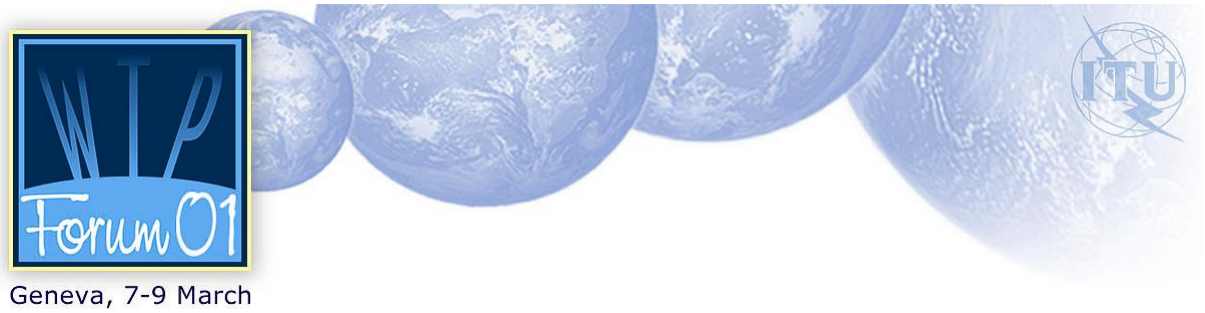

Geneva, 7-9 March

COMMENTS ON DRAFT REPORT OF THE SECRETARY-GENERAL ON IP TELEPHONY FOR THE WTPF 2001 FIRST DRAFT - 1 NOVEMBER 2000

1. COMMENTS RECEIVED FROM **CONCERT**

Concert would like to congratulate the authors of this paper for an excellent first draft on a complex subject. As with all significant changes in our industry, IP Telephony represents both a challenge to some industry participants and an opportunity to others. Rather than divide the ITU's Members into these two camps, the Draft Report wisely seeks to explain IP Telephony, explain how it fits into the broader changes underway in our industry – both technological and market-driven --, and identify the affects it may have on governmental telecommunications objectives that policy and regulations are intended to serve.

It is Concert's view that IP Telephony should be viewed as one of the many applications that employ IP technology. It should, therefore, be treated in government policy and regulation as all other IP applications are treated. It may represent a strong catalyst for driving prices for voice services to incremental costs. The ITU should view this positively, which would help achieve both the ITU's objective of reasonably priced services and the objective set forth in D.140 of cost-orientated settlement rates. Over the longer-run, however, it is actually one of many applications that will be run over IP-based networks, either as a stand-alone service or integrated with other features into new services. These innovations will be driven by software and intelligence devices located at the periphery of the networks, not located in the network core as in switched circuit networks. Applications driven by the innovations in the peripheral devices speaks to an industry that is far more diversified and customer-oriented than the traditional centralized network-oriented industry for which traditional telephony regulation was created. The challenge of this Policy Forum will be to avoid applying the archaic telephony regulatory schemes to the IP industries while at the same time sketching a road-map for achieving legitimate governmental telecom policy objectives in the industry of the future.

There is clearly the potential for the ITU's Membership to be divided over discussions regarding telecommunications policy for IP Telephony. Some may call for the new technologies to be regulated like the old and some may call for the new technologies to remain governed by the disciplines of the marketplace. However, to the extent that the Report and the discussions can be focused on how best to achieve legitimate government telecommunications objectives within the context of changing technologies and industry structures, the Forum will be less divisive and more productive.

The ITU and its Members should recognize that IP technologies represent a natural evolution of telecommunications technology and of the industry. All applications are migrating to IP; for example, customers are accessing information via Web browsers rather than making a call to a toll-free 800 number. All PTOs, both traditional and non-traditional, are facing the challenge of migrating their networks and their applications and services to IP technologies. PTOs are facing customer demand for both voice telephony services and for Internet access. Over time, the technology will allow both sets of demands to be met with one integrated network, thus allowing synergies and cost reductions to take place. At this point in time, however, most network providers are facing the very real challenge of how and when to make the migration to a fully integrated IP-based network.

As a general comment, this Draft Report seems to focus almost exclusively on the impact on traditional PTOs in developing countries. It would serve policy-makers in all countries better if it also focused on the impact to consumers and the economies at large, which broader government policies address. There is no doubt that the traditional PTOs in both developing and developed countries are facing transitional issues. These transitional issues include network technology transition as well as rate rebalancing and new service offering issues. But the determining factors for government policy should be what is best for the more general welfare of all members of the society, not just the PTO. We therefore recommend that the paper be broadened to include all players; governments, consumers, service industries, and old and new communications companies.

Concert's comments on the draft report are intended to help the Secretary-General explain IP Telephony as part and parcel of broader industry changes and to identify the governmental policy objectives which should be the primary focus of discussion. Per the request in the Preamble of the Draft Report, Teresa Evert, International Mobile and Policy Director, International Carrier Services, Concert, will be Concert's primary point of contact for this Third World Telecommunications Policy Forum.

PAGE BY PAGE COMMENTS ON THE DRAFT REPORT

1. SUMMARY

Paragraph 1.1: This paragraph states "Internet Protocol (IP) Telephony is rapidly reaching the top of the agenda for the telecommunications industry worldwide." Concert believes that the "top of the agenda" issue is actually the broader Internet, which is transforming everything from how business is run and to how we manage our personal lives. The fact that its growth has far exceeded that of the PSTN in capacity and traffic and the fact that carrying voice traffic in the margins of this broader Internet traffic puts the "top of the agenda" issue into focus. The Internet is becoming the most effective way to carry voice traffic because is can ride on the broader base of the overall Internet traffic at marginal incremental costs.

Paragraph 1.2: This paragraph notes that regulators and policy-makers are now giving their attention to IP Telephony because IP-based networks are being used as "alternatives to the circuit-switched networks." Please note the comments above. While these networks may represent "alternatives" in the short-term, IP technology is becoming the replacement technology for networks. Concert would also like to see mention made in this paragraph of the fact that that the creation of this ubiquitous data network (known as the Internet) and its rapid growth and diversity of applications has occurred largely as a result of the lack of regulation. It was fueled by providers other than the traditional PTO's. Any change in status will have an affect on the growth and diversity of the Internet-based industries.

Paragraph 1.7: Concert believes that a sentence needs to precede the current sentence to put the correct perspective on IP Telephony. The growth in the Internet and of IP-based Virtual Private networks has had profound implications for all players. Adding voice traffic to these networks now raises the questions of substitution services for circuit-switched services and of network transition issues.

Paragraphs 1.9 and 1.10: In these two paragraphs, the paper attempts to summarize the effects of IP Telephony on consumers and on PTOs. However, it excluded the effects on government telecom policy objectives, the effects on new industry players, and the effects on the economy as a whole – particularly the increasing reliance of the services sector and e-commerce industries on telecommunications and IP-based applications to run their businesses. We recommend the addition of several new paragraphs to address these players.

Additionally, in paragraph 1.9, it should be pointed out that with telecom competition spreading throughout the world, PTOs often face the choice of joining the transition to IP technology and applications or losing the traffic and the customers off their networks and service offerings. Consumers increasingly have choice everywhere.

2. TECHNICAL ASPECTS OF IP TELEPHONY

Paragraph 2.3: The statement that "IP Telephony developments seek to imitate the more connection-oriented PSTN circuits" is misleading. IP providers and equipment makers are seeking to emulate and add certain characteristics of the circuit-switched network, such as quality standards and intelligent features, onto the IP networks. This would be a more accurate portrayal of the efforts underway.
Paragraph 2.4: Concert believes that the flavor of this paragraph should be that IP Telephony "adds" certain features of the PSTN to IP networks rather than attempting to "replicate."

New Paragraph: Concert agrees with the USTIA to add a discussion of SIP.

Paragraph 2.5: We disagree with the phrase "immense complexity of transparent interconnection with the PSTN infrastructure." Better integration with the PSTN, e.g signaling gateways supporting C7 interconnect, needs to be accomplished -- but the same technology as is currently supported in the PSTN can be utilized for this purpose.

Quality of Service

Paragraph 2.9: Concert does not believe that the alternatives of "implementing quality of service support and increasing available bandwidth" are "based on very different philosophies" Concert believes that a complete end-to-end design of IP Telephony with QoS will utilize both methods depending on network topology.

Paragraph 2.12: The statement that "increasing the available bandwidth is far more practical means of speeding up the Internet than enhancing QoS, because it does not require coordinated action across Internet service providers" is only true when a provider is provisioning IP Telephony over a "private IP network". Only in this case can the provider makes decisions regarding bandwidth without coordinating with other providers. And because this is true, the next sentence in this same paragraph is untrue and misleading. There is no need for "Internet peering, transit and interconnection" when IP Telephony is provisioned over private IP-based networks, as these private IP-based networks are not interconnecting with the public Internet to transmit IP Telephony. Private IP-based networks carry the call end-to-end and then negotiate a terminating arrangement into the PSTN at either or both ends of the call. We suggest that the last sentence in this paragraph be deleted entirely as it does not apply to discussions on QoS for IP Telephony.

Paragraph 2.13: It is noted that IP Telephony has coincided with massive increases in international bandwidth. It might be worth noting that it has also been coincidental with market liberalization and market competition. Both of these factors have resulted in benefits to the consumers and economies at large.

3. POLICY AND REGULATORY ISSUES FOR IP TELEPHONY

While this section seems to focus on displaying the different regulatory schemes for IP Telephony, it does not identify a set of government telecommunications policy objectives that IP Telephony will affect. As we have previously noted, it would be most useful for the discussion to identify such a set of government policy objectives. The WTPF might then focus on how IP Telephony might affect these objectives. As an initial set, we might recommend the following:

- Universal Service/ Universal Access
- Affordable communications services
- Rate rebalancing
- Technology transfer
- Human resource development
- Growth of the economy as a whole, and the services sector in particular.

Paragraph 3.4: In the second bullet, it is stated that "there are countries that prohibit it, either directly or by inference." Inference is a matter of interpretation and opinion, and this Report should rest on facts. Thus, any "inferences" should be removed and the Tables at the end of the Report should reflect only facts.

Regulatory distinctions

Paragraph 3.8: An additional regulatory distinction that should be added to this paragraph is the distinction made between those entities that own network facilities and those that lease them for the provision of services. This distinction is made in licensing criteria and many other areas.

Functional equivalence

Paragraph 3.19: A policy of "technology neutrality" could mean applying traditional telephone regulation to Internet applications **OR** it could mean allowing marketplace competition to discipline all telephony (provided the "major supplier" has pro-competitive regulations applied per the WTO Reference Paper). However, regulation should not be applied with a complete disregard for technology. A blind policy of "technology neutrality" could have dramatic affects on product substitution and product innovation within an economy. Homogenizing all substitutable products and services and giving them all the same regulatory treatment will tend to dampen new service introduction and throttled product innovation.

For example, if the difference between being regulated, and incurring all the regulatory costs, or being unregulated boils down to delay in the transmission, IP Telephony providers can artificially inject delay into their networks. But consumers will suffer and nobody wins. Likewise, in Figure 1, it is becoming increasingly difficult to define an "ordinary telephone". There are IP phones on the market that look and feel like "ordinary telephones," but work directly with IP networks. In attempts to define ways in which to apply traditional telephony regulations to new IP applications, this paper is not only attempting to make fine regulatory distinctions that will be difficult to enforce, but it may have lost sight of the policy objectives regulation should be serving. The objective is not to burden new, innovative industries with regulatory costs, nor is the objective to dampen innovation and technology transfer. What is the objective we are seeking to serve?

Impact of IP Telephony on Universal Service schemes

Paragraph 3.23: We suggest adding the following underlined words to the first sentence in recognition of the fact that IP Telephony is typical provided by small enterprises, "A permissive policy towards Internet Telephony may be designed to encourage the development of the Internet and the development of small and medium-sized enterprises in a particular country."

Special Issues for developing countries

Paragraph 3.27: The conclusion that developing countries do not benefit directly from a permissive IP Telephony policy is based on a short-sighted view and on an incomplete set of facts. Stimulating increased international calling, whether inbound or outbound, can increase settlements revenues and promotes general welfare. Stimulating a market for small and medium sized enterprises also promotes general welfare and GNP growth. It is time to begin considering the larger picture within the economies of the developing countries – in addition to the single enterprise known as the PTO.

Paragraph 3.28: The first sentence assumes that the governments and the PTOs always have the same objectives, which may not be the case. In the second bullet, we recommend the first sentence be changed to read, "On the other hand, IP Telephony could be viewed as undermining the current pricing structure of the PTO that requires internal cross-subsidization. Thus, rate rebalancing may be required and these issues are politically sensitive."

Paragraph 3.29: When discussion the issue of *terminating* international calls, it should be noted that choice does currently exist in all markets – competitive and noncompetitive. Competitive market pressures in those markets with active competition require call originators and carriers to seek the lowest priced provider of termination. These market pressures are likely to heighten (not lessen). When making decisions regarding choice of termination provider, price, quality, and capacity perimeters come into play. It becomes almost irrelevant what type of technology is used, provided that price, quality, and capacity requirements can be met. This Report should not assume that IP Telephony is always the cheapest form of termination. Rather than recommending that PTOs spend scarce resources inhibiting market competition and retaining the old-world settlement payments, the Report should recommend that PTOs focus on expanding service offers to their own customers. If we may use China as an example, in Spring 1999, the average wholesale termination rate from the U.S. was about $0.70. Today with IP technology, the rate is about $0.10 – a seven-fold decrease. Retail prices to Chinese consumers during the same timeframe fell only by half. And, according to the VoIP case study on China done for the ITU Workshop last summer, the traffic increase was XXXX (cannot access website at the moment). PTOs should spend resources on transitioning to the IP world and on building new service offerings rather than plugging the old dike against impending competition.

Convergence and IP Telephony

Paragraph 3.31: When raising the question of *requiring* all operators, both ISPs and telephone, to interconnect with each other, it should be clearly noted that the WTO (as do most WTO countries) place the requirements for interconnection only upon the "major suppliers". ("Major suppliers" can be defined as network operators who control bottleneck facilities or possess market power.) The reasoning behind this is that only major suppliers have the ability to distort the market for interconnection. Please include this point in this paragraph and elsewhere in the paper where this issue is discussed.

Cross-border issues

Paragraph 3.35: This paragraph is based on the not-yet-reached conclusion that traditional telephony regulation should be applied to IP Telephony. International agreements should be driven by what is commercially viable. In the IP Telephony world, a number of clearinghouses are offering market-based termination prices for IP Telephony. They are also operating "financial clearinghouses" in a competitive environment -- creating financial netting and payments procedures and protocols for traffic between member companies. Routing is performed by individual Gatekeepers, and this distributed architecture allows maximum flexibility and utilization of network resources. These activities are best left to continue in the private, commercial arena. There is no need for governmental intervention. We recommend deleting this paragraph.

4. ECONOMIC ASPECTS OF IP TELEPHONY AND ITS IMPACT ON PUBLIC TELECOMMUNICATIONS OPERATORS

The market opportunity

As a general comment, there should be some discussion of broadband access in this Report. Consumers cannot actually use IP applications without access infrastructure and technologies at reasonable prices.

Paragraph 4.2: As with all other types of IP traffic, one cannot ascertain the actual source or originating point of IP Telephony traffic. Therefore, the last sentence, stating that the U.S. is the main source, should be deleted – or clearly substantiated.

Costs and prices

While it is unclear whether IP technology is, in fact, a less costly way to transport voice traffic in markets *where prices already reflect incremental costs*. The key issue is price and current pricing structures in the traditional telephone markets.

Substitutability

Paragraph 4.9: In the last sentence, we recommend a clear statement of the motivating factors behind the need to avoid making above-cost settlement payments. It is not just a desire to avoid payment – it is a marketplace necessity to match lower-priced services in one's home market. Without the ability to lower costs and match lower prices, the enterprise loses marketshare and customers, eventually going out of business to enterprises that have found lower-priced means of terminating calls in other countries.

Impact on public telecommunications operators

This draft Report focuses almost exclusively on the impact on traditional PTOs in developing countries. It should also focus on the impact to consumers and the economies at large, which broader government policies address. There is no doubt that the traditional PTOs in both developing and developed countries are facing transitional issues. These transitional issues include network technology transition as well as rate rebalancing and new service offering issues. But the determining factors for government policy should be what is best for the more general welfare of all members of the society, not just the PTO. We therefore recommend that this entire section of the Draft Report be re-written to focus on "**The Impact on the National Telecommunications Industry and on the Economy".**

Paragraph 4.15: We do not think that routing calls to mobile phones via IP networks will offer "a solution to bypass these high prices" of termination. Because the last leg of the call must still traverse the mobile network, the mobile network operator still has the ability to charge above-cost rates for terminating these calls. Regulation of call termination prices on mobile networks may therefore be required in "calling-party-pays" markets.

5. ASSISTANCE TO MEMBER STATES AND SECTOR MEMBERS: AVENUES FOR INTERNATIONAL COOPERATION

Paragraph 5.2: We recommend deleting the second question in the second bullet because it has not been explained or supported elsewhere. This creates too much confusion and the conference will loose focus.

In the fourth bullet, this proposal fails to take into account very fundamental attributes of today's telecommunications industry – increasing competitive pressures and the global scope of the industry. It is critical to give due recognition to commercial incentives and commercial pressures. All commercial enterprises seek to lower their costs through lowest-priced inputs, including lowest priced termination services. Add to this the global scope of the industry and the fact that national regulators can only regulate that which is within their jurisdiction, and this proposal clearly sets up unreasonable expectations. Exchange of information, queries and complaints are already taking place between regulatory agencies. Therefore, we recommend deleting this bullet.

We believe that the fifth bullet has enough substantive material for two bullets. The first issue addressed is that of network technology transition. This is one of the core issues for all network providers today and clearly within the ITU purview. More emphasis should be placed on assisting Members with these types of issues through economic/financial analysis and case studies. The second issue encompasses by this bullet is that of the impact of IP Telephony on the overall economy. This is also a core issue worthy of study in its own right, and therefore deserving of its own bullet.

The sixth bullet suggests a "refinement" of the concept of "technology-neutral regulation." This paragraph should clearly note that a policy of "technology neutrality" could mean applying traditional telephone regulation to Internet applications **OR** it could mean allowing marketplace competition to discipline all telephony (provided the "major supplier" has pro-competitive regulations applied per the WTO Reference Paper). However, regulation should not be applied with a complete disregard for technology. A blind policy of "technology neutrality" could have dramatic affects on product substitution and product innovation within an economy. Homogenizing all substitutable products and services and giving them all the same regulatory treatment will tend to dampen new service introduction and throttled product innovation. These unintended consequences of a policy of "technology neutrality" would prevent countries from gaining full benefit of the Internet revolution. The way in which this bullet is currently written, it seems to be "putting the cart before the horse" because the policy objective (which this regulatory concept is intended to serve) has not been clearly enunciated. The policy objective could be technical innovation and technology transfer, in which case this might not be the best regulatory concept to recommend. The Report should seek to clarify the policy objectives first.

2. COMMENTS RECEIVED FROM **ETSI TIPHON**

Source: John Horrocks (ETSI TIPHON)
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Comment 1
Whilst welcoming much of the useful information in the paper, more attention needs to be given to explaining the different scenarios where voice traffic may be carried on IP. This is important because any discussion of policy should identify clearly which of these scenarios is being considered. It is also unfortunate that "IP telephony" is being contrasted with the PSTN as IP may be used as a technology for the provision of the PSTN and many operators are currently considering migrating their PSTN platforms from circuit switched technology to IP.

IP is being used to carry voice as a public service in at least four scenarios:

A. Traditional and newer entrant "telcos" with direct connections to customers will migrate their existing PSTN services onto IP. This is the most heavily regulated part of telecommunications.

B. Newer entrant long distance and international operators with indirect connections to customers will use IP within their own networks whilst maintaining the same interconnections to local operators for collecting and delivering traffic.

C. New managed IP networks will be introduced offering a wide range of multi-media services including voice

D. Internet service providers will facilitate the use of the public Internet for voice and add interconnections to circuit switched networks for call delivery

These scenarios should be distinguished carefully as they involve quite different regulatory and policy issues.

Comment 2
Figure 1 proposes a complex list of criteria for determining if a particular instance of IP telephony is functionally equivalent to PSTN voice services. The third through to the penultimate criteria seem inappropriate and not sufficiently stable. For example:

- Local calls are not charged in the US and Hong Kong
- Headsets can be used instead of handsets and are used in many call centres
- Delays may exceed 250 ms on some PSTN calls

The key issue is whether the service is the public telephony service and this is not a function of charging to the caller nor of technology as they are not fundamental elements of the service. The following is proposed as an alternative set of criteria:

- Is the service available for use by the public?
- Is real-time[1] voice the dominant or only communication service?

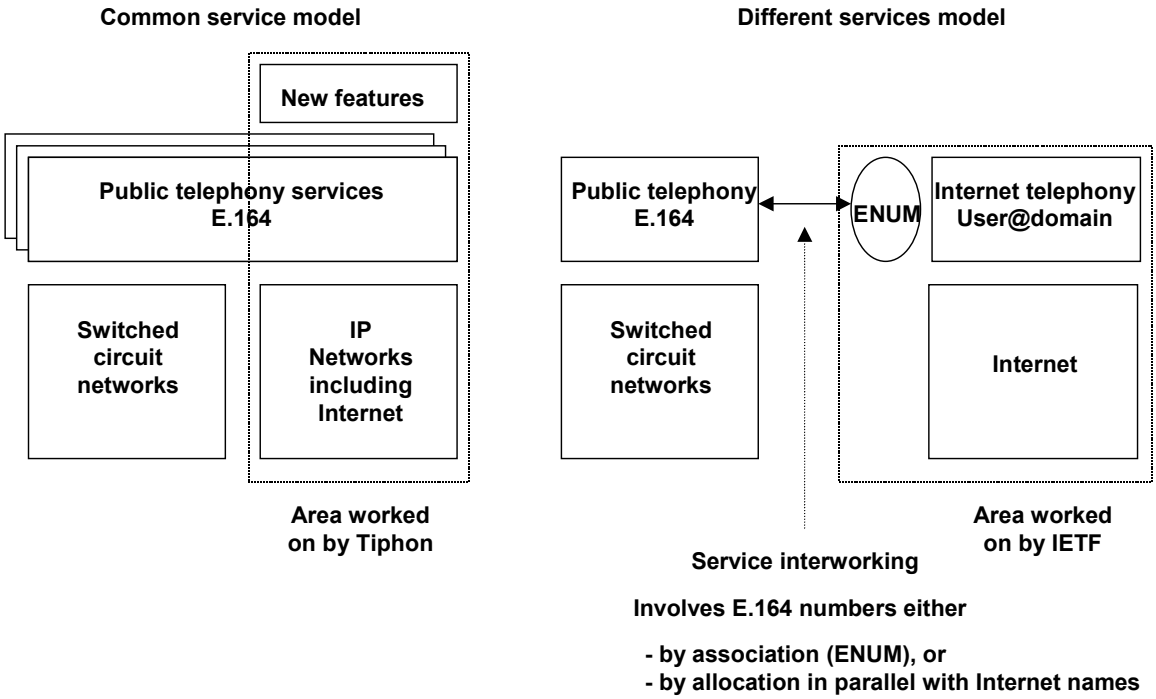
[1] Or near real-time as nothing is instant

- Is the called party identified by an E.164 number that is allocated to them for the purpose of receiving the service?

The use of the E.164 number is important because the way in which the caller identifies the called party is a central part of the service description and the allocation of numbers determines who can be reached. Any service that uses a different form of identification is a different service as is evident from the problems of for users of one service in communicating with users of the other service.

These criteria are in effect no more than a re-statement of the key words of "Public", "Switched" (ie the caller can select between many possible destinations using a defined identification system), and "Telephony". This attractive both because it is simple and because it does not add new (and thus potentially controversial) criteria.

The following diagram illustrates this point.



On the left is shown the use of IP to support essentially the same services that are supported on switched circuit networks, though with the possible addition of new features. This is the area where the ETSI TIPHON project is working.

On the right is shown the IETF's development of a different telephony service where the users are identified by Internet names of the form "user@domain". Interconnection with public telephony would require some service interworking function, which is one of the things that ENUM will provide.

The alternative criteria proposed are fewer and more objective than those proposed in Figure 1.

3. COMMENTS RECEIVED FROM **Rob Frieden, Pennsylvania State University**

The Changing Universal Telecommunication Mission
When Technologies Converge

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The universal service mission in telecommunication [1] will change and evolve as technological innovations make it possible to offer faster, better, cheaper and smarter applications. Technologies like Asymmetric Digital Subscriber Links, cable modems, wideband satellite service and terrestrial broadband options provide high speed access to new information age services such as direct to the desktop computer, "streaming" video. Collectively these technologies trigger the transition from Plain Old Telephone Service ("POTS") to Pretty Amazing New Stuff ("PANS"). As well they offer the promise of enhancing productivity and quality of life, particularly if the Internet continues to evolve as a major medium for communications and commerce.

Technological innovations and the diversification of service options complicates the longstanding public policy objective of achieving affordable and ubiquitous access to telecommunications services. Currently the universal service mission for POTS costs approximately $5 billion annually[2] and has become more irritating to some, because the funding method involves direct subsidization from long distance carriers and their customers who now see new charges on their monthly bills. At the same time as the POTS mission remains ongoing, Congress has expanded the universal service campaign to include specific "e-rate" beneficiaries, like schools and hospitals, and a mandate for access parity between urban and rural consumers for advanced PANS services.

An expanded and more costly universal service mission poses more daunting choices for consumers, but also greater challenges in shaping legislative and regulatory goals, strategies and policies. As the universal service mission cost rises, telecommunication service providers and their consumers have increasing incentives for finding ways to avoid making universal service subsidy contributions. Technological innovations and regulatory classifications make this avoidance strategy more easily achieved as ventures can offer Internet-mediated long distance telephone services that qualify for exemptions from the local network access charges and universal service subsidies paid by long distance carriers.

Technological convergence makes it possible for a single service provider to offer a package of POTS and PANS services that heretofore have triggered different regulatory burdens. Legislators and regulators will have greater difficulty in maintaining a "level competitive playing field" among telecommunications and information service providers while also achieving universal service objectives no longer limited to the primary twin objectives of bringing dial tone to the hinterland and making telephone service affordable everywhere.

This paper will address the impacts on universal service resulting when different technologies converge and when pre-existing regulatory models fail to work properly.

Technological innovation blends together previously discrete technologies, subject to a customized regulatory system. The resulting convergence does not lend itself to continued application of either

preexisting regulatory systems. For example, both state and federal regulators traditionally deem local and long distance telephone service as common carriage: a public utility offering subject to significant economic regulation designed to achieve universal service on nondiscriminatory and cost-based terms.

On the other hand many of the enhanced services, which might become part of an expanded inventory of universal service elements, traditionally have qualified for unregulated or lightly regulated status. Congress, the FCC and state regulators collectively share the view that cable television and value-added information services do not constitute common carriage and accordingly do not fit into a pervasively regulated category like telephony.

Technological Convergence Ruins the Existing Regulatory Regime and Threatens Universal Service Funding System

When an ISP can provide long distance telephone services free of universal service funding contributions and regulation two adverse consequences result:

ISPs can exploit their unregulated status to provide long distance telephone service functionally like that offered by regulated carriers; by not having to pay fees borne by competitors ISPs can offer cheaper service leading to a migration of long distance telephone traffic from routings that trigger a universal service funding contribution to ones that do not require such payments; and

2) In a broader sense the ISPs' ability to exploit their special unregulated status challenges the rationality of having two different classifications (private carriers providing enhanced, information services versus common carriers providing basic telecommunications services) when consumers perceive little difference between Internet-mediated and conventional long distance telephone service.

Regulatory dichotomies work only when technological categories remain discrete and absolute. But they surely do not work when technological convergence results in porous service categories and diversification by operators. When cable telephone and Internet Service Providers ("ISPs") offer telephone services functionally similar to what telephone companies, regulators cannot maintain preexisting dichotomies, particularly when regulations inadvertently have favored one type of technology and company over others. When ISPs offer consumers telephone service equivalents, which link PSTN access with Internet-mediated telephony, preexisting regulatory exemptions tilt the competitive playing field to their advantage. Should significant telephony traffic volumes migrate to routings exempt from the universal service contribution requirement, then the total funds available to achieve the universal service mission will decline. The potential for declining universal service funds occurs just as Congress has articulated a broader and more ambitious universal service mission and has expressly identified beneficiaries of this mission, viz., schools, libraries, hospitals, and clinics.

The Universal Service Mission

Ubiquitous and low cost access to basic telecommunication services constitute a fundamental public policy objective in the same vein as providing access to other basic infrastructure such as electricity and water. [3] "Telecommunications is not simply a connection between people, but a link in the chain of the development process itself." [4] A correlation exists between access to telecommunications facilities and services and economic development. [5] This means that efficient, effective and widely available telecommunications can stimulate social and economic development by providing the vehicle for more and better commerce, political discourse, education, and job training.

In view of changing technologies and consumer expectations, the concepts of universal access and universal service remain in flux. As a baseline we should consider universal access and service in terms of four components:

1) Infrastructure-the scope and nature of the network that serve users;

2) Services-what constitutes basic "life-line" service and to what other features should users have access at an additional price?;

3) Cost-should users pay the full cost of service, or should some subset of the user base receive subsidies for non-recurring charges, such as installation, as well as for recurring charges, such as monthly service?; and

4) Maintenance and Upgrades-what incentives must regulators create to ensure that universal service providers maintain and upgrade their networks?

Access also includes the issue of physical proximity between individuals and the telecommunications infrastructure. Even in developed nations, some users must share telephone lines. In developing nations and rural or high cost areas, shared access from the home or a public place might have to suffice in the short run. One cannot conclude that an entire nation has access to a telecommunications infrastructure simply because a satellite footprint illuminates the country. On the other hand, significant progress in a universal service mission will occur when the first of only a few telephone lines become available in a locality. Accordingly, the first step in reaching the universal service mission may involve the provisioning of lines to public facilities, such as libraries, post offices, government buildings, schools and clinics.

The Status Quo Ante: Common Carriage Before the Internet and Enhanced Services

In this information age, buzz words like convergence, digital, multimedia, and interactive describe an environment where technological innovations largely foreclose air tight legal and regulatory dichotomies. Until twenty years ago it was possible for judges and regulators to construct different rules and requirements based on the nature of the service and the characteristics of who provided the service. Something as apparently absolute as the First Amendment could apply differently as a function of the communication medium involved. For example, government could impose more burdensome restrictions on speech mediated through the public airwaves than through the spoken or written word.

In the pre-convergence age, a single regulatory structure for telecommunications could apply by extending the pre-existing public utility model of common carriage. The rights and responsibilities historically vested in common carriers ensured widespread access to essential services, established consumer safeguards and tempered the market power created when regulators authorized a single "natural monopoly" to operate. Governments negotiated a regulatory compact with common carriers: providing valuable insulation from competition and reduced liability or exemption from criminal and civil liability in exchange for agreeing to regulation of the prices charged, the revenues generated and many other aspects of the carrier’s corporate and operational behavior.

Historically, providers of neutral and transparent conduits did not have to monitor the content carried, nor could they typically refuse access to their bottleneck [6] facilities on the basis of content, or customer location. Government could require the telecommunications common carrier to provide service to anyone within a franchise geographical area ready, willing and able to take service. Common carriers could not discriminate among "similarly situated" users, meaning in application a limited capacity to price service as a function of demand and marketplace conditions, as opposed to a regulator-managed calculation of carrier costs and a fair rate of return.

On the other hand, non-common carriers could operate as private carriers when transporting content, whether over spectrum, e.g., satellite operators, or via closed circuit media, e.g., cable television operators. Their regulatory status derived from the perception that they lacked market power and did not provide essential or irreplaceable services.

The dichotomy between common carriers and private carriers has grown murky, because of:

- •legislative and regulatory tinkering with the common carrier model; [7]
- •technological innovations;
- •a growing body of cases articulating robust First Amendment speaker rights of common carriers; and
- •court cases imposing quasi-common carrier obligations on private carriers, e.g., the duty of cable television operators to carry broadcast television signals, and quasi-publisher duties on common carriers, e.g., the duty to inquire and disclose whether content is obscene or indecent.

A fuzzy line between common and private carriers makes it increasingly difficult for regulators to impose traditional common carrier requirements when ventures providing functionally equivalent service bear no such burdens. Legislators and regulators have not considered private carriers as providing such essential services that they should participate in the universal service mission, either as partial underwriters, e.g., payment of fees used to subsidize universal service, or as recipients of universal service subsidies. Increasingly, however, private carriers offer both competitive alternatives to basic service offered by regulated common carriers, e.g., wireless telephone services, and new services that legislators and the public believe should constitute a part of a revised and bolstered universal service mission.

Common Carriage and the Universal Service Mission

The common carrier regulatory regime makes it possible for policymakers to execute a universal service mission. Regulators can compel common carriers to provide undesirable or unprofitable service in two key ways:

1) regulators can impose costs on common carriers by forcing rate averaging and cross-subsidization as a necessary public interest dividend in exchange for the carrier's insulation from competition and some types of criminal and civil liability; and

2) regulators can more easily engineer a financial cross-subsidy mechanism for underwriting universal service programs when a single set of large ventures exist that can orchestrate the collection and distribution of universal service funds by adjusting service rates above and below actual cost, plus a reasonable return.

Telecommunications common carriers have accepted their status based on a rational cost/benefit analysis. They trade off upside profitability for protection from the downside of below market rates of return and open markets. While the regulator-granted franchise may not have expressly conferred market exclusivity, most telecommunications common carriers enjoyed monopoly status. Perhaps incumbent operators grew to expect exclusivity as part of the deal. Such expectations notwithstanding, the barriers to market entry have dropped, because of technological innovation and increased reluctance on the part of regulators to deny market entry opportunities. To make matters worse, market entrants typically operate with fewer regulatory burdens, including noncommon carrier status.

Incumbent common carriers' ability and inclination to pursue universal service objectives may decline in a competitive marketplace, particularly one with asymmetrical regulation, i.e., burdensome common carrier regulation of incumbents, and light or nonexistent regulation of market entrants. Incumbent operators may have to reduce rates for services, particularly in localities where they face competition. This competitive necessity would reduce internally generated revenues available for voluntary cross-subsidization of services not facing competition and downward rate pressure. Similarly, incumbent carriers may need to reallocate infrastructure investments to localities, e.g., cities where they have to match the diversified services available from new competitors. However, the common carrier classification may limit incumbent operators' ability to adjust rates in response to competition. Rate rebalancing has no net financial impact on the incumbent carrier's revenues or rate of return, but it typically results in reduced rates for competitive, urban services and raised rates for hinterland services. Such rebalancing comes across to rural residents as a discriminatory rate hike, and may have an adverse impact on universal service by making POTS and PANS more expensive in the absence of redirected or increased subsidies.

The common carrier classification best serves universal service objectives when regulators can leverage some degree of insulation from competition and liability in exchange for the carrier's commitment to serve unprofitable locales and customer categories. When noncommon carriers can offer functionally equivalent service, incumbent common carriers have legitimate concerns that they will remain the carrier of last resort for unprofitable services even as they lose market share and revenues in having to compete with newcomers. Market entrants predictably target the most profitable and easiest to serve customers, typically large volume business users in cities.

Incumbent carriers consider this market strategy unfair "cherry picking" and "creamskimming." Regardless of whether it constitutes unfair competition, such selective targeting of customers has a possibly immediate and adverse impact on universal service for two reasons:

1) all universal service funding most likely will have to come from consumers, without any local exchange carrier voluntary cross-subsidies; this means consumers will incur higher charges indirectly through above cost access charge payments passed through by interexchange carriers, or directly through additional long distance charges; and

2) incumbent local exchange carriers will have increased incentives to deaverage rates, i.e., to seek permission to subdivide service territories, such as an entire state, into smaller service regions based on traffic density and degree of competition.

Where Does Internet Access Fit Into the Universal Service Mission?

The Internet means different things to different people. On a macro, technological level, it constitutes a "network of networks" in the sense that ISPs purposefully link their individual networks with other networks to achieve global connectivity. ISPs provide consumers with "seamless" access to most of the individual networks that comprise what we call the Internet often with a contract covering only the first or last of many network connections. The packet-switched nature of the Internet, coupled with switching and routing protocols, provides robust and diverse network access without each ISP having to negotiate interconnection terms with every other operator. Telecommunications carriers achieve similar connectivity with greater effort and specificity: the one-by-one accumulation of operating agreements.

Internet users benefit from the technological ease in switching and routing traffic, but such seamlessness generates a host of legal and regulatory problems. For example, the lack of contract privity between each and every ISP raises liability questions when an ISP inadvertently provides a conduit for a criminal transaction, e.g., the transmission of obscenity, serving as the delivery mechanism for securities fraud, and providing the forum for predatory, libelous and other illegal

behavior. The legal and regulatory models created for telecommunication carriers provide near absolute exculpation. As neutral and transparent common carriers, telecommunication service providers lack liability or culpability even when serving as the conduit for the commission of a crime. Conversely, ISPs do not operate as common carriers. They benefit by not incurring the duties of common carriers: to provide service to any and all users in a particular geographical region without discrimination.

Impact From The Telecommunications Act of 1996

Section 254 of the Telecommunications Act of 1996 (hereafter referred to as the '96 Act) amends the Communications Act of 1934 to establish an explicit mandate for the FCC to promote universal access to telecommunication services. [8] The legislation requires explicit universal service funding [9] and mandates equitable and non-discriminatory sharing of the financial burden among all telecommunications carriers providing interstate telecommunications services.[10] The '96 Act also identified specific beneficiaries of the universal service mission: schools, health care provider facilities, and libraries. Additionally, the '96 Act directs the FCC and state commissions to promote in all regions of the nation services "that are reasonably comparable to those services provided in urban areas and that are available at rates that are reasonably comparable to rates charged for similar services in urban areas." [11]

The FCC, in consultation with State Public Utility Commissions, established six general universal service principles:

- Quality services should be available at just, reasonable, and affordable rates;
- Access to advanced services should be available in all regions of the nation;
- Access to basic and advanced services should be available to customers in rural and high cost areas and to low-income consumers at rates comparable to those in urban areas;
- Equitable and nondiscriminatory contributions should be made by all telecommunications providers to the preservation and advancement of universal service;
- Specific and predictable support mechanisms should exist at both the federal and state level; and
- Schools, health care facilities, and libraries should have access to advanced telecommunications services.

The FCC also determined that the following services warranted subsidization to achieve ubiquity:

voice grade access to the public switched network, with the ability to place and receive calls;

Dual Tone Multifrequency ("touch tone") signaling or its functional equivalent;

single-party service;

access to emergency services, including 911 and Enhanced 911 (which identifies a caller's location);

access to operator services;

access to interexchange services;

access to directory assistance; and

Lifeline and Link Up services for qualifying low-income consumers.

On the matter of telephone service affordability, the FCC accepted the recommendation of a Board comprised of both FCC and state public utility Commissioners that the states should monitor rates and non-rate factors, such as subscribership levels, to ensure local telephone service remains affordable. The FCC expanded the Lifeline program, which discounts local telephone service to qualifying users, and implemented the "e-rate" program that provides schools and libraries with discounted access to all commercially available telecommunications services, Internet access, and internal connections. Eligible schools will qualify for discounts ranging from 20% to 90%, with the higher discounts available to the most disadvantaged schools and libraries and to those in high cost areas. The Commission capped total expenditures for universal service support for schools and libraries at $2.25 billion per year, with a roll-over into following years of funding authority, if necessary, for funds not disbursed in any given year. Additionally all public and not-for-profit health care providers located in rural areas will receive universal service support, not to exceed an annual cap of $400 million. A health care provider may obtain telecommunications service at a transmission capacity up to and including 1.544 megabits per second, the bandwidth equivalent of a T-1 line, at rates comparable to those paid for similar services in the nearest urban area with more than 50,000 residents, within the state in which the rural health care provider is located. Rural health care providers also will receive support for both distance-based charges and a toll-free connection to an ISP. Each health care provider that lacks toll-free access to an ISP may also receive the lesser of 30 hours of Internet access at local calling rates per month, or $180 per month in toll charge credits for toll charges imposed for connecting to the Internet.

ISPs Exempted From Having to Pay Access Charges and USF Contributions

On the subject of ISP and other "enhanced service providers" the Commission noted that previously it exempted such ventures from paying access charges in addition to their ordinary line rental fees. In 1983, the FCC classified enhanced service providers as "end users" rather than "carriers" for purposes of the access charge rules. [12] The Commission tentatively concluded that ISPs should not be subject to access charges as currently constituted, i.e., that enhanced and Internet service providers should only have to pay business local service rates. However, the Commission did note that "usage continues to grow, [and that] such services may have an increasingly significant effect on the public switched network." [13]

The FCC has chosen to consider the issue broadly in terms of how to "provide incentives for investment and innovation in the underlying networks that support the Internet and other information services" [14] rather than narrowly a matter of whether enhanced and Internet service providers should pay access charges. [15] With that perspective in mind, the Commission noted:

the development of the Internet and other information services raise many critical questions that go beyond the interstate access charge system that is the subject of this proceeding. Ultimately, these questions concern no less than the future of the public switched telephone network in a world of digitalization and growing importance of data technologies. Our existing rules have been designed for traditional circuit-switched voice networks, and thus may hinder the development of emerging packet-switched data networks. To avoid this result, we must identify what FCC policies would best facilitate the development of the high-bandwidth data networks of the future, while preserving efficient incentives for investment and innovation in the underlying voice network. In particular, better empirical data are needed before we can make informed judgments in this area. [16]

ISPs Can Qualify For Indirect Universal Service Subsidies

Despite not having to contribute to universal service funding, ISPs can indirectly receive financial support when offering information services to schools, libraries, hospitals and clinics. While ISPs do not qualify for direct universal service subsidies as telecommunications carriers, they offer "advanced services" which the drafters of the '96 Act sought to make available to schools, etc. on a discounted basis. [17] In essence ISPs can have their cake and eat it too. [18]

The FCC initiated a Notice of Inquiry seeking comment generally on the implications of information services such as Internet access for the telephone network. The Commission asked what it should do to encourage development of packet switching hardware able to route data traffic around incumbent LEC switches, or to install new high-bandwidth access technologies such as asymmetric digital subscriber line ("ADSL"), or wireless solutions.[19] Without directly addressing the issue of ISP exemptions and the impact on universal service the Commission has turned its attention to the broader issue of how to promote deployment of advanced services by telecommunications carriers. [20]

Despite Misgivings, The FCC Maintains ISP Exemptions

In an April, 1998 Report to Congress, [21] the FCC strongly hinted its disinclination to maintain a blanket exemption of all types of Internet telephony from universal service funding obligations:

The record currently before us suggests that certain of these ["phone-to-phone" IP telephony] services lack the characteristics that would render them "information services" within the meaning of the statute, and instead bear the characteristics of "telecommunications services," [as defined in the Telecommunications Act of 1996]. . . .To the extent we conclude that the services should be characterized as "telecommunications services," the providers of those services would fall within the 1996 Act's mandatory requirement to contribute to universal service mechanisms. [22]

While the FCC refrained from taking a definitive stance "in the absence of a more complete record focused on individual service offerings," [23] the analysis in the Report to Congress provides significant insight on future Commission rulemakings and its assessment of how the Internet affects the Congressionally-mandated universal service mission. The Commission considers information services, a means to "buttress, not hinder, universal service," [24] particularly when such services stimulate demand for basic services that make universal service subsidy contributions. On the other hand, information services hinder the universal service mission if providers of such services also offer telecommunications services and do so in a manner that exploits anomalies and loopholes thereby exempting them from universal service obligations and reducing the funds available for subsidizes. [25]

The Definitions of Telecommunications and Information Service

The FCC reiterated its view that the Telecommunications Act of 1996 legislated a regulatory dichotomy between telecommunications and information services. Operators providing the former have a duty to contribute to universal service funding, but providers of the latter do not.

Unfortunately for the FCC such a clean semantic dichotomy cannot operate in a time of rapid technological evolution and convergence. Likewise, Congress ordered the FCC to consider the impact of mixed or hybrid services on universal service definitions. The Commission expressly recognized that the Internet integrates both telecommunications and information services, but that ISPs "generally do not provide telecommunications."[26] However, the provision of transmission capacity to ISPs does constitute a "telecommunications service." [27] Presumably, any basic service routed via such capacity does not necessarily convert into "information services" simply because an

"information service provider," as defined by the Telecommunications Act, [28] offers other information services perhaps transmitted over the same transmission capacity.

In it 1998 Report to Congress the FCC also acknowledged the view of Senators Burns and Stevens that regulatory mutual exclusivity cannot work for instances where a single enterprise provides both telecommunication and information services, or that a service combines aspects of both classifications. [29] The Commission stuck to its reliance on the semantic dichotomies established by the Computer Inquiries and the MFJ, and the pragmatic view that because all ISPs use basic transport capacity as a building block, it "would be difficult to devise a sustainable rationale under which all, or essentially all, information services did not fall into the telecommunications service category." [30] Accordingly the Commission reiterated the need for an absolute regulatory dichotomy based on a functional analysis:

Internet Telephony as a Telecommunications Service

As a result of its decision to stick to mutually exclusive categories, the FCC recognized the duty to categorize Internet-mediated telephony as either a telecommunication service, or an information service. Despite its disinclination to regulate the Internet, the FCC acknowledged that "phone-to-phone IP telephony"services bear the characteristics of "telecommunications services." [31] "Phone-to-phone IP telephony" enables users to access Internet-mediated telecommunication services via ordinary telephone handsets and pay phones instead of specially-configured personal computers. With the ease of ordinary telephone access, [32] the market for Internet telephony has exploded, coupled with a real potential for significant migration of traffic from customary switching and routing, subject to access charges and USF contribution requirements, to Internet-mediated switching and routing heretofore exempt from access charges and USF contribution requirements.

For ventures meeting a four-part test, [33] the Commission stated its tentative conclusion that the service provided constitutes telecommunications, primarily because:

From a functional standpoint, users of these services obtain only voice transmission, rather than information services such as access to stored files. The provider does not offer a capability for generating, acquiring, storing, transforming, processing, retrieving, utilizing, or making available information. Thus, the record currently before us suggests that this type of IP telephony lacks the characteristics that would render them "information services" within the meaning of the statute, and instead bear the characteristics of "telecommunications services." [34]

Despite its preliminary assessment, the FCC refrained from making "any definitive pronouncements in the absence of a more complete record focused on individual service offerings." [35] The Commission did note that if it were to deem phone-to-phone, Internet-mediated telephony telecommunications, that finding would trigger a mandatory USF contribution from such operators as required by Section 254(d) of the Communications Act. But even in the face of this financial contribution, the Commission implied that it might not have to subject such operators to the full array of common carrier requirements contained in the Communications Act, because Section 10 of the Act, established by the Telecommunications Act of 1996, [36] permits the Commission to forbear from imposing any rule or requirement of the Communications Act on telecommunications carriers. [37] For example, the Commission stated that it might not have to subject providers of Internet telephony to the international accounting rate toll revenue division system presumably because the Commission recognizes the consumer benefits accrued by access to services that can undercut and arbitrage the current, above-cost regime. [38]

ISPs Should Help Fund the Universal Service Mission

Section 254(d) of the Communications Act, as amended, mandates universal service contributions from "every telecommunications carrier that provides interstate telecommunications services." [39] In application the USF obligation has extended to wireless paging and telephone service providers, because they are providers of telecommunications service despite the limited use of the local loop and limited opportunity to receive financial support themselves. Some private telecommunication carriers also must make USF payments even though they operate as non-common carriers. [40] In its 1998 Report to Congress the FCC stated that its intention to "construe broadly the class of carriers that must contribute." [41] Likewise it recognized the potential for Internet-mediated telephone service to reduce universal service funding:

If such providers are exempt from universal service contribution requirements, users and carriers will have an incentive to modify networks to shift traffic to Internet protocol and thereby avoid paying into the universal service fund or, in the near term, the universal service contributions embedded in interstate access charges. If that occurs, it could increase the burden on the more limited set of companies still required to contribute. [42]

A Predisposition Not to Extend Legacy Regulation

Notwithstanding the real potential for adverse financial impact on its universal service mission, the FCC remains adamantly opposed to extending traditional telecommunications regulation to ISPs. [43] The Commission believes market forces will create incentives for a robustly competitive and ubiquitous highspeed information service infrastructure. As well the FCC wants to support the Clinton Administration's view that the Internet should be a tax-free, largely unregulated media. [44]

In a larger sense the FCC has unofficially expressed its reluctance to extend the common carrier classification and the regulatory burden its generates on Internet-mediated services, including ones that compete with, and appear as viable alternatives to common carrier services. The Commission appears disinclined to impose legacy regulations on new technologies even if these technologies migrate traffic and revenues from services that have borne the universal service subsidy obligation:

New technologies, while perhaps similar in appearance or in functionality, should not be stuffed into what may be ill-fitting regulatory categories in the name of regulation. Rather, the Commission should continue the approach of studying new technologies and only stepping in where the purpose for which the Commission was created, protecting the public interest, demands it.[45]

Staffers at the FCC's in-house think tank favors deregulating incumbents rather than regulating market entrants. The FCC should pay attention to the potential for anticompetitive conduct, and adverse impact on universal service funding. However, the Commission should decide to apply regulatory safeguards on an ad hoc, as needed basis and for instances where regulatory intervention outweighs the costs imposed.

Universal Service Cannot Fully Develop in an Unregulated Environment

Unofficially at least the FCC has expressed its confidence that marketplace resource allocation will adequately provide the capital, technologies and services necessary to achieve universal access to information superhighways. Part of this misguided confidence appears to stem from the widespread availability of multiple ISPs throughout the nation, the trend toward distance insensitivity in telecommunications and information services and the long standing tendency for ventures to offer nationally averaged, "postalized" rates. However, a fundamental question remains unanswered: have the millions of dollars already invested in universal service contributed to the above three factors, and conversely would a change in the level of available funds cause telecommunications

carriers to change their pricing policies in a manner detrimental to ubiquitous access? [46] More specifically:

- are there scenarios where the number of ISPs in rural and high cost areas might decline if their cost of doing business, e.g., network access costs, increased significantly?

- are first and last mile access services distance insensitive and will they remain so with new technologies like ADSL that have service limits based on proximity to switching facilities?

- under what circumstances will carriers deaverage rates thereby eliminating one-price, postalized services? and ,

- will state regulatory agencies authorize additional telecommunications service providers, including cellular radio operators, to maximize the benefits of universal service subsidies?

The Potential for Balkanization of the Internet and Its Impact on Universal Service

As the Internet matures and commercializes current promotional access pricing and interconnection arrangements will change. [47] During the Internet's initial incubation period, ISPs emphasized connectivity at the expense of a calibrated and efficient access and interconnection mechanism. During this time, network congestion did not present much of a problem and operators typically agreed to a zero cost "peering" arrangement with other operators. Having no apparent incentive to incur the cost to meter traffic flows, ISPs interconnected facilities on a Sender Keep All basis. Such an arrangement helped make the Internet "a network of networks" and as well expedited the accrual of positive networking externalities, i.e., expanding the value of the Internet as more users and content suppliers come on-line.

Internet interconnection arrangements have become more hierarchical with zero cost peering now primarily limited to large volume, Tier-1 backbone carriers. Lesser ISPs now must pay larger carriers for access to their backbone networks. This outcome constitutes a perfectly reasonable response to the proliferation of ISPs, including many small ventures who would become free riders of larger carrier facilities absent a transfer payment. As well, a payment mechanism helps reduce congestion, or at least imposes costs of carriers and their customers responsible for adding a traffic burden on another service provider.

However, the potential exists for a more hierarchical Internet to balkanize networks and to impose higher costs on rural ISPs and those incurring the higher access charges. The Internet might balkanize if more network operators refuse to peer and interconnect with other operators, even if the smaller operator offered to pay for access. Even in the absence of such balkanization, the diversification of Internet operator types probably means that most rural ISPs will fall into the lowest and smallest category thereby reducing their peering opportunities and obligating them to incur interconnection and access charges with just about every other ISP they access. Depending on what the financial impact of higher telecommunications link costs, rural ISPs may have to raise rates to levels comparatively higher than rates available in urban locales. Universal service support programs in telecommunications works to prevent such an outcome, but under the current regime only schools, libraries and health care facilities enjoy subsidized access to Internet service.

Distance and Volume Still Matters When Carriers Price Service and Set Access Terms

No doubt technological innovations in telecommunications and information processing support declining consumer costs. However distance and traffic volumes still matter in the cost calculus: a long call routing from a rural caller or Web surfer to a distant call recipient or content source costs more than a shorter or more easily routed call. In the telephony environment, carriers typically

average dense and sparse route traffic costs, but a small, rural ISP may not have the traffic volume or a wide enough service territory to engage in similar cost averaging.

There is nothing new to the fact that rural or inner city residents frequently face higher product and service costs. But arguably access to the Internet and other advanced services should qualify for the same preferred status as telephony. However, the USF mechanism cannot generate sufficient funds for such an expanded mission. Already the establishment of discounted e-rate access to telephony and the Internet has imposed substantial stress on the universal service contribution process with consumers objecting to a new tax when IXCs add a new line item to their bills to pass through explicit financial subsidy burdens. Billions more in universal service funding would be required if Congress expressly expanded the universal service mission to include Internet access beyond e-rate beneficiaries.

Rate Rebalancing Will Occur Despite Adverse Affects on Universal Service Goals

At the same time as rural ISPs incur higher telecommunications costs, all telephone service subscribers in rural and high cost areas face significantly higher rates. When ILECs face competition in urban areas, they rationally see the need to reduce rates and expand service options. Reduced urban service revenues will trigger the need to generate higher revenues elsewhere so that the carrier generates a fair total amount of revenues. One could consider such rate "rebalancing" as unfair in the sense that rural and high cost residents, even as they accrue the financial benefits of universal service funding, end up having to "subsidize" competitive rates available to large volume, urban users. But another way to look at this outcome is the appreciation that without a conscientious effort to meet competitors' prices, ILECs would lose urban and large volume customers. Should this occur, ILECs would have to rely even more so on the revenues generated when they operate as carriers of last and only resort to their "captive" customers who have no service alternative. Using universal service concerns as the basis for denying a rate rebalancing request might have the unfortunate effect of making matters worse for rural users in the long run.

Regulators Appear Reluctant to Support Alternative Carriers and Technologies to Achieve Universal Service Objectives

The Telecommunications Act of 1996 created a mechanism for state regulatory agencies to authorize more than one carrier to pursue universal service goals in a locality or region. [48] Heretofore states have been reluctant to certify additional carriers, including ones using wireless technologies that can provide cost-effective service on an immediate basis, despite the FCC conclusion that "the plain language of section 214(e)(1) does not permit the [Commission] or the states to adopt additional criteria as prerequisites for designating carriers eligible" for universal service subsidization.[49]

Perhaps such reluctance stems from the perception that authorizing multiple carriers to operate in a single region somehow would adversely affect the ability of the incumbent carrier to continue providing services in view of the potential for universal service fund diversion. If providing subsidized services has diverted time, money and effort from other more profitable endeavors, then ILECs should welcome the opportunity to share or abandon such a burden. In any event, no state or federal regulatory authority should second guess the business judgment of a new carrier ready, willing and able to provide essential, universal services.

Much of the cost incurred in providing wireless services occurs with the installation of the towers, antennas, switches and transmitters that constitute the infrastructure. The incremental cost of an additional minute of traffic anywhere within the overall "footprint" of a mobile radio system approaches zero, absent congestion. While a rural call may involve more switching and backhauling to a central facility, probably located in an urban locale, the mobile radio operator may

be inclined to offer postalized rates throughout a service area, i.e., declining to impose higher "roaming" charges simply because the caller is located outside a city. It appears that many regulators have failed to notice the significant reduction in mobile radio charges and the ability of wireless services, in some circumstances, to offer functional equivalent service at roughly the same cost as conventional wireline options. [50] In any event, the criteria for determining whether to grant ETC status to a wireless carrier does not depend on the affordability or substitutability of wireless services vis a vis incumbent wireline carrier services. [51]

Convergence Requires a New Approach to Universal Service

In a converging and Internet-centric environment, preexisting regulatory classifications simply do not work. Technological convergence blurs the semantic classifications between print media, broadcasting, closed-circuit media like cable television and telephony. Market convergence means that previously discrete industry segments merge, or at least become more easily penetrated by newcomers. For example, inn an Internet-dominated environment, an ISP could easily become a "one-stop-shop" for consumers' telecommunications, entertainment and information requirements offering an array of services including streaming audio (radio) and video (television) and local and long distance telephone service along with a variety of electronic commerce, news and entertainment applications.

Any attempt to extend regulatory regimes to Internet-mediated applications runs the risk of creating a dichotomy in regulatory rights and responsibilities between providers of functionally equivalent services. Many of the services available via the Internet provide a faster, better, cheaper and smarter evolution of preexisting services. The Internet provides a convenient, user-friendly medium for acquiring news and entertainment and for engaging in all sorts of commercial transactions. A bias or intention not to regulate, or to regulate lightly such activities may contrast significantly with a preexisting and more intrusive regulatory model. Governments should not automatically extend the application of preexisting regulatory regimes to Internet- mediated equivalent services. Nor should governments deregulate incumbent services simply because Internet options have become available, and governments have opted to apply a different and probably less burdensome regulatory regime to Internet services.

The onset of Internet-mediated services presents a regulatory challenge to governments, particularly those disinclined to treat Internet-mediated services as equivalents to services transmitted and delivered via traditional media. The juxtaposition of different regulatory regimes typically also creates an asymmetry that has the potential for tilting the competitive playing field in favor of the less regulated service. To the extent regulation can impose financial and operational burdens, the service provider subject to greater regulation typically suffers a competitive disadvantage vis a vis the less regulated operator. Governments need compelling justifications for establishing different regulatory regimes in view of the potential for such asymmetry to impact the marketplace attractiveness of one service vis a vis others.

Regulatory dichotomies work best when technological categories remain discrete and absolute. But they surely do not work when technological convergence results in porous service categories and diversification by operators. When cable television companies and ISPs both offer telephone services functionally similar to what telephone companies, regulators may not be able to maintain preexisting dichotomies. Heretofore, government regulators have assumed that incumbent telephone service providers have dominant market shares, should operate as common carriers and offer the best technologies and wherewithal to achieve universal service goals. Government regulators typically assume that market entrants like ISPS, other enhanced service providers and resellers of basic transmission capacity do not have the potential to acquire a dominant market share, or offer ancillary, non-common carrier services. In the future, such assumptions may prove incorrect.

When ISPs offer consumers telephone service equivalents, which link PSTN access with Internet-mediated telephony, preexisting regulatory exemptions tilt the competitive playing field to their advantage. Should significant telephony traffic volumes migrate to routings exempt from universal service contribution requirement, the sum of funds available to achieve the universal service mission will decline. The potential for declining universal service funds occurs just as many governments have articulated a broader and more ambitious universal service mission for all citizens to have access to both basic telephone service and advanced Internet services.

An Immodest Proposal

The universal service mission may suffer greatly if the FCC continues to apply the basic/enhanced service dichotomy coupled with the different regulatory treatment of common carrier versus private carriers. If the Internet becomes the predominant medium for telecommunications and information services as anticipated, then an increasing volume of traffic previously considered basic, common carrier services will transform into enhanced, private carrier services. This transformation may appeal to deregulatory advocates, but two secondary impacts will have a substantial, adverse impact on the generation of funds for supporting the universal service mission:

1) when ISPs offer functionally equivalent long distance services, their non-common carrier, enhanced services provider classification exempts them from paying access charges and contributing to universal service funding; and

2) incumbent carriers, fettered with a more onerous universal service burden as a result of asymmetrical regulation, will create new, enhanced service provider subsidiaries similarly exempt from universal service subsidy obligations.

When Congress enacted the Telecommunications Act of 1996 and expanded the scope of the universal service mission, it ordered the FCC to fund the mission with explicit support mechanisms from all telecommunications carriers. [52] Surely Congress recognized that substantially more funds would have to flow from companies providing telecommunication services to achieve an expanded universal service mission and to replace an unsustainable implicit subsidy mechanism from long distance services to local exchange services. For the subsidy burden to be equitable, all enterprises providing the functional equivalent to interstate telecommunications should make a contribution. This includes ISPs when they hold themselves out as providing telecommunications services like Internet-mediated, long distance telephone services. Likewise, all providers of local exchange services, which can support the universal service mission, should have access to universal service subsidies. This includes wireless operators, such as cellular radio and personal communication service providers when they apply for Eligible Telecommunications Carrier status and hold themselves out as providing the menu of essential local services specified by the FCC.

Few consumers understand or appreciate having new charges on their long distance bills listed as a "universal service charge." Consumer advocates claim that IXCs have passed onto consumers the entire universal service subsidy burden without a commensurate reduction in long distance charges that are possible, because the local access charges paid by IXCs contain a substantially reduced implicit universal service subsidy. At the same time as long distance telephone bills from conventional carriers contain new charges, new Internet telephony services provide substantial savings, partly the result of access charge and universal service funding exemptions. Part of the solution for stabilizing and rationalizing universal service subsidization lies in spreading the financial burden across all providers of long distance telephone services, no matter what their preexisting regulatory classification.

NOTES

1. One working definition of this mission: "a public policy to spread telecommunications to as many members of society as possible, and to make available, directly or indirectly, the funds necessary to support the policy." Eli M. Noam, Will Universal Service and Common Carriage Survive the Telecommunications Act of 1996?, 97 Columbia Law Review, 955, 957 (1997).
2. Universal service programs include funding for schools and libraries, commonly known as the e-rate program; high cost support, a rural health care program and two programs (discounted initial hook up fees and reduced monthly rates) supporting access by people with low incomes. See Federal Communications Commission, Accounting Policy Division, Universal Service, available at http://www.fcc.gov/ccb/universal_service/. In 1998 the Commission adoptedannual funding caps of $2.25 billion for schools and libraries and $400 million for health care providers.
3. See International Telecommunication Union, World Telecommunication Development Report 1998, Chapter 4, Universal Access (1998).
4. Heather E. Hudson, Access to the Digital Economy: Issues in Rural and Developing Nations, paper presented at Understanding the Digital Economy–Data, Tools and Research, conference organized by the United States Department of Commerce, Washington, D.C. May 25-26, 1999, available at http://mitpress.mit.edu/ude.html; see also http://www.ecommerce.gov.
5. See, e.g., Into Vogelsang, Micro-Economic Effects of Privatizing Telecommunications Enterprises, 13 Boston University International Law Journal (Fall, 1995); Robert J. Saunders, et al., Telecommunications and Economic Development 4 (2d ed. 1994); Ben A. Petrazzini, The Political Economy of Telecommunications Reform in Developing Countries: Privatization and Liberalization in Comparative Perspective 28 (1995); Walter T. Molano, the Logic of Privatization: The Case of Telecommunications in the Southern Cone of Latin America (1997). see also Christopher J. Sozzi, Project Finance and Facilitating Telecommunications Infrastructure Development in Newly-Industrializing Countries, 12 Santa Clara Computer & High Tech.L.J. 435, 436-39 (1996); Bella Mody, et al., Telecommunications Politics: Ownership and Control of the Information Highway in Developing Countries (1995).
6. "A firm controlling bottleneck facilities has the ability to impede access of its competitors to those facilities. We must be in a position to contend with this type of potential abuse. We treat control of bottleneck facilities as prima facie evidence of market power requiring detailed regulatory scrutiny. Control of bottleneck facilities is present when a firm or group of firms has sufficient command over some essential commodity or facility in its industry or trade to be able to impede new entrants. Thus bottleneck control describes the structural characteristic of a market that new entrants must either be allowed to share the bottleneck facility or fail." Policy and Rules Concerning Rates for Competitive Common Carrier Services and Facilities Authorizations Therefor, CC Docket No. 79-252, First Report and Order, 85 FCC 2d at 36.
7. See Rob Frieden, Contamination of the Common Carrier Concept in Telecommunications, 19 Telecommunications Policy, No. 19, 685-697 (Dec. 1995).
8. Telecommunications Act of 1996, Pub. L. No. 104-104, 110 Stat. 56, 47 U.S.C. § 254
9. 47 U.S.C. 254(e); see also Joint Explanatory Statement at 131 ("In keeping with the conferees' intent that universal service support should be clearly identified, [section 254(e)] states that such support should be made explicit . . .").
10. 47 U.S.C. § 254(d).
11. See 47 U.S.C. § 254(b)(3).
12. "In 1983 we adopted a comprehensive 'access charge' plan for the recovery by local exchange carriers (LECs) of the costs associated with the origination and termination of interstate calls. [citing MTS and WATS Market Structure, Memorandum Opinion and Order, 97 FCC 2d 682 (1983) At that time, we concluded that the immediate application of this plan to certain providers of interstate services might unduly burden their operations and cause disruptions in provision of service to the public. Therefore, we granted temporary exemptions from payment of access charges to certain classes of exchange access users, including enhanced service providers." Matter of Amendments of Part 69 of the Commission's Rules Relating to Enhanced Service Providers, CC Docket No. 87-215, Notice of Proposed Rulemaking, 2 FCC Rcd. 4305 (1987)(proposing to imposed access charges on enhanced service lines), terminated, 3 FCC Rcd. 2631(1988)(proposal abandoned on ground that despite the apparent discrimination in charges "a period of change and uncertainty" besetting the enhanced services industry justified ongoing exemption from access charge payments).
13. Id. at ¶282.
14. Id. at ¶ 283.
15. "The mere fact that providers of information services use incumbent LEC networks to receive calls from their customers does not mean that such providers should be subject to an interstate regulatory system designed for circuit-switched interexchange voice telephony. The mere fact that providers of information services use incumbent LEC networks to receive calls from their customers does not mean that such providers should be subject to an interstate regulatory system designed for circuit-switched interexchange voice telephony." Id. at ¶288.

16. Id. at ¶311.
17. Section 254(h)(1)(b) requires "telecommunications carriers . . . [to] provide both advanced telecommunications services and additional [FCC designated] services to elementary schools, secondary schools, and libraries for educational purposes at rates less than the amounts charged for similar services to other parties." When providing such discounted "e-rate" services, telecommunications carriers qualify for universal service subsidization. But so too do ISPs, because Section 254(h)(2)(A) requires the FCC to "enhance, to the extent technically feasible and economically reasonable, access to advanced telecommunications and information services for all public and non-profit elementary and secondary school classrooms, health care providers and libraries."
18. See Sean M. Foley, The Brewing Controversy Over Internet Service Providers and the Universal Service Fund: A Third Generation Interpretation of Section 254, 6 CommLaw Conspectus 245 (Summer, 1998) (stating the case for eliminating the telecommunications carrier/information service provider distinction and embracing a broader definition of telecommunication service so that ISPs both may universal service contributions and qualify to receive subsidies).
19. Inquiry Concerning the Deployment of Advanced Telecommunications Capability to All Americans in a Reasonable and Timely Fashion, and Possible Steps to Accelerate Such Deployment Pursuant to Section 706 of the Telecommunications Act of 1996, CC Docket 98-146, Notice of Inquiry, 3 FCC Rcd. 15280 (1998).
20. Deployment of Wireline Services Offering Advanced Telecommunications Capability, CC Docket No. 98-147, Memorandum Opinion and Order, and Notice of Proposed Rulemaking 13 FCC Rcd. 24012 (1998), First Report and Order and Further Notice of Proposed Rulemaking, 14 FCC Rcd. 4761 (1999); see also Inquiry Concerning the Deployment of Advanced Telecommunications Capability to All Americans in a Reasonable and Timely Fashion, and Possible Steps to Accelerate Such Deployment Pursuant to Section 706 of the Telecommunications Act of 1996, CC Docket No. 98-146, Report, 14 FCC Rcd. 2398 (1999).
21. Federal-State Joint Board on Universal Service, CC Docket 96-45, Report to Congress, 13 FCC Rcd. 11,501 (1998), available at http://www.fcc.gov./Bureaus/ Common_Carrier/Reports/ fcc98067.html [hereinafter cited as 1998 Universal Service Report to Congress].
22. 1998 Universal Service Report to Congress at ¶ 3.
23. Id.
24. Id.
25. See id. at ¶ 4.
26. 1998 Universal Service Report to Congress at ¶ 15.
27. "Moreover, we clarify that the provision of transmission capacity to Internet access providers and Internet backbone providers is appropriately viewed as 'telecommunications service' or 'telecommunications' rather than 'information service,' and that the provision of such transmission should also generate contribution to universal service support mechanisms." Id at ¶ 15.
28. The Communications Act of 1934 now defines information service as "the offering of a capability for generating, acquiring, sorting, transforming, processing, retrieving, utilizing, or making available information via telecommunication, and includes electronic publishing, but does not include any use of any such capability for the management, control, or operation of a telecommunications system or the management of a telecommunications service." 47 U.S.C. § 153(20)(1997).
29. "Senators Stevens and Burns indicate, an information service provider transmitting information to its users over common carrier facilities such as the public switched telephone network is a 'telecommunications carrier.'" 1998 Universal Service Report to Congress at ¶ 34. The Commission understand the concept of mixed or hybrid services to refer to "services in which a provider offers a capability for generating, acquiring, storing, transforming, processing, retrieving, utilizing or making available information via telecommunications, *and* as an inseparable part of that service transmits information supplied or requested by the user." id. at ¶ 56.
30. Id. at ¶ 57.
31. Id. at ¶ 83.
32. Internet telephony "offer users the ability to call from their computer to ordinary telephones connected to the public switched network, or from one telephone to another. . . . [A] user first picks up an ordinary telephone handset connected to the public switched network, then dials the phone number of a local gateway. Upon receiving a second dialtone, the user dials the phone number of the party he or she wishes to call. The call is routed from the gateway over an IP network, then terminated through another gateway to the ordinary telephone at the receiving end." Id. at ¶ 84.
33. An Internet telephony provider subject possibly subject to USF contribution requirements must meet the following conditions: (1) it holds itself out as providing voice telephony or facsimile transmission service; (2) it does not require the customer to use CPE different from that CPE necessary to place an ordinary touch-tone call (or facsimile transmission) over the public switched telephone network; (3) it allows the customer to call telephone numbers assigned in accordance with the North American Numbering Plan, and associated international agreements; and (4) it transmits customer information without net change in form or content. Id. at ¶ 88.
34. Id. at ¶ 89.

35. Id. at ¶ 90.
36. 47 U.S.C. § 160 (1999).
37. See id. at ¶ 92.
38. " We continue to believe that alternative calling mechanisms are an important pro-competitive force in the international services market. We need to consider carefully the international regulatory requirements to which phone-to-phone providers would be subject. For example, it may not be appropriate to apply the international accounting rate regime to IP telephony." 1998 Report to Congress at ¶ 93. See also Rob Frieden, "Falling Through the Cracks: International Accounting Rate Reform at the ITU and WTO," 22 Telecommunications Policy No. 11, 963-975 (December 1998).
39. The Commission concluded that to be a mandatory contributor to universal service under section 254(d): (1) a telecommunications carrier must offer "interstate" "telecommunications"; (2) those interstate telecommunications must be offered "for a fee"; and (3) those interstate telecommunications must be offered "directly to the public, or to such classes of users as to be effectively available to the public. Universal Service Order, 12 FCC Rcd. at 9173, citing 47 U.S.C. §§ 153(22), 153(43), and 153(46).
40. For example, the Commission held that operators of interstate private networks that lease excess capacity on a non-common carrier basis should contribute to universal service. SeeUniversal Service Order, 12 FCC Rcd. at 9178.
41. 1998 Universal Service Report to Congress at ¶ 16.
42. Id. at 4. Policy Implications at ¶ 5.
43. See Jason Oxman, The FCC and the Unregulation of the Internet, Federal Communications Commission, Office of Plans and Policies, OPP Working Paper No. 31 (1999) available at http://www.fcc.gov/opp/workingp.html.
44. See President William J. Clinton and Vice President Albert Gore, Jr., A Framework For Global Electronic Commerce, available at http://www.iitf.nist.gov (viewed July 22, 1999); United States Department of Commerce, The Emerging Digital Economy (April 15, 1998) available at http://www.ecommerce.gov/emerging.htm; and The Emerging Digital Economy II (June 22, 1999) available at http://www.ecommerce.gov/ede/.
45. Id at p. 24-25.
46. Arturo Gandara, "Equity in an Era of Markets: The Case of Universal Service," 33 Wake Forest L. Rev. 107 (1998).
47. See e.g., Robert M. Frieden,"Without Public Peer: The Potential Regulatory and Universal Service Consequences of Internet Balkanization," 3 Virginia Journal of Law & Technology 8 (Fall, 1998) available at http://vjolt.student.virginia.edu/. Kenneth Neil Cukier, "The Global Internet: A Primer," in Gregory C. Staple, Ed. TeleGeography p. 112 (1999); Robert M. Frieden, "Last Days of the Free Ride? The Consequences of Settlement-Based Interconnection for the Internet," 1 Info No. 3, 225-238 (June, 1999).
48. Any telecommunications common carrier can become certified as an eligible telecommunications carrier ("ETC"), and thereby qualified under Section 254 of the Communications Act to receive universal service subsidies. The appropriate state regulatory commission must determine, pursuant to Section 214(e) of the Communications Act, that:1) the candidate carrier provides the base set of services determined by the FCC, pursuant to Section 254(c), as worthy of federal universal service subsidization, e.g., POTS; 2) the carrier advertises the availability of such services and the applicable charges; 3) the carrier provides the supported services, whether owned or resold, throughout a designated service area; and 4) for service in rural area, the commission determines that certifying this carrier, in addition to the incumbent carrier, would serve the public interest. See 47 U.S.C. § 214(e).
49. Federal-State Joint Board on Universal Service, CC Docket No. 96-45, Report and Order, FCC 97-157 at ¶ 24 (May 8, 1997); see also Federal-state Joint Board on Universal Service: Promoting Deployment and Subscribership in Unserved and Underserved Areas, Including Tribal and Insular Areas, CC Docket No. 96-45, Further Notice of Proposed Rulemaking, FCC 99-204, 1999 W.L. 684121 F.C.C. (rel. September 3, 1999)(expressing enthusiasm for wireless options).
50. See Mark J. Ayotte, Eligibility of Wireless Carriers to Receive Universal Service Support, 17 Communications Lawyer 11 (Spring, 1999).
51. "Incumbent LECs can be expected to oppose ETC designation for . . . [wireless service] providers based on claims of 'affordability' and' substitutability.' Yet, such tests are wholly unrelated to the governing ETC criteria under Section 214(e) and are merely designed to protect their monopoly position and avoid competition." Id.
52. 47 U.S.C. §254(d) requires "[e]very telecommunications carrier that provides interstate telecommunications services . . . [to] contribute, on an equitable and nondiscriminatory basis, to the specific, predictable, and sufficient mechanisms established by the Commission to preserve and advance universal service."

4. COMMENTS RECEIVED FROM **AUSTRALIA**

Mr Yoshio Utsumi
Secretary-General
International Telecommunication Union
Place des Nations
CH-1211 Geneva 20
Switzerland

Attention: Mr Arthur Levin

Dear Mr Utsumi

Thank you very much for your letter of 17 October 2000 regarding the first Informal Expert Group Meeting of WTPF-01: IP Telephony, and also for your Draft Report, circulated to members on 1 November 2000.

As you are aware, I was unable to attend the first Informal Expert Group Meeting on 16-17 November 2000. However, Australia wishes to participate in this process and I would be grateful if you would forward the following comments for consideration by the second meeting of the Informal Expert Group in January 2001 and possible inclusion in drafting of opinions to be considered by the Policy Forum.

In general, Australia encourages the adoption of regimes that regulate services according to their functionality, rather than according to the technology used to deliver the service. In this context, Australia would be interested in sharing experience and advice with other countries as well as cooperating in sharing information about possible transitions from a circuit-switched to an IP-based network.

A possible opinion could advocate the development of competitive domestic and international communications environments. Technological neutrality is an important principle within such an environment for ensuring that particular competing technologies are neither advantaged nor disadvantaged thus maximising the opportunities for diversity, flexibility and innovation in the supply of services. This applies equally to conventional, PSTN telephony as it does to IP telephony. In this respect, the competition and technological neutrality principles support each other.

Australia believes that the list of avenues for international coordination at section 5 of the Draft Report provides a good basis for discussion of relevant issues.

In addition, we would suggest there is a role for Study Group 3 in this process. We expect that some of Study Group 3's work program over the next few years may generate outcomes that can assist in understanding and addressing matters relating to the handling of telephony, including IP telephony. Study Group 3 is examining the question of reform and development of charging, accounting and settlement principles for international telephone services. This issue acknowledges the changing environment with issues arising such as asymmetry arising across regulatory regimes, multi-operators, and competition between carriers operating within the accounting rate system and resellers outside this framework. Australia would like to see close liaison between the work of WTPF-01 and Study Group 3 on these issues.

Thank you once again for your invitation to participate in this important work. At this stage we are proposing to have Mr Michael Moynihan of this Department represent Australia at the 18-19 January meeting and would wish to be included on the agenda to give a presentation.

Yours sincerely

Brenton Thomas
A/g General Manager
Competition and Consumer Branch

November 2000

5. COMMENTS RECEIVED FROM **FRANCE TELECOM**

First of all, France Telecom would like to congratulate the ITU Secretariat General for producing the first draft report which offers an excellent basis for discussion on the complex and sensitive subject of IP telephony.

France Telecom who has the advantage to be a member of the Informal Experts Group (IEG) on this issue participated with much interest to the first meeting held on November 16-17 in Geneva. Following this event, we wish to express our comments on the first draft report as follows.

1 IP telephony, an opportunity for economic growth under a favourable environment….

France Telecom heartily shares the general view expressed in the first IEG meeting that the draft report should not focus so heavily on the negative aspects of IP Telephony. The IP technology makes it possible to offer a wide range of value added applications that can create new sources of revenues and foster economic growth both in developing and developed countries. This broadened scope should be reflected in the draft report especially in the economic chapter.

Yet France Telecom is convinced that economic growth will only be reached under a favourable environment matching all the coming challenges. As a global operator we are fully aware of these challenges. Two of them are the development of skilled human resources and the production of valuable contents. Equally important is the need to foster investment and innovation especially in a fast moving and converging market. Our success in meeting the challenges will condition economic growth and the decrease of the so called « Digital Divide » within and between countries. To reach this aim it is crucial to define what could be a favourable environment.

2 Which favourable environment ?

The environment to be created presents several aspects. One of them refers to the technology. France Telecom shares the view of the IEG that participants to the forthcoming Forum need to understand at a general and high level the specificity of IP networks (including their cost structure) before being able to discuss the more restricted issue of IP Telephony. Bearing in mind the progressive evolution of the networks and the various degrees of development, the interoperability between different networks (IP, PSTN, Mobile) will be an essential element of the favourable environment which is at stake. The IEG was right to emphasize this need.

Yet one of the most important feature to consider in building up the right environment is about the regulatory framework. The concept of technological neutrality was at the center of discussions at the first IEG meeting.. France Telecom does not oppose the principle as such but is deeply concerned about what could be an inadequate and careless application.

To create favourable conditions and particularly to foster innovation and investments, technological neutrality should be applied on a conditional basis, i.e if the need for specific regulation has been proved. In our view, two conditions only may justify this need, when there is a market failure or when public interests cannot be met by the Industry. If and after those two conditions are fulfilled, technological neutrality should be applied to avoid discrimination

and market distorsions but the concept should not be used to regulate services which have not been regulated so far and have been competitive from the very beginning.

3 IP Telephony, an evolution rather than a substitute to PSTN Telephony.

Moreover « neutral »should not mean « identical » but rather « similar ». The application of the principle should adapt to the foreseen overall objective and to the specificity of the concerned services. As far as IP Telephony is concerned the essential question to raise is about its substitutability to the traditional plain PSTN telephone service. France Telecom shares the view generally expressed at the first meeting of the IEG that IP telephony is an application among others made possible by IP technology and should be seen as an evolution full of opportunities rather than a mere substitute.

France Telecom is looking forward to the forthcoming discussions on this complex issue both in the IEG meetings and the March Forum.

6. COMMENTS RECEIVED FROM **Motorola**

Art Levin
International Telecommunication Union
Strategies and Policy Unit
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Place des Nations
CH-1211 Geneva 20
Switzerland
IEG-wtpf@itu.int

November 30, 2000

Dear Mr. Levin:

On behalf of Motorola, I am submitting the following proposed text for inclusion in the Draft Report of the Secretary-General on IP Telephony (the "Report").

During the recent Experts Group meeting, Chairman Anthony Wong proposed that the Report be expanded to encompass IP Networks. The text that follows attempts to describe IP-based networks for the Technical Aspects portion of the Report, and includes information on the Wireless IP component that I had promised to draft at the meeting. I am also providing language for a separate section on IP Standards activities.

TECHNICAL ASPECTS
[Insert the following in between the Introduction and IP Telephony Standards Activities sections on Page 5 of the 1st Draft Report]

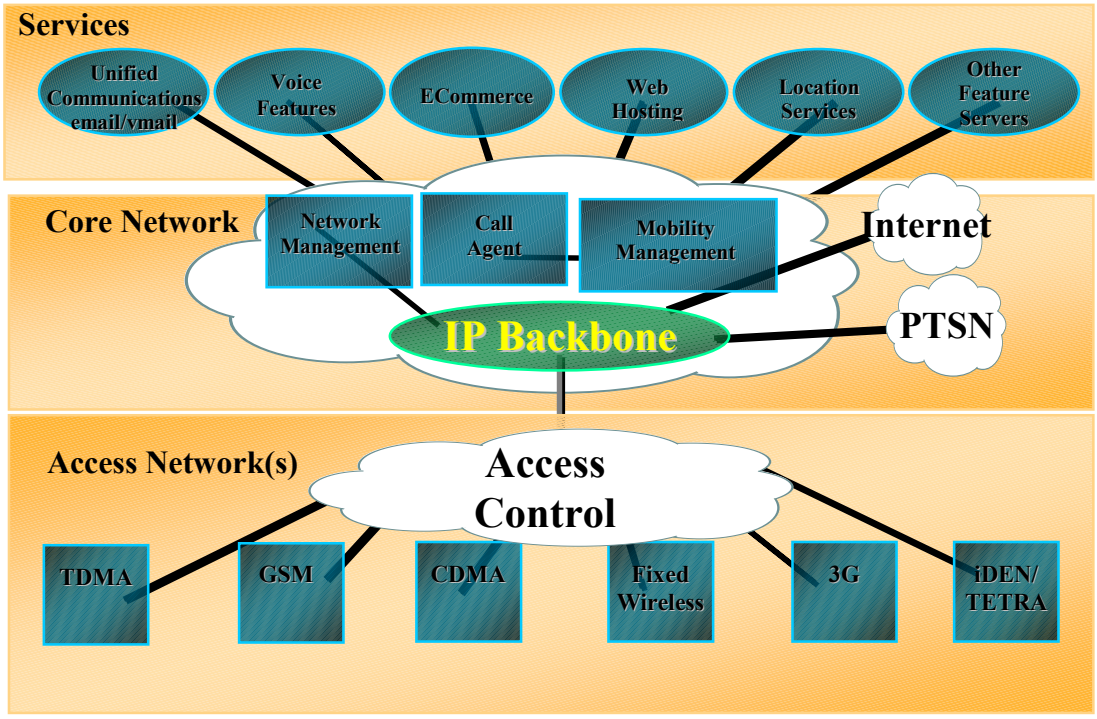
IP-based Network Architecture

2.3 Circuit switching is the network architecture for the Public Switched Telephone Network (PSTN). It allows communications facilities, or circuits, to be shared among users, but with each user having sole access to a circuit, i.e. a circuit is dedicated to a user. This network is optimized for voice transmission. For mobile communications, the current wireless circuit switched networks use wireless air interface protocols (e.g. GSM, CDMA, TDMA) to connect to the circuit backbone and mobile switching center (MSC), which in turn communicates with other network devices (e.g. the PSTN and the Internet) on this dedicated circuit basis.

2.4 IP-based packet switched networks stand to change how carriers provide their service, how innovative and customized applications are offered, and how customers access them. The core of the IP-based network is packet switching. Instead of reserving a dedicated circuit for the length of the call, a packet switching network allows many users to share transmission capacity by breaking up information into packets and then using a transmission line to alternately send packets from several different users.

2.5 The IP backbone enables direct interconnection between wireless networks (e.g. cellular, paging) and both IP and non-IP networks (e.g. PSTN, Internet) without the need and consequent delay of going through a circuit switch gateway circuit. The result is that all IP-based networks have the ability to offer "bandwidth on demand" i.e. to carry a higher volume of converged voice, data and multimedia traffic over a common transmission and routing infrastructure more efficiently and at a lower cost. Additionally, the layered approach of IP-based networks improves flexibility for operator access networks, core network providers and service providers. (See Figure A)

Figure A - IP-based Network Architecture



2.6 As voice becomes more and more a smaller fraction of the total percentage of bits transferred, deploying a network for the delivery of only voice services will not be justifiable. Consequently there will be an enormous effort to create IP technologies, which support real-time applications of reliable services and carrier grade quality. We have an idea of the robustness of this market as we note market predictions that the 500 million Wireless Voice Users and the 200 million Wired Internet Access Users will converge to become 1 billion Wireless Internet Access Users by the year 2005. All IP-based networks will ultimately bring us from a communications infrastructure to a true information infrastructure.

2.7 Vendors and operators are transforming themselves from voice-centric, circuit-switched providers of product to data-centric, IP-based providers of solutions and applications with capacities hundreds of times greater than today's networks and a rich source of revenues. Large operators have already begun investing in upgrading their networks towards an "all IP" architecture. It is expected that a deployment of all IP-based networks by operators, will first appear in Europe and Japan in 2002, with the rest of Asia second in 2003, and the Americas deploying in the late 2003 early 2004 timeframe, as is the case with 3G deployment.

Benefits of an IP-based Network

2.8 The ability of an all IP-based network architecture to connect the Internet, the PSTN, a myriad of enterprise applications, and existing and future third-party applications with the freedom of wireless mobility, is beneficial not only to operators, but third-party entrepreneurs, the consumer and society in general.

2.9 The convergence of wireless communications and the Internet will provide limitless access to information of all forms and provide extraordinary opportunity – it sets the stage for Universal Access and closing the gap between the "information haves and have-nots". We have already witnessed the explosive growth of the Internet and the resultant economic benefits, including increase in revenue and job opportunities and decrease in cost. These

benefits are generating unprecedented interest from diverse industry sectors (e.g. wireless providers, content industry, ISPs, virtual network providers, IT industry, etc.), operators, service providers, consumers, regulators and governments.

2.10 The benefits IP-based Wireless networks provide to operators include an orderly migration path from existing technologies (2G, 2.5G, 3G), the capability of extending, reusing and upgrading existing technology investment in a modular fashion, improved system capacity and quality of service, and reduced network operating costs associated with the maintenance of leased lines and interconnects on the current circuit switched network.

2.11 Because IP is open and non-proprietary, it allows third party developers access and add applications and features to the network, which in turn enable them to provide feature-rich customized applications to the consumer. IP increases system performance and reliability. It allows for the creation, storage and access to a wide range of information resources.

2.12 For the consumer, there will be offered a choice of customized services and features at a lower cost. IP's interworking function ensures that appropriate network resources are assigned so that services (e.g. IP Telephony and Real Time Video) can be optimally delivered to a wide range of wireless and fixed subscriber devices.

2.13 Deployment of IP-based networks will be accompanied by a considerable decentralism of network management; access technology independence; different and constantly changing business and market models, especially to the pricing and financing schemes; the entry of many new industry players from other sectors, and an increasing concentration of broadband services environment on IP platforms which will resemble the Internet client/server model more than the traditional telecommunications model.

Wireless IP Standards Activities

2.14 The influence of the Internet and IP technology has extended to encompass the mobile communications industry where standards bodies, operators and radio access network (RAN) equipment vendors have embraced IP as the networking architecture of choice for delivering a whole new class of service application offerings and adding mobility to Internet accessibility.

2.15 Today's wireless core network is based on a circuit switched S7 architecture similar to that found in wireline telecommunication networks. With the advent of IP technologies and the tremendous growth in data traffic, the wireless industry is evolving their core networks toward IP technology.

2.16 Wireless telecommunications started as an offshoot of wireless telephony and with the absence of global standards resulted in regional standardization. Two major mobile telecommunication standards have dominated the global wireless market, namely TDMA/CDMA developed by TIA in North America and GSM developed by ETSI in Europe. As we move toward third generation wireless, there is a need to develop standards, which are more global and collaborative.

2.17 Recently the global wireless industry has created two new partnerships projects to address this issue:

2.17.1 3rd Generation Partnership Project (3GPP) which is developing 3G standards for GSM based systems and

2.17.2 3rd Generation Partnership Project 2 (3GPP2) which is developing 3G standards for IS-95 based CDMA standards.

2.18 3GPP and 3GPP2 have developed radio technology standards to support higher data rates and are now focusing on development of standards for all IP networks. The workplan anticipates that a recommendation on how the specification development should be done on all IP networks should be concluded by December 2001 for release to the Standards Development Organizations.

2.19 A common set of IP Mobility protocols are needed to provide network level mobility between different access networks including wireless. The IETF is developing a suite of protocols (Mobile IP) to achieve such mobility. A new Forum MWIF started recently intends to drive a single open mobile wireless Internet architecture that enables seamless integration of mobile telephony and Internet services and is independent of the access technology.

2.20 TIPHON (Telecommunications and Internet Protocol Harmonization Over Networks) is an ETSI body focused on the broad question of making the new IP networks interoperate with the old circuit switched networks.

2.21 T1 (an ANSI group) contributes to IP/telecom issues as well, and TIA (Telecommunication Industries Association) also has relevant working groups.

Thank-you for the opportunity to comment on the Secretary-General's Draft Report. If you have any questions, please do not hesitate to contact me at (202) 371-6930.

Sincerely,

Teresa O'Connor
Director, Global Regulatory Relations
Motorola

7. COMMENTS RECEIVED FROM **ALCATEL**

Essential Distinction between VoIP and "Internet Telephony"

> We must avoid confusing voice offered over high end full IP technology-based networks (VoIP end to end technology) with the use of Internet technology to provide PSTN interconnect voice services (internet telephony) where intelligent management, signalling and services still remain under the control of the PSTN.

There is considerable difference between Internet Telephony, e.g. passing voice through some circuit switched telephone network (PSTN) segments using the IP-protocol with gateways to the PSTN (a potentially low quality, poorer version subset of "public voice telephony" but featuring for example dial or busy tone) and VoIP, a new greenfield full IP based network designed for voice trans-switching (a normal quality, managed voice service, e.g. voice integrated into multimedia applications). The two issues should not be confused and cannot be addressed using the same criteria and basic considerations.

Internet telephony is a voice service provided by operators introducing the adequate gateways to the SS7 world. We can talk of an IP-overlay to at least parts of the PSTN. The signalling information and intelligence still remains in the SS7 network level of the PSTN.

VoIP is essentially a technology for data-integrated voice service, but currently extended to the design of fully integrated networks for data and voice using the IP-protocol end to end, where voice and signalling information is packetized into cells (IP payloads). This kind of network does not use the PSTN signalling SS7, but can reach PSTN quality (carrier voice grade) in capacity and quality management as for instance planned for some greenfield third generation mobile networks. Soft switches (i.e. call servers) are necessary to manage the network with intelligence and all well known telephone features like busy tone, forwarding, call record data for billing,... .

Main Messages

> "Internet telephony" is distinguished from "VoIP-services" based on whether PSTN signalling (SS7) is used (IP network only overlay to PSTN) or signalling information is carried in the IP payload itself (H.323 or SIP).

Clarification is given and greater distinction strongly recommended in the discussion.

> For VoIP there is a lot of additional intelligent network management necessary.

An overhead management and control layer is invented and derived from the PSTN called the "soft switch" for providing the PSTN features like busy tone, forwarding, call data records for billing,... as regulated for the PSTN. Interworking of VoIP- and PST-networks require the same quality measures end to end. VoIP requires additional effort in billing systems/schemes (technical and commercial) in order to achieve the valid business cases of PSTN.

> Communication services need to be clearly separated from network operation and content provision in order to build up a long term valid stand-alone economic business model for service providers of Voice over IP.

> Seamless services over broadband- and narrowband access systems require standardized interfaces for the aforementioned separation.

Comments to SUMMARY Section of ITU Report

The following should be put into perspective when discussing a future outlook:

> The forecast for much more than next 10 years demonstrates that circuit switched networks still generate considerable revenues.

In 2000 $ 900 Mio sales will have been generated world-wide with IP-telephony according to a Frost & Sulivan study, increasing to $ 52,74 bn in 2005 and $ 91,49 bn in 2006. In 1999, the world-wide circuit switched PSTN including mobile generated 657 bn EUR sales and will increase to 766 bn EUR in 2001 according to the European Information Technology Observatory (EITO). Around 700 bn EUR sales of circuit switched network in 2000 represents nearly 700 times the sales in IP-telephony. For 2006 the IP-telephony is expected to represent 10% of circuit switched network sales due to an increase in 3rd generation mobile, but not in international calls

> Will the PSTN be fully replaced by IP substitution networks? This will probably not happen due to a saturation factor given by the most efficient network architecture for both real-time services (like voice and video) and delivery services (like data) with a certain time of delivery according to payment.

In addition, legacy systems will remain active ensuring a reasonable return on invest (investment protection) for existing and new equipment as a prerequisite in business world and in order to fulfil the Universal Service Obligation with reasonable quality (under State responsibility). Technology evolution and changes to the general network are constant (IP today, newer versions of IP and other technologies tomorrow).

> The future converged networks might look like a mix of existing circuit switched networks with large central switching/management functions as well as distributed lower level switching nodes on local level with packet overlay whenever adequate and economical with regard to the actual voice/data relation.

This relation varies from network section to network section with impact on the optimized mix of overlay and merged networks. Standardization bodies have already demonstrated such converged networks for the third generation mobile networks (IMT2000) in an outstanding manner. In addition locally advanced full IP-networks are built for special purposes like private campus networks, data focussed public networks, nation-wide telematic systems...

> The “star”-structure of the PSTN is especially adapted for real-time services, which is still the future structure and a basis for all kinds of overlay networks. This is the only network really providing reasonable revenues while meeting end-users strong demand for high quality real-time voice telephony.

In addition, it is the only network with a proper inbound region (SS7) where users cannot interfere without major attacks. To drop that and to switch completely over to VoIP, would make the world-wide telephone network even more sensitive to cybercrime.

Related Questions

What does ´Technology Neutral Regulation´ mean?

- A technology refers to equipment design based on technical specifications, usually standards (ISDN, IP, ATM, GSM are names of standardized technologies).
- A name of a technology should never appear in a service definition.
- Services must be defined by QoS, service level agreements (SLA) and end-user perception ONLY.
- Standards (from standardization bodies, or de facto) should never be referenced in regulation.

- Regulation must be based on generic market principles in order to be compliant with general competition law and related international agreements like the mutual recognition agreement (MRA).

Voice related Internet and Questions for Transition?

- Transition from the existing PSTN legacy infrastructure and related revenue schemes to a more complex, converged infrastructure blurring communication services types and end-user applications is now under progress.

  The current legislation already considers IP-services as telecommunications services in nearly all countries of the world.

- Just some of the provisions are not applicable to Internet Service Providers not offering voice telephony for the public.

  Moreover, the newly drafted regulatory framework of the EC drops the outstanding character of voice telephony compared to data services, but not the rights and duties of licensed or at least notified operators of telecommunications infrastructure for the public. Thus PSTN and VoIP services for the public will be technology neutral both considered as Voice Services under the category of communications services.

- There is no timeframe as integration and improvement is a constant driving factor in economic development.

  Legacy remains in operation for many reasons like investment protection, consumer protection, public interests, cultural aspects with strong impact on the content- and thus data traffic development...

- Analogue parts of the network are still built upon (e.g.: modem DSL solutions over existing copper access lines).

- The transition from narrow-band to broadband internet requires seamless service interoperability between both, requiring the mix of overlay and merged network architecture.

- Full-IP networks are considered as a kind of multiprotocol system with the unique internetworking protocol TCP/IP.

  The transition period for establishment of such complete IP based networks is estimated to be longer, in the case of integrating really all features, quality of service and uptime, we are used to in circuit switched networks. That requires an evolutionary approach fitting into the existing infrastructure in order to make The IP-revolution a real revolution with a valid business case when considering voice with the capability to reach every person of the world.

Is IP Telephony an Application or a Service?

- For IP telephony a wide range of processes have to be provided by a service provider.

  Beside the transport and switching activities of an infrastructure provider the service provider has to care for subscriber management, call set up of sessions, re-routing, access to databases and Intelligent Network (IN) value added features,... .

- "IP telephony" is in fact a contradiction in terms: "IP" being a technology, "telephony" referring to a PSTN basic set of communications services.

  A legal regime has been defined in the new drafted regulatory framework directive of the EC for communications service providers dealing with for instance call set up services and all the aforementioned related issues.

- Voice telephony will disappear into a revenue-based "communication service" over any infrastructure.

  This means, any IP-based voice should be possible e.g. a voice session inside a service package (access to call centre, session management, call set-up, routing services, soft switching)

- Voice or data are indifferent – indistinguishable inside a "same" communication service

- This brings us to the further question:

- Will voice (access- and trans-switching) service be merged into the data service model and treated as an unpaid content or
- will data (access- and trans-switching) service be merged into voice economic model with an adequate payment system for the service (time-, volume-, service-based billing including flat rates) ?

> The second option seems to offer the more stable business model, better adapted to what the users are ready to pay for !

How will Revenues be maintained in Telecommunications?

A three tier revenue generation scheme has been reflected in the new regulatory framework directive drafted by the EC:

- content (highest level),
- service (communication/transport) and
- infrastructure (operations, interconnection) level

with reasonable rights and duties in order to comply with the value chain by independent business models without cross subsidisation.

> Basic requirement should be to avoid any cross-subsidisation between revenue generating regimes.

This will be achieved by :

- Building new communication service charging models using time-, volume- and service-dependent tariffing including flat rates as already applied in advanced combinations of GSM voice/SMS/e-commerce offers
- Content/Publicity revenues characterized by copyright transfer independent from communication/access service
- Content/Application revenues characterized by portal- and application software provision/licensing, authorized usage

What is the Impact on the Telecom Value Chain and Business Model?

- End of cross subsidization implies the death of "free of charge" concept.

  Current time dependent tariffing model for voice will be extended to new application-dependent offers for future multimedia sessions opening a large variety of new tariffing models.

  The full IP-based model is not cheaper than the existing PSTN when comparing the number of subscribers, network management, directory/information services, QoS … This is often underestimated when saying that VoIP is cheaper than SS7 switched voice – this will change rapidly when cross- subsidization falls.

What changes in Infrastructure Investment?

- The most obvious change in investment is characterized by shorter innovation cycles with strong demand on downwards compatibility of the equipment.

  Some network elements can be exchanged, others are operated for a certain time as overlay. The combination of circuit and packet switched sections required additional development of multi protocol elements, gateways and interfaces for shared use of different operators.

- New management systems play an increased role in integration of element managers of different suppliers.

  This trend has demonstrated to be a "must" in order to handle the hybrid network. Management system interfaces are currently defined and some have already been standardized. Open interfaces get more importance than in the past and are strongly requested by the operators. Very few high level management centers will control the network of a whole country with less operational staff.

- Future combined circuit and packet switched networks need a common control layer.

  The traditional circuit switches are thus split into transport and control layer, which is simultaneously used for the packed switched domain. The control layer is called "soft switch" allowing quick and easy exchange of transport elements according to the traffic demand.

What changes in Peering Agreements (with the goal of adopting IP Access to the Reference Interconnection Offer (RIO) including commercial leverage scheme completing the peering agreement, like inter operator settlement rates) ?

Due to the fact that business models consider interfaces as commercial interfaces legal protection is required. For example, in Europe peering will be redefined for that purpose under IP interconnection with a more open and transparent handling of the commercial interface. As soon as interfaces transfer money, clear rules in legislation are requested. Inter operator accounting systems get more sophisticated and automated. Gateways will carry commercial information with special request on accounting accuracy. High level billing systems have to collect and integrate a large variety of different record data (time-, volume-, service-data) as well as data from other service providers like e-commerce providers, telematic service providers,...

To conclude, the term "IP telephony" should be discarded, the voice aspect (Internet telephony) disappearing into a technology neutral communication service in the EU´s legal context, VoIP being just one of the technologies enabling such service delivery.

8. COMMENTS RECEIVED FROM **New Zealand**

1 December 2000

1. New Zealand considers that the Draft Report of the Secretary General on IP Telephony contains some insightful analysis and raises important issues worthy of further discussion. It is New Zealand's view that the development of IP Telephony is positive for telecommunications consumers all over the world because of its potential to significantly lower costs and generate new services.

2. Given the potential benefits of IP Telephony, New Zealand considers that its regulation needs to be approached with considerable caution. The past regulation of traditional telephony does not, in New Zealand's view, provide a sound model for the future regulation of IP Telephony. Circumstances today are vastly different to when the regulation of voice networks was developed. Furthermore, the considerable costs of misguided regulation (to consumers, producers and economies in general) are now much more apparent.

Impact of IP Telephony on Universal Service Schemes

3. The draft report notes that in many countries the charging of outgoing and incoming international calls at above cost rates subsidises domestic network development and basic local access. While this may be true, there are valid questions about the efficiency and desirability of such a policy. It is also not known whether a reduction in international calling revenue would, in practice, have a significant adverse impact on domestic network development and basic local access.

4. In any event, domestic regulatory policy is likely to be have a much greater influence on the level of domestic network development and basic local access of a particular country than international developments in IP Telephony.

5. The draft report considers that a permissive policy towards Internet Telephony may be designed to encourage the development of the Internet (see paragraph 3.23). However, it is not demonstrated why this assumption would be made and why it is relevant. IP Telephony will bring its own benefits to consumers, so a permissive regulatory policy can be justified even if it does not increase Internet access.

6. The draft report also seems to assume (in paragraph 3.24) that universal service schemes can only be funded from levies on telephony transactions. This is not necessarily true and it is conceivable (and maybe even desirable) that such levies could be amended to cope with a move to IP Telephony by levying an alternative base, e.g. becoming a levy on the gross revenue of domestic telecommunications companies or being combined with traditional forms of taxation.

Special Issues for developing countries

7. While it is true that there is a greater incentive for developed country correspondents to use IP Telephony as a form of by-pass of the accounting rate system used by developing countries, the report does not (in this section at least) recognise that this may be positive in forcing incumbent PTO's in developing countries to make efficiencies and lower prices, which would benefit both domestic and international consumers.

8. In this section the draft report again paints IP telephony as a threat to investment in extending domestic networks and meeting universal service obligations because of its ability to undermine highly profitable international termination and origination rates. Following this logic one would expect to see countries with the highest rates for terminating international calls investing the most money in domestic networks and universal service obligations and countries with the lowest rates falling behind in these areas. This clearly is not what happens in reality because there are many more factors in the equation and heavily protected state owned monopolies are unlikely to be good at generating and efficiently reinvesting surplus revenue. In any case, the draft report itself later states (in paragraph 4.13) that in increasingly competitive markets such hidden cross-subsidies can no longer be sustained.

Convergence and IP Telephony

9. New Zealand is puzzled by the statement in paragraph 3.33 that " … complexity makes effective telecommunication regulation more important than ever." While effective telecommunication regulation may become more difficult with convergence, the need for it does not become more important. There has always been a need for effective regulation – no one would argue for ineffective regulation. The real debate has and continues to be about what degree and what form of regulation is most effective in protecting and promoting the interests of consumers.

9. COMMENTS RECEIVED FROM **India / Dept of Telecommunication**

1.0 Introduction: Internet has evolved to the point where it combines elements of telecommunications, computing, broadcasting, publishing, commerce and information services into a revolutionary new model for global communications. Unlike the PSTN, which is circuit-switched, the Internet network is packet-switched; communication on the Internet is accomplished by sending small packets of "data" back and forth. In addition to the data itself, each packet contains an address to ensure that it is routed to the correct destination. The exact format of these packets is defined by the Internet Protocol (IP). The "data" can be anything, including encoded, digitized "Voice".

1.1 "IP Telephony" is a generic term used for different ways of transmitting voice, fax and related services over packet switched IP based networks. IP Telephony can be divided into two major groups: Internet Telephony and Voice over IP (VoIP). The difference being the nature of the underlying IP network: the Internet telephony uses primarily the public Internet while the VoIP utilizes managed, dedicated IP based networks, even though both of them are based primarily on the Internet Protocol Technology.

1.2 In a Public Internet, the individual packets can take different routes across the Internet and arrive at different times creating various issues like packet loss, delay and jitter as Quality of Service (QoS) is not assured on Internet. Unlike a text message (i.e., e-mail) which can eventually be reconstructed once all the packetized "pieces" have arrived, real time voice communication requires timely delivery to avoid significant pauses which would render it virtually unusable, or at least not nearly comparable to traditional telephone communication. The situation is much simpler with respect to managed IP networks like VoIP where more bandwidth, faster transmission and engineered quality of service parameters can ensure near circuit-based switched quality for IP telephone calls.

1.2 While VoIP is a challenge in the technical sense, the trend to technological convergence has created quite a challenge in the regulatory sense.

2.0 Observations on the points for ITU forum: ITU -T has decided to convene the third World Telecommunication policy forum to discuss the strategies and policies in the changing telecommunication environment and has circulated an agenda with reference to document DM-1167. A draft document report of Secretary General on the IP Telephony was collected from the ITU web site (reference document DM-1177 dated 2nd Nov 2000). The comments on the draft document are as follows:

2.1 Para (1) of Agenda: - 1st Bullet - "Telecommunication policies and regulation of ITU member states".

2.1.1 Present status of Telecom Policy in India: India announced its Telecom Policy in 1994. The Government of India recognizes that provision of world class telecommunications infrastructure and information as the key to rapid economic and social development of the country. It is critical not only for the development of the Information Technology industry, but also has widespread ramifications on the entire economy of the country. Hence, New Telecom Policy 1999 was framed.

2.1.2 Objectives and targets of the New Telecom policy 1999

- Make available telephone on demand by the year 2002 and sustain it thereafter so as to achieve a tele-density of 7 by the year 2005 and 15 by the year 2010

- Encourage development of telecom in rural areas making it more affordable by suitable tariff structure and making rural communication mandatory for all fixed service providers
- Increase rural tele-density from the current level of 0.4 to 4 by the year 2010 and provide reliable transmission media in all rural areas
- Achieve telecom coverage of all villages in the country and provide reliable media to all exchanges by the year 2002
- Provide Internet access to all district head quarters by the year 2000
- Provide high-speed data and multimedia capability.
- Providing equal opportunities and level playing field for all players;
- Achieve efficiency and transparency in spectrum management
- Protect the defence & security interests of the country

2.1.3 New Policy Framework

The New Policy Framework would look at the telecom service sector as follows:

- Cellular Mobile Service Providers(CMSP), Fixed Service Providers(FSP) and Cable Service Providers(CSP) collectively referred to as 'Access Providers'
- Radio Paging Service Providers(RPSP). Public Mobile Radio Trunking Service Providers (PMRTSP).
- National Long Distance Operators**.** National long distance service beyond service area to the private operators has been opened from Aug,2000. All access providers shall be mandatorily required to provide interconnection to the NLDOs resulting in choice for subscribers to make long distance calls through any operator. Similarly GMPCS and VSAT based service has been opened for private operators.
- International Long Distance Operators. It has been decided to open the International Long distance by 2002.

2.1.4 Internet Telephony

The National Telecom Policy 1999 states that "Internet telephony shall not be permitted at this stage. However, Government will continue to monitor the technological innovations and their impact on national development and review this issue at an appropriate time".

As per the policy, the operators can choose any technology either "circuit switched or packet switched" for their switches as well as for the long distance connectivity.

2.1.5 Internet Service Provider Policy

Taking into consideration the worldwide explosion in the use of Internet the government has liberalized the ISP provisioning. For a token license fee, the service providers could obtain the license. The license can be taken for three categories of areas, namely Category- A for the whole country, Category-B for the a region or big metro cities and Category-C for Secondary Switching Areas. Any one including the Internet service providers have been allowed to set up their own international Gateways.

2.2 Regulatory Frame work of India.

The Regulatory framework consists of two bodies viz., Telecom Regulatory Authority of India (TRAI) and Telecom Dispute Settlement and Appellants Tribunal (TDSAT).

2.2.1 The role of TRAI is to make recommendations, either suo motu or on a request from the licensor, on the following matters, namely:-

(i) Need and timing for introduction of new service provider;
(ii) Terms and conditions of license to a service provider;
(iii) Revocation of license for non-compliance of terms and conditions of license:
(iv) Measures to facilitate competition and promote efficiency in the operation of telecommunication services so as to facilitate growth in such services.
(v) Technological improvements in the services provided by the service providers.
(vi) Type of equipment to be used by the service providers after inspection of equipment used in the network.
(vii) Measures for the development of telecommunication technology and any other matter relatable to telecommunication industry in general;
(viii) Efficient management of available spectrum;

2.2.2 The role of the tribunal (TDSAT) shall be as follows:

(a) Adjudicate any dispute -
(i) Between a licensor and a licensee;
(ii) Between two or more service providers;
(iii) Between a service provider and a group of consumers:

(b) Hear and dispose of appeal against any direction, decision or order of the Authority under this Act.

2.2.3 Licensing:

The functions of licensor and policy maker would continue to be discharged by Government in its sovereign capacity.

3.0 Observations on Para (1) - Bullet 2 "Implications of IP Telephony for developing countries particularly with respect to the policies and regulatory frameworks, as well as technical and economical aspects "

and

"the impact of IP telephony on the operations of sector Members, notably in terms of the financial challenges and commercial opportunities it presents"

3.1 Implication of IP telephony with respect to policies: The developing countries like India have a different spectrum as compared to developed countries. The telephone density with respect to the population is about , and the rate of circuit switched telephone growth is about 20%, which is in contrast to the world average of around11-15%. The dilemma one has whether to continue to invest on the circuit switched telephony, which is the need of hour, and if so, for how long. The uncertainty to the above is further driven by the need of Quality of Service, lack of full proof standardization, lack of inter-operability between different products, etc.

3.1.1 After the technology for implementing QOS in IP telephony is firmed up the IP Telephony can be introduced in the present telecommunication network in two phases.

i) The first phase is to introduce the Voice over IP technology for carrying traffic between long distance switching centers, and subsequently pre-paid type of services also can also be provided.
ii) The second phase uses the IP network for carrying voice services from the subscriber premises to the long distance carrier's network where the long distance carrier's network is also IP network, thus making the entire network as IP network. This phase is expected to gain significance when the IP Telephony becomes a significant part of voice traffic. At present, the technology for deployment of this scenario is still in a primitive stage.

3.1.2 As per the NTP-1999 all Fixed Service Provider (FSP) are free to provide all types of services utilizing any type of network equipment, including circuit switching and or packet switching that meet the relevant TEC / ITU-T standards. Similarly all National Long Distance Operators (NLDO) are also free to utilize any type of network equipment, including circuit switching and or packet switching. The usage of IP technology is permitted like any other new technology.

3.1.3 As per the new Telecom Policy –1999 of the ministry of communications, Govt. of India, Internet telephony is not permitted. However the Govt. will continue to monitor the technological innovations and their impact on national development and review this issue at an appropriate time. This means that Govt. of India has not permitted Voice over Internet Cloud i. e. Internet Telephony because this bypasses the PSTN and the International circuits and thus avoids the international rate accounting system which may be substantially higher as compared to internet telephony.

3.1.4 With ITU- T recognizing the importance of IP Telephony and its significant role in the present telecommunication structure, the strategies of the developing countries have to be reassessed and the Government and telecom bodies are to be geared up to meet the realities and challenges of VolP. The significant steps of ITU-T and IETF are the standardization of relevant standards viz., H.323 Ver 4 and H.248 / MEGACO. Related issues relevant are study of voice over IP, Investment, technical issues like quality of service and Inter-operability, training and Human Resource Development.

3.1.5 With this background the department has planned to use IP technology for real-time services for transit traffic between Long Distance Switching Centers and bypassing Long Distance Switching Network on experimental basis at six locations in the country. This network will use separate IP network. Presently it is not envisaged to connect to public Internet. The network will cover the six major cities in India. During this experiment, it is proposed to study various issues highlighted in para 3.1.4 and evolve a strategy for long term migration.

3.2 Implications with respect to regulatory issues:

3.2.1 As per NTP 1999, packetized network for carrying voice are permitted. It is suggested that IP voice traffic has to be regulated like any other voice traffic, so that the certain QOS could be provided to the customers. After the QOS for VoIP issues have been suitably addressed vis-à-vis circuit switching, the decision regarding tariff would be driven by the market forces Since the customer would not like a service with low Quality of Service (QOS) at the same time they would not like to pay exorbitant price for a service offering high QOS.

3.2.2 The regulatory mechanism for Internet Telephony can be a far more complex issue, which needs to be properly addressed. Issues like revenue sharing between different service providers, settlement across different networks, ensuring a common QoS for the entire network, carrying of emergency calls, etc., are to be properly addressed.

3.2.3 In a developing country like India all these operators are required to contribute towards Universal Service Obligation (USO) because the USO shall be used by the govt. for funding the rural telecom sector.

3.3 Implications with respect to Technical Aspects:

3.3.1 IP is a connectionless network protocol that provides datagram service on a best-effort basis without consideration of loss, latency or jitter. Voice, as an application is inherently intolerant to any delay or loss.

3.3.2 However, without careful control of the Quality of Service (QoS), the IP voice quality will suffer when mixed with non-delay sensitive applications such as FTP, e-mail and Web browsing. The wide implementation of technologies like Multi Protocol Label Switching (MPLS), Resource Reservation Protocol (RSVP), Real Time Protocol (RTP) and Differentiated Services (Diffserv) across multi vendor platform is essential for ensuring Quality of Service in a global network.

3.3.3 If IP technology has to be a viable option to circuit switching, all the features available on circuit switches are to be supported on the IP switches.

3.3.4 Due to lack of availability of networks implemented on standardized protocols viz., H.248 and H.323 Ver 4, all the VoIP technologies available today are proprietary and vendor specific. Largely in most of the places, the equipment from a single vendor has been deployed. If VoIP technology has to contribute in a bigger way, the technological solution shall has to be based on common standards.

3.3.5 A clear document for the numbering plan for inter-working of E.164 based telephone number system to IP address / Domain Name based system is required to ensure easy interconnectivity between IP and PSTN world.

3.3.6 A clear migration path is required to be defined so that the developing countries can plan their migration strategy from their dominant circuit switching based network to a mixed network (in the intermediately stage) and finally to packet network.

3.4 Implications with respect to Economical Aspects: Liberalization of Telecom sector in developing countries is going to bring down the tariff of the long distance calls. Consumers in the developing countries will be benefited immensely because of long distance calls become cheaper. With the strong middle class base in India, it is expected that this will fuel a demand, which may far exceed the fall in revenue. This phenomenon has been observed already in the cellular market, where reduction in tariff has resulted in an explosive demand growth.

IP Telephony can be used by operators to take advantage of the above fact, because implementation of this technology is easy and at a lower cost.

3.5 Impact of IP Telephony on the operations of Sector members - Financial challenges and commercial opportunities:

3.5.1 Financial Challenges: VoIP is likely to increase the competition by reducing barriers to entry in the long distance voice market, as well as decreasing bandwidth cost. The vigorous and active competition is expected to drive all the operators to resort to cost based pricing, thus eliminating the cross-subsidization which has been prevalent in most of the developing countries.

3..5.2 Incumbent operators will face a financial challenge to see that the service offered remains competitive. The new service providers are likely to deploy low cost infrastructure of VoIP for providing services at low costs. The incumbent operator can also deploy Voice over IP to effectively use the existing infrastructure in a more optimum and efficient way to carry more traffic and generate more revenue. A convergent media, which ensures a single media for all the multi media services including voice also enables to reduce the infrastructure cost including the staff, to a great extent.

3.5.3 Commercial Challenge: The commercial challenge to the basic telephone service providers arising out due to use of VoIP in the long distance sector could be met by offering value added services to the customers. More penetration of Internet along with these new value added services will in turn create more demand and lead to increase in the telephone penetration. The introduction of VoIP creates many new opportunities which a service provider can exploit and use it to sustain itself in the competitive market. The new services, which can be introduced with the VoIP are:

- Closed user group services.
- Multicast services.

- Multimedia conferencing.
- IT enabled services like call centers.
- Message Unification.
- IP call waiting facility.

4.0 Para 2 - "Action to assist Member states and sector members in adapting to the changes in the telecommunication environment due to the emergence of IP Telephony, including analyzing the current situation (e.g., by case studies) and formulating possible co-operative actions invo9lving (ITU Member "States and Sector Members to facilitate adaptation to the new environment:

4.1 It is suggested that the following action plan may be adapted by the member states for the evolving a new architecture for VoIP:

- Introduction of the VoIP network as a pilot project (as being tried out in India)
- Funding of pilot projects on VoIP by ITU.
- Sharing the experiences of such pilot project amongst the member countries.
- Development of vendor base in the Member States to ensure development and availability of technology locally.
- Trying out pilot project across member states for their mutual traffic requirements for studying inter-operability.
- Evolving a common strategy for migration from circuit switching network to packet based network.
- Creation of a common forum for the emergence of new technology.

5.0 Para (3) - "Actions to assist member states and Sector Members in meeting the human resource development challenges presented by new telecommunication technologies such as IP Telephony, in particular, skills shortages and the need for education and technology transfer".

5.1 It is suggested that the following action plan may be adapted by the Member States for meeting the human resource development challenges:

- Upgrading of technical skills for the staff by training, seminars, workshops and tutorials amongst the member countries.
- Sharing of pilot project and developmental activities amongst member countries.
- Deputation of skilled man power amongst member States.
- Setting up of a separate fund for HRD development.

10. COMMENTS RECEIVED FROM Germany / Fed. Ministry of Economics and Technology

1. General comments

Germany believes that the Draft Report of the Secretary-General gives a good overview of major technical and regulatory aspects of IP Telephony and, at the same time, of the impact of IP Telephony on the development of voice telephony markets and the challenges for business strategies used by the players on these markets.

2. Ad section 3 of the Draft Report: Policy and Regulatory Issues for IP Telephony

It is the responsibility of the German Government, as set out in the Constitution, to ensure the balanced provision of telecommunication services to the population. The Government believes that this objective can best be attained through competitive structures. That is why sector-specific regulation in the German telecommunications sector explicitly aims at creating workable competitive structures that will in the long term allow a transition to general competitive legislation. To this end, depending on the extent of competition reached, the intensity of regulation will have to be reduced.

At present, "internet telephony" is not subject to regulation in Germany since, for the time being, it is not considered a voice telephony service. The main reason given for this is the less satisfactory quality of "internet telephony".

It is open to question, however, whether or not it will be necessary or reasonable to include "internet telephony" in sector-specific regulation even if it has reached the quality standard of voice telephony. In the view of Germany it is to be expected that the free, i.e. non-regulated, development of "internet telephony" in particular will lead to stiffer competition in voice telephony and as a result will help to reduce the intensity of regulation in the latter sector.

Germany's policy is aimed at eliminating unnecessary regulation. Therefore, the basic approach should be to de-regulate sectors rather than to subject sectors to regulation that, up to now, are not regulated.

3. Ad section 5 of the Draft Report: Assistance to Member States and Sector Members: Avenues for International Cooperation

With a view to enabling participants in an international exchange of experience within the Policy Forum to better assess the particular aspects and impact of a general regulatory framework, we would like to suggest including a further paragraph in this section.

- Germany believes that a reliable empirical analysis of the current price advantage that internet telephony has over PSTN services would be helpful. The analysis should provide information on what types of calls (broken down by time and distance) in what countries have what kind of advantage.
- Moreover, it appears reasonable to compare cost structure aspects of IP networks or internet telephony and their individual components with cost structure aspects of traditional telecommunication networks.

11. COMMENTS RECEIVED FROM France / Ministère de l'économie, des finances et de l'industrie

27 novembre 2000

Commentaires sur le projet de rapport du Secrétariat général sur la Téléphonie IP en vue du FMPT 2001

Préambule

La France souhaite tout d'abord féliciter le Secrétariat général pour son projet de rapport. Sur un sujet complexe, il offre une présentation complète et équilibrée des notions et des enjeux liés à la téléphonie IP. Il constitue également une bonne illustration de la volonté d'approche coopérative et multilatérale de l'UIT, en prenant en compte aussi bien les perspectives que les craintes que peuvent avoir les différents acteurs du marché.

Les remarques qui suivent ont pour objet d'insister sur certains aspects qui nous paraissent d'importance et mériteraient, à ce titre, d'être soulignés davantage. Elles peuvent être réparties en cinq points :

- Remarques liminaires sur les principes qui sous-tendent le contenu du rapport
- Différenciation entre téléphonie sur IP et téléphonie sur Internet
- Concept de neutralité technologique
- Question de la numérotation
- Problématique du service universel

Sur un plan plus général, il nous semble important que, lors de la prochaine réunion du Groupe Informel d'Experts (GIE), un meilleur équilibre s'établisse entre pays développés et pays en de développement.

1. Remarques liminaires

Il convient de décorréler l'investissement des grands opérateurs de télécommunications dans des réseaux de transport utilisant le protocole IP et l'essor annoncé de la téléphonie sur IP. C'est le gain de capacité qui motive a priori ce choix technique des opérateurs, non le développement de la téléphonie IP. A fortiori il n'est pas acquis que le développement des dorsales IP conduira à une augmentation du trafic de voix sur IP de bout en bout et encore moins de voix sur Internet.

La téléphonie vocale sur IP (ou plutôt sur Internet), qui permet, le cas échéant, de contourner les réglementations existantes, est souvent présentée comme un facteur de baisse des prix de communications et d'ouverture des marchés encore en situation de monopole. Il convient de souligner que la bonne approche consiste à mettre volontairement en place la libre concurrence.

2. Différenciation téléphonie sur IP et téléphonie sur Internet

En septembre 1999, l'Autorité de régulation des télécommunications (ART) française a réalisé un appel à commentaires sur le thème de la téléphonie sur IP. Un consensus est intervenu entre les acteurs sur la pertinence d'une différenciation entre téléphonie sur IP et téléphonie sur Internet. Elle est toujours d'actualité et permet de distinguer un appel réalisé sur un réseau géré, avec notamment des éléments de qualité de service et la possibilité de numérotation directe, d'un appel transitant par le réseau Internet "public".

Dans le premier cas, la téléphonie sur IP relève d'un choix technique de l'opérateur et dans la mesure où la qualité de service est équivalente, peut clairement être identifié à un service de téléphonie vocale. Dans le deuxième cas, il s'agit de l'utilisation du réseau public Internet pour fournir un service de téléphonie vocale en concurrence avec les réseaux téléphoniques commutés dédiés, au prix d'une dégradation du service.

La France souhaite que cette approche soit mentionnée et qu'une distinction claire soit faite dans le document entre ce qui relève de la téléphonie sur IP et ce qui relève de la téléphonie sur Internet.

3. Concept de neutralité technologique

Le concept de neutralité technologique est également ressorti de l'appel à commentaires de l'ART et constitue par ailleurs un élément clé de l'approche européenne de la réglementation des télécommunications. La définition du service de téléphonie vocale doit s'appuyer sur des critères fonctionnels (transport et commutation) qui peuvent s'apprécier indépendamment des technologies (principe de neutralité technologique).

Il est important de le mentionner et de préciser les enjeux afférents, en particulier la mise en œuvre d'une réglementation et d'une régulation indépendantes des technologies et du type d'infrastructure.

A noter que si la figure 1 devait être conservée, il conviendrait d'une part d'inverser l'ordre des critères en commençant par « le caractère instantané de la transmission » pour finir sur la « mise à disposition du public » et de supprimer les critères 2 (« dominance »), 3 (« caractère payant »), 4 et 5 (« recours au RTPC »), et 6 (« terminal utilisé »).

4. Question de la numérotation

La mention faite dans le document de la production par l'Internet Engineering Task Force (IETF) d'un protocole ENUM, sous le nom de RFC 2916 est à conserver.

En revanche, il importe d'ajouter une mention sur le fait, qu'en l'état actuel des travaux, cette ressource se retrouverait gérée par un organisme national. Quel que soit le pays concerné, l'enjeu est suffisamment important pour que l'on rappelle dans le document que certains pays agissent (notamment au sein de la Commission d'études 2 de l'UIT-T) pour que la gestion d'une telle ressource s'effectue à un niveau international.

5. Problématique du service universel

Il conviendrait de souligner que les mécanismes de financement du service universel ne se limitent pas au recours à des subventions croisées entre trafic national et international, ou entre trafic local et longue distance, mais peuvent prendre d'autres formes qui permettent un rééquilibrage tarifaire et la mise en place de tarifs orientés vers les coûts.

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Le point de contact désigné pour la France est M. Patrick OLIVIER dont les coordonnées figurent dans le répertoire général de l'UIT.

12. COMMENTS RECEIVED FROM **THE EUROPEAN COMMISSION**

As expressed at the meeting of the informal group of experts on 16-17 November 2000, the European Commission congratulates the ITU secretariat general for taking up this most complex subject. IP Telephony clearly represents both a challenge to public telecommunications operators (PTOs) and an opportunity which may well enable PTOs to provide new and more cost-effective communications services in the future, including in particular in developing countries. It is important both to recognise that increasing use of IP based technologies will be made, (including IP based voice services), and also to develop policy strategies to deal with any regulatory issues that arise and ensure that all countries are adequately prepared to best exploit these developments.

We concur that IP Telephony should be viewed as one of the many applications that employ IP technology. It should, therefore, be treated in government policy and regulation in a way which is consistent with how other related communication services applications are treated, so as to avoid artificial distortions or incentives. Current regulation may therefore need to be reviewed in many ITU member countries and possibly adapted to accommodate this requirement.

We also agree that IP Telephony may represent a strong catalyst for driving prices for voice services to incremental costs which is the classical scenario for describing a competitive market environment. ITU member states should view this scenario positively, as it can only help achieve both the ITU's objective of reasonably priced services and the objective set forth in Recommendation D.140 of cost-orientated settlement rates. For those ITU member states who so far are opting for a non-competitive market for their voice communication services market, it would appear that this new technology would warrant careful consideration for their transition towards a competitive communication market scenario.

Within the European Community the communications policy regulatory framework applies generally. The type of regulation which is applied to a given infrastructure or service and to a given operator or service provider, is then subject to an individual assessment by the national regulatory authority. The principle used by the national regulatory authorities is that regulation is only applied when it is justified and then in a technologically neutral way. A basic public telephone service provided over an IP based network (or over something else) would not escape from justifiable regulation. We would encourage other countries and regions outside the European Community to follow a similar approach. This approach should, however, not be mistaken to mean that we endeavour to exclude so-called positive regulation, meaning regulation that provides the framework within which services may be provided without the need, for example, for a licence, but where merely a notification under a class licence concept would be acceptable. Note also that some countries regulation may be seen as 'enabling' rather than restrictive.

We agree with other comments presented at the meeting of the informal group of experts on 16-17 November 2000 that the Draft Report seems to focus heavily on the impact on traditional PTOs in developing countries. We would suggest that the report could be broadened in scope to also focus on the impact of IP telephony on consumers and the overall economy, which broader government policies address, such as human resource development and the ancillary services to basic voice telephony service which are important for the successful development and implementation of electronic commerce at a global scale. We are aware that IP telephony alone will not be the major reason for such impacts. Rather, it will be the impact of IP technology as such which then would need to be considered, of which IP telephony is only one particular application.

We consider that the current situation with the benefits of the Internet and the roll-out of new high capacity data and voice transmission networks taking place mainly in industrialised countries is not

sustainable from a global perspective. We therefore suggest that the ITU WTPF agree on policy proposals in the form of opinions that address this issue and embraces the adoption and promotion of IP technology by all ITU members as a suitable way forward towards a more equitable world where all interested parties are able to benefit from the new network technologies and their applications.

PAGE BY PAGE COMMENTS ON THE DRAFT REPORT

2. TECHNICAL ASPECTS OF IP TELEPHONY

In general terms we would favour this section being split into a more specific technical annex and more executive or general reader friendly part which explains the technical aspects using less technical terms.
Paragraph 2.1: The statement that "Today voice represents a an ever-diminishing percentage of over all communications traffic when compared to date" should be qualified to take into account that voice measured in absolute terms remains an increasing market.

Paragraphs 2.16-2.18 on ENUM: It would appear important that national regulatory authorities decide as soon as possible if they want to involve themselves in the ongoing work by the IETF and the ITU. Furthermore, we feel that these paragraphs should be amended to be more flexible as to the need for international standards, in particular regarding the issue of safeguarding or developing national standards. In paragraph 2.18 the position of Study Group 2 is highlighted, but as we understand it, the topics will only get discussed in Study Group 2 if the member states and sector members put in the contributions and the manpower to develop the issues.

3. POLICY AND REGULATORY ISSUES FOR IP TELEPHONY

We would agree with the suggestion that the identification of a set of government policy objectives for IP Telephony should be elaborated in this section. The following set of such objectives could be addressed:

- Universal Service/ Universal Access
- Affordable communications services
- Rate re-balancing
- Technology transfer
- Human resource development
- Growth of the economy as a whole, and the communication services sector in particular.

Paragraph 3.4: We would suggest the following rewording:

"At present, three broad national approaches emerge:

- First there are countries that include IP Telephony within their regulatory system or which do not regulate IP based telephony.
- Second there are countries that prohibit it.
- Lastly there are countries where the situation is uncertain or the issue remains to be formally addressed."

Functional equivalence

Paragraph 3.22: The whole approach is very negative and to say that the main purpose of IP telephony is to by-pass the PSTN should be reworded. [Who would not try to find a way around telephone calls at $2 a minute.] There may well be genuine concerns about loss or diversion of revenues, but we have seen this before with resale and call-back in the context of high accounting

rates. Nevertheless, inherent in any service is the issue of payment, and international agreements will still be needed for international interconnection or service termination under asymmetric market conditions, i.e., between competitive and monopoly markets.

Special Issues for developing countries

Paragraph 3.27: The conclusion that developing countries do not benefit directly from a permissive IP Telephony policy appears based on a rather short-sighted view. Stimulating increased international calling, whether inbound or outbound, can increase settlements revenues and promotes general welfare. Stimulating a market through cost-effective competition for small and medium sized enterprises both in the communication sector and in sectors using communication services also promotes general welfare and economic growth.

Convergence and IP Telephony

Paragraph 3.31: The report, when raising the question of *requiring* all operators, both ISPs and telephone service providers, to interconnect with each other, should clearly specify that the WTO basic telecommunications agreement places the obligations for interconnection only upon "major suppliers". ("Major suppliers" are defined as network operators who control bottleneck facilities or possess market power). The reasoning behind this is that only major suppliers have the ability to distort or abuse the market for interconnection. This point should be included in this paragraph and elsewhere in the paper where this issue is discussed.

Cross-border issues

Paragraph 3.35: We agree that International agreements should be driven by what is commercially viable. This paragraph may therefore not be necessary.

4. ECONOMIC ASPECTS OF IP TELEPHONY AND ITS IMPACT ON PUBLIC TELECOMMUNICATIONS OPERATORS

Costs and prices, and substitutability

Paragraph 4.4: It may be unclear whether IP technology is, in fact, a less costly way to transport voice traffic in competitive markets *where prices already reflect incremental costs*. But IP technology nevertheless offers much greater opportunities for the provision of new services to consumers which traditional circuit switching technology cannot offer at comparable service levels.

Paragraph 4.9: Rather than elaborating on the issue of by-pass or re-routing of traffic, we would suggest to focus more on the issue of price and current pricing structures in the traditional telephone markets. Because, rather then the use of IP telephony between computer terminals, it is the traditional telephone markets that makes IP telephony an attractive new opportunity for citizens and business.

5. ASSISTANCE TO MEMBER STATES AND SECTOR MEMBERS: AVENUES FOR INTERNATIONAL COOPERATION

Paragraph 5.2: The first question in the second bullet will, as we understand it, be better explained in the context of a draft opinion for the WTPF on interoperability.

We fail to fully understand the second question in the second bullet as we do not see the need for separating interconnection arrangements between IP backbone providers and PSTN providers from other interconnection agreement between conventional PSTN providers. Unless, this issue is further elaborated on in the report, we would suggest to delete this second question of the second bullet.

The sixth bullet point: we would propose to reword the text to read: "Explain the concept of technology-neutral regulation as it applies to the provision of functionally equivalent public voice telephony services, the aim being to establish a common approach to technology-neutral regulation within the ITU membership". However, note that by this we do not mean to say that all communications services should be subject to the same level of regulation. For example, within the European Union data services are less regulated that public voice telephony services.

Annex B:

Table B.1 should be amended to read as follows:

Table B.1: Countries that include IP Telephony within their regulatory system or which do not regulate IP based telephony

Final comment:

As discussed during the informal expert group meeting in Geneva on 16 and 17 November, we concur with the suggestion to recast the paper with the following main headings:

1. Summary (including of technical aspects of IP telephony)
2. Economic aspects of IP telephony and its impact on the telecommunications industry as a whole and on the global economy, in particular on developing countries
3. Policy and regulatory issues for IP telephony
4. Infrastructure and human resource development

Annex A: Council Decision 498
Annex B: Status of ITU Member States with regard to IP telephony
Annex C: Technical aspects of IP telephony

13. COMMENTS RECEIVED FROM Cuba / Ministerio de la Informática y las Comunicaciones

Our Administration celebrates the WTPF-01 as a very important interchange of information and opinions in a subject with an ever-increasing importance.

No other place as appropriate as ITU in which are represented practically all the world to examine this Global issue of strategic importance for every country and specially for developing countries less prepared to assimilate in a positive way the challenge imposed by the irruption of IP Telephony.

Observations to Draft Report

In doing our observations we consider that the best way of redacting this report is to expose the facts and possible implications and lets every country to make their own conclusions.

Reasons for the proposed changes are annexed in red.

Impact of IP Telephony on Universal Service schemes

3.21 IP Telephony can be an important issue for telecommunication regulatory regimes that redistribute funds from one segment of the market to another in order to subsidise prices in the latter. In many countries, particularly developing ones, revenues from outgoing international telephone calls charged at above-cost rates, together with net settlements levied for incoming calls, are used to subsidize domestic network development and basic local access. In both cases, associated revenues may be reduced ~~if calls can be originated and terminated by means other than traditional operators and services~~ and this become a risk for the achievement of the USO goals. **In this way we concentrate better in the main idea of this paragraph**.

Special issues for developing countries

3.27 In this scenario, the developing country does not benefit directly from a permissive IP Telephony policy (or lack of enforcement of a prohibition). Rather it is the foreign PTOs. that benefit from lower cost and these savings may be passed on to their customers. ~~Thus, customers and PTOs in those developing countries whose goverments have acted to prohibit outgoing IP Telephony tend not to gain from the spread of IP IP Telephony to nearly the same degree as consumers and PTOs in developed countries, particularly those where international IP bandwidth is cheap and IP Technology is widely available.~~

To have higher termination cost for incoming calls puts developing countries PTOs in the situation to obtain much less net profit for terminating a call than PTOS of developed countries, situation that is worsened by IP Telephony with lower rates and specially if illegal By-pass occurs.

It is recognised in plenipotentiary 98 and in SG3 that the cost for terminating a call differs considerably between developed and developing networks and this is an important fact that must be expressed in the paper.

3.29a In the case of Internet Telephony the full cost of the international connection and access is paid usually by the developing country even when it has more incoming than outgoing traffic in difference with the shared cost used in traditional Telephony.

Substitutability

4.9a **A new form of Call-Back employing IP Telephony is developed in which establishing a connection with an ISP in other country, this one provides telephone calls to thirds countries at reduced rates. It looks very difficult to control this without the collaboration of all countries even when Call-Back is forbidden in the majority of the countries .**

Impact on public telecommunication operators

4.11 ~~**Arguably erosion of monopoly power on over-priced international routes would happen anyway, even without IP Telephony.**~~ **Markets for international calling are shrinking in value as, on one hand, prices fall precipitously while, on the other hand, traffic is routed on least cost routes and settlement rates are forced** ~~**closer to cost**~~ **to lower rates. PTOs in developing countries may** ~~**be better advised**~~ **think about to embrace IP Telephony, and bear the consequences of reduced per minute revenues from long distance and international services,** ~~**than to**~~ **against the risk of missing the opportunity to generate revenues in future IP related growth areas.**

According to SG3 cost are very difficult to determine and not known in most of the countries, so is not appropriate to speak of rates closer to cost.

4.13 The public Telecommunication operator .....be sustained. Future PTOs will need, ~~**instead, to ensure that their local access networks are largely self-financing. This will require substantial and urgent tariff rebalancing to bring the price of local and international calls mush more closer together**~~**. to consider this situation in order to develop new policies and tariffs more appropriate to deal with this challenge**

Situations, facts and forecast must be made in this paper, but solutions must be left to administrations according to their situation.

4.14 While IP Telephony may bypass certain parts of a carrier's operations, ~~**where the price structure is not cost oriented,**~~ **it will not take away the need for local networks. Indeed .....**

For the same reason as 4.11

AVENUES FOR INTERNATIONAL COOPERATION

- **Identify the chain of cost of the Internet and IP connections and provide developing countries with elements to trace their best politics for the new situation.**

La Habana 1 de Diciembre de 2000

14. COMMENTS RECEIVED FROM **Ipsaris**

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December 1, 2000

The Secretary General
International Telecommunication Union
Place des Nations
CH-1211 Geneva 20
Switzerland

Dear Secretary-General Utsumi,

Please accept our warm congratulations on producing a report that succeeds in drawing together the varied and complicated issues that characterise the provision of VoIP, and of Internet services more broadly. Your treatment of all relevant issues – both policy, economic, and technical – is essential to the Forum's developing a useful output.

With a fibre optic network that will extend 7,000 km by the end of June 2001, ipsaris currently offers extensive broadband coverage across Europe. In 2001 we will offer services to clients across continents. ipsaris provides tailored solutions to other telecommunications operators who want to build national networks, as well as to ISP's and other users. Our network is based upon ring topology, and is being constructed to enable high quality bandwidth from E1 through to STM-64 and individual 10 Gigabit wavelengths.

Given ipsaris' developing position as a global service provider, we believe there are several additional matters that could be reflected in the next iteration of your report. The first calls for a more detailed reflection of the rationale of those Administrations that do not regulate the services discussed by the report. More than just a vehicle for the several Opinions that will result from the Forum, this document can go far in summarising the principal motivations of Regulators who have already addressed themselves to the question of regulating internet services, and who have decided not to do so. Noting the reasons for which they have come to such a decision may save time and be a useful record for deliberations of other affected parties.

Secondly, we believe the report could be usefully augmented if it recorded examples of national policies that have been conducive to network infrastructure development. Indeed, the associated Opinions could specify those types of regulation that administrations can adopt to encourage such development. It would, in this way, serve to provide additional guidance to Administrations seeking advice in the development of IP networks.
ipsaris is determined to support the work of the Forum, which includes supporting the broadest preparatory efforts possible. We stand prepared to assist you in any way we can as you prepare for this important event.

Regards,

Ruth Hine
Regulatory Affairs Manager
IPSARIS Limited

15. COMMENTS RECEIVED FROM **PanAmSat**

December 1, 2000

Dear Secretary-General Utsumi:

I would like to take this opportunity to congratulate you and the ITU Strategic Planning Unit for capturing the relevant aspects of IP Telephony in the draft Report, and for enabling the Membership to provide comments and suggestions in preparation for the upcoming World Telecommunications Policy Forum next March.

PanAmSat, a satellite provider of fast, reliable, scalable, and secure video broadcast services for sixteen years, has two Internet based offerings. The first is *NET-36*, which provides a satellite-based Internet Broadcast Network that enables content providers to broadcast digital and streaming media to DSL providers, cable headends, ISPs and broadband wireless providers worldwide. The second, *SPOTbytes Internet Connections*, is a bundled package, offering backbone network operators, international ISPs and corporate customers a one-stop shopping resource for satellite space segment, gateway transmission services and a dedicated Internet backbone connection. *SPOTbytes Internet Connections* can replace a more expensive or less flexible fiber-based connection or supplement existing IP capacity to provide for network diversity and efficiency. With this flexibility, we believe that satellites will play an increasingly important role in the provision of IP based services such as voice and video to all countries and regions of the world.

As the Report indicates, IP Telephony is just one of many IP based applications that are available today including data transfer, video streaming, web browsing, etc. As we proceed to the next stages in preparation for the Policy Forum, we need to be careful in the approach to regulatory or policy matters. The Opinions and suggestions stemming from the WTPF may be focused on VoIP, but may have unnecessary consequences for other types of IP services. It is critical that the Report recognizes and the WTPF recognize these distinctions.

For example, the Policy Section of the Report mentions that regulators make distinctions between voice and data services as a means of basing regulations. Historically, voice services have been more heavily regulated than data. In an IP context, this could cause harmful consequences if all IP based services, such as video are regulated as traditional voice. Furthermore, the "functionally equivalent" (page 12, section 3.18/3.19) approach should be applied with caution so that it does not lead to over regulation of new, improved services as regulators try to classify newer services as being equivalent to traditional services.

In the section addressing cross-border issues (paragraph 3.36), the Report acknowledges that the issues for creating favorable market conditions for investment and installation of IP based networks should be addressed. PanAmSat, as a provider of satellite capacity of internet services, believes that the Report and its Opinions should emphasize the steps for creating a favorable market environment, such as regulatory measures and market access conditions, for the long-term development of IP networks worldwide. This type of dialogue during the WTPF and discussion in the Report would be of considerable value to network providers, regulators, ISPs and consumers alike.

Again, PanAmSat would like to thank you for this opportunity to comment on this draft Report and we look forward with enthusiasm to participating in the WTPF next March 2001.

Regards,

Matthew Botwin
Manager, Regulatory Affairs
PanAmSat Corporation

16. COMMENTS RECEIVED FROM VON Coalition

1. SUMMARY

1.1 Internet Protocol (IP) Telephony is rapidly reaching the top of the agenda for the telecommunications industry worldwide. The possibility of transmitting voice over IP-based networks, with all its challenges and associated opportunities, such as voice and data integration, constitutes a milestone in the convergence of the communications sector.

1.2 The key issue that has gained the attention of policy-makers, regulators, and industry alike is the fact that the Internet, and other IP-based networks, are increasingly being used as alternatives to the circuit-switched telephone networks.

1.3 **[[Note very small percentage of voice traffic that is now VoIP. Eliminate speculative forecasts about growth of VoIP.]]** As of late 2000, more than three-quarters of international traffic originated in countries in which the provision of IP Telephony is liberalised. Furthermore, the majority of IP Telephony now travels over managed, private IP networks as opposed to the public Internet. Major international Public Telecommunication Operators (PTOs) have announced that they will migrate all their international traffic onto IP platforms. For instance, Cable & Wireless is spending more than US$2 billion on a global IP network. It plans to use voice over IP (VoIP) to deliver some 900 billion minutes of calls in the year 2006 compared with just 675 million in 1999. It estimates that VoIP technology will allow it to carry calls at a quarter of the cost of doing so over a conventional, circuit-switched network.[2]

1.4 Market forecasts project that IP Telephony will account for between 25 and 40 per cent of all international voice traffic by the year 2004. Worldwide, the volume of traffic on IP-based networks already far exceeds the voice traffic that travels over the public switched telephone network. Consequently, even for those countries that nominally prohibit IP Telephony, it has become nearly impossible to ignore it.

1.5 Yet, not all IP Telephony services are the same nor are they treated in the same way by governments and industry around the world. From a definitional point of view, for example, it is important to differentiate the various forms that IP Telephony can take. **[[Revise definitions to focus on the most generic form: VoIP]]** In this report, "IP Telephony" is used as a generic term for the many different ways of transmitting voice, fax and related services over packet-switched IP-based networks. IP Telephony can be subdivided into two major groups: Internet Telephony and VoIP, the difference being the nature of the underlying IP network: the former using primarily the public Internet while the latter utilises managed, private IP-based networks. Even within these two broad groups, there is an almost infinite number of ways to use IP technology to provide voice-related services.

1.6 Furthermore, from a regulatory point of view, IP Telephony is treated in widely divergent ways among ITU Member States. [[Emphasize that most governments have refrained from adopting restrictive policies]] **In some countries, governments have used the definitional tools to allow the delivery of IP Telephony services to the public in spite of the existence of market exclusivity of the incumbent over basic voice telephony. In some others, the service is completely prohibited, in others it is licensed and promoted, while in some, IP is treated as just another technology that can be adopted by PTOs.**

1.7 The rise of IP Telephony across the globe—regardless of the way it is delivered and the regulatory regime under which it operates—has, nevertheless, profound implications for consumers, industry, and national administrations.

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[2] See "Cable & Wireless announces the industry's largest VoIP migration programme", 2 October 2000, at: http://www.cablewireless.com/news.asp?NewsId=66.

1.8 **[[expand to include benefits of promoting infrastructure development, closing the digital divide, new applications, greater competition]]** For consumers, IP Telephony offers potentially much cheaper long-distance and international telephone calls compared with the alternative of using a circuit-switched fixed-line or mobile network. These cost savings may, at least, partially offset the usual loss of quality. IP Telephony may also offer consumers advanced services integrating voice and data, such as merged World Wide Web and voice services (e.g., "click-to-talk").

1.9 For PTOs, the potential cost advantages of IP Telephony are more complex to calculate. That is because incumbent PTOs have existing revenue streams that they fear may be cannibalised by a shift to lower-priced IP Telephony, particularly given the investment required to add IP Telephony capability.

1.10 [[Focus separately on the issues of bypass of accounting rates and universal service]] **Given that IP Telephony calls are mainly carried outside of the PSTN[3]—and hence outside the regulatory and financial structures which have grown up around the PSTN—it is argued that, for incumbent PTOs in developing countries, IP Telephony threatens to undermine not only current revenue streams but also existing universal service programmes aimed at extending networks and services in unserved or underserved areas.** [[Eliminate negative language in favor of a neutral discussion. Discuss opportunities offered to PTOs by VoIP. Many PTOs see VoIP as a way to generate more and different types of revenue streams (calling cards, origination, click-to-talk, etc) and are investing in their own networks or leasing services for a growing number of IP carriers. PTOs are thus using VoIP to help them better adjust to the transition to more competition and globalization. PTOs, especially in developing countries, are also creating alliances with small and large global VoIP companies to rapidly become global players, such as accessing immigrant communities abroad and providing immigrant-home country traffic and services.]]

1.11 As a first step to address some of these complex and interdependent economic and regulatory challenges and opportunities posed by IP Telephony and its likely impact on ITU Member States and Sector Members, the ITU held an IP Telephony Workshop in Geneva from 14-16 June 2000. Some 34 experts from 21 different ITU Member States participated in the meeting, at the invitation of the Secretary-General, representing a range of regulatory and policy-making agencies, PTOs, IP Telephony Service Providers, equipment vendors, academic institutes and others. The documents presented at that meeting are available at: http://www.itu.int/iptel/.

1.12 Section 2 of this Report looks at technical aspects of IP Telephony. Section 3 discusses the different policy and regulatory approaches that Member States have taken to IP Telephony, and its significance for universal service schemes and convergence policy. Section 4 deals with the economic aspects of IP Telephony and its impact on PTOs. The Report offers, in Section 5, a set of reflections on international coordination and possible co-operative actions to assist Member States and Sector Members.

2. Technical aspects of IP Telephony

Introduction

2.1 A fundamental shift has been occurring in the telecommunications industry—a shift that is arguably as important as that from the telegraph to the telephone or from the mainframe to the personal computer. That change is a shift from traditional PSTN *circuit-switched* voice networks to *packet-switched* data networks, using Internet Protocol (IP) technology. For the most part of the last century, voice traffic was predominant. Today voice represents an ever-diminishing percentage of

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[3] The term PSTN (public switched telephone network) is used in this document as a synonym for traditional circuit-switched telephone networks offered by Public Telecommunication Operators (PTOs), as well as Integrated Services Digital Networks (ISDN), and Public Land Mobile Networks (PLMN). Generally with convergence, today's telecommunications networks and transport technologies are increasingly complex and difficult to categorize.

overall telecommunications traffic when compared to data. One result is that support for IP-related technologies is now a strategic element in the design, development and use of telecommunication networks. It also means that most PTOs are aggressively implementing IP technologies in their networks.

2.2 IP Telephony is possible over any data network using the Internet Protocol, which includes the public Internet, corporate Intranets and most Local Area Networks (LANs).

IP Telephony standards activities

2.3 Telephone networks have been carefully engineered to provide extremely reliable, high-quality voice transmission, making real-time, two-way conversations possible between almost any two points on earth. IP networks, on the other hand, were originally designed for two-way, asynchronous (not real-time) *text-based* communication. While Internet communications are typically "connectionless" or "stateless" (that is, no unique end-to-end circuit is created and held for the duration of a particular session), current IP Telephony developments seek to imitate the more connection-oriented, PSTN circuits, rather than other types of IP communications. In other words, the touted differences between packet-switching and circuit-switching are becoming increasingly blurred. During the last few years, the desire to make these two types of networks interconnect and interoperate, without the user being able to tell the difference, has prompted enormous technical research and development efforts in both the telecommunication and computer industries. In this respect, IP Telephony is the embodiment of convergence and will force both types of networks to mutate and become more alike.

2.4 It should not be surprising that IP Telephony standards development represents, in many ways, attempts to replicate long-established technical practices in the PSTN, such as call set-up and tear-down, Intelligent Network (IN) services and guaranteed quality of service. Although not always well coordinated, a great deal of work on technical standards for IP Telephony is underway in many industry and regional bodies as well as in conventional standardization bodies such as the European Telecommunications Standards Institute (ETSI), the Internet Engineering Task Force (IETF) and the ITU Telecommunication Standardization Sector (ITU-T).

2.5 Of course, most telephones are—and for several years to come will continue to be—connected to traditional circuit-switched telephone networks. IP Telephony services must be able therefore to accept calls originating on the PSTN, to terminate calls on the PSTN, and to do it all seamlessly. Today, the most basic IP voice services accomplish this by means of *gateways*, which can convert and forward calls in one direction or another. However, before IP Telephony can be a mass-market alternative to the PSTN, there must be much greater integration between the two. The initial enthusiasm of "free long distance on the Internet" appears to have been dulled by the reality of the immense complexity of transparent interconnection with the PSTN infrastructure.

2.6 Current research and development work, both into proprietary vendor solutions and open industry standards, seeks to make telephony more *media-neutral*, that is, equally functional and interoperable across many different types of physical networks, equipment, and control software (e.g., switches, routers, signalling systems). The first generation IP Telephony services that linked to the PSTN via gateways were not capable of Intelligent Network (IN) functionality, such as calling party identification (indeed, on the Internet, guaranteed anonymity is often considered an advantage), nor could they interface seamlessly with PSTN signalling systems such as Signalling System 7 (SS7). These advanced call control functions facilitate the advanced level of functionality to which telephone subscribers have become accustomed, and which form the basis for many premium rate and enhanced services. Recognizing this, the latest generation of IP Telephony standardization activities has focused around improving gateway architectural components linking PSTN and IP networks. These include two key facilities, namely:

Media gateways: This device performs simple encoding and decoding of analogue voice signals, compression, and conversion to/from IP packets.

Media gateway controllers: This device contains call control intelligence and analyses how calls are to be handled and performs functions similar to the SS7 network in the PSTN environment. It needs to understand various signalling systems such as SS7 and GSM in order to ensure interconnectivity with the PSTN.

2.7 An example of a *media gateway* protocol is the ITU-T H.323 series of Recommendations. The H.323 series are a set of multimedia standards for networks that do not provide guaranteed Quality of Service (QoS), including IP-based networks, most LANs, and the public Internet. The scope of the H.323 series is very broad and supports point-to-point and multipoint multimedia conferencing, call control, multimedia and bandwidth management, as well as interfaces between different network architectures. The current ITU-T H.323-related work plan includes the release of Version 4.0 (planned for approval in November 2000) and a large number of Annexes that include, *inter alia*, support for improved security, new signalling, user and service mobility, and QoS. The H.323 series has proven to be successful in the IP Telephony Service Provider marketplace.

2.8 Although the H.323 series was originally intended to standardize both the *media gateway* and *media gateway controller* architectural components, it was somewhat less successful in the latter case. After several incarnations, a competing simpler industry effort called MGCP (Media Gateway Control Protocol) was developed that "decomposed" media gateway controllers from media gateways. In order to address divergent industry efforts and meet the broadest set of requirements, the Internet Engineering Task Force (IETF) and ITU-T decided to collaborate closely and jointly produced a new single protocol called H.248 (ITU-T name)[4] and Megaco (IETF name). H.248/Megaco defines a master/slave protocol to control media gateways that can pass voice, video, facsimile and data traffic between PSTN and IP-based networks. H.248/Megaco supports various "packages" that interface with conventional PSTN switches and Intelligent Network (IN) services, with plans to support a range of existing signalling protocols including ISUP (SS7 Signalling Protocol), GSM and others.

[[Describe industry-lead efforts such as SIP, as examples of how industry on its own is dealing with many standards and QoS issues].]

Quality of service (QoS)

2.9 Quality of service is at the core of voice telephony and, as such, is often the focal point of the IP Telephony debate. There are many aspects to quality, including reliability, throughput and security. However, it is the perceived poor transmission quality of voice delivered over the current public Internet that explains why Internet Telephony is often not considered as carrier-grade service. While it has been technically possible to transmit voice telephone calls over IP-based networks for years, poor sound quality and inconvenience have prevented IP Telephony from threatening traditional voice telephone systems. There are, in general, two ways in which this quality can be improved—implementing quality of service support and increasing available bandwidth. Massive amounts of research time and money are being put into enhanced and prioritized routing or switching research, while billions of dollars are also being spent to increase the bandwidth capacity of global data networks. Each have the potential to make IP Telephony a viable commercial alternative to the PSTN, but are based on very different philosophies.

2.10 When IP packets carry bits of an email message, delays of milliseconds or even seconds caused by inherent limitations of the Internet do not make much difference. But when those packets carry pieces of a telephone conversation, these time delays can accumulate and make normal conversation unintelligible and impractical. Research has been underway in the Internet industry for several years on ways to prioritise certain packets over others. One

[4] Approved in June 2000.

recognized solution is that latency-sensitive transmissions, such as voice and video, are given higher priority over asynchronous services such as email and Web browsing.

2.11 Therefore, a considerable amount of research has gone into allowing for different classes of service for different kinds of traffic. In an integrated network where different types of traffic compete for resources, priority should generally be assigned to real-time traffic. Class of service differentiation is already a well-known feature of ATM networks, which grew out of broadband ISDN standardization. A lot of work has gone into developing technologies to implement the same features in an IP environment including various IP over ATM architecture schemes, the Resource reSerVation Protocol (RSVP), Real Time Protocol (RTP) and Layer 3 Switching (Tag Switching and Multiprotocol Label Switching or MPLS).

Bandwidth

2.12 The other basic means of decreasing latency in IP packet transmission is to increase or "over-dimension" the bandwidth of the network or networks employed. More bandwidth means less congestion, which in turn means less delay and more natural voice conversations. Indeed, some observers argue that increasing the available bandwidth is a far more practical means of speeding up the Internet than is enhancing QoS, because it does not require coordinated action across Internet services providers.[5] In this regard, debates over the principles of Internet peering, transit and interconnect demonstrate that there are still a wide range of views on how bandwidth providers should be appropriately compensated for their contributions to the overall performance and capacity of the Internet.

2.13 The situation is much simpler with respect to private managed IP networks. More bandwidth, faster transmission, and better voice quality combine to produce satisfied customers for more of the time. Privately operated bandwidth is therefore typically a key element in commercially viable IP Telephony, and much more so at present than QoS. It is no accident that the rise of IP Telephony has coincided with massive increases in available international bandwidth by means of fibre optic cable and satellite. Ironically, IP Telephony (like Web browsing) is not nearly as lucrative a way of using that capacity as traditional voice telephony, particularly given the predilection of Internet users towards 'free' services.

Numbering

2.14 [This section should not only present the options for numbering, but also the threshold issue of whether any action on numbering issues relating to IP Telephony is necessary.] One of the technical challenges raised by the ever-closer integration between circuit-switched and packet-switched networks concerns how to address calls that pass from one to the other. Generally, it is assumed to be desirable that an integrated global subscriber access plan exists. For example, the same ITU-T E.164 telephone number would reach a subscriber regardless of whether IP-based or PSTN network technologies are used. Indeed, the concept of being "technology independent" suggests that any global numbering/addressing plan should be abstracted as much as possible from underlying lower layer technologies.

2.15 It is now widely possible to originate calls from IP address-based networks to other networks, but it is currently rare to terminate calls from other networks to IP address-based networks. Rather, calls are generally terminated on the PSTN, so the called party can only use a terminal device connected to these networks. In order to access a subscriber on an

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[5] See Odlyzko, A.M., "The current state and likely evolution of the Internet," presented at IEEE Globecomm '99, <http://www.research.att.com/~amo/doc/globecom99.pdf>; and Huston, G., "Quality of Service: Fact or Fiction?" The Internet Protocol Journal (Cisco) (March 2000), <http://www.cisco.com/warp/public/759/ipj_3-1/ipj_3-1_qos.html>.

IP address-based network, some sort of global numbering/addressing scheme across both PSTN and IP address-based networks needs to be developed and implemented.

2.16 ITU-T Study Group 2 (SG2) is currently studying a number of possible options whereby users in IP address-based networks can be accessed from/to PSTN users. As one of these options, SG 2 has temporarily reserved, for test purposes, a part of the E.164 numbering resource 878 878 for an IP-based implementation of Universal Personal Telecommunication (UPT) services.

2.17 Another potential approach to the integration of different subscriber access systems in the PSTN and IP address-based networks is the ENUM protocol. The ENUM protocol is the result of work of the IETF's Telephone Numbering Mapping working group[6]. The charter of the ENUM group is to define a Domain Name System (DNS)-based architecture and protocol for mapping an E.164 telephone number[7] to what are known as Uniform Resource Identifiers (URIs)[8]. A relatively stable standard-track version of the ENUM protocol has recently been published as RFC 2916[9]. URIs are strings of characters that identify resources such as documents, images, files, databases, email addresses or other resources or services in a common structured format. The most commonly known types of URI are Uniform Resource Locators (URLs) which are used to locate resources using the World Wide Web. For example http://www.itu.int/infocom/enum/ is the URL for the ITU website providing an overview of ENUM activities.

2.18 [[Alternative views on this issue should be presented as well]] **Because E.164 numbers typically start with country codes, they implicitly have implications of sovereignty (geographic country codes) that, in turn, are associated with national Administrations responsible for numbering policies. This, along with the inherent monopoly of DNS zones, suggests that it is appropriate that national or regional policy-makers for integrated numbering plans (or other designated governmental authorities) at the "country code level" decide how ENUM-related services are to be managed or sub-delegated in subordinate DNS zones. Currently, discussions of these issues are ongoing between ITU-T Study Group 2 and the IETF. The view of ITU-T Study Group 2 is that administrative entities, including DNS administrators, should adhere to the applicable tenets of pertinent ITU Recommendations, e.g., E.164, E.164.1, E.190, and E.195, with regard to the inclusion of the E.164 resource information in the DNS.**

[[Discuss how IP technology and VoIP allow people to talk and access information on the Internet through different and potentially cheaper devices than a computer.]]

[[Discuss the use of VoIP with mobile networks. This is an area of great technical innovation and offers important options for developing countries.]]

3. POLICY AND REGULATORY ISSUES FOR IP TELEPHONY

Introduction

[[The Introduction should: (i) acknowledge the limitations of the available information about government policies; (ii) acknowledge the extent to which the Internet and IP-based data networks have grown and added to consumer welfare without the imposition of telecom regulation (iii) give prominence to the fact that most countries have refrained from adopting policies that prohibit or restrict the offering of VoIP; (iv) include among the questions asked ones that address whether the imposition of legacy telecom regulation on VoIP is needed or productive for consumer welfare; (v)

[6] http://www.ietf.org/html.charters/enum-charter.html
[7] http://www.itu.int/itudoc/itu-t/rec/e/e164.html
[8] http://www.ietf.org/rfc/rfc2396.txt
[9] http://www.ietf.org/rfc/rfc2961.txt

emphasize the risks of attempting to regulate technology that is highly dynamic and at an early stage of development and deployment; and (vi) separate the issue of bypass from the issue of universal service.

[The ITU's role relative to policy issues, particularly in the context of a WTPF, is appropriately limited to information exchange and should not be prescriptive.]]

3.1 IP Telephony is treated in widely divergent ways within ITU Member States, from being completely prohibited, to being licensed, to being regarded as merely another technological platform that can be adopted by PTOs. This section discusses the different policy and regulatory approaches that Member States have taken to IP Telephony, and the methods used to categorize it within those frameworks. The significance of IP Telephony for universal service schemes, convergence policy, and cross-border issues are also considered.

3.2 Where does IP Telephony "fit" within telecommunication regulatory regimes? How should the rights and obligations of its providers compare with those of traditional telephony providers, many of whom are subjected to common carriage regulations and universal service commitments? What status should be afforded to different types of IP Telephony? Should Internet Telephony, VoIP, and PSTN voice traffic be treated the same way, or differently? Should IP Telephony providers hold a license as most traditional voice telephony carriers do?

3.3 To explore these questions, this section attempts a rough categorization of the different ways in which IP Telephony is presently treated in many Member States and provides illustrative examples of different national approaches. As background, the tables in Annex B classify certain Member States according to their responses to an ITU regulatory questionnaire. [[These tables appear to contain inaccurate information about the policies of at least some countries. Information about government policies should be included only if it is more fully documented, with appropriate citations to applicable laws and regulations. Also, the column on callback (while it is documented) is not relevant to the discussion.]]

The general picture

[[The list should be reordered to reflect the predominant approach, which has been to refrain from adopting policies that limit deployment]]

3.4 At present, three broad national approaches emerge:

- First, there are countries that permit IP Telephony, either with or without a license.
- Second, there are countries that prohibit it, either directly or by inference.
- Lastly, there are countries where the situation is uncertain or the issue remains to be formally addressed

~~{3.5 }~~[3.5 [Describe the limitations of the available information about government policies. Note that there can be a variance between official policies and official practice; some countries that have an official policy restricting VoIP have in practice permitted it to be deployed, and vice versa.]] **This latter group is probably the most numerous. Countries have taken widely differing approaches, often related to different prevailing market conditions and degrees of liberalization. It is important to note that it is the service component, i.e., voice telephony *service* delivered by means of the Internet or IP-based networks, which is most frequently the subject of policy, not IP *technology* itself.** [[Regulations in some countries deal with VoIP differently depending on whether the service is provided to consumers or on a wholesale basis to other carriers.]]

3.6 Many countries that have retained telecommunication monopolies do not specifically prohibit IP Telephony. However, it is likely that they would not allow any company other than the incumbent PTO [[or a company hired by the PTO]] **to provide it. It is possible, however, as a practical matter, that IP Telephony (or at least PC-to-Phone services) may be**

permitted in these countries because it is not considered voice telephony at all, and therefore not a competing service. Hungary is an example of a country where IP Telephony has been defined by the regulatory authorities in such a way as to fall outside the legal monopoly of the fixed-line voice incumbent. However, reliable, reasonably high-speed access to the Internet is required for tolerable PC-to-Phone service, and this is often not widely available in developing countries. Consequently the issue of termination of incoming international calls is the more significant aspect of IP Telephony for many developing countries.

[[Add a section entitled "Refraining from Regulation," that describes the rationales for not prohibiting or restricting VoIP at least at this time, including: (i) importance of Internet infrastructure development (including closing the digital divide and referencing Y.110 (June 1998), which contains excellent language about the benefits of the development of the global internet); (ii) encouraging innovation; (iii) consumer benefit from lower cost service and added competition, including more universally available service; (iv) difficulty of enforcement (e.g. definitional issues of "phone" and "enhanced service"); (v) de minimis traffic; (vi) quality of service inadequacies; (vii) prematurity; and (viii) the fundamental disparity between IP networks and applications, which have grown out of a market environment, and circuit-switched networks, which have developed in a monpoly environment.]

License restrictions

3.7 Licensing is one of the principal means by which telecommunications authorities address the question of IP Telephony. Terms and conditions in existing licenses can be interpreted as either prohibiting or permitting such service offerings by new market entrants. Indeed, in non-competitive markets, the license of the incumbent operator may be viewed as precluding new market entrants from offering IP Telephony. On the other hand, a few countries expressly license PTOs to provide IP Telephony. [. [Mention ambiguity of licenses and government policies, citing Egypt Telecom example]]

Regulatory distinctions

[[Pull this discussion into the "Refraining from Regulation" section.]]

3.8 In countries that have policies on IP Telephony, it is possible to identify a number of distinctions, which are used to separate IP Telephony from other, usually reserved or licensed, telecommunication services. In making the determination as to whether a particular service constitutes, or should be classified with, traditional voice telephony, a number of different regulatory distinctions are employed, alone or in combination, by many countries. Among the most commonly-used distinctions are voice versus data, and quality of service. These, and other distinctions, are discussed below.

Type of service

3.9 Most national IP Telephony policies specifically refer to Phone-to-Phone services. PC-to-Phone services tend to be prohibited in those countries that prohibit IP Telephony generally, while they tend to be permitted without conditions in countries that permit some or all forms of IP Telephony. Calling-card services are rarely treated separately in policies. Rather, they are rolled in with other forms of Phone-to-Phone service, since the difference is more one of marketing and billing than technology. It should also be noted that, for many countries, information simply is not available as to whether or not incumbent PTOs are employing IP Telephony, and if so, whether by right of their existing licences, or under special authorization. Some PTOs may simply assume that their international franchise allows them to use IP Telephony, should they decide to pursue it, as a cost-saving measure, or to offer a discounted service. For instance, Telecom Egypt concluded exclusive agreements to offer IP Telephony within Egypt in 1999 without seeking clarification as to whether this was covered by its license.

Voice or data

3.10 [[Discuss the limitations of trying to distinguish between Phone-to-Phone and other services, including (i) the absence of any rational basis for such a distinction, (ii) the discriminatory effect on those that are not wealthy enough to have access to a PC; and (iii) the increasing difficulty of distinguishing between PCs and phones.]] **Another, and perhaps the most important regulatory distinction in many countries, is whether IP Telephony constitutes voice or data. The voice/data distinction is a matter of judgement. IP Telephony services can, in some cases, achieve a level of functional equivalence to traditional telephony services, making the means of transmission irrelevant to the user. Still, the voice/data distinction is used as a definitional tool to implement policy; thought not always with the best outcomes. For instance, in Nepal, data VSAT (very small aperture terminals) services are liberalized but not voice VSAT. The net result is that outgoing IP Telephony traffic can be blocked, but incoming packetised voice, which is converted to PSTN voice once it arrives in the country, cannot.**

3.11 The Internet has been treated in most countries as something other than traditional telecommunications. The trend has been in favour of little or no regulation of Internet services, even while traditional voice services are subject to extensive (albeit increasingly targeted) regulation. The reason is that Internet traffic is considered, for regulatory purposes, as data traffic, even though in some forms (e.g., dial-up Internet sessions), the bits actually pass over regular public voice circuits. When voice became one of the applications that can be provided over the Internet, the argument for treating it differently was that it is simply another form of Internet data. Hence the regulatory advantage of Internet Telephony—being treated as something other than voice, even though voice is the actual functionality being offered.

[[Retail vs. Wholesale/Carrier-carrier

Some regulators allow VoIP providers to be treated differently depending on whether or not they provide service directly to consumers/end-users versus wholesale/carrier-to-carrier service providers.]]

Mode of network transmission

3.12 **[[Note that, in many countries, data networks have been permitted to operate in a market-based environment with little if any regulatory oversight or consumer demand for such oversight.]]** Policies may also vary depending upon where IP/PSTN conversion takes place (i.e., whether there is a service provider) or whether the PSTN is used at all. In Phone-to-Phone services, the initial conversion of speech from circuit-switched mode to IP mode generally takes place on the premises of a service provider of some kind, particularly in the case of calling card services. In PC-to-PC and PC-to-Phone services, the initial conversion takes place at the user's PC, such that there is often no requirement for a service provider to be located in the same country as the user. Commercial presence is usually a precondition for effective regulation in a particular country.

3.13 Another case is where a given call does not use the domestic PSTN, but goes from a private data network to an IP gateway and then over international Internet links. Thus the local PSTN has not been "used." Regulation relating to basic telephony often focuses on the local access network. If that network is not used, then the service in question may not in fact be considered a basic telecommunication service at all.

3.14 In North America, policies generally distinguish between the Internet and other IP networks as the underlying means of transmission for IP Telephony calls. This can make the difference between a service being characterized as an Internet service, or simply another form of resale provided by means of a different technological platform.

Quality of service

3.15 Another means to distinguish IP Telephony is the notion of whether it provides "real time" communications, similar to traditional telephony. This is a technical measurement that asks whether the service provides instantaneous, two-way (or "full-duplex") transmission of speech. If not, the service is often not considered voice telephony, but rather a store-and-forward or messaging service. The latter are often considered to be "value-added" or "enhanced" services, which have traditionally been subject to little or no regulation. The difference between real-time and store-and-forward may be measured in milliseconds as a technical matter, but is usually left undefined as a legal matter. [[Consumers benefit from having increased choice by being able to pay different prices for different quality calls.]

3.16 Since IP Telephony signals, transmitted over the public Internet, generally involve several conversion steps and face unpredictable traffic conditions, and as a result suffer levels of delay not generally experienced with circuit-switched telephony, they might not be considered to meet the criteria of "real time" communications. Typically, communications that are not considered to meet the standard of "real time" are regulated more lightly, or not at all, as value-added services. However, improvements in IP Telephony may reduce the delay to a point at which such communications could reasonably be considered to be "real time". Furthermore the delays involved in IP Telephony might typically be as good if not better than those experienced in satellite telephony, and the sound quality may be comparable with mobile telephony. Thus technical quality of service measurements that are defined to exclude IP Telephony may also unintentionally exclude other types of voice telephony from regulation. [[Note the inconsistency of regulations that allow live Internet-radio and other types of voice-services to be unregulated while regulating live voice telephony.]]

3.17 ITU-T Recommendation G.114 (2.96 revision) (One-way Transmission Time) establishes the following technical parameters for satisfactory telephony:

"[T]he ITU-T *recommends* the following limits for one-way transmission time for connections with echo adequately controlled, according to Recommendation G.131 (*Stability and Echo*):

- **0 to 150 ms**: Acceptable for most user applications.
- **150 to 400 ms**: Acceptable provided that Administrations are aware of the transmission time impact on the transmission quality of user applications.
- **above 400 ms**: Unacceptable for general network planning purposes; however, it is recognized that in some exceptional cases this limit will be exceeded."

Functional equivalence

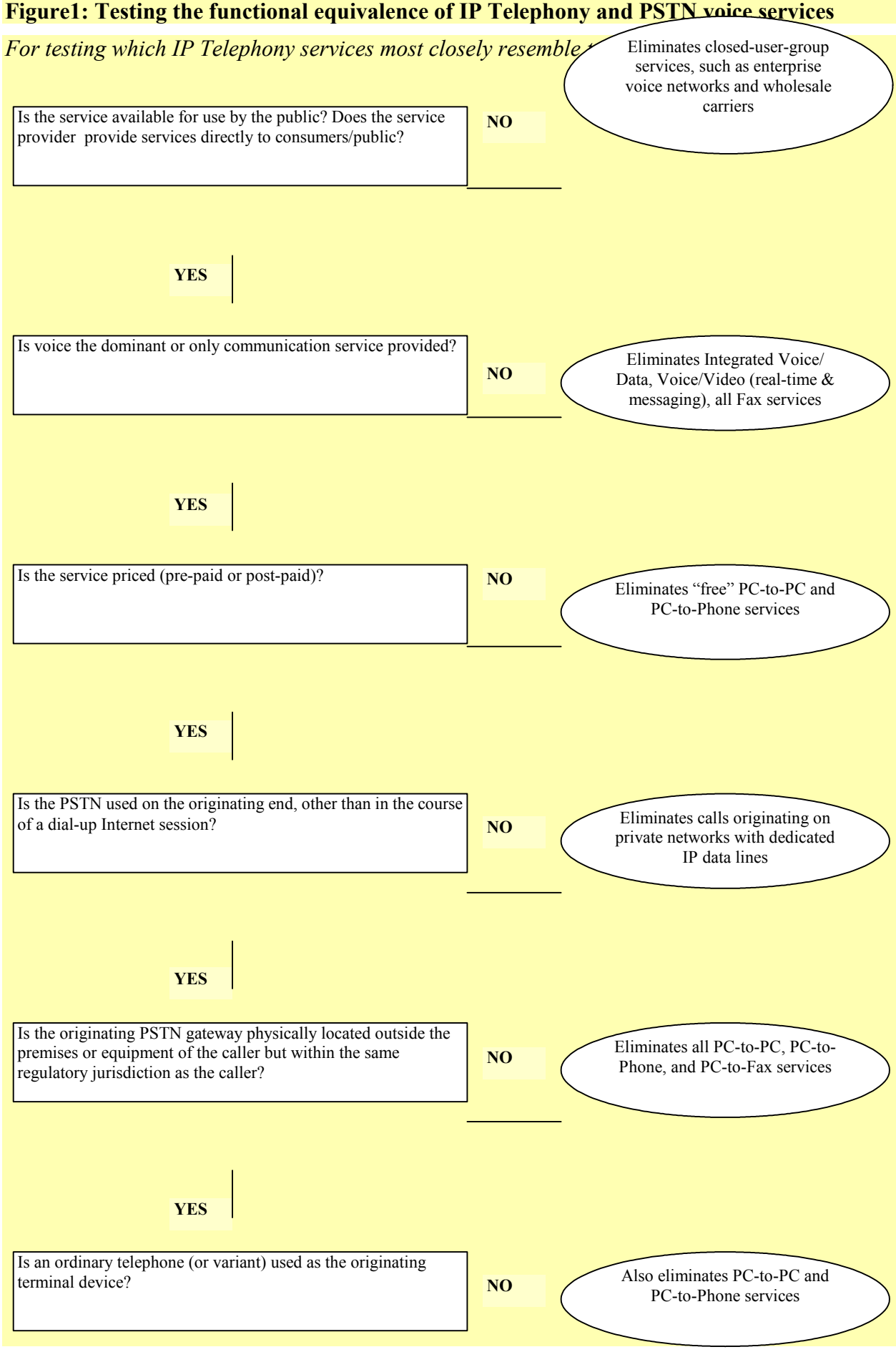
[[Any functional equivalence test begs the fundamential question of whether regulation is appropriate. Other factors should also be considered, including whether the service is provided directly to consumers or to other carriers and whether advanced services are available.]]

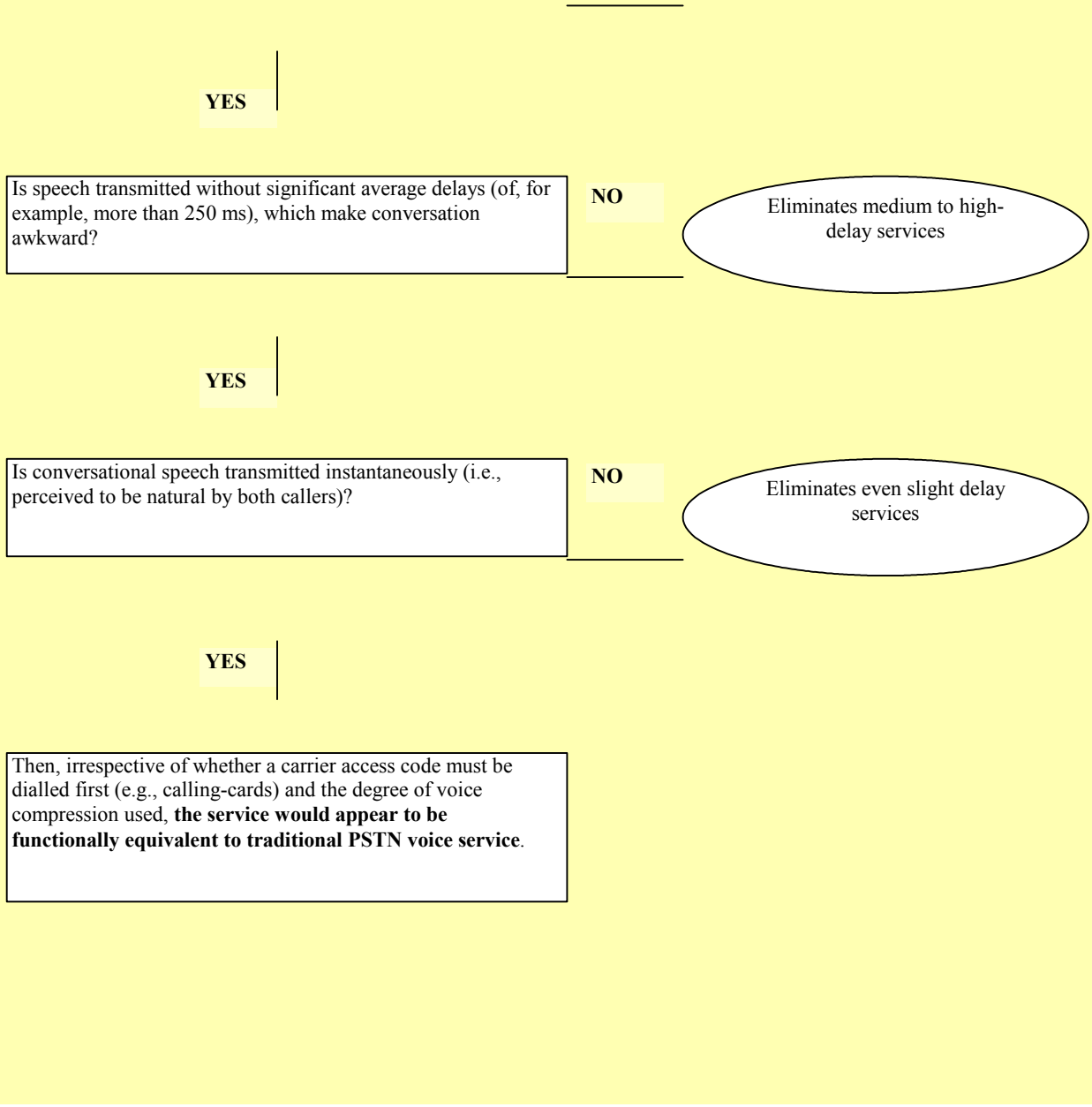
3.18 Functional equivalence is a regulatory concept used by some countries to link all or some of the above criteria in developing a policy as to whether some forms of IP Telephony should be treated on the same basis as conventional switched telephony. The premise for this approach, if the goal is to make the regulatory framework technology-neutral, is that similar services should be treated in a similar way.

3.19 On this basis, functionally equivalent services should be subject to similar regulatory requirements, unless other policy imperatives require otherwise. In determining "functional equivalence", policy-makers can look at such criteria as the quality of service, the nature of the service, the transmission networks used and such other factors as whether the service is offered to the public. Where the type of IP Telephony service under review is such that an

ordinary telephone can be used as the originating terminal device, the service is offered to the public, the PSTN is involved at some point and there is an acceptable technical level of call quality, then there is a sound basis for concluding that it is functionally equivalent to traditional telephony. Figure 1 shows a possible decision path for establishing or assessing functional equivalence.

Figure1: Testing the functional equivalence of IP Telephony and PSTN voice services




YES
Is speech transmitted without significant average delays (of, for example, more than 250 ms), which make conversation awkward?
NO
Eliminates medium to high-delay services
YES
Is conversational speech transmitted instantaneously (i.e., perceived to be natural by both callers)?
NO
Eliminates even slight delay services
YES
Then, irrespective of whether a carrier access code must be dialled first (e.g., calling-cards) and the degree of voice compression used, **the service would appear to be functionally equivalent to traditional PSTN voice service**.

Source: ITU.

Special categories

3.20 In some countries, mobile operators are given special rights to use IP Telephony to route international calls, allowing them to bypass the incumbent's international gateway for incoming or outgoing calls, or both. Other countries restrict the right of mobile operators to offer or provide IP Telephony.

Impact of IP Telephony on Universal Service schemes

[[This section should be divided into two pieces, one addressing bypass and the other addressing universal service. The bypass section should not take for granted that above-cost prices for international traffic is necessarily used to support infrastructure development or universal service. It also should emphasize that the pressure to bypass will exist as long as prices for international traffic are above costs, regardless of whether VoIP is regulated. Moreover, bypass itself is a larger topic both well beyond the scope of this policy forum, and one that only recently was addressed by the WTSA, and any further examination of these questions should come only following ample experience with any new policies or Recommendations.]

The universal service section should emphasize (i) that, because VoIP is cheaper than traditional telephony, it can be an effective way to increase telephone penetration and connectivity; and (ii) that VoIP will promote needed investment in telecoms infrastructure throughout the developing world, particularly the development of IP-based networks.]

[Discuss the potential impact of new IP devices on increasing access and lowering costs for consumers to talk and to access Internet content. These will be cheaper than computers and phones and may enable interaction with information in a format that is more accessible to those that are illiterate.]]

[[Compare the costs of building a circuit based network versus an IP network. These cost differences may make universal service much cheaper to obtain in the future]]

[The universal service section should recognize that IP Telephony, in fact, results in contributions to countries' universal service funding program because of its use of private lines.]

3.21 IP Telephony can be an important issue for telecommunication regulatory regimes that redistribute funds from one segment of the market to another in order to subsidize prices in the latter. In many countries, particularly developing ones, revenues from outgoing international telephone calls charged at above-cost rates, together with net settlements levied on incoming calls, are used to subsidize domestic network development and basic local access. In both cases, associated revenues may be reduced if calls can be originated and terminated by means other than from traditional PTOs and services.

3.22 The asymmetric regulation of voice and data services naturally creates an incentive for arbitrageurs to develop the capability to treat voice as data. The main purpose is to bypass the PSTN and thereby to avoid the regulatory obligations associated with voice traffic, in particular contributions towards implicit cross-subsidies or explicit universal service funds, or both. This can make offering international services profitable for small PTOs, or give larger PTOs crucial cost savings in extremely competitive markets. This incentive is particularly high where outgoing traffic exceeds incoming traffic and/or where universal service obligations are significant.

3.23 A permissive policy towards Internet Telephony may be designed to encourage the development of the Internet in a particular country. However, such a policy may be questionable in light of the fact that most commercial IP Telephony traffic travels over private IP networks, and not the public Internet at all, for quality reasons. [[The existence of private networks spurs demand for public interconnecting networks.]] **Such a policy would do little or nothing to increase Internet access, while facilitating the bypass of universal service funding schemes designed to increase the accessibility of the very telephone lines most often**

required to access the Internet in the first place. [[This argument needs to include the fact that the Internet and VoIP tends to increase use of private lines, which itself may contribute to universal service funding. Perhaps the paper should note that the U.S. has taken this position in its domestic regulation. Moreover, the existence of competition to dominant PTOs may itself promote increased penetration and connectivity.]]

3.24 IP Telephony is being used more and more to offer functionally equivalent services without the regulatory burdens associated with providing traditional voice telephony. While this is good for competition, and therefore good for consumers, it can render universal service schemes increasingly unsustainable and subject to challenge, where such policies depend on distinctions between voice and data traffic. In a few countries, providers of IP Telephony that is equivalent to other forms of telephony are required to contribute to universal service funds. Canada is one such country, where a test of functional equivalence is applied. Thus, a basic question is whether calls on one technological platform (e.g., IP, Frame Relay or ATM-based) should be treated differently from calls on another when it comes to universal service obligations.

3.25 Increasing access to the Internet is a policy goal in many countries, and low-cost long distance and international voice services can be easily added to the range of Internet services already available at community telecentres. Such services would not necessarily compete with the incumbent's existing business, and could be used as an interim strategy to provide easy and affordable access to those without a telephone in their home.[10]

Special issues for developing countries

[[This seems to belong with the bypass section.]]

[Include examples from China and elsewhere where PTOs and others have used Internet/VoIP networks to rapidly build domestic networks at a fraction of the time and cost of traditional networks. A lighter regulatory licensing regime would ease/foster more of these networks being built.]]

3.26 One aspect of IP Telephony that has particular implications for developing countries is that of international call termination. This is because IP Telephony is experienced in developing countries primarily in the form of incoming telephone calls. That is, foreign PTOs bring in low-cost IP Telephony traffic to developing countries and neither the caller in the foreign country nor the user receiving the call are aware their call is routed over an IP-based network.

3.27 In this scenario, the developing country does not benefit directly from a permissive IP Telephony policy (or lack of enforcement of a prohibition). Rather, it is the foreign PTOs that benefit from lower costs and these savings may be passed on to their customers. Thus, consumers and PTOs in those developing countries whose governments have acted to prohibit outgoing IP Telephony tend not to gain from the spread of IP Telephony to nearly the same degree as consumers and PTOs in developed countries, particularly those where international IP bandwidth is cheap and IP technology is widely available.

3.28 IP Telephony thus presents a dilemma for developing countries, especially for their incumbent PTOs:

> On the one hand, it promises to reduce the price of international telephone calls, for instance, enabling residential customers to make calls to relatives living abroad that

[10] See the information on public Internet access centres in Peru in the ITU-commissioned case study available at <http://www.itu.int/osg/sec/spu/ni/iptel/countries/peru/index.html>.

might otherwise be too expensive, and enabling business customers to participate more effectively in the global marketplace.

On the other hand, IP Telephony could be viewed as a threat to undermine the pricing structure of the incumbent PTO and undercut its profitable business in originating and terminating international calls. IP Telephony might also threaten the ability of the PTO to invest in extending the domestic network and meeting its universal service obligations.

[Put additional pros and cons. Such as the benefits of increases in traffic and network usage as well as increased ability of PTOs to tap into new markets outside their country. CAT's calling card service is one such example.

Also mention how new IP devices will offer cheaper and easier access to Internet content (voice interactive networks, etc).]

3.29 It is somewhat surprising that few IP Telephony policies refer to *terminating* international calls via IP Telephony, yet this is the primary form of this business in developing countries. Since developing countries tend to have relatively higher accounting rate levels, there is a greater incentive for their developed country correspondents to use IP Telephony as a form of bypass of the accounting rate system. While there may not appear to be much IP Telephony business activity in a particular country, because it is not advertised, international IPTSPs (IP Telephony Service Providers) may have already entered into deals with local ISPs (Internet Service Providers) or other private companies with "leaky" private corporate exchanges to terminate IP calls for them on the local PSTN. This would allow the traffic to pass outside of the accounting rate structure maintained by the incumbent PTO(s). Preliminary research suggests that this is very common all over the world.

Convergence and IP Telephony

[[This may be the best place to elaborate on (i) the fundamentally different regulatory regimes that have grown up around and continue to characterize IP-based packet networks and circuit-switched networks and (ii) the principle that the growth of IP-based networks provides an opportunity to reduce regulation generally instead of an imperative to impose legacy telecom regulation on the new technology.]

3.30 Technology analysts have been suggesting for several years that all forms of electronic communications will eventually merge into one platform, and in recent years IP appears to have emerged as the unifying platform. With PTOs and broadcasters entering each others' markets in many countries, and mobile operators considering shifting to an IP platform as they develop third generation systems, regulatory structures the world over are being pressured to adapt.

3.31 One of the key issues in local telecommunication markets that have been opened to competition has been the terms for interconnection among all local service providers. It is conceivable that some IPTSPs may seek the benefits of licensed local provider status, such as interconnection rights, numbering resources, and access to essential facilities such as directory listings. This is already the case, for instance, in the United Kingdom. IP Telephony rides on top of the PSTN, in the sense that calls are sometimes originated and almost always terminated on the PSTN, but is not fully integrated with it. The question of whether the public interest *requires* that ISPs (and IPTSPs) interconnect with each other may also arise in the near future. In Chile, for instance, IPTSPs are required to offer interconnection.

3.32 An important aspect of this issue is access to unbundled elements of the "local loop". While full local loop unbundling is currently required in a relatively small, though growing number of countries, it is seen as an important step in the evolution of markets from

monopoly to full competition. Unbundling allows different networks to interconnect, to exchange traffic and, most importantly, makes it all appear seamless to the end-user.

3.33 In many ways, local competition has proven to be the most complex regulatory undertaking yet in liberalized telecommunication markets. The integration of Internet and IP-based services with incumbent and new entrant circuit-switched networks will make the local environment even more complex. Far from making regulation irrelevant, this complexity makes effective telecommunication regulation more important than ever. The inherently international nature of the Internet, in turn, will make international cooperation on such matters essential.

Cross-border issues

3.34 The treatment of Phone-to-Phone IP Telephony may have implications for the international telephony market. IP Telephony may serve the public interest in the originating country by placing significant downward pressure on international settlement rates and consumer prices. In the terminating country, it may serve to introduce an alternative calling option even though policy-makers have otherwise decided to restrict or prohibit competition. In addition, these IPTSPs may benefit from a lighter regulatory approach than that imposed on incumbent PSTN operators. Where a permissive approach in the originating country conflicts with clear and restrictive policies in foreign markets in which the services are terminated, it might be useful to have a means to resolve such difficulties.

3.35 More generally, consideration could be given as to the extent, if any, to which some forms of IP Telephony should be subject to international agreements and procedures, such as the numbering plan or conventions on routing traffic and settling accounts, that apply to traditional international telephony.

3.36 IP Telephony may also be considered as part of a broader process of deploying IP-based networks around the world. IT is unlikely to be cost effective to develop IP-based networks solely for the carriage of voice, but rather as part of a strategy to develop a full-range of Internet services. For countries that would seek partners to build such networks, then issues for creating favourable market conditions for investment and installation of IP-based networks need to be addressed.

4. ECONOMIC ASPECTS OF IP TELEPHONY AND ITS IMPACT ON Public Telecommunication Operators

[[Reorganize around a discussion of the economic motivations of service providers deployment of VoIP, including (i) added revenue from deployment of IP-based networks for which there is substantial demand; (ii) potential for enhanced services that require voice capability; (iii) lower-cost deployment and effect on teledensity; and (iv) bypass of accounting rate regimes]]

The market opportunity

[[Insert information about the current size of VoIP traffic, including its size relative to that of circuit-switched networks, showing that VoIP remains small in relation to global traffic. Insert information about the magnitude of existing investment in legacy networks.]]

4.1 From an economic viewpoint, IP Telephony raises a number of key questions. Foremost among these is: how big is the market opportunity that IP Telephony creates? [[Eliminate outdated and overly speculative estimates; provide valid cites to source materials; note the tremendous difficulty of predicting the pace of change]] **Market estimates vary widely:**

> The market research company, *IDC*, estimates that the IP Telephony market generated 2.7 billion minutes of traffic in 1999 and will expand to around 135 billion minutes, with revenues of US$19 billion, by 2004;

Deltathree.com forecasts that IP Telephony will generate around 16 billion minutes of international traffic in 2000 and will account for some 35 per cent of the total by 2005;

Tarifica estimates that more than 40 per cent of all international calls will be carried over IP by 2004. *Analysys* thinks that it will reach 25 per cent by the same date;

In China alone, the Ministry of Information Industry (MII) has estimated that the IP Telephony business will be worth some US$12 billion by 2004. **[[Does this include domestic and international traffic?**

Include data/estimates on the potential of domestic, in-country traffic. This is a major market and IP can play a key role in this.]

4.2 Most studies show that the main use of IP Telephony at present is for international traffic rather than for domestic long-distance or local traffic. The United States is currently the main source of IP Telephony traffic. [[This is extrapolating mainly from the experience of the U.S. where domestic prices are very, very low. In countries where there has been less experience with competition and where domestic call prices are high and there is limited domestic infrastructure, the potential for domestic IPTSPs is great and could help lower domestic prices, increase network usage, and increase network buildout since IP networks are cheaper and faster to build.]]

4.3 One reason that the market estimates differ so much is because the studies use different definitions. Market forecasts, such as those put out by *IDC*, are based mainly on traffic reported by IP Telephony service providers (IPTSPs). They do not generally include traffic that is being carried over IP-based networks (for at least part of the route) by the major PTOs. This is particularly difficult to estimate. The *Sema Group* reports that some 60 per cent of PTOs believe that IP Telephony is capable of becoming the main means of telecommunication by 2004, and that one quarter of them believe that the majority of their voice traffic will be carried over IP by that date. **[[This survey data indicates nothing other than what people are guessing]]** Already, the number of international circuits that are used for leased lines (primarily for Internet use) outnumber those that are used for the PSTN. On the busiest routes, for instance between the United States and Europe, international PSTN circuits in use are declining in number.

~~{Costs and prices~~

~~}~~**[[MARKET, SERVICES AND PLAYERS:**

Include separate sections describing the ITSP market place, structure products and players. VoIP markets, services and players are very different than the traditional telco market. The discussion for example, should examine the difference between PC-to-Phone, phone-to-phone, retail/wholesale, service providers as well as the revenue impact of new services, such as calling cards and other IP services. It should also examine how alliances between ITSPs and traditional PTOs can help relatively small PTOs transition to more competition and increase their global footprint and help the PTOs focus their limited resources on their domestic or targeted markets/users. These alliances also entail substantial cross-training and increase of knowledge of developing country PTOs of cutting-edge IP knowledge/expertise.]]

Costs and prices

4.4 A second economic issue raised by IP Telephony relates to the cost savings it might offer. For **consumers,** IP Telephony is invariably *cheaper* than the traditional alternative (PSTN telephony) especially for calls originating in non-liberalised markets or that are carried over the public Internet. For instance, in Hungary, where consumers have had a choice of using IP Telephony since 1999, the price advantage over standard PSTN calls ranges between 20 and 50 per

cent per minute. If all other factors—quality, convenience, reliability, etc.—are equal, the choice to use IP Telephony is an economically rational one. For the moment, however, the other factors are not equal. In Hungary, for instance, IPTSPs would be regarded as breaching the monopoly of the incumbent, *Matav*, if the average delay of voice transmissions was less than 250 milliseconds or if packet loss was less than 1 per cent. Therefore consumers must generally make a trade-off between price and quality. Willingness to make that trade off will generally depend on price sensitivity:

> Consumers in low income countries, or in low income families in developed countries, will be more inclined than other less-price-sensitive consumers to choose IP Telephony, where it is available;
>
> Residential consumers may be more inclined to use IP Telephony than business users for whom transmission quality and reliability are more important.

4.5 For **PTOs**, the potential cost advantages of IP Telephony are more complex to calculate. That is because incumbent PTOs have existing revenue streams, which they fear may be cannibalised by a shift to lower-priced IP Telephony. In the case of Hungary quoted above, the initial pressure to offer IP Telephony came from mobile service providers that saw the opportunity to bypass *Matav's* monopoly on carrying international calls, although *Matav* itself is now an IP Telephony service provider.

4.6 The precise nature of the cost advantage to PTOs offered by IP networks is the subject of much debate. It will depend, for instance, on:

> Whether a particular investment in IP is as a new-build network, or as an upgrade or overlay to an existing network. The incentive to choose IP will be greater for new, or substantially new, networks. For instance, in Senegal, where existing networks serve just over 1 per cent of the population, *Sonatel* plans to migrate its existing core network to an IP backbone by 2004 and to offer both voice and data services over the same integrated IP network.
>
> Whether a particular carrier is an incumbent or a new market entrant. New market entrants, with no legacy network to defend, are likely to be the first movers towards IP Telephony. In China, for instance, *China Netcom*, a new market entrant which is based around the Ministry of Railway's network, is building a voice over IP network which will cover 15 cities and include some 9'600 kilometres of fibre optic cable by the end of 2000. The use of IP has allowed *China Netcom* an earlier entry into the market than might otherwise be the case.
>
> The extent to which value-added services are being offered. In economies such as Hongkong SAR and Singapore, where local call charges are free (bundled into the access charge), new market entrants are offering value added services that allow, for instance, voice users to retrieve their email (*T2mail.com*) or voicemail and fax communication services (*2Bsure.com*) over an IP platform.

4.7 In reviewing these factors, it seems likely that the pressures to shift towards IP Telephony will be different in economies at different states of development and with differing degrees of market competition:

In countries where **prices for international traffic are high**, the main opportunity for voice over IP will be for price arbitrage of simple voice transmission. In many of these countries, outgoing IP Telephony is banned. Thus, the main form of IP Telephony is incoming traffic. Even though this may be no more legal than for outgoing traffic, it is harder to detect and block. In Nepal, for instance, incoming PSTN traffic fell from 29 million minutes in 1998 to 22 million in 1999 during a period when outgoing international traffic grew from 20 to 25 million minutes. It is thought that at least part of the decline in recorded incoming traffic is due to the fact that PTOs are bringing their traffic into the country as a packetised voice in an Internet traffic stream to VSATs (very small aperture terminals) and then breaking the calls out into the PSTN locally.

In countries where **prices for international traffic are falling**—for both retail (consumer) and wholesale (settlement) rates—VoIP traffic may already be playing a role in promoting price competition (as, for instance, in Hungary or Thailand) or in providing an alternative to the services of the fixed-line incumbent (as, for instance, in Colombia). However, a critical factor is how easy it is for subscribers to use the service. In Peru, for instance, the success of IP Telephony was partly based on the availability of a telephone-like device (Aplio) that could use either IP networks or the PSTN for establishing calls.

In countries where prices for international traffic are already low**, due to the effects of competition, IP Telephony is likely to be important for reasons other than price arbitrage. The market opportunity for IP Telephony is likely to lie, on the one hand, in the prospects of value-added integrated services for users and, on the other hand, cost reductions for PTOs. As an example of the former, in the United Kingdom, *yac.com* offers a service for personalised numbers and automated call forwarding via the Internet. As an example of the latter, the *BT/AT&T* joint venture, *Concert*, is building a new managed IP-based global network to deliver services, such as electronic commerce and global call centres, to link some 90 cities worldwide. Even though the required investment is of the order of US$1 billion per year, an integrated IP network is considered to offer the most cost-effective solution for handling multiple traffic streams**[.

Insert some thoughts on impact on domestic traffic, especially in developing countries.

Substitutability] ~~{Substitutability}~~

4.8 A third economic issue raised by IP Telephony is the issue of substitutability between services. Clearly, much of the traffic carried over PC-to-PC Internet Telephony will be "new" traffic, which would not otherwise have existed on the PSTN. Much of the discount traffic generated over PC-to-Phone services is also likely to be new traffic, especially that which is offered "free of charge", for instance by companies such as *DialPad.com* or *phonefree.com*. But some of this traffic, and the vast majority of calls carried over Phone-to-Phone services, are likely to be calls that would otherwise have been made over the PSTN, and could therefore be regarded as substitute traffic. The cheaper prices generally available for IP Telephony may spur higher growth rates in traffic, where demand is elastic. But existing PTOs will inevitably lose some market share.

4.9 One of the main motivations for PTOs to route traffic via IP-based networks is to reduce the level of settlements that are due to partner countries. Under the international settlements system, the PTO(s) in the country that originates a call has traditionally made a compensatory payment to the PTO(s) in the country that terminates the call. Payments are made when traffic in one direction is greater than traffic in the return direction. The level of payment is based on bilaterally negotiated "accounting rates". A net settlement payment is usually made on the basis of excess traffic minutes, multiplied by half the accounting rate (the accounting rate share, or settlement rate). Net settlement payments, primarily from developed countries, have grown larger as traffic flows have become less balanced. ITU estimates that, during the 1990s, net flows of settlement payments from developed counties to developing ones amounted to some US$50 billion[11]. PTOs that send more traffic than they receive have an incentive to develop alternative routing procedures. They do this to avoid having to make settlements based on above-cost accounting rates and instead pay interconnection fees, based on local call rates or below.

Impact on public telecommunication operators

4.10 In developing countries, and especially those with high international call charges, the major impact of IP Telephony on PTOs is likely to be a potential loss of income from

[11] See, for instance, analysis in ITU/TeleGeography Inc. "Direction of Traffic: Trading Telecom Minutes", ITU, Geneva, October 1999, 347 pp, available at: <http://www.itu.int/ti/publications/DOT99/index.htm>.

international calling, which is both direct (loss of collection charges) and indirect (loss of settlement payments). In the case of Sri Lanka, for instance, incoming international traffic streams have fallen from some 16 million minutes to just 9 million minutes per month and the estimated loss to the incumbent operator, Sri Lanka Telecom Ltd., is around US$2 million per month. At least some of this lost traffic is thought to be due to IP Telephony and Sri Lanka Telecom has initiated court action against those companies that it believes are using IP Telephony to carry incoming traffic.

4.11 Arguably erosion of monopoly power on over-priced international routes would happen anyway, even without IP Telephony. Markets for international calling are shrinking in value as, on the one hand, prices fall precipitously while, on the other hand, traffic is routed on least cost routes and settlement rates are forced closer to costs. PTOs in developing countries may be better advised to embrace IP Telephony, and bear the consequences of reduced per-minute revenues from long-distance and international services, than to risk missing the opportunity to generate revenues in future IP-related growth areas. There are a growing number of PTOs that have chosen to offer lower priced IP Telephony services~~(,)~~ [on their own or by entering into agreements with ITSPs, as a strategy to regain traffic lost to high prices and other providers or as a way capture new revenues from increased traffic and/or net services.] **even though this may ~~(cannibalise)~~** [affect] **their existing revenue streams. These PTOs include *Telecom Egypt*, *GamTel* (Gambia), *Matav* (Hungary) and *CAT* (Thailand).** [These PTOs are acting intelligently to try to adapt to lower prices and trying to generate new revenue sources – it is in their self-interest to follow this strategy. PTOs should be encouraged to follow suit.]]

4.12 In more competitive markets, where prices for international calls have already come closer to costs, the impact of IP Telephony on PTOs is likely to be less significant. IP Telephony is just one of many options for discounted calling. PTOs will route traffic over whichever route is cheapest, and customers will choose PTOs according to their ability to combine low cost calling with value-added services.

4.13 The public telecommunication operator of the future may "own" the customer, in terms of providing billing and customer care support, and may "own" the local network, in terms of providing origination and termination of calls. However, it is unlikely to be able to "own" or control the types of application that the customer chooses, and IP Telephony might be better viewed as an application rather than a service. PTOs have traditionally used profitable long-distance and international services to cross-subsidise the functions of network access and local calling. In increasingly competitive markets, such hidden cross-subsidies can no longer be sustained. Future PTOs will need, instead, to ensure that their local access networks are largely self-financing. This will require substantial and urgent tariff rebalancing to bring the price of local and international calls much closer together.

4.14 While IP Telephony may bypass certain parts of a carrier's operations, where the price structure is not cost-oriented, it will not take away the need for local networks. Indeed, insofar as IP Telephony is a new "killer application", and makes access to the Internet even more popular, it will actually increase the volume of local calls and the demand for second lines. Already, in some economies, as much as a third of all local calls are to the Internet and around 15 per cent of all local lines are used primarily for Internet access. Furthermore, dial-up Internet access is on a steeply rising curve while international traffic growth is slowing down.

4.15 Over time, the price arbitrage opportunity for IP Telephony on international routes may disappear, but other opportunities are expected to emerge. For instance, in many European countries, rates for the termination of calls on mobile networks are widely believed to be

out of line with costs[12]. Routing calls to mobiles via IP networks may offer a solution to bypass these high prices. Similarly, countries that maintain many different call zones for domestic traffic, based on distance, may find that these are unsustainable in an IP-based world. Competition will drive prices closer to costs and, where IP Telephony offers the lowest cost alternative, it will be the preferred solution.

[Discuss the positive impact of ITSPs building gateways around the world on reducing US-centric Internet traffic and increasing intra-regional traffic flows as gateway-to-gateway billing and other services are provided.]

[12] See the discussion of this issue in the ITU Workshop on Fixed-Mobile Interconnection, available on the ITU website at: http://www.itu.int/interconnect.

17. COMMENTS RECEIVED FROM Cable and Wireless

Introduction

Cable & Wireless (C&W) is grateful to the ITU secretariat for the opportunity to comment on the Secretary General's draft report on IP Telephony (1st draft, November 2000). C&W welcomes the draft report which has already progressed discussion of some difficult issues associated with IP Telephony.

C&W participated in the meeting of the Informal Experts Group (IEG), convened as part of the preparatory process for the 3rd WTPF, at the ITU on 16/17 November 2000, and will participate in further events leading up to the WTPF as well as the WTPF itself. C&W's primary point of contact for the WTPF is:

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Structure of the Report

C&W endorses the conclusions of the IEG as to the structure for the 2nd draft of the report.

Opinions

C&W endorses the conclusions of the IEG as to the topics to be covered by the opinions, and the process established by the ITU secretariat to move this forward. C&W looks forward to participating in this process.

C&W's comments on the 1st draft of the Report

C&W offers the following comments on the 1st draft. These do not refer to specific passages of text, but are more high level comments on the overall substance and conclusions of the draft.

Definition of 'IP Telephony' and implications of this for analysis of technical, economic, and regulatory issues

IP Telephony is not a precisely defined term. C&W therefore believes that great care must be taken in discussion of technical characteristics, economic characteristics and consequences, and regulatory implications associated with the range of services and applications which fit within the broad heading of IP Telephony. There are important distinctions between some of these services and applications, and the impact of regulation on them is not fully understood. For example, IP

Telephony may be closely integrated into a suite of IP services producing economies of scope and synergies which may impact on the economic rationale for imposing regulation. C&W believes it to be important for the WTPF to acknowledge that it may not be possible to apply a single set of conclusions across all IP Telephony products.

Also, it is impossible to predict how voice applications and services will evolve in future and this makes the job of identifying economic consequences and appropriate forms of regulation even more difficult.

Because of these uncertainties, C&W considers that any calls for regulation of IP Telephony should be tempered by a precautionary principle. C&W believes that it would be very dangerous to regulate IP Telephony in a 'knee jerk' fashion, and particularly to assume that all regulation of circuit switched voice telephony must automatically apply to IP Telephony, on the basis of a static analysis of markets and technology. Such an approach would risk seriously undermining the development of IP networks and applications and hence the benefits which this will bring to customers. C&W's view on regulatory issues associated with IP Telephony is explained further below.

The costs and benefits of IP Telephony beyond the telecoms sector must be acknowledged

As was discussed at the IEG meeting on 16/17 November 2000, the 1st draft of the report tends to focus too narrowly on issues which impact directly within the existing boundaries of the telecommunications industry. For example, in C&W's view, the current draft economic section concentrates too much on the impact of IP Telephony on incumbent telecommunications carriers. Whilst all sectors must have their concerns addressed, the debate needs to take account of the wider impact of IP Telephony - i.e. not just on the telecommunications sector, but also on the wider economy and society, both within national jurisdictions and internationally.

C&W believes that the current focus (on the telecommunications industry and particularly incumbent carriers) will naturally tend to underplay the benefits of IP Telephony. The development of IP technology and the roll out of networks and applications will bring valuable economic and social benefits beyond the provision of voice telephony. IP Telephony (which is just 1 such application) has the potential to deliver benefits through lower cost telephony and will also stimulate the development of other IP based services. Whilst it will be difficult for the report comprehensively to identify and measure all the benefits of IP Telephony, it should acknowledge that the impact will be felt more widely than just in the telecommunications sector.

Regulatory issues

As already stated, identifying economic outcomes and appropriate regulatory measures for IP Telephony is difficult (and dangerous) because of the quite broad range of applications to which the term is applied and the dynamic nature of both the technology and the market. However, C&W believes that it is possible to identify some broad principles which should apply to analysis of IP Telephony markets. These are explained below in the context of the 1st draft Report, and some tentative conclusions are drawn.

Economic regulation is appropriate where there is market failure

C&W believes that economic regulation should only apply in markets where market failure prevents the operation of effective competition. This can be the case where a market participant is dominant and therefore has the ability to act independently of competitive forces.

No market failure has been identified for IP Telephony

No structural market failure has been identified in markets for IP applications generally or IP Telephony particularly. In other words, these markets are no more or less vulnerable to such market failures than other markets which rely on underlying telecommunications services as essential inputs. Assuming that regulation of conventional telecommunications systems addresses competition concerns in these underlying markets (see below for further discussion of this), C&W believes that questions related to dominance in IP markets should be addressed as they arise and on a case-by-case basis, and not be the subject of sector specific ex-ante regulation. National competition authorities or telecommunications regulators should enforce competition rules as they apply in the telecommunications sector in each jurisdiction. This approach allows the necessary flexibility to reflect the dynamic nature of the market.

The implications of IP Telephony on existing regulation of circuit switched voice

Whilst C&W believes that the need for ex-ante economic regulation of IP Telephony has not been demonstrated, we agree with the report that the
impact of IP Telephony on some existing aspects of the regulation of circuit switched telephony – e.g. universal service provision and funding - needs to be considered. Some key points are discussed here.

- The potential implications of 'technology neutrality' must be carefully considered

The draft report discusses the concept of 'technology neutrality', and this has also been a theme in European Community debates on IP Telephony. It is
argued by some that technology neutrality is a reason to apply regulatory requirements which currently apply to circuit switched voice services to IP Telephony services. C&W believes that care needs to be taken in considering the relevance of technology neutrality in this case. Our thoughts are set out here.

C&W believes that technology neutrality can be a legitimate concept for application where a homogeneous product is provided in a single market using alternative technologies for delivery. The virtue of technology neutrality is that it ensures that neither solution is artificially stimulated as a result of inconsistent regulation.

As already noted, a number of different applications and services currently fit within the broad definition of IP Telephony. In the event that any such applications or services are identified as inhabiting the same economic market as circuit switched telephony (and therefore having a high degree of substitutability), technology neutrality may therefore be a factor in determining whether regulation should apply. In this event, it will be important to recognise that 'consistent' regulation (as required by technology neutrality) does not mean 'the same'. For example, it would be inappropriate for the same pricing structure (including settlement rates) as applies to circuit switched voice to mandatorily be applied to IP Telephony because the underlying costs of the two are quite different.

It is very important that technology neutrality is not used to justify the application of inappropriate regulation to IP Telephony. It is just one of many factors to be considered.

- There is a continuing need for regulation of dominant access providers

One issue which perhaps should be given greater prominence in the report is the continuing need for regulation of dominant access networks. This will be important to ensure that IP applications

(including IP Telephony) can be delivered over dominant access networks without structural deficiencies in

access markets constraining competitive activity in downstream markets for IP services.

As applications breakout from IP to circuit switched networks, they will require delivery to end-users, and so the IP network becomes reliant on the circuit

switched network for access. Incumbent telcos retain an advantage in this because of the ubiquity of their networks and their share of subscriber lines.

Hence, with interoperability between IP and circuit switched networks, the dominance still enjoyed by incumbent telcos resulting from inheritence of ubiquitous networks can restrict market development and can be used by the incumbent to leverage its power into markets for IP services. Regulatory instruments which are in place or being developed to deal with this dominance (e.g. cost based interconnect, local loop unbundling) remain appropriate in an IP world for as long as circuit switched networks are the primary means of access.

The WTPF should consider what knowledge and skills transfers will assist the development of IP networks and services in developing markets

The draft report correctly identifies that the emergence of IP Telephony will present different issues and challenges in different jurisdictions. For some, there will be a need for human resource development and knowledge transfer to overcome skills shortages. C&W believes that the WTPF can actively progress this issue by encouraging mutually beneficial sharing of knowledge and skills between jurisdictions and between industry players and policy makers and regulators.

Cable & Wireless
December 2000

18. COMMENTS RECEIVED FROM **Poland / Ministry of Posts and Telecommunications**

Our ref.:DWZ-0833-358/ /JG/00

Mr Arthur LEVIN
Strategic Planing Unit, OfficeT.1305
International Telecommunication Union
Place des Nations
12-11 Geneva 20,
Switzerland

Subject: Third World Telecommunication Policy Forum

With reference to the letter DM1177 of 2 November 2000 I sent you herewith our comments on the draft report of the Secretary – General on IP telephony for the WTPF -01. This letter will be sent also by E-mail.

The ITU document describes many important issues, but we would like to focus only on definitions of the different IP telephony services.

For the effective and market oriented regulatory regime it is essential to give proper definitions for different types of IP telephony services.

We agree with the ITU definition of IP telephony that is proposed in the document, according to which IP telephony is a generic term for the many different ways of transmitting voice, fax and related services over packet-switched IP-based networks. In other words the term describes all telephony services offered via the Internet.

However we would like to propose some changes in subdividing definitions. The ITU document proposes to treat Internet Telephony as the one using public Internet; VOIP in contrast is treated as the one that utilises managed private IP-based networks.

We agree that it is essential to distinguish between private and public IP-based networks. However in our opinion the above proposal is not exactly in line with our understanding of the terms set out in the previous paragraph. Therefore we propose subdividing IP Telephony into the following groups:

> Intranet Telephony
> Internet telephony that utilises private IP- based networks for internal purposes of one entity.
> Internet Telephony
> Telephone Services offered via the Internet for commercial purposes.

The services offered are in effect similar to those accessible in fixed and mobile telephony.

Voice over IP (VOIP)
Voice transmission over Internet.

According to the above described definitions IP Telephony has a general meaning, covering all telephony services offered both for commercial and non commercial purposes that use both private and public networks. We propose subdividing IP Telephony into two main groups: Intranet telephony and Internet Telephony. The former would use private networks for internal communication within one entity while the latter describes all telephony services used for commercial purposes. We consider it essential to define VOIP separately. It is a part of IP Telephony, but offers services limited only to voice transmission over IP. A separate definition for VOIP is very important for regulatory purposes.

We believe that this way of defining IP Telephony will make the regulatory process easier and will lead to greater transparency within the market.

Yours faithfully

Wladyslaw WILKANS
Director

19. COMMENTS RECEIVED FROM **USA / Department of State**

December 7, 2000

Dear Mr. Wong:

I would like to take this occasion to thank you for all your efforts to ensure that the first meeting of the Group of Experts to prepare for the upcoming World Telecommunication Policy Forum (WTPF) was successful. Under your leadership, we believe that progress was made and that a productive framework has been set for further work in this area.

We believe that the process must be as inclusive as possible and for that reason we urge the ITU to make every effort to broaden the participation of ITU members, in particular developing countries, to ensure a balanced outcome. We further believe that the Forum must be inclusive in representing all points of view with regard to the benefits of IP Telephony. The Forum and the corresponding draft report, in our view, are critical to providing essential information to key decision makers around the world to assist them in their efforts to direct the transformation of their economies and to embrace the information revolution. It is our view that IP Telephony can bring great advantages to consumers around the world and set the stage for further deployment of advanced technologies. It is in this spirit that we offer the attached U.S. Contribution which articulates our specific comments to the November l Draft Report of the Secretary-General on IP Telephony.

Sincerely,

[signed]

Malcolm R. Lee
United States Coordinator
International Communications and Information Policy

Attachment:
U.S. Contribution

Mr. Anthony Wong
International Telecommunication Union
Place des Nations
CH-1211 Geneva 20
Switzerland

United States of America

Comments on the First Draft Report on IP Telephony of the Secretary-General

Introduction

In Decision 498, the 2000 session of the ITU Council decided to convene the third World Telecommunication Policy Forum in Geneva, from 7 to 9 March 2001, in order to discuss and exchange views on the theme of Internet Protocol (IP) Telephony. Consistent with Resolution 2 (Rev.2, Minneapolis, 1998), this forum shall neither produce prescriptive regulatory outcomes nor produce outputs with binding force. Rather, the Policy Forum is an opportunity for Member States and Sector Members to discuss and exchange views and information on telecommunication policy and regulatory matters (Rev. 2, Minneapolis, 1998).

The United States strongly supports the broad approach of technology and market analysis that we understand to be the new framework for the ITU revised draft report which will be released on December 15. We share the view expressed during the November ITU Experts Group Meeting on IP Telephony that the ITU Draft Report on IP Telephony needs to examine the wider technological and economic benefits of deploying IP-based networks. We believe this Forum offers an opportunity to encourage Member States to recognize the positive impacts of IP Telephony, such as incentives for stimulating investment and economic development.

Our comments on each specific section of the Secretary General's draft report dated November 1 on IP Telephony are articulated in detail below.

Technical Aspects of IP Telephony

Based on the results of the November Group of Experts meeting on IP Telephony, the United States anticipates a number of comments to be included in the second draft report. In general, the following points should be addressed in the technical section of the December 15 draft report:

- A description of the development and evolution of network infrastructures that can deploy IP Telephony[13],

- Voice over IP should be distinguished from voice services on a circuit-switched network. The dynamics of the IP Telephony environment is such that any definition is only transitional at best. Therefore, only “working definitions” exclusively for use at this Forum would be appropriate. We make this suggestion while noting that many terms in general use today may have multiple meanings.

Below are specific comments on how the technology section could be further improved. These comments are included below to provide feedback on the November 1 draft text that may still be retained in some form in the second draft:

[13] Council Decision 498 and the Draft Report use the term "IP Telephony." Our understanding is that this term is intended to encompass the broad range of voice applications over IP-based networks, often referred to as "Voice over IP" or "VoIP." Our comments on this section use the terms "IP Telephony" and "Voice over IP" interchangeably. The Draft Report may want to adopt this practice.

1. Given the diversity of regulatory regimes internationally, the report should recognize that IP Telephony can be an application as distinguished from a service. The report should recognize that IP Telephony can be deployed on networks that are private.

2. The Section 2.12 reference to Internet peering, transit and interconnect is inappropriate in this section.

3. Any claims regarding the growth rate of IP Telephony should be substantiated with specific source citations throughout the draft.

4. Much of the detail on Media Gateway, Media Gateway Controller, QoS, Bandwidth and ENUM should be shifted from the body of the draft report to footnotes or annexes.

5. The work of IETF and other bodies in standards work should be recognized, including areas such as the Session Initiation Protocol, the Session Description Protocol and the next generation Internet.

6. The Draft Report should highlight the value of the existing network infrastructures as essential support for IP Telephony.

7. We would suggest that text be inserted which describes the potential for new, multifunctional end user devices that can support Voice over IP technology which may be more user-friendly, and which may be more convenient than traditional telephones or personal computers.

8. Section 2.4 should note that IP Telephony is not just emulation or replication of the PSTN; rather IP-based technology facilitates an increasing array of new, innovative applications.

9. To meet the goal articulated at the November Group of Experts Meeting of using the Forum as a way to educate high level policy makers, additional modifications will need to be made to the Technology section that broaden the scope of the chapter to address the "Technical Aspects of IP-based Networks".

Economic Aspects of IP Telephony and its Impact on Public Telecommunication Operators

The United States supports the balanced view of IP Telephony articulated at the November ITU Group of Experts meeting on IP Telephony. We agree that the section titled, "Economic Aspects of IP Telephony and its Impact on Public Telecommunication Operators" should not focus solely on the possible impact of IP Telephony on Public Telecommunication Operators, but should be enhanced to address the broader market aspects and associated economic benefits of IP Telephony to both Sector Members and Member States. In particular, we appreciate the chairman's decision to acknowledge the economic benefits of this technology to end-users. We support the decision to reorder the report and reframe this section. This approach will enhance the Forum as a way to educate interested parties on all aspects of IP Telephony. We are committed to the idea of the Forum as a venue for information exchange where the views of all participants will be considered.

The United States supports a further rewrite of the Economic section that would emphasize the following concepts: the identification of both the costs and benefits associated with IP Telephony; the costing structure of IP networks as compared to traditional circuit switched networks; how IP networks can attract investment and support universal access; and how countries can transition from a circuit switched network to an IP based one. We believe that this section should note the positive role that IP Telephony can play in helping to achieve universal access, particularly in developing countries. IP Telephony can help meet the immediate goal of expanded telephony access, and can

promote infrastructure development, human resource development, and innovation -- all of which are important to narrowing the Digital Divide.

Policy and Regulatory Issues for IP Telephony

With respect to the "Policy and Regulatory Issues for IP Telephony" section of the ITU Draft Report, the United States believes that this section should provide information to Member States on the benefits of innovative new services that IP Telephony offers. The United States believes that this section should encourage Member States to ask the fundamental question of whether government regulation is necessary before moving forward. In addition, the section should address the costs and benefits of any form of regulation of IP Telephony, keeping in mind that the goal of any policy should be to encourage investment, spur innovation and advance development.

Below are specific comments on how the Policy and Regulatory section of the November 1 draft report of the Secretary-General could be further improved:

1. Paragraphs 3.18 through 3.20 discuss the principle of technological neutrality. While convergence may suggest a policy of technological neutrality, we believe Member States should take a cautious approach to regulating innovative new technologies, such as IP Telephony. Member States should consider new, pro-competitive policies, rather than impose old, monopoly-era regulation.

2. Paragraph 3.35 should call for caution against the assumption that accounting rates and other legacy regulatory regimes apply to IP Telephony.

3. With regard to Paragraph 3.31, a consideration of interconnection obligations for Internet Service Providers (ISPs) should take full account of the advantages of using, where appropriate, domestic anti-trust laws and pro-competitive regulatory policies to address problems if they arise.

4. Paragraph 3.34 suggests that the ITU consider arbitration or resolution mechanism among Member States with different policies on IP Telephony. We believe that privately negotiated agreements obviate the need for an internationally sanctioned dispute resolution mechanism. In any event, the decision to regulate or not to regulate IP Telephony should remain a sovereign right of each Member State.

5. Paragraphs 3.23, 3.24 and 3.26 through 3.29 should note the positive role that IP Telephony plays in helping to achieve universal access, particularly in developing countries.

20. COMMENTS RECEIVED FROM **iBasis**

iBasis, Inc., a leading IP Telephony provider, congratulates the ITU Secretariat General for the first Draft Report of the Secretary-General on IP Telephony. iBasis, which has been in existence since 1996, has 100 carrier customers in 41 countries. We offer these service providers global voice and fax termination, pre- and post-paid calling card services, Unified Communications (making voicemail, email, and fax messages accessible from any device), speech-enabled services (giving telephone users access to web content and trade), and turnkey hosting solutions so that our clients can provide all of these services on a world-wide basis. We were grateful for the opportunity to provide input to the ITU Secretariat General through the response provided by the Voice on the Network (VON) coalition, of which iBasis is a member. In addition, we would like to share some general observations that underlie many of the detailed comments contained in the VON contribution.

In general, we believe that the Draft Report is a good preliminary undertaking to compile information on a complex topic that is evolving at the speed of technology. However, we believe the first Draft Report unduly focuses on challenges identified by regulators and incumbent carriers that perceive Internet telephony as a threat. Indeed, a growing number of forward-looking carriers, service providers and regulators perceive and are using IP Telephony as a tool to promote competition, foster innovation and infrastructure build-out, increase service and access options for consumers, generate new revenue sources, increase network usage, and drive down costs. If the ITU seeks to become an institution that helps regulators around the world foster the development of Internet and to reduce the "digital divide," it can do so by ensuring that future drafts survey the many advantages of Internet-based technology, thus presenting a more complete picture of IP Telephony services, markets and participants.

For example, termination of international voice traffic, the main focus of the first Draft, is only one of many IP Telephony applications and services. Incumbent carriers as well as new service providers enter agreements with IP Telephony companies such as iBasis not simply because we offer more affordable ways of terminating or originating voice traffic but also because they want to offer new packet-based services that integrate voice, text and web content. Such services – pioneered by IP Telephony companies – promise to transform the way people communicate and retrieve information. Partnerships between traditional carriers from developing countries and companies such as iBasis also enable these carriers to develop expertise in cutting-edge technology. Through the new global networks, such carriers can rapidly increase their international footprint and expand their domestic networks to tap into new revenue sources in a more affordable and scalable manner than with traditional circuit-based networks.

Our experience is that IP Telephony platforms will be offered first in those more-liberalized countries that do not regulate IP Telephony services as voice services simply because part of their offering includes a voice component. Future drafts of the Report will better serve regulators and the ITU goal of fostering Internet development by identifying and discussing these trends and presenting the perspectives of some of the regulators who are facilitating, rather than hindering the development of IP Telephony.[14]

We look forward to continuing to assist the ITU Secretariat General and the IEG on future drafts of the Report as well as with other efforts to help make the WTPF meeting a success.

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[14] Future drafts of the Report could contain information on these trends and perspectives by reviewing and updating some of the existing ITU IP Telephony case studies of China and Peru as well as conducting similar analysis for countries such as Singapore that have recently changed their regulations. Regulators in other countries such as Argentina, the Czech Republic and most countries in the European Union have also implemented regulations that foster IP telephony. iBasis would be pleased to provide additional concrete information.

21. COMMENTS RECEIVED FROM **Nepal / Nepal Telecommunications Corporation**

1. As yet Nepal Telecommunications Corporation is using circuit switched technology for its telephone traffic. A study on VoIP is underway in cooperation with ITU. Internet telephony is not regulated, but Internet customers are not barred accessing Internet telephony sites. This has reduced telephone traffic through the normal gateway of Nepal Telecom.

2. Price of the circuit switched international telephony in developing countries is kept too high to subsidize the local traffic and to generate fund for the expansion of the network. On the other hand Internet telephony is using the subsidized local call to cater the international market. The subsidy envisaged for the local calls is in effect being enjoyed by international IP telephony which is not necessary.

3. Solution would be to find ways where international IP telephony is not subsidized and at the same time in the name of USO, international circuit switched telephony calls are not priced unnecessarily too high. For this a regulated framework is needed where IP telephony is routed and priced in such a fashion that it also contribute towards the USO.

4. To accelerate the economic growth in developing countries, infrastructures need to be improved. In 21st century telecommunication is one of the main infrastructure. Developing countries are deprived of many infrastructures including roads, railways, electricity that requires heavy investment to build them. But due to the rapid development of telecommunication technology, the telecom infrastructure is becoming in the reach of general populace of the world. Monopoly private and public sector international operators in developing countries are reluctant to lower international tariff for fear of losing revenue needed for USO. The high international tariff has adversely affected the growth of economy. The cost of international call must be decreased drastically to fuel the economic growth of the developing countries.

5. In an effort to reduce the international tariff, the Internet telephony should be allowed in a regulated framework, where it also contributes to the expansion of the network.

22. COMMENTS RECEIVED FROM **Genuity Inc.**

1.0 Introduction

Genuity would like to thank the ITU secretariat for the effort it has taken to ensure that the first Group of Experts meeting was successful. We believe that much progress was made towards having a productive World Telecommunication Policy Forum (WTPF). We appreciated the opportunity to participate in the Group of Experts meeting and be able to express our views on the complex issues related to IP Telephony. We also plan to attend the future planning meetings for the forum, as well as the forum itself.

Genuity has chosen to limit its comments and suggested edits in this paper to the technical part of the first draft report on IP Telephony (Version 1, 1 November 2000). The discussions at the first Group of Experts meetings covered the other parts of the report in detail. Given the commitment by the Strategic Planning Unit to address the Experts' concerns and to substantially rewrite the draft report, we are withholding further comments on these sections until the second draft report is issued.

We believe that this forum offers a unique opportunity to provide a common understanding of IP Telephony and its ability to improve the economic base for both industry and governments. However, it is a complex subject and cannot be treated in the same manner as the present day telephony. The forum also needs to have a very clear charter and focus to be successful.

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2.0 Specific Comments

This section of this paper provides suggested changes and additions to selected paragraphs in the first draft on IP Telephony (Version 1, 1 November 2000). The changes have been italicized and underlined, and additional comments are in [brackets]. These changes focus mostly on the evolution of the IP-based networks. These changes have a direct impact on how IP Telephony traffic is carried in the networks. If required, we are available for further comments and assistance as you rewrite the first draft report.

1. SUMMARY

1.1 Internet Protocol (IP) Telephony is rapidly reaching the top of the agenda for the telecommunications industry worldwide. The possibility of transmitting voice over IP-based networks, with all its challenges and associated opportunities, such as voice and data integration, constitutes a milestone in the convergence of the communications sector.

1.2 The key issue that has gained the attention of policy-makers, regulators, and industry alike is the fact that *the Internet and other IP-based networks are increasingly being used for new types of applications* and as alternatives to the circuit-switched telephone networks. The terms used for these services are not consistent, but for this report the term "IP Telephony" will be used as a the generic term for the voice, fax and related services carried over packet-switched IP-based networks. The term "Internet" applies to the interconnected IP-based networks that are used to transport IP Telephony and IP Data services.

[Paragraph 1.2bis has been added to the draft report]

1.2bis Over the last two years the backbone architecture of the international and regional IP-based networks has evolved from territorially constrained services to ones that serve global or at least wide geographic areas involving a number of political divisions. This change has been gradual and brought on by deregulation, privatization and technology advances. This evolution in architecture is well illustrated in Europe, where the incumbent carriers have changed their international networks from ones that connected with half-circuits through the traditional international gateways to totally owned pan-European networks. Each of the major incumbent carriers, as well as the new carriers, now operates separate networks that compete with each other.

1.3 As of late 2000, more than three-quarters of international traffic originated in countries in which the provision of IP Telephony is liberalised. ***Around the world, many new market entrants are putting together arrangements to access customers and to access to IP-based networks to allow customers to meet their needs for an expanding array of applications, including IP Telephony. Major international Public Telecommunication Operators (PTOs) have also announced that they will migrate all their international traffic onto IP platforms. For instance, Cable & Wireless has announced plans to spend more than US$2 billion on a global IP network. It plans to use voice over IP (VoIP) to deliver its projected demand for 900 billion minutes of calls in the year 2006 compared with just 675 million in 1999.*** **It estimates that VoIP technology will allow it to carry calls at a quarter of the cost of doing so over a conventional, circuit-switched network.15**

1.4 Market forecasts project that IP Telephony will account for between 25 and 40 per cent of all international voice traffic by the year 2004. Worldwide, the volume of traffic on IP-based networks already far exceeds the voice traffic that travels over the public switched telephone network. Consequently, even for those countries that nominally prohibit IP Telephony, it has become nearly impossible to ignore it.

1.5 [This paragraph has been deleted.]

1.6 Furthermore, from a regulatory point of view, IP Telephony is treated in widely divergent ways among ITU Member States. In some countries, governments have used the definitional tools to allow the delivery of IP Telephony services to the public in spite of the existence of market exclusivity of the incumbent over basic voice telephony. In some others, the service is completely prohibited, in others it is licensed and promoted, while in some, IP is treated as just another technology that can be adopted by PTOs.

1.7 The rise of IP Telephony across the globe—regardless of the way it is delivered and the regulatory regime under which it operates—has, nevertheless, profound implications for consumers, industry, and national administrations.

1.8 For consumers, IP Telephony offers potentially much cheaper long-distance and international telephone calls compared with the alternative of using a circuit-switched fixed-line or

15 See "Cable & Wireless announces the industry's largest VoIP migration programme", 2 October 2000, at: http://www.cablewireless.com/news.asp?NewsId=66.

mobile network. *Consumers have shown their willingness to trade some loss in quality for such cost savings.* IP Telephony may also offer consumers advanced services integrating voice and data, such as merged World Wide Web and voice services (e.g., "click-to-talk").

1.9 For PTOs, the potential cost advantages of IP Telephony are more complex to calculate. That is because incumbent PTOs have existing revenue streams that they fear may *be affected* by a shift to lower-priced IP Telephony, particularly given the investment required to add IP Telephony capability.

1.10 to 1.12 [No change to these paragraphs.]

2. Technical aspects of IP Telephony

Introduction

2.1 A fundamental shift has been occurring in the telecommunications industry—a shift that is arguably as important as that from the telegraph to the telephone or from the mainframe to the personal computer. That change is a shift from traditional PSTN *circuit-switched* voice networks to *packet-switched* data networks, using Internet Protocol (IP) technology. For the most part of the last century, voice traffic was predominant. Today voice represents an ever-diminishing percentage of overall telecommunications traffic when compared to *data (non-voice).* One result is that support for IP-related technologies is now a strategic element in the design, development and use of telecommunication networks. It also means that most PTOs are aggressively implementing IP technologies in their networks.

2.2 IP Telephony is *now possible over many data network using the Internet Protocol, which includes the public Internet, corporate Intranets and most Local Area Networks (LANs). Conventional telephone networks have been carefully engineered to provide extremely reliable, high-quality voice transmission, making real-time, two-way conversations possible between almost any two customers on earth. IP networks, on the other hand, were originally designed as two-way, asynchronous (not real-time) digital or text-based communication between computers. The conventional telephone network establishes a unique end-to-end circuit that is held for the duration of a particular session while Internet communications are typically "connectionless" or "stateless".*

IP Network Architectures **[This is a new subsection]**

2.2bis1 It is important to understand the changes the have occurred in the architecture of IP-based networks over the last few years before addressing the current developments in IP Telephony. New technology developments combined with the deregulation and privatization have made changes to the original IP network architecture that was designed to interconnect computer centers. These changes have produced a network that has global reach with a broadband fiber optic backbone that is owned by a single organization. These circuits that are used to carry the IP-based traffic are full circuits that are either entirely owned by the organization or leased from a carrier. There are at least a half dozen of these global networks in the world today.

2.2bis2 These global networks own their own circuits between their Points of Presence (POPs). These networks also are interconnected with each other at many places throughout the world so that they may interchange traffic more efficiently. The customer is access through local and regional networks that are usually not owned by the global carrier; however, they most likely will have an interconnection agreement (peering or transit) with one or more of the global carriers. Large organizations also may have their own agreement with these global carriers.

2.2bis3 The Internet has been called a network of IP-based networks, which is true. IP-based traffic that is carried by these networks usually transits several different networks from the time it is originated and received at one or more locations. This data traffic in most case is asymmetrical in nature with different formats in each direction. A simple set of "non real-time"

request packets can produce a stream of real-time video or audio packets. These two sets of information then can travel on different backbone networks depending on who originated the information and where it was going. Since these networks are connectionless there is no guarantee that all of the information will go over the same route during a single session. In some cases this may include a transit across an ocean and back because of congestion or the cost of the local transmission.

IP Telephony standards activities

2.3 *While current IP Telephony developments may seek to imitate the more connection-oriented, PSTN circuits, it is still subjected to the architecture and connectionless traffic controls. During the last* few years, the desire to make these two types of networks interconnect and interoperate, without the user being able to tell the difference, has prompted enormous technical research and development efforts in both the telecommunication and computer industries. In this respect, IP *Telephony may be the embodiment of convergence, but it will force the eventual phase out of the conventional switched PSTN.*

2.4 onward [no further changes]

23. COMMENTS RECEIVED FROM **the Philippines**

Department of Transportation and Communications
Office of the Undersecretary for Communications

December 01.2000

H.E. YOSHIO UTSUMI
Secretary-General
International Telecommunication Union
Place des nations,
CH – 1211 Geneva 20,
Switzerland

Attention : Strategic Planning Unit, Office T.1305

Dear Sec-Gen Utsumi:

This pertains to your letter inviting comment on the first draft of the Report of the Secretary-General of the International Telecommunication Union (ITU) on the issue of IP Telephony, a topic which shall to be taken up during the Third World Telecommunication Policy Forum (3WTPF).

This Administration wishes to manifest interest in discussion of developing globally accepted IP telephony standards to facilitate the entry of the service. Such standards will serve as basis for the regulatory agency for telecommunications to supervise its operation within its jurisdiction.

The standards to be developed must consider not just mere connectivity, but interoperability of networks as well. This Administration supports other standard setting efforts to improve the service of IP telephony including efficient numbering systems.

The Philippines supports the convening of the 3WTPF for the purpose of contributing to the development of global standards for IP, and in suggesting proposals to assist developing Member States of the ITU in establishing networks of this nature as one of many steps to develop the respective national information infrastructure of Member States.

For your information.

Very truly yours,

AGUSTIN R. BENGZON
Undersecretary for Communications