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Column

Internet Telephony Architecture and Federal Access Charge Reform

Christopher Libertelli, Esq.

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Internet Telephony Architecture and Federal Access Charge Reform[†]

Christopher Libertelli*

1. Introduction

A number of start-up software companies have begun marketing Internet telephony ("I-phone") applications to users of the Internet. Put simply, these programs enable a person using a personal computer with a modem to make long distance calls without paying for the long distance service in the way it has been billed traditionally—on a per minute basis. Users of the software can make calls to others using similar software, or they can dial conventional telephones connected to the public switched telephone network ("PSTN"). [1]

The potential for bypassing PSTN-based long-distance calling is an issue that recently arose within the Federal Communications Commission ("FCC" or "Commission"). On March 4, 1996, America's Carriers Telecommunication Association ("ACTA"), a coalition of telecommunications providers, filed a *Petition for Declaratory Ruling, Special Relief and Institution of a Rulemaking* with the FCC. The petition requests that the Commission address the various regulatory issues surrounding I-phone applications. [2]

The petition comes at an important time in the telecommunications industry. With passage of the Telecommunications Act of 1996 ("TCA"), the Commission is forced into proceeding on a number of regulatory fronts. As will be discussed below, federal access charge rules and common carrier regulation are at the center of changes brought about by the TCA. Whether I-phone applications will survive these changes is unknown. This column takes no position on the possible

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* J.D., 1995, Boston University School of Law; Bowler Communications Law Fellow, 1994. Mr. Libertelli is an associate at Dow, Lohnes & Albertson, Washington, D.C.

success of I-phone applications. Rather, it attempts to answer two questions critical questions: What is Internet telephony, and how is it regulated? [3]

First, a working definition of Internet telephony software applications and the underlying Internet transmission architecture is offered. Second, the federal regulatory environment in which Internet telephony operates is discussed. By piecing these two elements together, the reader will be in a better position to realistically evaluate the possibilities of Internet telephony in a regulatory climate where much is changing. [4]

2. *Description of Internet Telephony Applications*

A. Parallel Functions of the PSTN and the Internet

Internet telephony programs use the Internet, not the PSTN, to connect callers. The PSTN connects callers through two basic networks: (1) local exchange networks provided by local exchange companies ("LECs"), competitive local exchange companies ("CLECs"), or competitive access providers ("CAPs"); and (2) inter-exchange networks ("IXCs") provided by long-distance networks. Not surprisingly, inter-exchange networks connect local exchanges. Local exchanges are usually controlled by Bell Operating Companies ("BOCs"). [5]

In some major metropolitan centers, CAPs provide local exchange access networks. For instance, when a caller picks up a phone to make a long distance call over the PSTN, she uses the "local loop," which are the lines that connect her home or business to the LEC's telephone switch. The LEC's switch then determines over which communications path the message should travel. Long distance calls are directed toward the IXC's network at the point where the IXC and the LEC's network interconnect. This interconnection point is known as a "point of presence" ("POP"). From the LEC's network, the message is handed off to the IXC, routed over the IXC's network and then terminated on another LEC's network. The second LEC provides the local access service to the IXC. The IXC passes the call to the terminating LEC, the phone rings, and the communications path is established—all in a matter of seconds. [6]

In contrast, the Internet is best described as a "network of networks." It is less hierarchical than the PSTN. At its most fundamental level, it is a loose grouping of interconnecting computer networks that use different languages, yet are capable of communicating using a common protocol. That protocol, the "Transmission Control Program/Internetworking Protocol" ("TCP/IP") is the common language that allows computers to communicate with each other over the Internet. [7]

The current structure of the Internet is not regulated like the PSTN. There is no centralized bureaucracy, such as the Federal Communications Commission

("FCC"), designed to deal exclusively with Internet issues, and states have not shown a willingness to jump into regulating a medium that is global in scope. Instead, the Internet organizes itself through bilateral contractual arrangements by providers of Internet traffic transport capacity and through user groups that set standards and allocate network addresses. In contrast, the FCC regulates virtually every aspect of the PSTN, from telephone smut to the detailed accounting practices of the LECs. [8]

The Internet is a virtual network. Unlike the PSTN, it has few physical facilities of its own. Instead, it lies atop the telecommunications facilities of public and private computer networks, interconnecting them with dedicated lines leased from LECs, CAPs or IXC's. [9]

When a subscriber transmits or receives information over the Internet, she does so in a different way than does the user of the PSTN. When an internet subscriber makes a call, she uses the LEC's local-loop residential lines to connect to an Internet Service Provider ("ISP"). Once at the ISP's premises, the communication path designation is performed by specialized computers known as routers. These computers perform routing functions for the Internet that are roughly analogous to the role of a switch in the PSTN. Routers manage traffic and network load on the Internet in much the same way as LEC switches do. [10]

Engineers refer to the Internet as a "packet switched" network, while the PSTN a "circuit switched" network. As noted above, every Internet communication complies with TCP/IP protocols. Each transmission is broken down into "packets" that contain the address of where the communication is heading on the Internet. Because the networks that form the Internet are interconnected at numerous points, the most efficient path varies from second to second. Therefore, the packets comprising a single communication may each have traveled a different route from the communication's origin to its destination. When an end user transmits data, it is sent out onto the Internet, disbursed, routed across many different telecommunications facilities, and then re-assembled at the Internet address of the recipient. With the router making the decisions, packets of TCP/IP data travel many different places before being reassembled at the destination. [11]

All this stands in contrast to the circuit-switched network. When a user places a voice telephone call, the LEC—or in some cases, a CAP—sets up a temporary dedicated circuit between two or more users. Unlike the Internet, with packets all sharing the same transmission facilities, no traffic is mixed while traveling along the PSTN. [12]

B. Internet Telephony and Transmission

Over fourteen software developers have rolled out a version of an Internet telephone.¹ In all these programs, signal processing algorithms digitize the speaker's voice and split the speech into packets that are routed to the receiver and processed at the end user's personal computer ("PC"). After processing, the packets are re-assembled, converted back into analog signals, and sent to the PC's speaker. The basic hardware components required to run an Internet telephone application—a microphone, sound card, speakers and a modem connection communicating at more than 14.4 kilobits-per-second ("Kbps")—are components that many PC users currently have. [13]

The main attraction for using Internet phone applications is the ability to bypass usage-based and toll rates. A peak-hour long-distance telephone call from New York to Los Angeles could cost approximately fifteen dollars an hour. From New York to Paris, the transmission could cost up to sixty dollars an hour. Internet access, on the other hand, costs no more than approximately four dollars an hour for a dial-up connection to an ISP. One important reason for this price discrimination lies in the FCC's access charge regime. [14]

3. *Description of Access Charges and Exemption*

A. Basics

The status of Internet telephony's success may depend upon a complicated web of FCC rules surrounding "access charges." Interstate access services, offered by LECs, provide the access to the local exchange network that is necessary to place and complete interstate long-distance calls. Part 69 of the Commission's rules² prescribes the service definitions, pricing requirements and rate structures for interstate access. There are generally two types of basic interstate access service: "switched access" and

¹ Vendors and products include: Vocaltec Internet Phone, located at <http://www.vocaltec.com/homep.html>; Freetel, located at <http://www.freetel.com/>; Camelot Corp. Digiphone, located at <http://www-leland.stanford.edu/~sjzhang/DIGIPHONE/> (site under construction); Electric Magic Company Netphone, located at <http://www.emagic.com/>; Netspeak Corporation Webphone, located at <http://www.itelco.com>; Cyberphone, located at <http://magenta.com/cyberphone/>; Speak Freely for Windows, located at <http://www.fourmilab.ch/speakfree/windows/>; Telescope Communications TS Intercom, located at <http://www.telescope.com/>; Third Planet Publishing's Digiphone, located at <http://www.planeteers.com/>; White Pine Software's Enhanced CU-SeeMe, located at <http://goliath.wpine.com/cu-seeme.html>; Tribal Voice's PowWow, located at <http://www.tribal.com/powwow/>; SilverSoft's SoftFone 2.2, located at <http://www.pak.net/softfone.html> (site removed for release of version 2.3); Quarterdeck's Webtalk, located at <http://www.quarterdeck.com/qdeck/products/webtalk/>.

² See generally 47 C.F.R. § 69 (1992). Access services are defined in the rules as "services and facilities provided for the origination and termination of any interstate or foreign telecommunication." 47 C.F.R. § 69.2(b).

"special access." Switched access service, the most commonly used form of access, utilizes the local exchange to switch to interconnect transmission facilities and route traffic. This form of access is the basic building block of the PSTN. Special access traditionally provides a dedicated service for the exclusive use of one customer. Users of special access are not able to reach any phone on the local public switch network. Rather, special access offers private lines or private networks that can be accessed only by that customer, and at the locations the customer specifies. [15]

Traditionally, IXCs are the primary purchasers of interstate access services. Under the conventional model, the end user picks up a landline phone and accesses the local telephone company's network; the local company then passes the long-distance call to the IXC, which routes it to the terminating LEC's network and ultimately to the called party. IXCs combine their own services to offer customers end-to-end long-distance services under one price tag. Close to forty percent of an IXC's cost of providing long-distance service is consumed by the purchase of access to a local subscriber from the LEC. For this reason, changes in the rules governing access charges will have a significant impact on the long-distance marketplace. If long-distance carriers could eliminate forty percent of the costs of service, significant downward pressure on long-distance rates would likely follow. A software provider or ISP who could escape paying access charges to LECs would stand at a significant competitive advantage in relation to traditional IXCs. [16]

B. Regulatory Impact of Access Charges

Within this access charge regime, the FCC established a dichotomy between "basic" and "enhanced" common carrier services in its *Computer II* and *Computer III* proceedings.³ Basic services are subject to the full-blown common carriage regulation. Enhanced services are not subject to Title II common carriage regulation and are generally deregulated. The distinction between basic and enhanced services is not always clear. Basic service is simple common carrier transmission from one user to another. Enhanced services employ the application of computer processing power to the simple transport of communications. The term "basic service" means services "such as 'plain old telephone services' ("POTS") [that] are regulated as

³ See Amendment of Section 64.702 of the Commission's Rules and Regulations (Third Computer Inquiry), Phase I, Report and Order, Docket No. 85-229, 104 F.C.C.2d 958 (1986) [hereinafter *Computer III Phase I Order*] (emphasis added), *recon.*, 2 FCC Rcd 3035 (1987) (hereinafter *Phase I Reconsideration Order*), *further recon.*, 3 FCC Rcd 1135 (1988) [hereinafter *Phase I Further Reconsideration Order*], *second further recon.*, 4 FCC Rcd 5927 (1989) [hereinafter *Phase I Second Further Reconsideration Order*], Phase I Order and Phase I Reconsideration Order *vacated sub nom. California v. FCC*, 905 F.2d 1217 (9th Cir. 1990) [hereinafter *California I*]; see also *Filing and Review of Open Network Architecture Plans, Phase I, Memorandum Opinion and Order*, 4 FCC Rcd 1 (1988), *recon.*, 5 FCC Rcd 2084 (1990); 5 FCC Rcd 3103 (1990); *Computer III Remand Proceedings*, 5 FCC Rcd 7719 (1990), *vacated and remanded sub nom. California v. FCC*, 39 F.3d 919 (9th Cir. 1994) [hereinafter *California III*].

tariffed services under Title II of the Communications Act."⁴ The term "enhanced service" refers to services that "use the existing telephone network to deliver services other than basic transmission, such as voice mail, E-mail, voice store-and-forward, fax store-and-forward, data processing and gateways to on-line databases."⁵ Never well-defined, the ESP, or enhanced service provider, umbrella has expanded to include a wide array of commercial on-line services. [17]

As noted above, an ISP connects an end user/I-phone subscriber to the Internet. The ISP is performing a service that transports data from the end user to Internet Network Access Point, otherwise known as an ISP's point-of-presence ("POP"), and then onto the world. At the time the FCC promulgated its original access charge rules, some interstate service providers who were ESPs were using local business lines to obtain access to the local exchange for their interstate traffic. The tariffed rates for such services were typically well below the rates that would apply under the access charge rules that would be imposed for technically similar connections. [18]

Fifteen years ago, the demand for enhanced information services was nascent and uncertain. As a transitory mechanism, the FCC permitted the ESPs to use local business lines or other state-tariffed forms of access for their interstate traffic, thereby exempting them from federal access charges.⁶ The Commission has always stated that its primary objective in formulating access charge rules has been to assess access charges on all users of exchange access without regard to their regulatory designation.⁷ Nevertheless, the Commission adopted an interim exemption from full access charge treatment for interstate service providers to permit them to avoid "rate shock."⁸ The Commission extended the exemption out of concern that the industry continued to be affected by a number of significant, potentially disruptive, and rapidly changing circumstances.⁹ As of July 11, 1991, when the Commission last considered the question, ESPs remain exempt from access charges. [19]

⁴ See Computer III Further Remand Proceedings, Notice of Proposed Rulemaking, CC Docket No. 95-20, at ¶ 3 (released February 21, 1995).

⁵ *Id.*

⁶ See MTS and WATS Market Structure, CC Docket No. 78-72, First Order on Reconsideration, 97 F.C.C.2d 682, 715. See generally 47 C.F.R. §§ 69.2(m), 69.5(a); KELLOGG, THORNE & HUBER, FEDERAL TELECOMMUNICATIONS LAW, 11.1-11.10 (1995).

⁷ See Amendments of Part 69 of the Commission's Rules Relating to Enhanced Service Providers, Notice of Proposed Rulemaking, CC Docket No. 87-215, 2 FCC Rcd 4305 (1987).

⁸ See Amendments of Part 69 of the Commission's Rules Relating to the Access Charge Subelements for Open Network Architecture, Notice of Proposed Rulemaking, CC Docket No. 89-79, 4 FCC Rcd 3983, 3987 ¶¶ 29-30 (1989).

The regulation of ESP is a significant issue, because end-users using I-phone applications will transmit their communications through ISP/ESPs. As noted above, the continued ability of ESPs to offer fixed, low priced, non usage-sensitive Internet access for I-phone users is necessary for the continued success of the I-phone. For example, when an end user places an interstate telephone call to the IXC network, a charge is assessed for use of the local network. This is not the case, however, when a caller initiates an interstate message over an ESP network. A user placing a telephone call to a friend in a distant state will incur interstate access charges. When sending e-mail to that same friend by using the same underlying network, the user will incur no interstate access charges, due to the ESP exemption. [20]

If the exemption is lifted, I-phone will be swept within regulations that would make the application less attractive to end-users. Lifting the exemption is not without political costs. Eliminating the exemption will be seen by many as a "modem tax" or "Internet service tax." Continued application of the exemption, however, is an argument for non cost-based pricing, and perpetuation of the web of implicit subsidies present in the current access charge regime. So long as the exemption is eliminated in the context of overall access charge reform, the FCC will have a more legitimate argument. Long-distance and business rates will decrease when their contribution to subsidized local rates diminishes. Competition will grow in the local loop because new entrants will no longer have to compete with the incumbent LEC subsidized local lines. All of this, according to the Commission, will result in a net reduction in costs, increased competition and consumer welfare. [21]

C. Current Developments

On February 8, 1996, Congress passed the Telecommunications Act of 1996 ("TCA").¹⁰ It is no exaggeration to say that this law creates the most sweeping change in the nation's telecommunications laws since the Communications Act of 1934 ("Communications Act").¹¹ Nowhere is this more clear than in the area of telephony. The TCA changes definitions and establishes new regulatory structures, with the fundamental goal of introducing competition into markets dominated by incumbent telecommunications providers.¹² [22]

⁹ See Amendment of part 69 of the Commission's Rules Relating to Enhanced Service Providers, Order, CC Docket No. 87-215, 3 FCC Rcd 2631 (1988).

¹⁰ Telecommunications Act of 1996, Pub. L. No. 104-104, 110 Stat. 56 (1996).

¹¹ Pub. L. No. 73-416, 48 Stat. 1064 (1934) (codified at 47 U.S.C. §§ 151-609 (1994)).

¹² See Pub. L. No. 104-104, 110 Stat. 56. The preamble to the legislation indicates that the TCA is "[a]n act to promote competition and reduce regulation in order to secure lower prices and higher quality

Whether the TCA alters the Commission's authority to regulate the I-phone is unclear. The Commission's core authority to regulate telecommunications and the Internet is found at section 151 of the Communications Act.¹³ This section grants the Commission the authority to regulate interstate wire communications.¹⁴ The Internet is a form of wire communications over which the Commission arguably has jurisdiction. The TCA sets out new definitions for providers of interstate communications.¹⁵ [23]

If I-phone users were swept within this definition, then these providers would have to comply with sections 203 and 213¹⁶ of the Communications Act of 1934 and its general tariff requirements.¹⁷ The TCA, however, also provides the

services for American telecommunications consumers and encourage the rapid deployment of new telecommunications technologies." *Id.*

13 See 47 U.S.C. § 151.

14 Section 151 of the Communications Act provides:
For the purpose of regulating interstate and foreign commerce in communication by wire and radio so as to make available, so far as possible, to all the people of the United States a rapid, efficient, Nation-wide, and world-wide wire and radio communication service with adequate facilities at reasonable charges, for the purpose of the national defense, for the purpose of promoting safety of life and property through the use of wire and radio communication, and for the purpose of securing a more effective execution of this policy by centralizing authority heretofore granted by law to several agencies and by granting additional authority with respect to interstate and foreign commerce in wire and radio communication, there is created a commission to be known as the "Federal Communications Commission," which shall be constituted as hereinafter provided, and which shall execute and enforce the provisions of this chapter.
47 U.S.C. § 151.

15 Section 3 of the TCA includes the following definitions:
(48) Telecommunications. The term "telecommunications" means the transmission, between or among points specified by the user, or information of the user's choosing, without change in the form or content of the information as it is sent and received.
(49) Telecommunications Carrier. The term "telecommunications carrier" means any provider of telecommunications services (as defined in section 226). A telecommunications carrier shall be treated as a common carrier under this Act only to the extent that it is engaged in providing telecommunications services, except that the Commission shall determine whether the provision of fixed and mobile satellite services shall be treated as common carriage.
....
(51) Telecommunications Service. The term "telecommunications service" means the offering of telecommunications for a fee directly to the public, or to such classes of users as to be effectively available directly to the public, regardless of the facilities used.

Pub. L. No. 104-104, § 3, 110 Stat. 56.

16 See 47 U.S.C. §§ 203, 213.

Commission with authority to forbear from any tariff filing requirements if it makes the appropriate findings.¹⁸ [24]

4. *Conclusion*

Whether the ACTA petition will answer these statutory questions is unknown. What is known is that should the Commission begin reforming access charges and eliminate the ESP exemption, the statutory questions under the TCA will become less important. I-telephone applications will have lost an important competitive input into a service that allowed them to price their services well below an umbrella established by the major long-distance telephone companies. [25]

¹⁷ This is one form of the relief that the American's Carriers Telecommunications Association seeks in its recently filed Petition for Declaratory Ruling, Special Relief and Institution of Rulemaking. See *supra* Section 1, Introduction.

¹⁸ The FCC is authorized to forbear from applying any regulation or any provision of the Communications Act to a telecommunications carrier if it determines that:

- (i) enforcement is not necessary to ensure that charges, practices, classifications, or regulations of the carrier are just, reasonable and non discriminatory;
- (ii) enforcement is not necessary to protect consumers; and
- (iii) forbearance is in the public interest.

Pub. L. No. 104-104, § 401, 110 Stat. 56