

Before the  
FEDERAL COMMUNICATIONS COMMISSION  
Washington, D.C. 20554

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In the Matter of )  
)  
Implementation of Sections 255 and )  
251(a)(2) of the Communications Act of )  
of 1934, as Enacted by the )  
Telecommunications Act of 1996; )  
)  
Access to Telecommunications Service, )  
Telecommunications Equipment and )  
Customer Premises Equipment by )  
Persons with Disabilities )

WT Docket No. 96-198

COMMENTS OF THE VON COALITION

Voice on the Net (VON) Coalition

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## **Summary**

The Voice on the Net (“VON”) Coalition urges the Commission to allow industry to continue to work towards voluntary solutions to the common goal of providing full access as new IP voice applications are developed.

The VON Coalition is committed to IP voice applications being as accessible as readily achievable and to considering the user requirements of people with disabilities in the development of new products and services. The VON Coalition’s commitment to this effort includes establishing a dialogue with consumers with disabilities and their advocates so that service providers and equipment vendors of Internet-based voice applications will better understand the needs of these consumers.

In the last several years, industry has been working to develop Recommendations and standards to provide for the continued viability of text telephones (“TTYs”) in IP-based networks. All relevant industry work has taken into consideration the requirements necessary to make TTYs compatible with these networks. IP voice applications, which are still developing, do not appear to have been the source of any problems for consumers with communications-related disabilities.

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**COMMENTS OF THE VON COALITION**

The Voice on the Net Coalition (“VON Coalition”) hereby submits these comments in response to the Further Notice of Inquiry released September 29, 1999 in the above-captioned proceeding.<sup>1/</sup> The VON Coalition understands that using a variety of telecommunications devices and services is important to people with disabilities and that meeting this need is important to industry and to the public. The VON Coalition is committed to that effort, including maintaining a dialogue with consumers with disabilities and their advocates so that service providers and equipment vendors of Internet-based voice applications will better understand the needs of these consumers.

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<sup>1/</sup> The VON Coalition consists of 32 companies that are developing and offering voice products and services for use on the Internet and IP networks. Additional information regarding the VON Coalition is available on its website, <http://www.von.org>.

The IP environment raises unique concerns for persons with communications-related disabilities who use assistive devices, including slow-speed text telephones (“TTYs”) and TeleBraille™ terminals, that were designed to function in the circuit-switched public switched telephone network (“PSTN”).<sup>2/</sup> Because these devices will continue to be widely-used, industry has been working both to understand potential problems that these devices raise in IP networks and to devise solutions thereto.

The VON Coalition urges the Federal Communications Commission (the “FCC” or “Commission”) to take no regulatory action at this time. The record shows that voluntary industry efforts are underway without government intervention. The Commission should be reluctant to take any action that would appear to introduce regulation, particularly as industry’s progress to ensure disability access is ongoing. The vibrant growth of the Internet is attributable, in part, to the regulatory freedoms it enjoys.

**Section 255 and the FNOI.** Section 255 of the Telecommunications Act of 1996 (“Section 255”) provides in pertinent part that manufacturers of telecommunications equipment and providers of telecommunications service must ensure that their products and services are accessible and usable by individuals with disabilities, if readily achievable. In its Report and Order adopting rules to enforce the statutory mandates, the Commission opted to extend Section

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<sup>2/</sup> These comments respond only to that portion of the NOI pertaining to IP telephony services and focus primarily on TTYs and TeleBraille terminals, as these types of assistive devices are widely used by those with communications-related disabilities to communicate telephonically and have been the focus of discussions with disability advocates. Further discussions with disability advocates may identify other devices that also raise issues for IP-based networks.

255 requirements to two information services, voice mail and interactive menus.<sup>3/</sup> Given the ubiquity of these two services, particularly in today's business environments, the Commission concluded that the imposition of Section 255 requirements to voice mail and interactive menus was "critical to making telecommunications accessible and usable by people with disabilities."<sup>4/</sup>

Several commenters shared the position that Section 255 should also be applied to what they referred to as "Internet telephony." These commenters did not suggest that IP telephony services were causing problems for disabled consumers but, rather, expressed the desire for disability access to be incorporated into developing technologies and services. *Section 255 Report and Order and FNOI* at ¶ 178. The Commission declined these requests, explaining that

[u]nlike voicemail and interactive menus, other information services discussed by commenters do not have the potential to render telecommunications services themselves inaccessible. Therefore, we decline to exercise our ancillary jurisdiction over those additional services.

*Id.* at ¶ 107. The Commission, however, adopted a Further Notice of Inquiry ("FNOI") to aid its understanding of the access issues presented by communications services and equipment not covered by the rules adopted in its Order, focusing in particular on Internet telephony and computer-based equipment. It seeks to develop a record with which to address whether IP telephony in general, and phone-to-phone IP telephony specifically, creates problems for the disability community and whether there is a need for Commission action. *Id.* at ¶¶ 179-180. The

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<sup>3/</sup> *Implementation of Sections 255 and 251(a)(2) of the Communications Act of 1934, as Enacted by the Telecommunications Act of 1996; Access to Telecommunications Service, Telecommunications Equipment and Customer Premises Equipment by Persons with Disabilities*, WT Docket No. 96-198, FCC 99-181, Report and Order and Further Notice of Inquiry (rel. Sept. 29, 1999) (hereinafter "*Section 255 Report and Order and FNOI*").

<sup>4/</sup> *Id.* at ¶ 93; see also *id.* at ¶ 107 (stating that the Commission uses its "discretion to reach only those services we find essential to making telecommunications services accessible").

FNOI also explores what type of action, if any, may be appropriate and permissible should the Commission conclude that action is warranted. *Id.* Commenters that identify ways in which phone-to-phone IP telephony services “may be interpreted as falling within the purview of Section 255” are also asked to provide specific definitions of the services or equipment to which the statute might apply and the appropriate means of limiting its application to only those services and equipment. *Id.*

In addition to developing a record on specific services, the FNOI explores how to best achieve the goal of “ensur[ing] that the disability community is not denied access to innovative new technologies . . . that may become complements to, or even replacements for, today’s telecommunications services and equipment.” *Id.* at ¶ 173. While the Commission asks commenters to “tell us what we can do” to guarantee access, it is also “expressly interested in commenters’ views on the extent to which government regulation will be necessary to ensure accessibility of communications technology in the future.” *Id.* at ¶ 176.

**The VON Coalition’s Commitment to a Dialogue with the Disability Community.**

In a July 1999 filing in this proceeding, the VON Coalition assured the Commission that it is committed voluntarily to making voice applications as accessible as readily achievable and to considering the user requirements of people with disabilities in the development of new products and services.<sup>5/</sup> The VON Coalition committed to developing a broader dialogue with consumers with disabilities so that service providers and equipment vendors will better understand the needs of these consumers.

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<sup>5/</sup> Letter from Bruce D. Jacobs, Counsel to the VON Coalition, to Magalie R. Salas, dated July 7, 1999.

Consistent with these representations, in December 1999, the VON Coalition organized a day-long forum at the FCC's headquarters building, in which members of the VON Coalition, representatives of various disability-rights organizations, and FCC staff met to share information and discuss disability access issues in the IP environment, including any specific problems encountered by consumers with disabilities. Participants for the disability community included representatives from the Alexander Graham Bell Association, American Foundation for the Blind, Consumer Action Network, Gallaudet University, Georgetown University's Institute for Public Representation, Self Help for Hard of Hearing People, and Telecommunications for the Deaf Incorporated. Industry was represented by Cisco Systems, Ericsson, Intel, Microsoft, Motorola, Net2Phone, Omnitor, Telogy Networks, and the VON Coalition. Over seven FCC staff members participated.

Issues surrounding the use of legacy TTY devices in IP networks were addressed by Toby Nixon, Senior Program Manager, Windows Networking and Embedded Products Group, Microsoft Corporation and member of the VON Coalition Board of Directors. *See Attachment A, Supporting Text Telephony Over IP Networks.* Gunnar Hellstrom, a Rapporteur to ITU-T Study Group 16 addressing accessibility to multimedia systems and services, then discussed standards-setting work taken to date by the ITU-T. *See Attachments B and C, Text Telephony and Total Conversation in the IP Revolution,* presentation and paper, respectively.

While concerned that legacy TTYs raise issues when used in IP networks, disability advocates present at the forum did not identify any specific problems that TTY users have experienced with IP voice applications. The discussion, however, did identify a number of items for industry research and follow-up, such as the need to determine the effect of compression on



sound quality and, consequently, the value of including persons who are deaf or hard-of-hearing in the testing of low bit-rate audio codecs. The forum was particularly instructive in alerting industry to the prevalence of TTY devices in the United States that use various proprietary signaling systems with a higher bit-rate than the 45.5 scheme. Because these systems are proprietary, it was agreed that manufacturers of such devices must be identified and encouraged to participate in industry efforts to establish standards. Similarly, it was agreed that manufacturers of text telephones with braille displays, like the manufacturers of proprietary TTYs, should be identified and encouraged to participate in standards-setting efforts.

**The Development of Industry Standards.** In the last several years, industry has been working to develop Recommendations and standards to ensure the continued viability of TTYs in packet-switched networks, including IP-based networks. All relevant industry work has taken into consideration the requirements necessary to make TTYs compatible with these networks. This work reflects solutions based on state-of-the-art technology. As industry continues to develop advanced technologies and features, these Recommendations and standards can be expected to evolve as well.

Described below is the standards work undertaken to date by the International Telecommunication Union – Telecommunication Standardization Study Group 16 (“ITU-T SG-16”); the Internet Engineering Task Force (“IETF”); and Cable Television Laboratories, Inc., (“CableLabs”). Although these organizations are generating multiple protocol standards, the technical issues involved in supporting TTYs over IP networks, and the potential solutions, are

similar.<sup>6/</sup> Consequently, while we are able to provide the greatest detail with regard to the efforts of the ITU-T, other standards-setting organizations can be expected to be making similar progress.

#### **A. V.18 and Related Recommendations**

Almost two years ago, in February 1998, the ITU-T approved three Recommendations aimed at enhancing the capability of people with disabilities to use telecommunications in multimedia environments.<sup>7/</sup> The first Recommendation, V.18, entitled *Operational and Internetworking Requirements for DCEs Operating in the Text Telephone Mode*, describes modem procedures for automatic internetworking with the installed base of existing TTYs, relay services, and emergency centers. The Recommendation specifies the signal analysis, signal transmission, and logic needed to determine the type of text telephone, as well as the actions needed to communicate in the mode supported by each terminal type. The V.18 standard is backward-compatible with all non-proprietary textphone methods.<sup>8/</sup>

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<sup>6/</sup> The digital cellular industry is also addressing the issue of support for legacy TTYs. A solution devised by the digital cellular industry, in which the TTY characters are demodulated and remodulated into the codec itself, appears similar to the solution devised by the IP voice industry. These generally similar approaches suggest the feasibility of technical solutions to the issue of TTY support in advanced networks.

<sup>7/</sup> The ITU calls its standards “Recommendations” because it is the responsibility of member countries to formally adopt standards. Nevertheless, an ITU Recommendation is, in practice, a standard.

<sup>8/</sup> Five major text telephone systems operate globally. The 45.5 Baudot scheme is used in Canada, Iceland, Ireland, the United States and parts of the United Kingdom, with Australia and New Zealand using a higher bit-rate Baudot system. Dual tone multi frequency (“DTMF”) is used primarily in Denmark and Holland. European Deaf Telephone (“EDT”) is used primarily in Austria, Germany, Italy, Spain, and Switzerland. Minitel is used primarily in Belgium and France. V.21 is used primarily in Finland, Norway, Sweden, and parts of the U.K.

The V.18 Recommendation specifies that when the connection in V.18 mode is established, the presentation protocol specified in Recommendation T.140 should be used. T.140 adds facilities to enable harmonized text conversation presentation and the use of different alphabets in a consistent way in text communications. A third Recommendation, T.134, describes how these facilities can be integrated in the multimedia communications systems defined by the ITU-T.

These three Recommendations, the ITU-T noted in its press release,

will open up a new area of communications for disabled people and ensure that disabled people are not excluded from multimedia communication. . . . Disabled people will now be able to choose any combination of text, voice, graphics and video for their communications and make their calls over the normal telephone network, mobile phones or the Internet. V.18 and T.140 can be used immediately to improve text communication. The multimedia facilities will become increasingly useful as more multimedia devices come into use.

*ITU approves suite of technical standards to cater for communications needs of disabled people,*

ITU Press Release, ITU/98-5 (Feb. 9, 1998).<sup>9/</sup>

## **B. H.323 Recommendation**

The ITU-T's H.323 Recommendation is designed to provide specifications for transmitting real-time voice, video, and data over packet-switched networks, including IP-based networks.<sup>10/</sup> Though originally designed for multimedia conferencing over local area networks ("LANs"), the H.323 Recommendation was revised in January 1998 to address various issues,

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<sup>9/</sup> This document is available on the ITU's website, <http://www.itu.int>.

<sup>10/</sup> H.323 is part of a family of ITU-T Recommendations called H.32x that provide multimedia communications services over a variety of networks. For example, H.320 provides an ISDN videoconferencing standard while H.324 is the ITU-T standard for multimedia conferencing over the PSTN.

including the emergence of voice-over-IP applications.<sup>11/</sup> The ITU-T is currently drafting a third version, which may be approved as early as Spring 2000 ("Version 3").

H.323 is an umbrella standard that defines the call control, channel setup, and codecs (the devices used to translate voice signals from analog to digital and vice versa) required to move audio, video, and data over packet networks.<sup>12/</sup> H.323 specifies four kinds of components which, when networked together, provide point-to-point and point-to-multipoint multimedia communications. These components are end-point terminals; gateways (which convert IP signals into some other form, thereby connecting two dissimilar networks); gatekeepers (which provide various services, including authorization and authentication and billing); and multipoint control units ("MCUs," which provide support for three or more H.323 terminals).

The ITU-T SG-16 is currently working on procedures to establish and carry text conversation sessions in real time over packet and IP networks in the H.323 multimedia environment. A proposed Annex G, pertaining to Text Conversation and Text Conversation Simple Endpoint Type Devices ("Text SET"), describes how a T.140 text conversation can be carried over a data channel in an H.323 session. As proposed, a text transmission follows the same method as audio and video: a channel is established for each medium directly between the endpoints involved in a call; a transport protocol for T.140 text suitable for H.323 and other packet environments is obtained by using the real time protocol RTP.3. As part of H.323 draft

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<sup>11/</sup> The standard can work as a voice-over-IP protocol by restricting the media to audio.

<sup>12/</sup> H.323 contains multiple code standards, including H.261 (video codec for  $\geq 64$  kbps); H.263 (video codec for  $< 64$  kbps); G.711 (pulse code modulation audio codec for 56/64 kbps); G.722 (audio codec for 7 Khz at 48/56/64 kbps); G.723 (speech codec for 5.3 and 6.4 kbps); G.728 (speech codec for 16 kbps); and G.729 (speech codec for 8/13 kbps). H.323 also incorporates the T.120 data-conferencing standard.

Version 3, Annex G is on track for approval by Spring 2000.

### **C. H.248 and Megaco**

Work is underway to separate, or “decompose,” IP gateways into two components: a media gateway controller (“MGC”), which performs protocol conversion and resource allocation, and a “dumb” media gateway (“MG”), which takes the real-time media stream from a circuit-switched network and converts it into a stream of IP packets for transmission on the IP network (and vice-versa).

Attempts to create protocols between MGCs and MGs began with Simple Gateway Control Protocol (“SGCP”) from Telecordia (formerly Bellcore) and Cisco Systems, and with IP Device Control (“IPDC”) from Ascend, Level 3, and Nortel. Given similarities in concept between SGCP and IPDC, the authors collaborated and produced Media Gateway Control Protocol (“MGCP”), which they subsequently introduced to both the ITU-T and the IETF.

The ITU-T has named its draft international standard for “decomposed” gateways H.248, while the IETF has re-named MGCP “Megaco” to differentiate the standard from the input.<sup>13/</sup> Nonetheless, the two entities are working jointly and envision that the ITU-T’s core H.248 document will be published as an IETF document as well.

Consistent with the Commission’s goals, disability access is being incorporated as standards to govern the decomposed gateway are being developed. Specifically, work is progressing on an H.248 annex that will specify how audio text telephone (V.18 and all its legacy

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<sup>13/</sup> The H.323 and H.248 standards are envisioned as compatible. H.248 is used between components of a decomposed gateway (i.e., MGC to MG). H.323 is used between the conceptually “monolithic” gateway (the MGC in H.248 terms) and other H.323 endpoints, including gatekeepers.

modes) can be conveyed using the T.140-over-IP mechanism.

**D. Session Initiation Protocol**

In addition to its Megaco efforts, the IETF is working on a second multimedia protocol, Session Initiation Protocol (“SIP”) to be used in IP telephony and IP multimedia communications. Like Megaco, SIP is intended to facilitate the decomposed communications environment. SIP is envisioned as an alternate to H.323 in IP networks, with gateways or multifunction protocols securing internetworking between the two.

SIP specifies text transmission in real time transport protocol (“RTP”) and registers it as a multipurpose Internet mail extension (“MIME”) medium. SIP therefore is considered “text ready” and should require no further standardization efforts for text transmissions.

**E. PacketCable**

CableLabs, which is comprised of television system operators serving cable subscribers in North and South America, has established a project “PacketCable” to develop interoperable interface specifications for delivering real-time multimedia services over two-way cable plant. CableLabs has set the second half of 2000 as its goal for market deployment of PacketCable.

The PacketCable 1.0 architecture has been designed to carry text conversations in PacketCable networks. In December 1999 CableLabs released 11 PacketCable 1.0 interim specifications that define the requirements for call signaling, quality-of-service, media stream, client provisioning, billing event message collection, PSTN interconnection and security interfaces applicable to residential voice services. Support for those who are deaf or hard-of-hearing is specifically addressed in Section 5 of the Audio/Video Codecs Specification, PKT-SP-

CODEC-101-991201 (Interim).<sup>14/</sup> According to this specification,

Since CPE for the hearing impaired consists of text input/output devices coupled with voice-band modems, any system designed to support them would need to be able to pass DTMF and voice-band modem tones coherently. Of the list of proposed voice codecs, only G.711 would be able to achieve this . . . . Typically, these devices will interface to the PSTN via an acoustical coupler to a phone or with a regular RJ-11 telephone jack.

MTA [multimedia terminal] devices MUST support detection of ITU V.18 hearing-impaired tones, including V.18 Annexes A, B, F, and G. Upon detection of a V.18 signal, the codec at each end is then switched to G.711 for the remainder of the session. Additionally, echo compensation is disabled for the duration of the V.18 call. It is optional to disable echo cancellation for Annex B because it is DTMF-based.

[The ITU-T's] G.711 MUST be supported in all MTAs. This codec provides toll-quality bitrate and is ubiquitous. It provides the "fallback" position for services such as fax, modem, and hearing-impaired services support, as well as common gateway transcoding support.

Sections 5.1.5 and 5.2.1 at pages 12-13.<sup>15/</sup>

**VON Coalition Policy Recommendations.** The VON Coalition urges the Commission not to impose any Section 255 regulation on IP voice applications, particularly at this time. A VON Coalition White Paper discusses our position that IP voice applications are an information service rather than a telecommunications service.<sup>16/</sup>

It would be premature for the FCC to consider imposing Section 255 regulation at this time. IP voice applications are still undergoing development, are not used by significant numbers

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<sup>14/</sup> An interim document, as defined by CableLabs, is one which has undergone "rigorous Member and vendor review, suitable for use by vendors to design in conformance to and for field testing." See Document Status Sheet, PacketCable Audio/Video Codecs Specification, PKT-SP-CODEC-101-991201, at page ii.

<sup>15/</sup> The PacketCable interim specifications and related technical reports may be accessed at [http://www.packetcable.com/packetcable\\_specs.html](http://www.packetcable.com/packetcable_specs.html).

<sup>16/</sup> Voice on the Net (VON) Coalition, "White Paper on IP Voice Services," *Report to Congress on Universal Service*, CC Docket No. 96-45 (March 18, 1998). The White Paper is incorporated herein by reference.

of consumers, and do not appear to have been the source of any problems for consumers with communications-related disabilities.

The Commission should not reverse its tentative decision to confine its exercise of ancillary jurisdiction to voice mail and interactive menus. *Section 255 Report and Order and FNOI* at ¶ 107. While IP voice applications have garnered significant attention, they still represent only a small share of the voice communications market, are not nearly as pervasive as voice mail and interactive menus, and (in contrast to these services) have not been at all problematic for disabled consumers.<sup>17/</sup> Consequently, the threshold requirement to an exercise of ancillary jurisdiction – the finding of a “critical” or “essential” need to assert ancillary jurisdiction to make telecommunications accessible and usable by people with disabilities – is absent.

There is always a cost to imposing regulation, or being viewed as regulated. The vibrant growth of the Internet and its applications is attributable, in part, to the regulatory freedom it enjoys.<sup>18/</sup> This agency should be reluctant to take any action that appears to introduce regulation of the Internet. As it has in the past, the Commission should be sensitive to the costs of regulation and be judicious in the use of its regulatory authority.

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<sup>17/</sup> Revenues generated from the provision of domestic telecommunications services totaled approximately \$246 billion in 1998. *Trends in Telephone Service*, Industry Analysis Division, Common Carrier Bureau, Federal Communications Commission (Sept. 1999), Tables 19.1 and 19.2.

<sup>18/</sup> *Federal-State Joint Board on Universal Service*, Report to Congress, 13 FCC Rcd 11501, 11546, 11 CR 1312 (1998) (recognizing that the absence of regulation has contributed to “the level of competition, innovation, investment and growth in the enhanced services industry over the past two decades.”). *See also* 47 U.S.C. § 230, expressing national Internet policy.



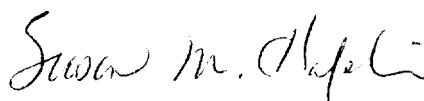
The Commission also should be sensitive to the burdens it imposes upon itself. Because Section 255(f) vests the Commission with exclusive jurisdiction to hear complaints, its task does not end with the application of Section 255 to a particular service or piece of equipment. To fairly and promptly resolve complaints, the Commission must be sufficiently informed of rapidly evolving technologies to evaluate the admittedly complex issues of whether accessibility is “readily achievable.” *Section 255 Report and Order and FNOI* at ¶ 149.

### **Conclusion**

Therefore, based on the foregoing, the VON Coalition urges the Commission not to impose Section 255 regulation on IP voice applications.

Respectfully submitted,

**THE VON COALITION**



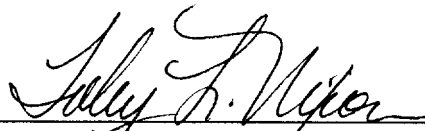
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Date: January 13, 2000

## DECLARATION

I, Toby L. Nixon, under penalty of perjury, do hereby declare as follows: I have reviewed the foregoing Comments of the VON Coalition. The facts contained therein are true and correct to the best of my knowledge and belief.



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**ATTACHMENT A**

**SUPPORTING TEXT TELEPHONY  
OVER IP NETWORKS**

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# Supporting Text Telephony Over IP Networks

**Toby Nixon**

*Member of Board of Directors, VON Coalition*

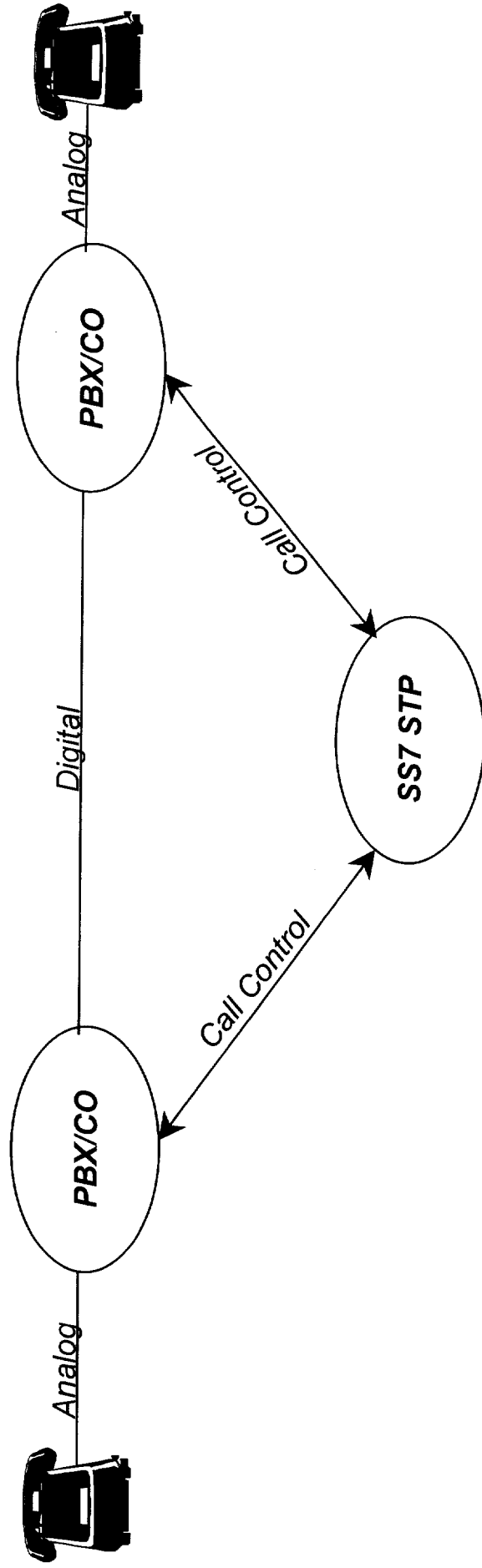
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# Circuit-Switched Telephony

- Modern digital networks sample analog audio 8000 times per second at 4096 levels (12 bits), then compress to 8 bits per sample according to ITU-T Recommendation G.711
  - 64,000 bits per second per channel
- Many channels combined into single physical circuit, but each one gets 8000 8-bit samples per second
- Produces “toll-quality” voiceband signal with 3.1 kHz bandwidth (roughly 300 to 3400 Hz)
- Call signaling carried on separate data network (SS7)
  - Path of call established at call setup

# Circuit-Switched Telephony



# IP Networking

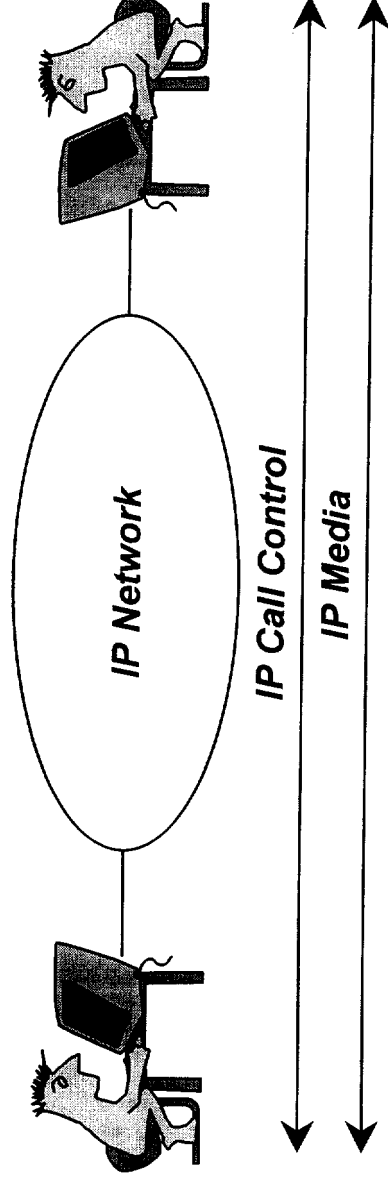
- Many types of data and control protocols carried on a single network in “packets”
  - Both data and connection control
- Each packet is self-contained, including a source and destination “address”
- Packets sent from computer to computer until the destination is reached
  - Each stop along the way adds delay and “jitter” (delay variation)
  - Routing is determined by tables maintained in each computer
- Special types of computers called “routers” are dedicated to this purpose in the core of and between IP networks

# IP Telephony

- Call signaling protocols are used to establish connections between endpoints
  - Either directly or through intermediate servers
- Many audio samples are collected into packets
  - Reduces number of packets sent and protocol overhead
  - But adds delay at source
- G.711 encoding not normally used
  - Typical dial-up connections are less than 33,600 bit/s
  - 64,000 bit/s won't fit through that pipe!
  - Lower bit-rate codecs must be used



# IP Telephony 1997: PC-PC



- Original for hobbyists; like amateur radio (and not that good quality!)
- Mostly non-standard protocols
- No dependency on IP telephony network elements