploying VoIP services since these would appear to be subject to the same regulatory framework governing the provision of PSTN services.

2. Latin America

Mexico

Mexico reluctantly allows VoIP services, but is concerned about illegal service providers. The Mexican government considers VoIP providers to be voice telephony providers without distinction from traditional long distance or local service providers. Thus, VoIP providers have the same licensing requirements and contributions to universal service funds as any other voice (local or long distance) carrier. The Mexican government classifies a VoIP provider as an illegal carrier if it is not properly licensed or not making contributions to universal service funds. Mexico is currently involved in a study to evaluate the benefits of further deregulation in the VoIP market. The Mexican government has recently shut down a number of VoIP operators it considered to be illegal.

The Mexican government's approach to VoIP regulation would appear to be very restrictive. The fact that the government is taking steps to shut down new entrants to the VoIP market if they do not meet licensing requirements suggests that the deployment of VoIP services will be slow to develop in that market and that there will be little, if any, competition offered to the services offered by incumbent operators. In addition, Mexico's policy would appear to be designed to unfairly favor the incumbent operators over any new entrants.

[4] Federal Communications Commission, *Notice of Proposed Rulemaking In the Matter of IP-Enabled Services*, WC Docket Number 04-36, February 12, 2004, http://hraunfoss.fcc.gov/edocs_public/attachmatch/FCC-04-28A1.txt

Brazil

VoIP services are allowed and are offered by a large number of service providers, including U.S. companies. There are no specific regulations or legislation pertaining to VoIP in Brazil. While this may appear to be a commendable approach and one that would encourage new entrants, the lack of any specific regulation also creates uncertainty since Brazil is unlikely to be able to avoid addressing the issue of VoIP policy.

Peru

In Peru, VoIP services are allowed and offered by a large number of service providers, including U.S. companies. VoIP provides competition to Telefonica in Peru (the incumbent service provider). VoIP providers have been licensed since 1996 in Peru, and in 2000 there were 28 providers licensed. Peru is part of an ITU case study on VoIP. OSIPTEL, Peru's telecommunications regulator, is reviewing regulatory options, but is unlikely to adopt any new regulations that would limit the abilities of operators to provide competition to Telefonica.

Peru's approach to VoIP appears to provide both a level of regulatory certainty to encourage new entrants in the market while also recognizing that it may be too early to develop further policies concerning VoIP.

Colombia

VoIP services are allowed in Colombia and are provided by a limited number of service providers. VoIP is considered a voice telephony service and is subject to all the licensing and universal service contribution requirements that apply to any provider of voice telephony services. Colombia is extraordinarily concerned with illegal service providers. The operators that legally provide VoIP services in Colombia are those that are already licensed for other voice telephony services and licensing fees in Colombia are high (about $150 million for a long distance license), limiting the interest of new entrants in the market to provide voice telephony services. Colombia is currently engaged in a study on licensing fees and is expected to reduce those fees when that study is completed, some time in 2005.

Until Colombia's extraordinarily high licensing fees are eliminated for new providers of VoIP services, the current regulatory environment will be deemed too prohibitive for new entrants. This policy appears to unfairly favor incumbent providers. Without further changes in its policy, there will likely be little competition in this market in VoIP services or deployment of new services.

3. The United Kingdom and Europe

United Kingdom

The United Kingdom's regulator, the Office of Communications (OFCOM) opened a public consultation on September 6, 2004 "New Voice Services—A Consultation and Interim

Guidance" to consider issues relating to VoIP[5]. Comments were accepted until November 16, 2004. The interim rules do not require VoIP providers to offer access to emergency services, nor do they require the same level of emergency access available from providers of traditional telephone services, so long as users are adequately notified.

In addition, VoIP providers are allowed to assign telephone numbers from the same numbering ranges as providers of traditional telephone services. The rules also do not create regulatory distinctions based on whether a particular VoIP service appears similar to traditional telephony, or whether the service is used as primary or secondary line. Finally, VoIP providers do not have to offer the same features as those available to users of traditional telephone services.

European Commission

On June 14, 2004 the European Commission's Information Society Directorate-General released a Commission Staff Working Document on "The Treatment of Voice Over Internet Protocol (IP) Under the EU Regulatory Framework."[6] The document explains the conditions that apply to different types of VoIP services and the degree to which a provider of these services will face obligations under the EU Regulatory Framework depending on the type of service offered. The consultation document discusses issues in relation to the provision of emergency services and calls on market players to work together to find solutions. The document further discusses the rights and obligations of Publicly Available Telephone Service (PATS) and the extent to which these rights and obligations may apply to certain types of VoIP services. The Consultation Document proposes, but does not mandate, that National Regulatory Authorities (NRAs) should provide a standardized declaration to PATS providers concerning the applicable conditions of the general authorization of the EU Regulatory Framework.

The Consultation Document is an important first step in creating a VoIP policy in Europe and the consultation process encouraged wide participation from all industry providers. While the policy recommendations in the Consultation Document suggest a minimal regulatory approach to VoIP, each member state will develop its own specific policies under the EU framework, with varying degrees of regulation. Until there is a harmonized approach to VoIP regulation across the EU, there will remain a high degree of regulatory uncertainty.

Ireland

On June 17, 2004, the Commission for Communications Regulation (ComReg) issued a Consultation Paper on Numbering for VoIP Services. Responses were due July 30, 2004. Although the Consultation Paper introduced many of the broader issues surrounding the introduction of VoIP services in the Irish context, the purpose of the Paper was to address

[5] Office of Communications (OFCOM), "New Voice Services—A Consultation and Interim Guidance," September 6, 2004, http://www.ofcom.org.uk/consult/condocs/new_voice/anew_voice/?a=87101

[6] European Commission Information Society Directorate-General Commission Staff Working Document, "The Treatment of Voice Over Internet Protocol (VoIP) Under the EU Regulatory Framework," June 14, 2004, http://europa.eu.int/information_society/topics/ecomm/doc/useful_information/library/commiss_serv_doc/406_14_voip_consult_paper_v2_1.pdf

numbering for VoIP services, since "numbering is a key requirement to facilitate the launch of new services and to ensure interoperability with existing networks."[7] However, ComReg also is using the Consultation Paper as a medium to open debate on VoIP in Ireland. As a result of the Consultation Paper, certain VoIP operators that qualify as Electronic Communication Services (ECS) but not as PATS may now also be eligible to receive numbers for their customers, in accordance with ComReg document 04/103 "VoIP services in Ireland: Numbering and related issues"[8].

Germany

The Regulatory Authority for Telecommunications and Posts (RegTP), announced with two Administrative Orders dated August 19, 2004 the locality-based allocation of local network call numbers by providers of Voice over Internet Protocol (VoIP).[9] RegTP ruled that local network call numbers for Internet telephony offers may only be allocated to customers within their relevant local networks. RegTP is also examining the provision of a separate subrange for national subscriber numbers for VoIP services. Both to this end and for the general regulatory classification of Internet telephony or VoIP, RegTP has carried out public hearings and is currently evaluating them. Allocations on national numbering were announced in November 2004 in the 032 range with the first allocations made in 2005.

While RegTP has been relatively quick to address the issue of numbering, Germany has not taken the further—and more important step—of concluding a consultation process on VoIP regulation more broadly. New entrants to Germany's telecommunications market have long complained that RegTP's policies unfairly favor the incumbent operators. Without further regulatory certainty with respect to VoIP, Germany will likely continue to be a difficult market for new entrants providing VoIP services.

Moldova

The Republic of Moldova fully liberalized its telecommunication market as of January 2004. In particular, the VoIP segment of the market has also been liberalized. There are currently 3-4 private companies that are providing VoIP services and 10 additional companies have sought and received licenses to provide VoIP—although not all are currently providing services. The government of Moldova has shown that developing countries can move ahead in the area of VoIP policymaking to create a dynamic environment for competition and the deployment of new services.

Romania

In 2002, the national regulatory agency (ANRC- National Regulatory Agency for Communications) issued an order regarding unbundling the local loop. At the beginning of 2003, the voice market was opened to competition so any service provider could offer fixed

[7] Commission for Communications Regulation, Consultation Paper on Numbering for VoIP Services, June 17, 2004, http://www.comreg.ie/_fileupload/publications/ComReg0472.pdf
[8] Commission for Communications Regulation, "VoIP Services in Ireland: Numbering and Related Issues, 04/103, http://www.comreg.ie/_fileupload/publications/ComReg04103.pdf
[9] Regulatory Authority for Telecommunications and Posts, Administrative Orders, August 19, 2004

voice communications, subject to a licensing procedure (although there is no charge for a license). This procedure encourages the deployment of VoIP because it does not restrict or specify the technology used by the service provider to deliver fixed voice communications. Consequently, most of the new entrants are choosing VoIP. As of 2004, there were 41 licenses issued.

4. Africa

South Africa

Voice over IP will be the fastest growing technology application among South African corporations this year, according to research firm World Wide Worx. A survey conducted by the company indicates that VOIP will develop from the emerging technology it was in 2003 with 78 percent of the surveyed corporations using it in 2004, up from 31 percent in 2003. With 100 corporations taking the survey, amounting to more than 10 percent of Johannesburg Stock Exchange-listed corporations, World Wide Worx says the results are a good indication of future VOIP use. With deregulation of telecommunications being implemented on February 1, 2005, it will be legal to use VOIP for all calls and not just for calls within an organization's network as the existing law states.[10]

5. Asia

Australia

The Australian Communications Authority (ACA) is reviewing telecommunications regulations pertaining to VoIP. The ACA has called for industry and public comment on the issues raised in its discussion paper, *Regulatory Issues Associated with Provision of Voice Services Using Internet Protocol in Australia*[11], released in October 2004. The review aims to identify regulatory challenges resulting from the increased availability of VoIP services and make recommendations to the government about how those challenges might be met. Comments were due December 31, 2004.

The ACA is taking an important first step in the development of VoIP policy. However, it remains to be seen whether the process will consider the views of all providers—incumbents and new entrants—and how quickly a regulatory structure will be introduced. Until there is a policy, the market will be governed by regulatory uncertainty and a current policy environment that tends to favor the incumbent provider.

[10] Stuart Lowman, "VoIP to Saturate in 2005," ITWeb, January 5, 2005, http://allafrica.com/stories/200501040582.html

[11] Australian Communications Authority, *Regulatory Issues Associated with Provision of Voice Services Using Internet Protocol in Australia* http://www.aca.gov.au/aca_home/issues_for_comment/discussion/ACA_VoIP_DP.pdf

China

At present, all major operators and many other companies offer phone-to-phone VoIP service in the form of subscription and calling cards, where users dial an access code such as "17900" before the called number. The service is extremely competitive, as the actual price has fallen considerably in the past few years. In terms of PC-to-PC calls, the Ministry of Information Industry (MII) has not come out with an official definition for the service. Most in the industry, however, think PC-to-PC VoIP falls in the category of value-added service whereby it does not involve PSTN switching and routing as seen in Tom-Skype, MSN and many others available on the web. Recently, 263 Group, one of the largest IT companies on the mainland, began to provide broadband VoIP that allows users to dial directly from a broadband connection without going through the PSTN. At this time, it is not clear as to what the Chinese government will do about this type of service. Users may be required to pay for registration or a monthly fee that includes unlimited VoIP calls. For broadband VoIP service, it is usually included in the monthly charge.

Finally, the issue of "basic" and "value-added" service is subject to debate. While VoIP users actually pay for the service, the money does not go to incumbent operators but a host of new service providers, and this is why incumbent operators are trying to block or delay legislation that may favor the deployment of VoIP by their competitors. The ambiguity of current policy shows the government wants to protect the incumbents but also recognizes the service can benefit the public and market growth.

Singapore

Singapore has an open public consultation concerning the policy framework for IP telephony and electronic numbering. As such, there are no final rules in place concerning the offering of VoIP services. Positive aspects of the consultation include: a general approach by the Info-Communications Development Authority ("IDA") to impose regulations only to the extent necessary to address economic, social/public and regulatory concerns; allow for the licensing of VoIP services as either facilities-based or services-based operation; allow for interconnection between VoIP providers and the PSTN as well as mobile networks; forbearance from imposing quality of service obligations on VoIP operators; and allow VoIP providers to determine whether to provide access to emergency services so long as such providers inform users of whether access is available.

Hong Kong

On October 4, 2004 the Office of the Telecommunications Authority (OFTA) released a Consultation Paper on "Regulation on Internet Protocol (IP) Telephony. Comments were due by December 4, 2004. In its consultation, OFTA is of the preliminary view that "the minimum and proportionate level of regulation should be applied to IP Telephony subject to preserving the achievement of certain social objectives."[12] The consultation also suggests that it may be necessary for VoIP services that provide substitute services for the public telephone services to

[12] Hong Kong Office of Telecommunications Authority, Consultation Paper, "Regulation on Internet Protocol (IP) Telephony, October 4, 2004, http://www.ofta.gov.hk/report-paper-guide/paper/consultation/20041004_summary.pdf

meet certain minimum conditions for connectivity, emergency services, and number portability. However, since VoIP may be considered a new class of services different from the traditional circuit-switched telephone service, the regulations of the Fixed Telecommunications Network Services (FTNS) may not apply.

The Consultation Paper is an important step in the development of VoIP policy and preliminary proposals in the Paper suggest that the Hong Kong government may be considering a minimal regulatory approach.

Korea

Korea has taken a different path than the United States in deciding how to manage Voice over Internet Protocol (VoIP) telephony. The Ministry of Information and Communication (MIC) formally opted on September 1, 2004 to regulate VoIP as a basic telecommunications service rather than consider it an unregulated value-added Internet service, and promulgated a Ministerial Decree amending the Telecommunications Business Act to govern VoIP service. The regulations provide for two types of operator licenses, impose minimum quality of service standards, create a system for providing telephone numbers to VoIP subscribers, and govern interconnection.

The decision to regulate VoIP is intended to promote development of the VoIP market by encouraging participation of the country's major telecommunications service providers, and as a stepping stone towards MIC's policy goal of migrating to a completely Internet-based telephony system by 2010. Nevertheless, VoIP remains controversial, with heated debate over interconnection, billing, and its impact on the overall telecommunications market.

VII. Additional References

The following links to sites and documents may be useful as references on VoIP policy and activities.

European Regulators' Group Common Statement on VoIP
http://erg.eu.int/doc/publications/erg05_12_voip_common_statement.doc

Remarks of FCC Chairman Michael Powell, *"Preserving Internet Freedom: Guiding Principles for the Industry"* Silicon Flatirons Symposium on "The Digital Broadband Migration: Toward a Regulatory Regime for the Internet Age," University of Colorado School of Law, Boulder, Colorado
http://hraunfoss.fcc.gov/edocs_public/attachmatch/DOC-243556A1.doc

Federal Communications Commission, *Notice of Proposed Rulemaking In the Matter of IP-Enabled Services*, WC Docket Number 04-36, February 12, 2004,
http://hraunfoss.fcc.gov/edocs_public/attachmatch/FCC-04-28A1.txt

Canadian Radio-television and Telecommunications Commission, Telecom Public Notice 2004-2, *Regulatory Framework for Voice Communication Services Using Internet Protocol*, April 7, 2004, http://www.crtc.gc.ca/archive/ENG/Notices/2004/pt2004-2.htm

Office of Communications (OFCOM), "New Voice Services—A Consultation and Interim Guidance," September 6, 2004 http://www.ofcom.org.uk/consult/condocs/new_voice/anew_voice/?a=87101

European Commission Information Society Directorate-General Commission Staff Working Document, "The Treatment of Voice Over Internet Protocol (VoIP) Under the EU Regulatory Framework," June 14, 2004, http://europa.eu.int/information_society/topics/ecomm/doc/useful_information/library/commiss_serv_doc/406_14_voip_consult_paper_v2_1.pdf

Commission for Communications Regulation, Consultation Paper on Numbering for VoIP Services, June 17, 2004, http://www.comreg.ie/_fileupload/publications/ComReg0472.pdf

International Telecommunication Union
http://www.itu.int/home/