EXHIBIT D

IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF KANSAS

SPRINT COMMUNICATIONS COMPANY L.P., Plaintiff, v. THE GLOBE.COM, INC., ET AL. Defendants.	Case No. 05-2433-JWL

EXPERT NON-INFRINGEMENT REPORT OF JOEL M. HALPERN

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I. INTRODUCTION

Vonage Holdings Corp. and Vonage America, Inc. (collectively, "Vonage") have retained me as a technical expert in this case. I expect to testify at trial regarding the matters set forth in this report if asked by the Court or the parties' attorneys. I am also prepared to provide the Court and the jury with a tutorial on the technology involved in this matter, including the evolution of the technology at issue in this case, and expect to generate demonstrative exhibits explaining the technology and the basis of my opinion. I am being compensated for my work associated with the litigation at my customary rate of $450 per hour. My compensation does not depend on the outcome of this litigation, the opinions I express, or my testimony.

I understand that Sprint Communications Corp. ("Sprint") has asserted certain claims of United States Patent Nos. 6,452,932, 6,304,572, 6,633,561, 6,463,052, 6,665,294, 6,298,064 and 6,473,429 (the "Sprint Patents") against Vonage based on the internet telephone service provided by Vonage. I submit this expert report, which contains my opinion regarding the non-infringement of the claims of the Sprint Patents and responds to the January 12, 2007 report of Stephen Wicker. For the reasons stated below, it is my opinion that (a) Vonage does not infringe any asserted claim of the Sprint Patents and, (b) Dr. Wicker's report fails to provide support that Vonage infringes any of the asserted claims of the Sprint Patents.

I. BACKGROUND AND QUALIFICATIONS

A. QUALIFICATIONS

I have over 27 years of experience in the computer and networking industries, most recently as CTO for a company that designed and built devices at the interface between the GPRS wireless data network and other networks, including the Internet. I have made significant

contributions to the technology and standards of the Internet, including serving as the Routing Area Director for the IETF and as the chair of the ATM Forum Technical Committee Advisory Group and co-chair of the IETF Policy Framework Group. I also was an early member of the SMDS Interest Group and the Frame Relay Forum. A more detailed explanation of my background is included in Appendix A to this report.

B. PRIOR TESTIMONY

In the past four years I have provided expert testimony, either by trial or by deposition, in the following cases:

Cisco Sys. Inc. v. Alcatel
Storage Tech. v. Cisco Sys. Inc.
Toshiba v. Juniper Networks
Catch Curve Inc. v. Callwave Inc.
Apple Computer Inc. v. Burst.com, Inc.
Verizon v. Vonage

C. INFORMATION RELIED ON

Attached as Appendix B is a list of the materials that I reviewed in connection with my preparation of this report.

II. OPINIONS AND BASES FOR THOSE OPINIONS

A. LEGAL STANDARDS

In conducting my analysis and forming my opinions I have received and relied upon information provided by counsel regarding the applicable legal standards on patent infringement.

I understand that the assessment of infringement is a two-step process. First, the Court must construe the language of the patent claims. Second, the claims as construed by the Court are applied to the accused product by the trier of fact to determine whether the accused product meets each and every limitation of a claim. I understand that the Court has not yet construed the

claims of the asserted patents. My opinion is based on my understanding of what the claims mean to a person of ordinary skill of the art of telecommunications at the time of the effective filing date of each asserted patent. I reserve the right to supplement my opinion based on any changes made by Sprint to its claim construction, or based on any claim construction the Court may issue.

I understand that Sprint has the burden of proving infringement by a preponderance of the evidence. I understand this standard requires that Sprint present evidence that as a whole shows the fact sought to be proved is more probable than not, i.e., that it is more likely than not that the accused service Vonage provides infringes the Sprint Patents.

I understand that there are two types of infringement – literal infringement and infringement under the doctrine of equivalents. I understand that for an accused product or method to literally infringe a claim, the accused product or method must literally meet each and every limitation of the claim. I understand that if just one claim limitation is absent from the accused product, then there is no infringement.

I understand that to infringe a dependent claim, the accused product or method must include each and every limitation of that dependent claim, and each and every limitation of the claim(s) from which it depends. Thus, a dependent claim cannot be infringed if the independent claim from which it depends is not infringed.

I understand that if a claim is not literally infringed, it may be infringed under the doctrine of equivalents ("DOE"). I understand that to establish infringement under the DOE, the accused product must (for each claim limitation not literally met) have "insubstantial differences" from the corresponding claim limitation in the patent. I understand that one way to determine substantial equivalence for a claim limitation is to examine whether the accused

product performs substantially the same function, in substantially the same way, to achieve substantially the same result as the claim limitation.

I understand that application of the DOE contains some restrictions, such as: (1) an accused product that wholly lacks even a single limitation of a claim cannot infringe that claim; (2) the range of equivalents cannot be so broad as to encompass what was already known in the prior art; (3) the doctrine of prosecution history estoppel precludes a patentee from reclaiming through the DOE subject matter that was disclaimed or relinquished in statements or amendments during prosecution of the patent; and (4) a particular limitation is not entitled to any range of equivalents if the patentee narrowed that claim limitation by amendment during prosecution of the claim for reasons pertaining to patentability, unless the patentee shows that: (i) the equivalent was unforeseeable at the time of the application; (ii) the rationale underlying the amendment bears no more than a tangential relation to the equivalent; or (iii) the patentee could not reasonably have been expected to have described the equivalent in question. In addition, I understand that the DOE cannot be applied to a claim limitation in a manner that would effectively ignore or eliminate that limitation from the claim.

I also understand that material disclosed in the specification of a patent, but not claimed, dedicates that unclaimed material to the public, thereby precluding coverage under the doctrine of equivalents.

B. ORDINARY SKILL IN THE ART

A person of ordinary skill in the art at the time of effective filing dates of the Sprint Patents would have had a bachelors degree in electrical engineering, computer engineering or computer science, and at least three years experience in the telecommunications industry. The person would also have some familiarity with narrowband and broadband networks,

telecommunications signaling requirements and the Public Switched Telephone Network ("PSTN").

My opinion of what is described and claimed in the Sprint Patents is based on a person of ordinary skill of art during 1994 and 1995, the years which the asserted Sprint patents claim priority.

C. BACKGROUND TECHNOLOGY

The Sprint Patents are comprised of two patent families, both of which are directed to related but different technology. U.S. Patent Nos. 6,473,429, (the '429 Patent), 6,298,064 (the '064 Patent), and 6,665,294 (the '294 Patent) have identical written descriptions and drawings and all claim the priority date of U.S. Patent No. 5,991,301 filed September 8, 1995 collectively, the "'301 Family Patents") and are directed to transferring telephone calls between the PSTN and an ATM network.

U.S. Patent Nos. 6,462,932 (the '932 Patent), 6,463,052 (the '052 Patent), 6,633,561 (the '561 Patent) and 6,304,572 (the '572 Patent) have identical written descriptions and drawings and all claim the priority date of the U.S. Patent Application No. 08/238,605filed May 5, 1994 (collectively, the "'605 Family Patents") and are directed to transferring telephone calls between the PSTN and a broadband network.

In the following sections I provide a description of a technology overview for the PSTN, ATM networks, the '301 and '605 Patent Families, Voice Over Internet Protocol (VoIP) and a description of the VoIP services provided by Vonage. These serve as the basis for my opinion that the Vonage System does not infringe the '301 and'605 Patent Families.

1. Overview of the Public Switched Telephone Network ("PSTN").

The Public Switch Telephone Network ("PSTN") is a series of geographically dispersed switches which carry telephone communications between traditional telephones. The network is made up of various components which use both analog and digital technologies. Typically, a calling party's telephone is connected to a local central office switch by a pair of twisted copper wires. An analog voice signal from the calling party is typically digitized at the central office switch. The loop between a telephone and the central office is called a subscriber loop. By varying analog voltages and frequencies on the subscriber loop, the telephone can also transmit call setup information, such as dialed digits, to the central office to initiate a call. Communications betweens switches in the PSTN is typically in digital format until the signal arrives at the local central office switch of the called party, where the digital voice signal is converted back to an analog signal for transmission to the called party over another twisted copper wire.

When the central office switch receives the dialed digits, the central office switch connects the call to the called party by circuit switching through the PSTN. In circuit switching, the central office switch selects a trunk connection to another PSTN switch that is ideally closer to the called party. The circuit switching progresses switch by switch, with the trunk connections remaining dedicated for the duration of the call. When the connection reaches the switch having the called party's subscriber loop, that switch causes the called party's telephone to ring. The connection between the two telephones remains exclusive and dedicated for the duration of the call.

As described above, the subscriber loop utilizes analog technology, while telephone connections between switches in the PSTN are typically digital. A common physical digital

transmission in the U.S. is known as a T1, which transports a constant rate digital bit stream at 1.544Mbs. While all sorts of data formats and protocols can be transferred over a T1, telephone companies typically divide the T1 into logical digital channels, sometimes referred to as time slots or lines. The channels are sized to carry a single voice communication and are known as "DS0" channels. DS0 stands for "Digital Signal, level zero," and is a 64kbps, one voice conversation digitized under pulse code modulation ("PCM"). Twenty-four DS0s are equal to one DS1, which may be carried over the physical T1 connection. *See, e.g., Newton's Telecom Dictionary*, at 312 (1992).

The call setup dialed digits in the above subscriber loop example is one form of signaling. Signaling is used to setup, supervise and teardown telecommunication connections. Signaling has developed into several classifications, two such classifications being "in-band" and "out-of-band." In-band signaling, like the dialed digits on the subscriber loop, uses the same physical path for both the voice and signaling portion of a call. *See, e.g.,* Stallings, *ISDN and Broadband ISDN,* at 62 (2d ed. 1992). In contrast, out-of-band signaling messages are transmitted over a different path than the voice communications. *See, e.g., id.*

Two significant signaling protocols known to one of skill in the art at the time of the effective filing dates of the '301 and'605 Patent Families are Signaling System 7 ("SS7") and ISDN Q.931. These signaling protocols have implications to the structure of the PSTN. SS7 messages travel over a separate packet network discussed below whereas ISDN Q.931 signaling messages travel over one of the DS0 channels in a connection.

Integrated Services Digital Network ("ISDN") consists of trunks that have a D-channel for carrying signaling and several B-channels for carrying the data or voice communication. As illustrated in Figure 7.1 below, ISDN is deployed in two standard capacities, primary rate

("PRI") or basic rate ("BRI"). PRI can carry more traffic having 23 B-channels and one D channel, whereas BRI only has two B-Channels and one D-channel.

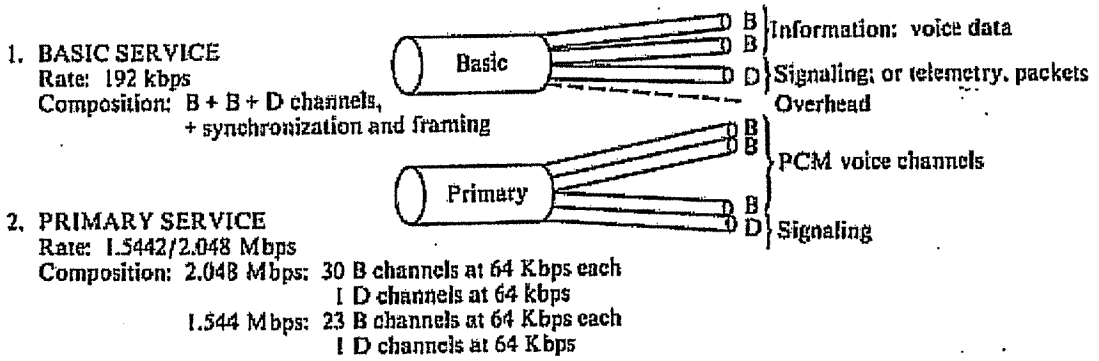


FIGURE 7.1 ISDN Channel Structures

Stallings, *ISDN and Broadband ISDN,* at 62 (2d ed. 1992).

In Figure B-3 below, BRI is intended to directly interface with individual ISDN telephones or other terminal equipment (designated "residential"). PRI is typically deployed between a switch and a private branch exchange ("PBX") of a business or other enterprise.

In contrast, SS7 signaling is carried over a separate packet network made up Signal Transfer Points ("STPs"), which route the SS7 packets through the SS7 network, without originating them. *Newton's Telecom Dictionary*, at 812 (1992). The SS7 network enables signaling between central office switches, which when used with SS7 are known as Service Switching Points ("SSPs"). Similar to ISDN, the voice channels between two SSPs are organized into groups called trunks, specifically Inter-Machine Trunks ("IMTs") (not shown in Figure B-3 below). Because there is no need for reserving a D-channel for signaling, all of the channels in the IMTs are bearer channels.

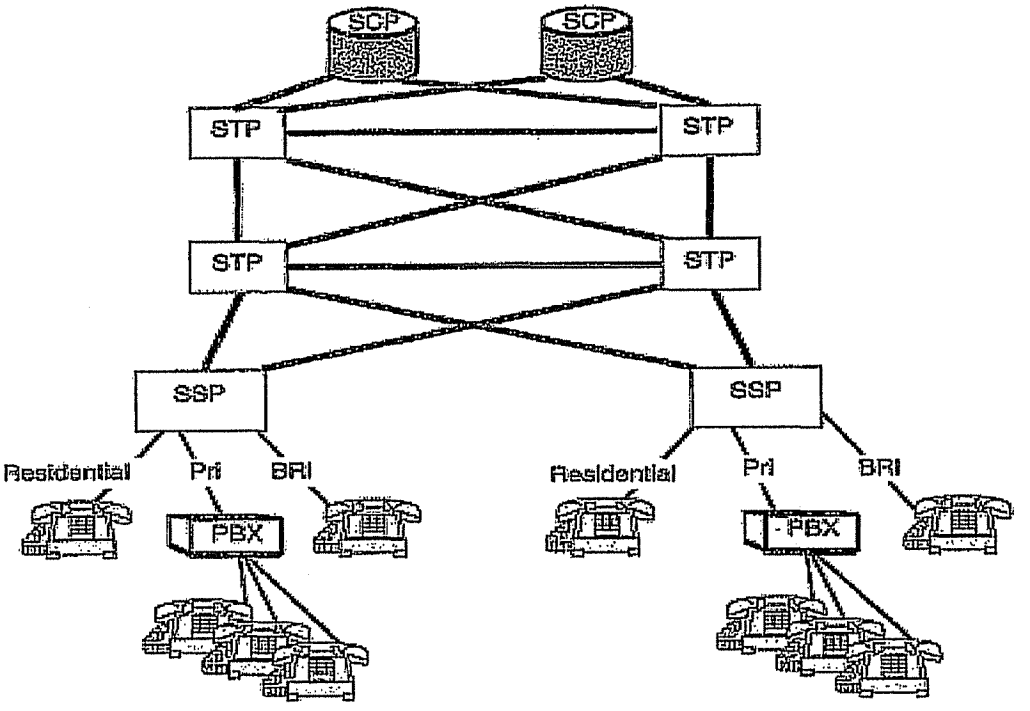


Figure B-3 Black, *Voice over IP*, at 287-288 (2000).

As illustrated above in Figure B-3 , the SS7 network allows for some routing intelligence and services to be implemented remote from the SSP's. The routing intelligence may reside in Service/Signal Control Points ("SCPs"), which have software and databases that provide the translation and routing data needed to manage certain calls. For example, "1-800" numbers are implemented by a SCP. A SSP that receives a 1-800 telephone call will request instructions from the SCP on how to process the 1-800 call. Such requests are called SS7 "TCAP" queries. SCPs respond to TCAP queries with a routing instruction on how to handle the call. When the SSP receives the routing instruction from the SCP, the SSP will establish a connection to the destination SSP by sending a SS7 Message via the network of Signal Transfer Points ("STPs"). The particular message is known as an Initial Address Message ("IAM") and is formatted for routing by the STPs. *See, e.g., Newton's Telecom Dictionary*, at 792 (1992); Thorner, *Intelligent Networks* (1994).

2. Overview of ATM

"ATM", or Asynchronous Transfer Mode communication, is the name used for a set of techniques for data communication developed in the 1980s and refined and used in the 1990s. Originally, the ATM technologies were referred to as Broadband ISDN ("B-ISDN"), to indicate that they were intended by the telephone companies (who started the development) as the successor to the existing narrowband integrated services digital network ("ISDN").

The ATM or B-ISDN technology was intended to be the upgrade for the infrastructure of the entire telephone network worldwide. As such, it needed to be able to carry all forms of communication (including data, voice, and video) with the same degree of certainty as to the quality, delay bounds, and bounds on delay variation that the existing PSTN had as their targets.

In order to meet these constraints, the key concept for the ATM networks was the cell. An ATM cell is a small, fixed length piece of information. By transferring data in cells, one can control and predict the variation in service delivery. The exact cell structure is described below.

The next key concept for ATM was the virtual circuit. In order to ensure that the communication properties delivered to the user could be known accurately, the system was designed to send a given communication over a fixed path. Whenever anyone wanted to communicate over ATM, one party to the communication would establish a virtual circuit. This would determine the path for the communication. The term "virtual circuit" is used for this sort of path established communication. The term is used to encompass the parallel concept of establishing a path by selecting and reserving a sequence of copper wires. A virtual circuit reserves a specific path through a network, and can reserve resources (*i.e.*, bandwidth, buffers) on that path, but it does not have a dedicated wire.

a. ATM Switch

The basic component of an ATM network is an ATM switch. An ATM switch has a number of ATM ports. These ports can send and receive ATM cells. ATM virtual circuits conceptually consist of a series of segments, where each segment is on a wire between two adjacent ATM switches. ATM switches process the ATM cells they receive, determine which virtual circuit the cell is on, and switch the cell to the output port and segment which continues the ATM virtual circuit. That switching is the primary function of the ATM switch.

b. ATM Signaling

Almost all ATM switches (like most telephony switches) have control processors. These processors manage the switch. In most cases, these processors also participate in the establishment of the ATM virtual circuits. When a user of the ATM network needs a virtual circuit, the user sends a signaling message, called a SETUP message, using the Q.2931 protocol standardized by the International Telecommunication Union ("ITU"). In the usual case, this signaling message is received by the ATM switch and establishes the segment of the virtual circuit to that ATM switch. The ATM switch looks at the information in the SETUP message and forwards the message on to the next switch in the path towards the destination, as identified by an ATM destination address. At the destination, after suitable processing, an ITU Q.2931 CONNECT message is generated and passed back from ATM switch to ATM switch to the calling user. This CONNECT message confirms the establishment of the ATM Virtual circuit from one end to the other for the duration of the call. Between adjacent switches, a virtual circuit is reserved for carrying the signaling. This signaling is the broadband equivalent of the narrowband Q.931 and the Frame Relay circuit establishment protocols. In the normal case, ATM signaling is sent through the control processors of the same switches that would then

handle the data for that virtual circuit. Even in the early 1990s, there was a discussion of off-path, or 3rd party call control, where the signaling was sent to different processors than those associated with the switches that would handle the data.

c. ATM Cell Format

As I mentioned above, the ATM cell is a small, fixed size piece of information. The cell consists of a very small header and a small piece of data. The ITU (previously called the "CCITT") standardized a 5-byte ATM cell header and a 48-byte ATM cell body. Thus, to use ATM to send information, that information has to be divided into 48-byte (or sometimes even smaller) pieces.

Each ATM cell to be transferred in an ATM network must be in an ATM virtual circuit. An ATM virtual circuit is identified by a pair of numbers, known as the Virtual Path Identifier and the Virtual Channel Identifier (known usually as the "VPI/VCI"). This split is to allow the core of the ATM network to use trunks to carry cells from many different ATM virtual circuits with simpler processing. The VPI/VCI is carried in the 5-byte (40 bit) ATM header. It occupies the first 28 bits of that header on every cell. (There was originally a different use for the first 4 bits of the cell header, but that again was not widely used).

It is understood that this meant that more than 10% of the bandwidth of the ATM network was used just for these cell headers. This is seen as a tradeoff in order to deliver highly predictable, highly reliable, services.

So, each ATM switch that receives an ATM cell looks at the VPI/VCI on the received cell to determine where to forward the cell. However, it is understood that the network needs to support more than 256 million circuits in total over the whole world. So the VPI/VCI is only a local identifier in ATM. What this means is that the translation from VPI/VCI to actual end-to-

end virtual circuit depends upon where in the network one looks at the value in that field. Each switch, in addition to deciding where to send the ATM cell, determines a replacement VPI/VCI value to use for that cell. That replacement identifies the same virtual circuit on the next segment (from the processing ATM switch onward). Of course, this lookup, replacement, and forwarding is normally done in hardware for performance reasons. The signaling to establish the ATM Virtual Circuit creates the state in the hardware to perform the forwarding.

d. ATM Services

ATM was designed for carrying all types of data the telephone company carried for its customers. There were techniques, known as ATM Adaptation Layers, or "AALs", to carry different kinds of data. For example, AAL1 was used to carry fixed rate bit streams, such as are the equivalent of the telephone company T1 or T3 circuits. AAL2 was specifically designed to carry voice and video streams and was called Voice over ATM or "VoATM." AAL5 was developed and used to carry data such as IP information. AAL5 was also used to carry the ATM Signaling information to establish ATM Virtual Circuits.

D. THE SPRINT PATENTS

The following is a brief description of the '301 and '605 Family Patents to identify terms and concepts that I use later in my opinion. It should be noted that these descriptions are general, and do not capture all the nuances of the claims or of the disclaimers in the patent prosecution history.

1. The '301 Family Patents

The specification for the '301 Family Patents describes an invention for interconnecting an ATM network to a narrowband telephone network. The abstract and Summary of the Invention are quite clear in that the invention is specific to ATM: "The invention is a system for

providing virtual connections through an ATM interworking multiplexer on a call-by-call basis." (Abstract, first sentence).

The patent specification argues that ATM switches have well known cross-connect capabilities, which do not allow call-by-call circuit establishment. Like the '605 Family Patents, the '301 Family Patents specification describes a desire to enable call-by-call circuit establishment without having the switches do all the work of processing signaling. In this specification, the specific method of interfacing ATM virtual circuits with the PSTN is described as allowing an effective solution to call-by-call circuit establishment without having to solve the issues of high quality ATM signaling or interconnecting ATM signaling with narrowband telephony signaling (which specification background indicates are issues). Also, it is perceived that for the ATM switches to handle signaling would "cause problems because they must be very sophisticated to support current networks." (Background section; e.g. '064 Col. 1, ll. 50-53).

The solution relies on an ATM Multiplexer. "ATM multiplexers are being developed that can interwork traffic into ATM cells and multiplex the cells for transport over an ATM network." (Background section; e.g. '064 Col. 1, ll. 62). Further description makes clear that the interworking being discussed is interworking with the traditional telephone system for either voice circuits or other low speed communications.

The Summary of the Invention section explains the use of the ATM Interworking Multiplexer to interconnect the ATM network with the narrowband network. This is used in conjunction with a signaling processor so that the processor may establish an ATM to narrowband communication path through the ATM Interworking Multiplexer without the ATM Interworking Multiplexer needing to be able to process narrowband or ATM signaling. The invention describes a number of specific methods to use the signaling processor and the ATM

Interworking Multiplexer to provide interconnection between the narrowband world and the ATM network. Each method includes the use of a VPI/VCI that I described in Sec. III(C)(2)(c).

2. The '605 Family Patents

The specification for the "605 Family Patents states that the field of the Invention is specifically communications control processing in telecommunications signaling. The Summary of the Invention section then makes clear which form of telecommunications signaling is being processed by the invention.

In conventional known telecommunications, as described in the Background of the Invention section of the specification, signaling for establishing a communication path is sent from switch to switch through the communications network (much as I described above as background for the ATM network in). Each switch has logic for processing the full signaling protocol and performing all of the steps needed for path computation and path establishment.

For the described invention, instead, the first switch relays signaling it receives to a special control processor. That processor does all of the complex computations and determinations. The processor then controls the switch to establish the switch's portion of the communication path. That same processor also controls other switches. (Potentially, it controls all the switches in the communications path). In principle, this allows the switches to be simpler devices, and allows simpler, more centralized processing and control of the establishment of communications paths.

E. VOICE OVER INTERNET PROTOCOL (VoIP) TECHNOLOGY

In general, VoIP allows voice to be transported over the internet encoded in voice packets. There are many different methods for implementing VoIP, and in this section I describe

the basic operation of a VoIP system and provide a few examples for how the technology can be implemented. Common to all types of VoIP systems is that the human voice is sampled, digitized, possibly compressed, and then divided into many voice packets. Each voice packet contains an IP address and port of the destination device. Each voice packet traverses the internet independently of the other voice packets to arrive at a destination device which ultimately will decode and, if necessary, decompress the voice data from the voice packets to form an analog voice signal. VoIP technology can be implemented between users solely via the internet, and VoIP technology can be implemented over the internet and the PSTN when either the caller or the called party is using a device connected to the PSTN. In order for a VoIP subscriber to place a VoIP call over the public internet, the VoIP subscriber must have access to an Internet Service Provider ("ISP"), such as cable or Digital Subscriber Line Zero. In a typical deployment, a Vonage subscriber connects his conventional telephone to a telephone adapter ("TA") which is connected to his high speed cable line or DSL line.

One signaling protocol for establishing a VoIP call is Session Initiation Protocol ("SIP"). SIP signaling occurs between SIP endpoints either directly or through a SIP server, sometimes called a SIP Proxy, as illustrated in the following Figure 2-2:

Figure 2-2 Scalable Private Number Plan Support

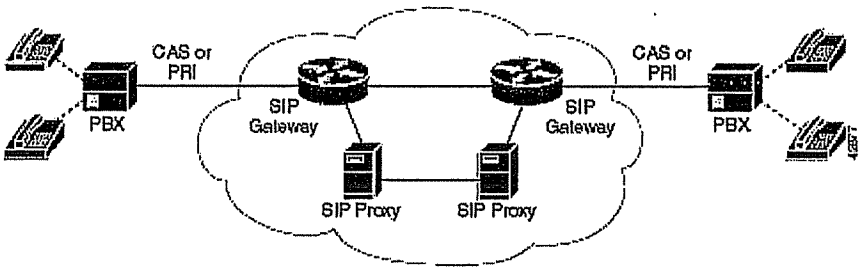


Figure 2-2, *Guide to Cisco Systems' VoIP Infrastructure Solution for SIP*, Version 1.0, Cisco Systems (2000).

In this example, the SIP Gateway interfaces with a PBX to receive signaling and media (data and/or voice). The signaling received from a PBX may be one of the common signaling protocols used by the PBX (and PSTN) such as SS-7 or Q.931. The SIP Gateway recognizes this PSTN signaling and generates SIP signaling which is recognized by Internet devices to route the signaling to the corresponding SIP endpoint, the other SIP Gateway. In this example, the SIP Gateway also receives the media in a format used by the PBX and generates voice (or data) packets for transmission over the Internet.

IP addressing presents challenges in large scale VoIP networks. For example, VoIP subscribers may have devices for which the IP addresses and TCP/UDP ports change routinely. One reason is that ISPs typically give their subscribers new IP addresses daily. Another reason is that the IP/Port may possibly change when connections are disrupted. Additionally, Network Address Translation and other local schemes implemented by VoIP subscribers devices tend to hide a VoIP Subscriber's Technology Adaptor or Terminal Adaptor. SIP Proxies alleviate these problems by tracking addressing information for VoIP Subscribers. A proxy maintains a record of IP addresses and ports used for SIP signaling for the devices for which it is associated. SIP Proxies are thus useful in forwarding SIP signaling to an intended SIP endpoint (terminal device).

The SIP endpoints exchange signaling messages to establish a connection between the SIP endpoints using the IP address and port selected by the SIP endpoints for receiving voice packets. Common SIP signaling messages include a call request ("SIP Invite"), ringing ("SIP 180"), and call acceptance ("SIP 200 OK"). The SIP Invite message and the SIP 200 OK, or 183 Session Progress message allows the SIP endpoints to designate which IP address and port will

be used for receiving the voice packets so that the SIP endpoints may control their communication resources.

Within SIP, the protocol used to designate the parameters for the communication session (IP address, UDP Port, Compression Capabilities) is known as Session Description Protocol ("SDP"). The originating SIP endpoint generates its own SDP and sends it to the other SIP endpoint in a "SIP Invite." If the called party answers, the destination SIP endpoint generates its respective SDP and sends it back to the originating SIP endpoint in a "SIP 200 Ok" or 183 Session Progress. In this way, the SIP endpoints designate which ports they want to receive the voice packets. After setting up the call, the SIP endpoints communicate voice packets using a streaming packet protocol, such as Real Time Protocol ("RTP"). Black, *Voice over IP*, at 219 (2000).

SIP gateways interface with the PSTN using different deployments, which operate in fundamentally different ways. In the first way, illustrated in the Figure 2-2 above, the SIP gateways have the necessary complexity to process and generate signaling, including SIP and PSTN signaling such as SS7 or Q.931, and also receive and transmit media such as voice or data. Such a device is labeled simply as a "SIP Gateway."

Alternatively, components known as "Signaling Gateways" and "Media Gateways" may be deployed together, as shown below in Figure 2-7. In this deployment, the Signaling Gateway is not a part of the communication path for the media. The "Media Gateway" is part of the communication path and serves to interconnect PSTN voice and voice over IP. The Signaling Gateway is sometimes referred to as a signaling controller, softswitch, a media gateway controller, or call agent. Shown below is a deployment of a Signaling Gateway, labeled "Signaling Controller" and a Media Gateway, labeled "SIP Gateway"

Figure 2-7 Cisco SS7 Interconnect for Voice Gateways Solution Implemented with a SIP VoIP Network

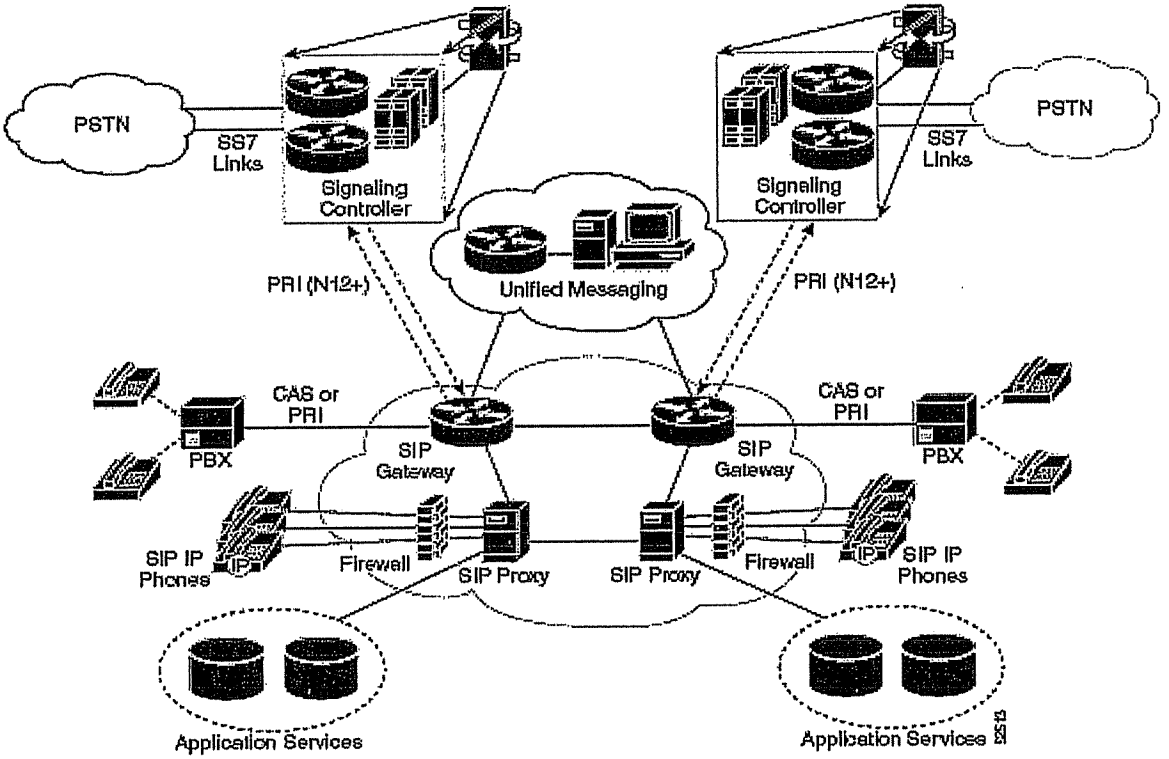


Figure 2-7, *Guide to Cisco Systems' VoIP Infrastructure Solution for SIP*, Version 1.0, Cisco Systems (2000).

A Signaling Gateway communicates with its Media Gateways over a protocol such as Media Gateway Control Protocol ("MGCP"). The use of a Signaling Gateway is optional. When a Signaling Gateway is deployed, an STP network carries SS7 signaling and Inter-Machine Trunks ("IMT") transport communication. When a stand alone SIP Gateway is deployed, the ISDN D-channel typically carries signaling (Q.931) and the B-channels transport communication, both over ISDN trunks.

In conjunction with a Signaling Gateway, a Signaling Link Translator ("SLT"), or alternatively an ITP expand, is typically used to generate and receive SS7 messages in the SS7 format used by the PSTN. The signaling link translator frees other components from having to process the SS7 messages in the PSTN format. One such deployment, shown below in Figure 3,

where the SLTs interface signaling between Signaling Gateways and STPs of the PSTN and the signaling Gateways interface media with the SSPs of the PSTN.

Figure 3. Standalone Cisco SLT Architecture

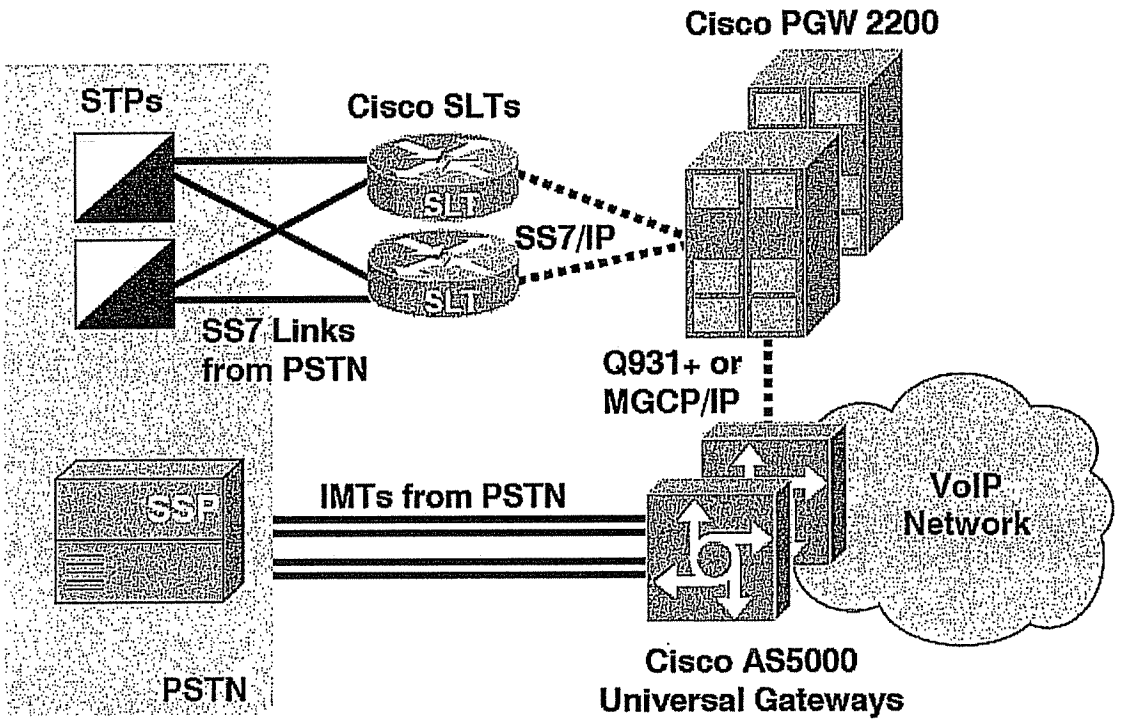


Figure 3, *Cisco Signaling Link Terminal Data Sheet*, Cisco Systems (1992-2006).

F. THE VONAGE SYSTEM

Vonage implements their own VoIP solution based on the standard protocols of SIP and RTP. I will refer to this implementation collectively as the "Vonage System" throughout my report. Major components in the Vonage system include:

(i) Customer Terminal Adaptor (TA);
(ii) Outbound SIP Proxy (OB Proxy Group or OB Proxy Server);
(iii) Inbound SIP Proxy (IB Proxy Group or IB Proxy Server);
(iv) Signaling Gateway (SG);
(v) Media Gateway (MG);
(vi) Signaling Link Translator (SLT); and
(vii) RTP Relay (RTP Relay).

Some of the general functionality of these components has been discussed above. The proxy groups are mentioned because, for reliability, Vonage SIP proxies are deployed in groups of four servers performing a given function. Some of the proprietary implementations based on the standard protocols and components, described above, may be understood through a description of the following basic scenarios:

(i) TA Registration;
(ii) Inbound Calls (from a PSTN customer to a Vonage customer);
(iii) Outbound Calls (from a Vonage customer to a PSTN customer); and
(iv) RTP Relay Call Flows.

1. TA Registration

Vonage OB Proxy Servers are allocated in OB Proxy Groups, each of which have four servers. Each of the OB Proxy Servers have their own IP address, and the OB Proxy Group has a common domain name which resolves to one of the list of four IP addresses.

During initialization of the TAs, Vonage programs the TAs to point to a specific OB Proxy Group. Wherever and whenever a Vonage customer connects a TA to the Internet, the TA

will attempt to register with the OB Proxy Group. The first OB Proxy Server that responds to the registration request from the TA will store the IP address and Signaling Port of the TA.

The specific OB Proxy Server with which the TA has registered is the only device in the Vonage network that possesses the IP address and Signaling Port to use to communicate with the TA. A system of publishing servers is responsible for replicating the TA/OB Proxy association and other database information among various components of the Vonage System, including IB Proxy Servers. The publishing servers continually inform the Vonage System as to which OB Proxy Group a particular TA has registered.

The TA automatically registers with its OB Proxy Server every 20 seconds. In this way, the TA continually updates the OB Proxy Server of its current IP address and Signaling Port, which may have changed due to the ISP, NAT or DHCP issues discussed above. The 20 second registration also allows the TA to automatically switch over to a new OB Proxy Server in the event that the OB Proxy Server it was registered with fails. Further, this registration ensures that any NAT or firewall will continue allowing signaling messages through.

Thus, the publishing system, the OB Proxy Group deployment, and the TA's automatic registration all work together to allow Vonage TA to be a "plug and play" device, overcoming the addressing challenges of operating a telephony service in the environment of the public Internet.

2. Inbound Calls (From A PSTN Customer To A Vonage Customer)

When a PSTN caller telephones a Vonage customer, the PSTN carriers recognize the called phone number as belonging to a Vonage customer. The PSTN carrier routes the call to an incoming SIP Gateway over ISDN trunks. The SIP Gateway receives the PSTN signaling in the form of Q.931 over the D- Channel of the ISDN trunks.

The SIP Gateway receives the ISDN signaling, selects its own IP address and UDP Port, designates its compression capabilities, and generates a SIP Invite message containing SDP information. The invite also contains the called phone number as a SIP URI. The SIP Gateway then sends the SIP Invite to an IB Proxy Group, which resolves to one of several IB Proxy Servers.

The IB Proxy Server receives the SIP Invite and looks up information about the Vonage customer associated with the telephone number being called. For example, the IB Proxy Server will lookup information such as whether the Vonage customer wishes to have their calls forwarded to a work number, a cell phone, or their Vonage TA. Assuming the customer has not turned on such features, the IB Proxy then looks up the OB Proxy Group with which the TA last registered.

The IB Proxy Server forwards the SIP Invite created by the SIP Gateway to each of the OB Proxy Servers in the group. The OB Proxy Server with which the TA has registered will acknowledge the SIP Invite and forward it to the TA's last known IP address and Signaling Port.

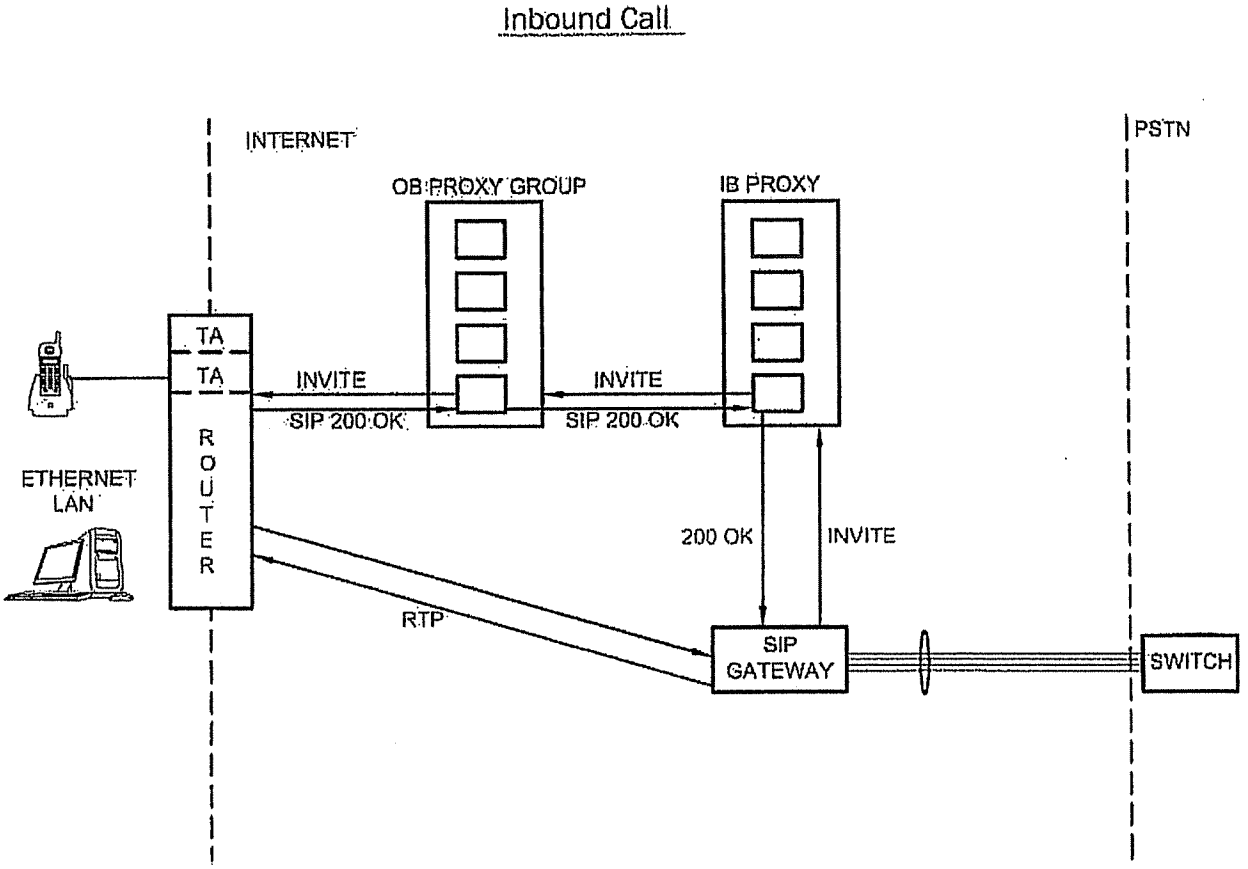
The TA receives the SIP Invite created by SIP Gateway and causes the conventional telephone connected to the TA to ring. The TA then sends a SIP 180 Ringing message back to the SIP Gateway via the same Vonage components, although not necessarily the same routing through the Internet traversed by the SIP Invite, the path reported in the "via" headers.

If the Vonage customer answers the phone, the TA will select the IP address, UDP port, and compression standard to be used for the voice communication. The TA designates the selections by generating a SIP 200 Ok message containing the SDP information. The TA then sends the 200 OK message back to the SIP Gateway via the Outbound and Inbound proxies.

Upon receipt of audio traffic, the TA and SIP Gateway convert the audio signals into RTP packets puts the RTP into a UDP packet, and that into an IP packet, and send the packets to each other based on the IP address and UDP ports designated in the SDP messages by the respective endpoints.

For inbound calls, a connection in the Vonage System is established by exchanging SIP messages between the TA and the SIP Gateway so that both the TA and the SIP Gateway are provided with the SDP information from the other device that enables the TA and the SIP Gateway to address messages to the other device. This SDP provided information is known as a "4-tuple" and consists of both the IP address and UDP port for both of the SIP Gateway and the TA.

In this way, the SIP Proxies setup a signaling path between the SIP endpoints so that the SIP endpoints can engage in end-to-end SIP signaling in a distributed, intelligent endpoint architecture. Attached to this report in Appendix C is a call trace for an Inbound Call. A simplified graphical representation of an Inbound Call is illustrated in the figure below.



Vonage Inbound Call Scenario

3. Outbound Call (From A Vonage Customer To A PSTN Customer)

When a Vonage caller dials the telephone number of a called party on the PSTN, the TA selects the parameters, and generates, SDP information (designating its own IP address, UDP port, and compression capabilities for use during the call). The TA generates a SIP Invite message which includes the SDP information and the called party telephone number. The TA sends the SIP Invite message to its OB Proxy Server.

The OB Proxy Server receives the SIP Invite. It determines that the call is not for a Vonage subscriber, so the proxy performs a longest match comparison on the called party telephone number and calling party telephone number pair to select candidate Signaling

Gateways to send the call signaling to the PSTN. The SIP invite is forwarded by the OB Proxy server to one of the candidate Signaling Gateways.

The Signaling Gateway receives the SIP Invite and performs a longest match comparison on the called party telephone number to identify possible trunks to use for the communication. The Signaling Gateway then uses a series of load balancing algorithms to identify a circuit identification code, or CIC, for the communication. The Signaling Gateway sends a message using an IP/Ethernet protocol to a Signaling Link Translator containing the proposed CIC.

The Signaling Link Translator receives the message, generates an SS7 IAM message, and sends the SS7 message to the PSTN SS7 network. The PSTN will then complete the steps necessary to ring the called party using conventional PSTN signaling.

Simultaneously, the Signaling Gateway sends a MGCP create connection message ("CRCX message") to a private IP address and port of the Media Gateway. The CRCX message includes the SDP from the TA (the TA's IP address, UDP port, and compression capabilities) and the CIC for the communication with the PSTN.

The Media Gateway receives the CRCX message and selects the parameters for, and generates, a SDP (Media Gateway's public IP address, UDP port, and compression information). The Media Gateway sends the selected SDP information to the Signaling Gateway in a MGCP reply message.

When the called party answers the telephone, the Signaling Gateway will receive an Answer message from the PSTN via the Signaling Link Translator.

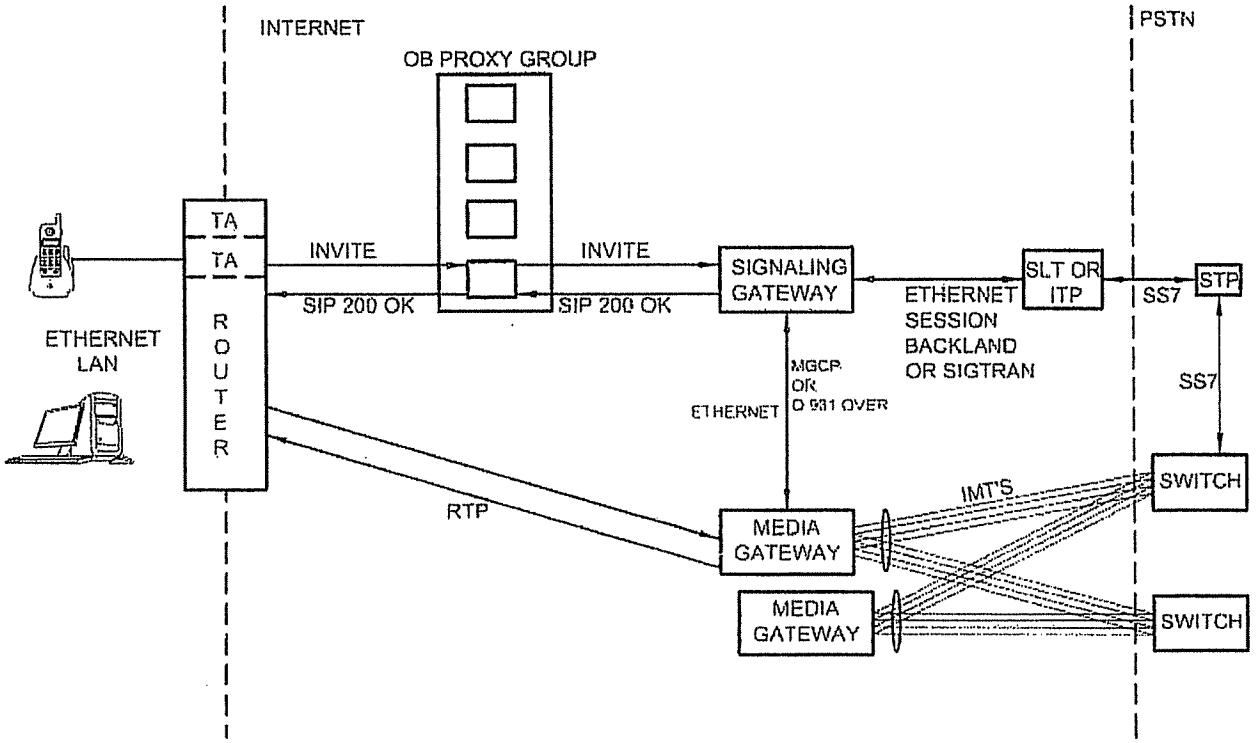
The Signaling Gateway receives the Answer message and generates a SIP 200 Ok message, with the SDP information selected by the Media Gateway. The SIP 200 Ok message

is relayed along the route taken by the originating SIP Invite, as shown in the via headers, back to the TA.

Upon arrival of audio traffic, the TA and Media Gateway convert the audio signals into RTP packets and send the RTP packets in UDP packets in IP packets to each other based on the IP address and UDP ports designated in the SDP information generated by the respective endpoints.

In this way, the SIP Proxies setup a signaling path between the SIP endpoints so that the SIP endpoints can engage in end-to-end SIP signaling in a distributed, intelligent endpoint architecture. Attached to this report as Appendix D is a call trace for an Outbound Call. A simplified graphical representation of an Outbound Call is illustrated in the figure below.

Outbound Call



Vonage Outbound Call Scenario

4. Network Address Translation Call Flows Using The RTP Relay

When a Vonage customer's TA is behind a router that employs Network Address Translation ("NAT"), the NAT'd TA will generate SIP messages having an IP address that is not publicly addressable on the Internet. Of note, for a NAT'd TA, the UDP port on the router for the RTP is not designated until the first RTP packet flows out of the TA through the router, which does not occur until after the call setup is finished. Thus, a Media Gateway can not know where to send RTP packets based on the call flows described above, necessitating Vonage's proprietary solution to the NAT traversal dilemma.

When a NAT'd TA registers with its OB Proxy Server, the Server detects that the SIP message contains inconsistent IP address information. The OB Proxy Server flags that TA as being a NAT'd TA. If the OB Proxy Server receives any SIP Invites to or from the NAT'd TA, the OB Proxy Server will request that an RTP Relay designate an upstream port and downstream port for use during a communication. The RTP Relay will select and reserve the requested resources and inform the OB Proxy Server of the IP address and ports associated with the these resources.

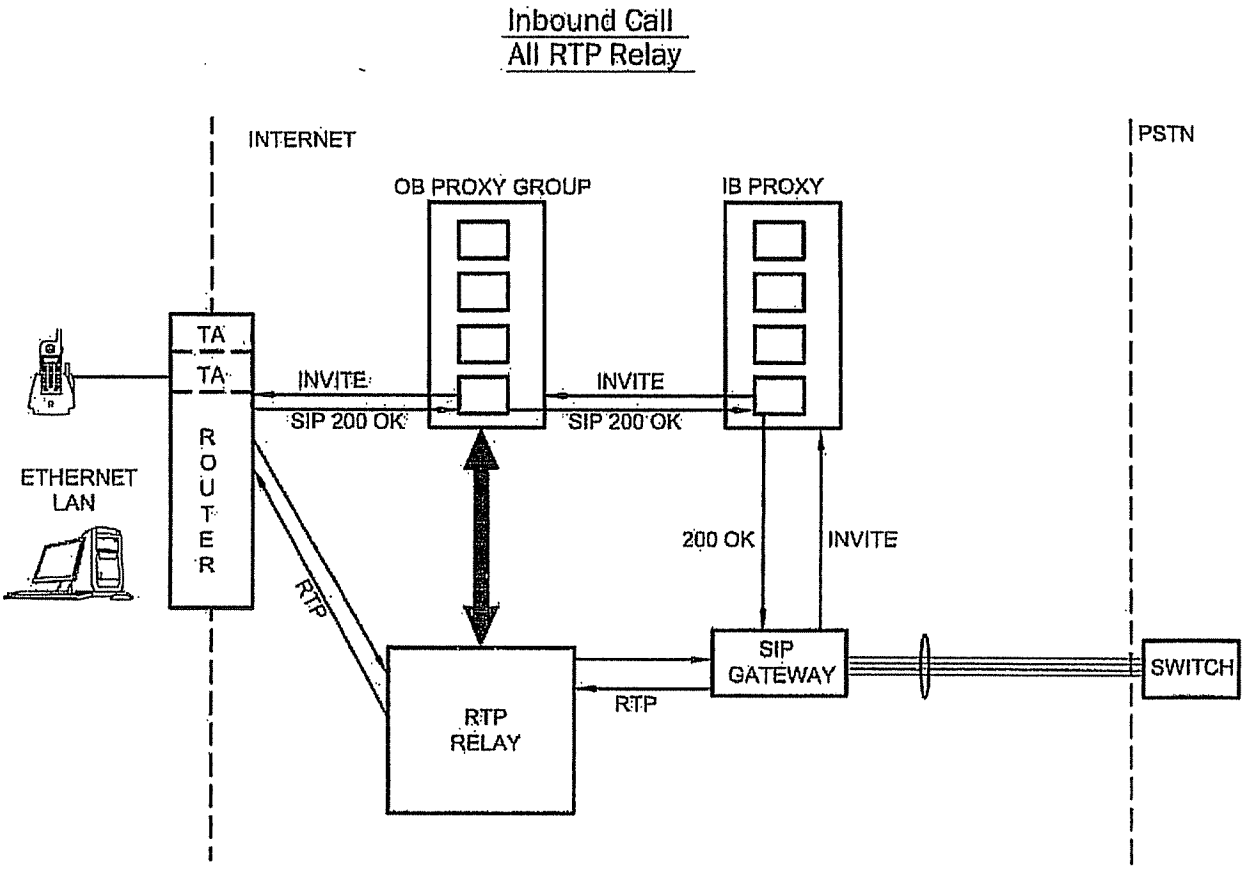
The OB Proxy Server will then replace the SDP IP address and UDP port in the SIP Invite and SIP 200 Ok messages exchanged between the SIP endpoints. Thus, when an SDP is received at a SIP endpoint, that SIP endpoint will address its outgoing RTP packets to the RTP Relay and its respective port instead of the IP address and UDP port of the other SIP endpoint.

At this point, the RTP Relay still does not know the port address on the router that will receive RTP packets from. When the NAT'd TA sends its first RTP packet to the RTP Relay via the router, however, the router maps the TA IP address and UDP port to a UDP port on the router. The router will maintain the mapping. The router will route RTP packets arriving on the

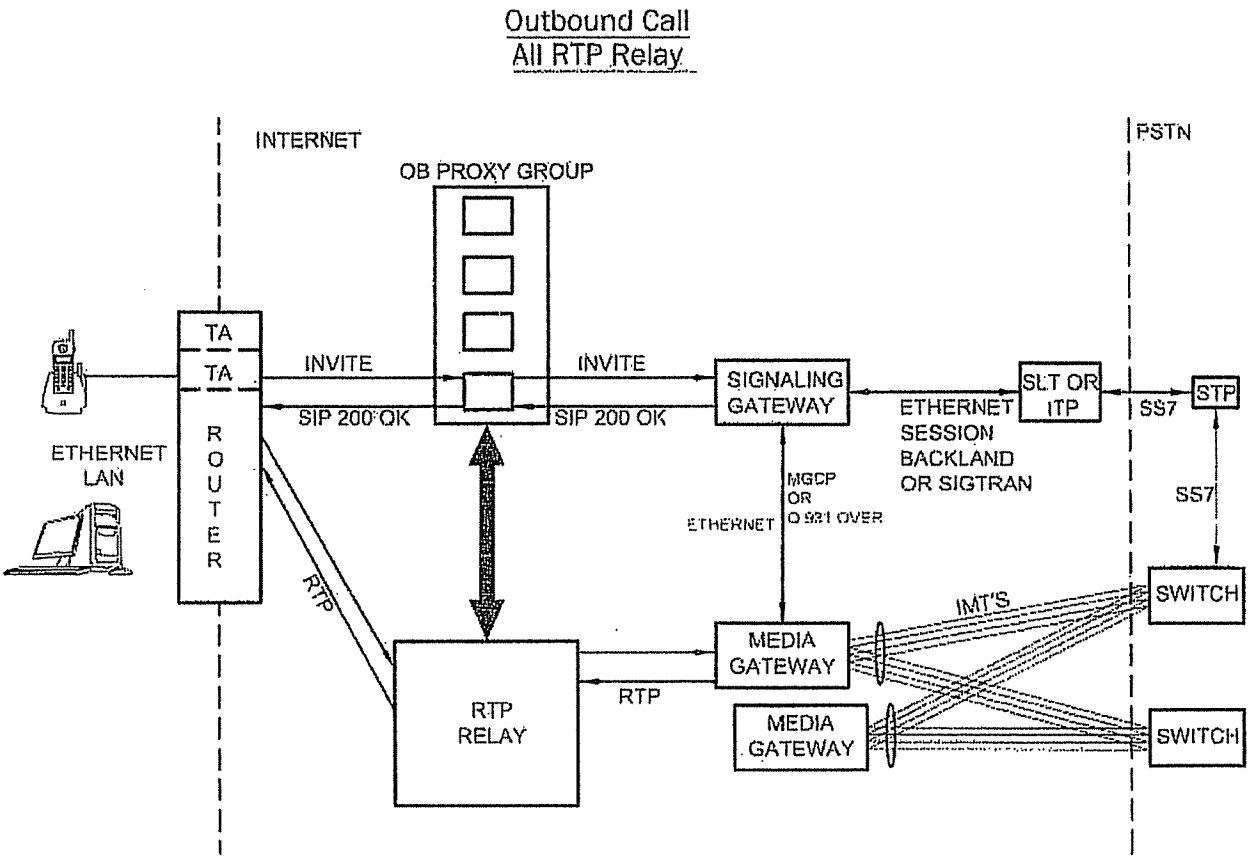
router port back to the NAT'd TA. For RTP packets from the TA, the router NAT function replaces the IP address and UDP port the NAT has assigned.

When the RTP Relay receives the RTP packet, it identifies the router UDP port sending the RTP packets. Thereafter the RTP Relay will address any RTP packets destined for the assigned relay UDP port to the identified router port. Likewise, the RTP Relay identifies the UDP port used by the Media Gateway upon arrival of the first RTP packet from the Media Gateway, and performs similar forwarding in that direction. An RTP stream then flows between the SIP endpoints via the RTP Relay.

Attached to this report as Appendix E is a call trace for an Outbound Call for a NAT'd TA. A simplified graphical representation of an Inbound Call and an Outbound Call for a NAT'd TA are illustrated in the figures below.



Vonage Inbound Call w/RTP Relay Scenario



Vonage Outbound Call w/RTP Relay Scenario

5. Vonage-To-Vonage Call

A call between two Vonage subscribers follows the Outbound Call Procedure above from the calling party TA to the Outbound Proxy. The outbound proxy determines that the call is for Vonage subscriber; and sends it to an Inbound Proxy where the Inbound Call procedures are followed to complete the call. NO gateways or PSTN components are used for a Vonage to Vonage call.

6. Prior Implementations of the Vonage System

Prior to the summer of 2003, I understand that the Vonage System utilized a SIP Gateway (instead of the separate Media Gateway and Signaling Gateway utilized presently) for Outbound Calls. The single gateway communicated with the PSTN over the D- channel using ISDN protocols. In Sec. G below, I describe how this single gateway avoids infringement of Claims in the '064, '932, and '561 Patents.

G. NON-INFRINGEMENT OPINION

For each asserted claim, I have first set forth the claim language and identified the claim limitations that are not present in the Vonage System, followed by an analysis of Dr. Wicker's assertions and the reasons Dr. Wicker's assertions do not support a finding of infringement. In the Section below, I have provided my non-infringement opinion for each of the claims addressed by Dr. Wicker in the body of his report. My non-infringement opinion for the remaining asserted claims can be found in Appendix F to this report. For each claim I identified the limitations that were not present in the Vonage System and provided an explanation of why the limitation was not present. I did not separately identify those claim limitations that reference other claim limitations that I had previously found not to be present in the Vonage System, but instead only identified those limitations having an independent basis for not being found in the Vonage System.

For each of the accused independent claims identified below, Dr. Wicker provided an element by element analysis for purposes of infringement for the non-NAT'd scenarios. He did not provide an element by element analysis for the NAT'd scenarios and thus it is unclear how or if Sprint is asserting that Vonage infringes under the NAT'd scenario. For certain of the claims, it appears that Dr. Wicker has attempted to identify where a claim limitation may be read on the

NAT'd scenario, but his analysis is too cursory to understand and in some cases contradictory to positions he has taken elsewhere in his report. For example, it is inconsistent for Dr. Wicker to assert that either the Media Gateway or the RTP relay is the network element which provides egress for the user communication from the packet communication system. I therefore reserve my right to supplement my report should Sprint attempt to provide a limitation by limitation analysis of infringement in the NAT'd scenario.

1. Non-infringement Of The '429 Patent

In my opinion, the Vonage System does not infringe any of the asserted independent claims of the '429 Patent. Therefore, the asserted dependent claims cannot be infringed either. The basis for my opinion is that there are limitations in the asserted claims of the '429 Patent that are not present in Vonage's System, either literally or under the doctrine of equivalents.

a. Opinion Regarding Non-infringement Of Claim 23

Claim 23 recites:

23. A communication system comprising:

a processing system configured to
receive information related to a user communication,
process the information to select an identifier,
generate a message containing the identifier, and
transmit the message; and

an interworking unit configured to
receive the message,
receive the user communication from a DS0 connection,
convert the user communication into an asynchronous communication with the identifier in a header in response to the message, and
transfer the asynchronous communication.

Sprint has asserted that this claim is infringed by Vonage when processing an Inbound Call. However, at least the following claim limitations are not present in the Vonage System:

1. *A processing system configured to*:

   a. *process the information to select an identifier.*

   b. *generate a message containing the identifier and transmit the message*

2. *Interworking unit*

3. *An interworking unit configured to convert the user communication into an asynchronous communication with the identifier in a header.*

Each of these limitations is addressed below.

(1) The Processing System In the Vonage System Does Not Select An "Identifier"

Claim 23 requires a processing system to process signaling information "to select an identifier".

a. "Identifier" Means VPI Or VCI

The only "identifier" expressly described in the specification is a virtual path identifier (VPI) and virtual channel identifier (VCI):

> As such, AAL 220 obtains the virtual path identifier (VPI) and virtual channel identifier (VCI) for each call from assignment 240.

As I described in Sec. III(C)(2)(c) above, VPI and VCI are terms of art used to described the route identifier that identifies the virtual connection used by ATM cells in an ATM system, such as the ATM cross connect network illustrated at Figures 1 and 5 of the '429 Patent. The terms VPI, VCI or combination thereof, are used throughout the specification to identify the virtual connection selected by processing the signaling information. For example:

> Since multiple virtual connections are pre-provisioned from ATM interface 230 to the other destinations in the network, CCM 250 can select a virtual connection to the destination. The selection process can be accomplished through table lookups. For example, a table could be used to translate a portion of a dialed the dialed number into a VPI. The VCI would be selected based on the available VCIs in the selected VPI. The VPI/VCI combination would correspond to a

> unique virtual connection pre-provisioned from ATM interface 230 to the appropriate network destination. ('429 7:14-24)

Thus, the specification for the '429 Patent clearly describes the selection of an ATM VPI, VCI or combination thereof as "selecting an identifier." Conversely, the specification does not provide support for any other meaning for selecting an "identifier" other than selecting an ATM VP, VCI or combination thereof.

The Vonage System does not use an ATM cross connect system or any other ATM system and thus does not process signaling information to select a VPI, VCI or combination thereof. Thus, the limitation "process the information to select an identifier" is not present in the Vonage System.

b. The Vonage System Does Not Select an Equivalent of an "Identifier"

An ATM cross-connect network is a telecommunications network having pre-provisioned virtual connections. In an ATM network, the pre-provisioned connections are identified by VPI, VCI, or a combination thereof. In the Vonage System calls are communicated as RTP voice packets through the Internet. Each voice packet is sent through the Internet using standard Internet protocols and each packet may travel a different path to reach the ultimate destination. Pre-provisioned virtual circuits are not used in the Internet. Voice packets carried over the Internet are substantially different from the use of ATM cells carried over a pre-provisioned virtual connection as I described above in Sec. III(C)(2). Thus, the Vonage System does not select an equivalent of an identifier.

c. Dr. Wicker Does Not Support Sprint's Contention That An "Identifier" Can Be An IP Address

In his report at p. 50, Dr. Wicker describes at a very high level the operation of the Vonage System. He identifies an IP address as an "identifier", but does not identify where he finds support in the specification for such a for this broad definition. He discusses several different IP addresses, both for signaling and for voice traffic, and it appears that he is interpreting "identifier" to mean an address that is used for routing the user communication. This definition is broader than is supported by the specific disclosure provided by the specification, as I discussed above. However, even using this definition, Wicker's assertion is incorrect because in the Vonage System an IP address and UDP port is required in order to route a user communication. As acknowledged by Wicker on page 41, both an IP address and port is required for routing voice packets in the Vonage System. Thus, Wicker's report does not support that the limitation "identifier" is an IP address.

(2) The Processing System In the Vonage System Does Not Generate A Message Containing The "Identifier."

Claim 23 requires that the processing system "generate a message containing the identifier". This limitation is not present in the Vonage system for the same reasons I discussed above regarding the "identifier" limitation. Additionally, this limitation requires that the Vonage processing system "generate" a message containing the "identifier". To "generate" a message in the context of the '429 Patent means to create a new signaling message. Even if we assume Dr. Wicker's position that an identifier can be any address used to route a user communication, in the Vonage System new signaling messages containing the IP address and UDP port of the destination are generated by the TA and the SIP Gateway, not in the processing system. For example, as I described above with respect to an Inbound Call in Sec. III(F)(2), the TA generates

a SIP 200 message containing the IP Address and port for the TA to receive voice packets. Thus, the TA generates the message with the TA IP address and UDP port, not the processing system, and thus this limitation is not present in the Vonage System. Even if Sprint could establish that the Vonage System's Processing System selects the requisite "identifier" (which it does not), because the processing System does not *generate a message containing the identifier* it is equally fatal to its claim of infringement.

(3) The Vonage System Does Not Have an Interworking Unit

Claim 23 requires that an interworking unit receive the message generated by the processing system.

(a) "Interworking Unit"

An "interworking unit" is clearly defined in the specification of the '305 Patent Family as an "ATM interworking multiplexer." Every time the specification of the '429 patent uses the term "interworking" to refer to a device, it specifically uses the term "ATM interworking multiplexer." The term is even used as a section heading. ('429 8:1). The Abstract of the '429 patent says that the claimed invention specifically includes an "ATM interworking multiplexer":

> The invention is a system for providing virtual connections through an **ATM interworking multiplexer** on a call-by-call basis. A signaling processor receives signaling for a call and selects the virtual connection for the call. The signaling processor generates new signaling that identifies the selection and transfers the new signaling to the **ATM interworking multiplexer** that accepted the access connection for the call. The multiplexer converts user information from the access connection into ATM cells for transmission over the virtual connection in accord with the new signaling. ('429 abstract)(emphasis supplied).

Unlike other portions of the specification which described preferred embodiments, the specification makes it clear that the ATM interworking multiplexer is an important and necessary component of the invention. For example, Sprint in the "Summary" of the invention of the '429 Patent expressly describes its claimed invention:

> The invention also includes a telecommunications system to provide a call with a virtual connection in response to signaling for the call. The system comprises a signaling processor to receive and process signaling to select the virtual connection for the call, and to generate and transmit new signaling that identifies the selected virtual connection. The system includes an **ATM interworking multiplexer** to receive user information from a connection, convert the user information into ATM cells that identify the selected virtual connection, and transmit the ATM cells over the selected virtual connection. The system could also include an ATM cross-connect system connected to the **ATM interworking multiplexer** and configured to provide a plurality of virtual connections to the **ATM interworking multiplexer**." ('429 2:32-45)(emphasis supplied)

Importantly, Sprint's description was of the invention itself, not, as is often the case, just a preferred embodiment of the invention . The specification makes clear that the "interworking unit" is an "ATM interworking multiplexer.

An ATM interworking multiplexer is not present in the Vonage System, and Sprint has not asserted that one is present.

b. The Vonage System Does Not Have The Equivalent Of An ATM Interworking Multiplexer

As I described above in Sec. III(C)(2), the operation of an ATM cross-connect system having fixed length ATM cells is substantially different than the operation of the Internet using RTP voice packets and thus there is no element present in the Vonage System which could be deemed equivalent to the ATM interworking multiplexer so as to infringe the '429 Patent under the doctrine of equivalents..

c. Dr. Wicker Does Not Support Sprint's Contention That The Vonage System Has An Interworking Unit

In his report at pages 50-51, Dr. Wicker asserts that the interworking device is the Vonage Media Gateway. The "Media Gateway" he refers to appears to be the "SIP Gateway" of the Vonage system. However, for the reasons discussed above in Sec. III(F), the media gateway is not an "ATM interworking multiplexer."

(4) The Vonage System Does Not Have An Interworking Unit To Convert The User Communication Into An Asynchronous Communication With The Identifier In A Header

Claim 23 requires that the interworking unit convert the user communication into an asynchronous communication with the identifier in a header. In addition to my opinion regarding the lack of an "identifier" and "interworking unit" in the Vonage System discussed above, this limitation is not present in the Vonage system because the user's voice data is not converted into an asynchronous communication in the context of the specification, much less an asynchronous communication with a VPI, VCI or combination thereof in the header, as discussed in more detail below.

a. Asynchronous Communication In The '429 Patent Is A Communication Over An ATM Network

The claimed invention of the '429 Patent is a method of controlling and using a component only in an ATM network, and is inapplicable to any other *asynchronous communication* or environment. Indeed, the only time the specification of the '429 patent uses the term "asynchronous" is in the background section, when expanding the acronym "ATM" to read "Asynchronous Transfer Mode" ('429 1:22-24). That the scope of the '429 Patent is limited to ATM networks, rather than any other asynchronous communication, is well described by Sprint in the abstract of the '429 Patent:

> The invention is a system for providing virtual connections through an **ATM** interworking multiplexer on a call-by-call basis. A signaling processor receives signaling for a call and selects the virtual connection for the call. The signaling processor generates new signaling that identifies the selection and transfers the new signaling to the **ATM** interworking multiplexer that accepted the access connection for the call. The multiplexer converts user information from the access connection into **ATM** cells for transmission over the virtual connection in accord with the new signaling. ('429 abstract)(emphasis supplied).

Unlike other portions of the specification which described preferred embodiments, the specification makes it clear that the ATM interworking multiplexer is included in the invention. Therefore, to infringe the '429 Patent, any accused product or system must as well. For example, in the "Summary" section, Sprint is careful to describe the invention itself, not just a preferred embodiment of the invention, as necessarily including an ATM interworking multiplexer :

> The invention also includes a telecommunications system to provide a call with a virtual connection in response to signaling for the call. The system comprises a signaling processor to receive and process signaling to select the virtual connection for the call, and to generate and transmit new signaling that identifies the selected virtual connection. The system includes an **ATM** interworking multiplexer to receive user information from a connection, convert the user information into **ATM cells** that identify the selected virtual connection, and transmit the **ATM cells** over the selected virtual connection. The system could also include an **ATM** cross-connect system connected to the **ATM** interworking multiplexer and configured to provide a plurality of virtual connections to the **ATM** interworking multiplexer." ('429 2:32-45)(emphasis supplied)..

The specification of the '429 patent does not support any definition of "*asynchronous*" that does not include ATM. It is clear from the specification that Sprint was familiar with and expressly considered TCP/IP and other non-ATM protocols, but chose to show the use of these other networks only in the signaling link and not in the voice communication. For example, the following excerpt from the specification describes possible signaling links to the signaling processor:

> Also shown for signaling processor 610 are ethernet interface 635, platform handler 640, message handler 645, and data handler 650. Ethernet interface 635 is a standard ethernet bus supporting TCP/IP which transfers signaling messages from MTP level 3 to platform handler 640. Also, if UDP/IP is used to communicate with the muxes, Ethernet interface 335 would accept the links to the muxes. Those skilled in the art will recognize other interfaces and protocols which could support these functions in accord with the invention. ('429 11:19-28).

Thus, because Sprint chose to describe its invention, and not just an example of a preferred embodiment, as the transmission of ATM cells over the selected virtual connections in

an ATM network, the limitation "*asynchronous communication*" means, exclusively, a communication over an ATM network. Sprint effectively excluded communications over other networks from the scope of the claim. Therefore other networks do not fall within the scope of, and thus cannot infringe, Claim 23 of the '429 Patent.

b. The Vonage System Does Not Have The Equivalent Of Converting The User Communication Into An Asynchronous Communication

An equivalent to converting the user communication into an asynchronous communication would have to perform substantially the same function in substantially the same way to get substantially the same result. For example, converting a user communication to a communication for transmission over a pre-provisioned virtual connection in a network may be equivalent if the network behaves like an ATM network. However, as I described previously, an ATM network functions very differently from the Internet, and Sprint has not identifed an equivalent.

c. Dr. Wicker Has Not Shown That The Vonage System Has An Interworking Unit To Convert The User Communication Into An Asynchronous Communication With The Identifier In A Header

Dr. Wicker concludes that an IP network is an asynchronous communication network, and therefore that an RTP voice packet is an asynchronous communication. However, Dr. Wicker's interpretation ignores the express teaching of the specification that the invention includes and thus requires transmission of ATM cells over selected virtual connections in an ATM network. Thus, there is no support in the specification for Dr. Wicker's position.

b. The Other Asserted Claims of the '429 Patent Are Not Infringed

In Appendix F, I have included a claim chart expressing my opinion that the remaining asserted claims of the '429 patent are likewise not infringed, literally, or under the doctrine of equivalents.

2. Non-infringement Of The '294 Patent

In my opinion, the Vonage System does not infringe any of the asserted independent claims of the '294 Patent. Therefore, the asserted dependent claims cannot be infringed as well. The basis for my opinion is that there are limitations in the asserted claims of the '294 Patent that are not present in Vonage's System, either literally or under the doctrine of equivalents.

a. Opinion Regarding Non-infringement Of Claim 19

Claim 19 recites:

19. A method of transferring a telecommunication signal, the method comprising:

transferring a first signal component including user information from a narrowband communication signal; and

transferring a second signal component including an identifier for routing the user information,

wherein the identifier is selected by processing a signaling message, wherein an interworking device receives the narrowband communication signal and a control signal indicating the narrowband communication signal and the identifier, and in response to the control signal, converts the narrowband communication signal into a packet format having the first signal component including the user information and the second signal component including the identifier to form the telecommunication signal.

Sprint has asserted that Claim 19 is infringed by Vonage when processing an Inbound Call. However at least the following claim limitations do not exist in the Vonage System:

1. *Transferring a second signal component including an identifier for routing the user information wherein the identifier is selected by processing a signaling message.*

2. *Interworking device*

3. *Converts the narrowband communication signal into a packet format*

Each of these limitations is addressed below.

(1) The Vonage System Does Not Transfer a Second Signal Component Including An "Identifier"

Claim 19 requires "transferring a second signal component including an identifier for routing the user communication, wherein the identifier is selected by processing a signaling message."

As I described above with respect to the '429 Patent, "identifier" means VPI, VCI or combination thereof. Thus, for the same reasons I provided with respect to the "identifier" limitation in the '429 Patent, the Vonage System does not and cannot transfer a second signal component including an identifier, wherein the identifier is selected by processing a signaling message.

(2) Dr. Wicker does not support Sprints contention that an identifier can be an IP address

In his report on page 46 Dr. Wicker describes at a very highlevel the operation of the Vonage system. He identifies an IP address as an "identifier." As with his similar description on page 50 regarding the '429, he does not identify where he finds support for this broad reading. As I discussed relative to the '429 patent, and other discussions of the scope of the specification, Dr. Wicker's conclusion is incorrect and unsupported.

(3) The Vonage System Does Not Have an "Interworking Device"

Claim 19 requires an "interworking device" to receive the narrowband communication signal and a control signal.

As I described above with respect to the '429 Patent based on Sprint's explicit statement in the specification, "interworking device" means an ATM interworking multiplexer. Thus, for the same reasons I provided with respect to the "interworking device" limitation in the '429 Patent, the Vonage System does not have an interworking device.

(4) Dr. Wicker Does not Support Sprints Contention that the Vonage System has an Interworking Unit

In his report on page 46, Dr. Wicker asserts that the interworking device is the Vonage Media Gateway. As I discussed in the discussion of the '429 patent, and III (F), this appears to refer to the SIP gateway which is definitely not the required "ATM Interworking Multiplexer."

(5) Dr. Wicker does not Support Sprints Contention that the Vonage System IP Voice as the Packet Format of the Claim

In his report on page 46, Dr. Wicker asserts that the IP packets used to carry RTP are the packets of this claim. Dr. Wicker does not identify any support for this interpretation, and does not address the ATM centric nature of the patent.

(6) The Vonage System Does Not Convert The Narrowband Communication Signal Into A Packet Format

Claim 19 requires that the interworking device convert the narrowband communication signal into a packet format.

The summary section of the specification of the '294 patent specifically states that the invention includes the conversion of the user information into ATM cells that identify the selected virtual connection:

> The method also includes receiving the user information for the call from the particular connection into the ATM interworking multiplexer, converting the user information into ATM cells that identify the selected virtual connection in response to the new signaling, and transmitting the ATM cells over the selected virtual connection. ('294 2:21-27)

Thus, the invention is described as converting user information into ATM cells that will include a VPI/VCI (the identifier) and a digitized voice stream (the user information). The specification does not use the term "packet" for use with the user communications; only ATM cells are discussed. The specification does, however, use the term "packet" for use with the signaling messages only. Thus, Sprint's use of the limitation "packet format" refers to the ATM cells.

As I described above, the Vonage System uses VOIP packets, not ATM cells, and thus the Vonage System does not have "packets" as that limitation is used by Sprint in the '294 Patent. Additionally, as previously described, there are substantial differences between ATM cells and VoIP packets and thus, because of this difference, it is my opinion that a VoIP packet is not equivalent to an ATM cell.

b. The Other Asserted Claims of the '294 Patent Are Not Infringed

In Appendix F, I have included a claim chart expressing my opinion that the remaining asserted claims of the '294 patent are likewise not infringed, either literally or under the doctrine of equivalents.

3. Non-infringement Of The '064 Patent

In my opinion, the Vonage System does not infringe any of the asserted independent claims of the '064 Patent. Therefore, the asserted dependent claims cannot be infringed as well. The basis for my opinion is that there are limitations in the asserted claims of the '064 Patent that are not present in Vonage's System, either literally or under the doctrine of equivalents.

a. Opinion Regarding Non-infringement Of Claim 1

Claim 1 recites:

1. A communication method for a call comprising:

receiving set-up signaling associated with the call into a processing system;

processing the set-up signaling in the processing system to select a DS0 connection;

generating a message identifying the DS0 connection;

transmitting the message from the processing system;

receiving the message and an asynchronous communication associated with the call into an interworking unit;

in the interworking unit, converting the asynchronous communication into a user communication; and

transferring the user communication from the interworking unit to the DS0 connection in response to the message.

Sprint has asserted that Claim 1 is infringed by Vonage when processing an Outbound Call. However at least the following claim limitations do not exist in the Vonage System:

1. *Receiving the message and an asynchronous communication associated with the call into an interworking unit.*

2. *In the interworking unit, converting the asynchronous communication into a user communication.*

3. *Transferring the user communication from the interworking unit to the DS0 in response to the message.*

Each of these limitations is addressed below.

(1) The Vonage System Does Not Receive the Message And "An Asynchronous Communication" Associated With The Call Into An "Interworking Unit"

Claim 1 requires an "asynchronous communication" to be received in an "interworking unit." For the same reasons described with respect to the terms "asynchronous communication" and "interworking unit" in the '429 and '294 Patents, these limitations are not present in the Vonage System either literally or under the doctrine of equivalents.

(2) Dr. Wicker Does not Support Sprints Contention that the Vonage System has an Interworking Unit.

On page 49 of his report, Dr. Wicker simply asserts that Vonage media gateway is the interworking unit of the claim. He also asserts that the IP voice packets of the Vonage system are the asynchronous communication of the claim. However, he provides no support for these assertions.

(3) The Vonage System Does Not Covert The "Asynchronous Communication" Into A User Communication In The "Interworking Unit"

Claim 1 requires an "asynchronous communication" to be converted in an "interworking unit." For the same reasons described with respect to the terms "asynchronous communication" and "interworking unit" in the '429 and '294 Patents, these limitations are not present in the Vonage System either literally or under the doctrine of equivalents.

(3) The Vonage System Does Not Transfer The User Communication From The Interworking Unit

Claim 1 requires the "interworking unit" to transfer a user communication. For the same reasons described with respect to the term "interworking unit" in the '429 and '294 Patents, this limitation is not present in the Vonage System either literally or under the doctrine of equivalents.

(4) Dr. Wicker Does Not Provide Support For Infringement Of The Vonage System Utilizing A Single Gateway

As I described in Sec. III(F)(6), the Vonage System previously utilized a SIP gateway (instead of a separate Media Gateway and Signaling Gateway) for Outbound Calls. In his report, Dr. Wicker relies on the Media Gateway and Signaling Gateway being separate entities, the Signaling Gateway in the processing system and the Media Gateway being the interworking unit outside the processing system. Dr. Wicker does not provide any support for infringement in the case where the Vonage System uses a single gateway.

b. The Other Asserted Claims of the '064 Patent Are Not Infringed

In Appendix F, I have included a claim chart expressing my opinion that the remaining asserted claims of the '064 patent are likewise not infringed, either literally or under the doctrine of equivalents.

4. Non infringement Of The '932 Patent

In my opinion, the Vonage System does not infringe any of the asserted independent claims of the '932 Patent. Therefore, the asserted dependent claims cannot be infringed as well. The basis for my opinion is that there are limitations in the asserted claims of

the '932 Patent that are not present in Vonage's System either literally, or under the doctrine of equivalents.

a. Opinion Regarding Non-infringement Of Claim 18

Claim 18 recites:

18. A communications system for handling a call having a first message and communications, the communication system comprising:

a processing system external to narrowband switches and configured
to receive and process the first message to select one of the narrowband switches and
to generate and transmit a second message based on the selected narrowband switch;
and

an asynchronous communication system configured to
receive the second message and the communications and
transfer the communications to the selected narrowband switch in response to the second message.

Sprint has asserted that Claim 18 is infringed by Vonage when processing an Outbound Call. However, at least the following claim limitations do not exist in the Vonage System:

1. *A processing system external to the narrowband switches configured to*

   (a) *receive the first message*;

   (b) *process the first message to select one of the narrowband switches*;

Each of these limitations is addressed below:

(1) The Vonage System Does Not Have A Processing System External To The Narrowband Switches to Receive The First Message

Claim 1 requires a processing system external to the narrowband switches to receive the first message.

(a) The First Message Is The Signaling Information Associated With A Telephone Call That Is Received Directly by The Processing System.

The only call described in the specification of the '932 Patent is a telephone call. In the case of a telephone call made on a PSTN telephone, the first message of a telephone call is the signaling message. The signaling message of a phone call can be SS-7 signaling or Q.931 signaling. The specification of the '931 Patent describes that the processor processes signaling before it is applied or processed by the switch, and the Sprint argued that this was an important feature that distinguished over cited references in the patent prosecution file history of its parent . In the '605 patent application, Sprint added the limitation "receiving a telecommunications signaling message into a processor that is located externally to any switch" and argued that this feature distinguished over the cited references:

> In the claim, the signaling processor sends a signaling message to a switch that did not generate a query. In contrast, SCPs only respond to the switch that sent the query. This claimed distinction is made possible because the claimed signal processor receives the same signaling messages typically received by switches. It can then process this signaling to generate new signaling messages for transmission to any switch needed-to establish the communications path. (Office Action Response dated December 12, 1995, page 16 discussing Claim 121.)

Thus, the first message is the signaling message accompanying a telephone call that is sent directly to the processing system, i.e., SS-7 or Q.931. In the Vonage System during an Outbound Call, SS-7 or Q.931 is not sent to the OB Proxy Server. As I described in Sec. III(F)(3) above, for an Outbound Call originating with a Vonage customer, the signaling message received with the telephone call is typically the dialed digits, i.e., narrowband signaling. The narrowband signaling is received by a TA which creates new signaling in the form of a SIP Invite message. This new signaling is received by the OB Proxy Server of the Vonage System.

Thus, Vonage does not have a processing system external to the narrowband switch to receive the first message.

(b) The New Signaling Message Generated By The Telephone Adapter Is Not Equivalent To The First Message.

Nor can the processing of the new signaling message generated by the TA be considered to be equivalent under the doctrine of equivalents. As I described in Sec. III above, signaling for the PSTN and SIP signaling function substantially different and therefore can not be deemed to be equivalents.

(c) Dr. Wicker Has Not Shown That the Vonage System Has a Processor That Receives a First Message

In his report, Dr. Wicker says this limitation is found in the Vonage System by characterizing the SIP message generated by the TA as the claimed "first message". However, Wicker's report provides no support for how the SIP message can be the "first message" in view of Sprint's statements that the processing system receives the same signaling messages typically received by switches.

(2) The Vonage System Does Not Have A Processing System External To The Narrowband Switches to Process The First Message To Select One Of The Narrowband Switches

Claim 18 requires a processing system external to the narrowband switches to process the first message to select one of the narrowband switches. In addition, to reasons for non-infringement I discussed above with respect to the "first message", this limitation is not present for the further reasons discussed below.

(a) The Vonage System Does Not Select a Narrowband Switch

In the specification for the '932 Patent, Sprint defined that a network element is a telecommunications device such as a switch, and that a connection is the media between two network elements. (Col 4, lines 55-60.) Throughout the specification, the applicant made it clear that the call control processing system (CCP) could select network elements, connections, or both. For example, the specification describes how the processor may select switches or DS0 connections:

> The CCP may select network elements such as switches ....The CCP may select connections, such as DS0 circuits and ports. Col. 13, lines 32-35.

The specification also describes how the processing system could select both a narrowband switch and a connection on the switch:

> In one embodiment, CCP 120 selects the network elements and the connections that comprise the communications path. (Col. 6, lines 23-25).
>
> As a result of the processing, a narrowband switch and a DS0 port on that switch are typically selected as shown in box. (620. Col. 16, lines 41-43).
>
> The specification also describes how the processor may select only the switches and not the connections:
>
> In another embodiment, CCP120 may select only the network elements and not the connections. (Col. 6, lines 62-63)

Thus, in the specification of the '932 Patent, Sprint clearly distinguished between selecting a network element, such as a switch and selecting a network connection.

As I described above in Sec. III(F)(3), for an Outbound Call originating with a Vonage customer making a call to a party connected to the PSTN, the Signaling Gateway selects a DS0 connection as a function of load balancing for across trunks and circuits. The Media Gateway

maybe associated with several narrowband switches, each narrowband switch having several DS0s connecting to the Media Gateway. Thus, the Vonage System selects the DS0, or in the terms of the '932 Patent, the connection between the Media Gateway and narrowband switch, but does not select the narrowband switch. Therefore, the limitation of the processor selecting a narrowband switch is not literally present in the Vonage system.

(b) Selecting A Narrowband Switch Is Not Equivalent To Selecting a DS0 Connection

I understand that material disclosed in the specification of a patent, but not claimed, dedicates that unclaimed material to the public, thereby precluding coverage under the doctrine of equivalents. In the present case, the applicant disclosed that the processing system may select the narrowband switch, a DS0 connection, or both. However, in Claim 18, Sprint chose to only claim the selection of the narrowband switch, thus the selection of the DS0 connection is dedicated to the public and Sprint is precluded from asserting that selecting a DS0 connection is equivalent under the doctrine of equivalents.

(c) Dr. Wicker Has Not Shown That the Vonage System Has a Processor That Selects A Narrowband Switch

In his report, Dr. Wicker recognizes that the Signaling Gateway in the Vonage System selects "a specific circuit connection between a media gateway and the PSTN" and not the narrowband connection. However, Dr. Wicker assumes that the selection of a specific circuit connection is equivalent to selecting a narrowband switch, which appears to be improper in view of my discussion above.

(3) Dr. Wicker Does Not Provide Support For Infringement Of The Vonage System Utilizing A Single Gateway

As I described above in Sec. III(F)(6), the Vonage System previously utilizes a SIP Gateway (instead of a separate Media Gateway and Signaling Gateway) for Outbound Calls. In his report, Dr. Wicker relies on the Media Gateway and Signaling Gateway being separate entities, the Signaling Gateway in the processing system and the Media Gateway in the asynchronous communication system. Dr. Wicker does not provide any support for infringement in the case where the Vonage System uses a single gateway.

b. The Other Asserted Claims of the '932 Patent Are Not Infringed

In Appendix F, I have included a claim chart expressing my opinion that the remaining asserted claims of the '932 patent are likewise not infringed, either literally or under the doctrine of equivalents.

5. Non-infringement Of The '052 Patent

In my opinion, the Vonage System does not infringe any of the asserted independent claims of the '052 Patent. Therefore, the asserted dependent claims cannot be infringed as well. The basis for my opinion is that there are limitations of the asserted claims of the '052 Patent that are not present in Vonage's System either literally, or under the doctrine of equivalents.

a. Opinion Regarding Non-infringement Of Claim 1

Claim 1 recites:

1. A method of transferring a user communication to a packet communication system, the method comprising:

receiving the user communication into a device;

receiving signaling formatted for a narrowband system into a processing system;

in the processing system,
processing the signaling to select a network code that identifies a network element to provide egress for the user communication from the packet communication system;
transferring an instruction indicating the network code from the processing system to the device; and
transferring a packet including the network code and the user communication from the device to the packet communication system in response to the instruction.

Sprint has asserted that Claim 1 is infringed by Vonage when processing an Inbound Call. However, at least the following claim limitations do not exist in the Vonage System:

1. *Receiving signaling formatted for a narrowband system into a processing system.*

2. *In the processing system, processing the signaling to select a network code that identifies a network element to provide egress for the user communication.*

Each of these limitations is addressed below

(1) The Vonage System Does Not Receive Signaling Formatted for A Narrowband System Into A Processing System

Claim 1 requires "receiving signaling formatted for a narrowband system into a processing system.

(a) SIP Signaling is Not Formatted for A Narrowband System

The limitation "signaling formatted for a narrowband system" means that the signaling is received in the same format as it would be received at a switch in the PSTN. As I described above with respect to the '932 Patent, Sprint described that it was important and necessary that the processing system receive signaling in the same format that the switch received it. In addition, Sprint described that preferably, no or minimal changes are made to the signaling prior

to the signaling being received by the CCP, so that the CCP receives the signaling in the same format as a switch would receive the signaling. Also, during the prosecution of the '052 Patent, Sprint amended the claims to add that the signaling was formatted for a narrowband system, and argued that the claim was distinguishable over the prior art LaPorta '852 Patent "by requiring the processor to handle narrowband signaling." (Office Action Response dated June 16, 2000, page 3).

Further, the applicant added the language "format identical to signaling received by a switch" in a new claim in the '780 Patent and explained that the limitation of receiving signaling as intended for a switch was not found in the prior art:

> The processor can receive signaling in a format identical to signaling received by a switch . The signaling can be processed to produce information used to establish communication paths. The processor also can generate and transmit new signaling based on this information to a plurality of signaling points. The cited references do not teach or suggest a processor with these requirements. The cited references employed processors which could not handle signaling in the format received by a switch since they received switch queries and not the signaling intended for a switch ('605 App. Amend A p. 27

Thus, Sprint made it clear that the claimed processor can receive signaling in a narrowband format.

As I described above in Section III(F)(2), in the case of an Inbound Call from a PSTN customer to a Vonage customer, the signaling is received into the SIP Gateway as narrowband signaling. The SIP Gateway generates new signaling in the form of a SIP Invite message and sends the SIP Invite message to an I/B Proxy Server. Thus, the processing system in the Vonage System receives signaling (a SIP message) in a broadband format and not in the narrowband format received by a switch in the PSTN. Therefore, the limitation of receiving signaling formatted for a narrowband system into a processing system is not found in Vonage's System.

(b) Broadband Signaling is Not The Equivalent Of Narrowband Signaling

I understand that the doctrine of equivalents cannot be applied to a claim limitation in a manner that would effectively ignore or eliminate that limitation from the claim. In the present case, the claim limitation "formatted for a narrowband system" would be completely eliminated if broadband SIP signaling were deemed to be an equivalent. Thus, this limitation is not present in the Vonage System under the doctrine of equivalents.

(c) Dr. Wicker Has Not Shown That The Processing System In The Vonage System Receives Signaling Formatted for a Narrowband System

In his report, Wicker agrees that the SIP Gateway receives narrowband signaling and generates a new SIP signaling message. Thus, it appears that Wicker agrees that the limitation is not found literally, but he fails to explain how this limitation is met under the doctrine of equivalents.

(2) The Processing System of The Vonage System Does Not Select a Network Code that Identifies A Network Element to provide Egress For the User Communication From The Packet Communication System

Claim 1 requires that the processing system process the signaling to select a network code that identifies a network element to provide egress for the user communication.

(a) The Processing System Does Not Select a Network Code

A network code is the logical address of a network element. For a network element attached to the Internet, the logical address is the IP address and port of the network element that is used to route the communication through the Internet.

As I described above in Sec III(F)(2) for an Inbound Call from a PSTN customer to a Vonage customer, the TA of the Vonage customer generates a SIP 200 OK message which identifies the IP address and the UDP port on which the telephone adapter will receive the RTP voice packets. Thus, the processing system of the Vonage System does not select the network code of the TA, but rather the TA informs the processing system of the network code. Therefore, the limitation that the processor selects the network code is not literally present in the Vonage System.

(b) The Processing System In The Vonage System Does Not Select the Equivalent Of The Network Code For The User Communication

I understand that the doctrine of equivalents cannot be applied to a claim limitation in a manner that would effectively ignore or eliminate that limitation from the claim. In the present case, the claim limitation "selecting a network code to provide egress for the user communication" would be eliminated if the processing system received the network code from the TA instead of selecting it itself. Thus, this limitation is not present in the Vonage System under the doctrine of equivalents.

(c) Dr. Wicker Has Not Shown That The Processing System In The Vonage System Receives Signaling Formatted for a Narrowband System

In his report, Dr. Wicker asserts that the outbound proxy of the Vonage System selects the IP address of the TA and includes this in the message for routing the user communication. However, as I explained above in Sec. III(F)(3), the IP address and UDP port contained in the SIP 200 OK message sent to the SIP Gateway is selected by the TA and not the outbound proxy.

b. The Other Asserted Claims of the '052 Patent Are Not Infringed

In Appendix F, I have included a claim chart expressing my opinion that the remaining asserted claims of the '052 patent are likewise not infringed, either literally or under the doctrine of equivalents.

6. Non-infringement Of The '561 Patent

In my opinion, the Vonage System does not infringe any of the asserted independent claims of the '561 Patent. Therefore, the asserted dependent claims cannot be infringed as well. The basis for my opinion is that there are limitations in the asserted claims of the '561 Patent that are not present in the Vonage System either literally, or under the doctrine of equivalents.

a. Opinion Regarding Non-infringement Of Claim 24

Claim 24 recites:

24. A method of operating a processing system to control a packet communication system for a user communication, the method comprising:

selecting a network code that identifies a network element to provide egress for the user communication from the packet communication system to a narrowband communication system;

generating a control message indicating the network code and transferring the control message from the processing system to the packet communication system; and

generating a signaling message for the user communication and transferring the signaling message from the processing system to the narrowband communication system;

receiving the user communication in the packet communication system and using the network code to route the user communication through the packet communication system to the network element; and

transferring the user communication from the network element to the narrowband communication system to provide egress from the packet communication system.

Sprint has asserted that Claim 24 is infringed by Vonage when processing an Outbound Call. However, at least the following claim limitations do not exist in the Vonage System:

1. *In the processing system, selecting a network code that identifies a network element to provide egress for the user communication*

This limitation is addressed below.

(1) The Processing System of The Vonage System Does Not Select A Network Code that Identifies A Network Element to Provide Egress For the User Communication From The Packet Communication System

Claim 24 requires that the processing system process the signaling to select a network code that identifies a network element to provide egress for the user communication from the packet communication system to the narrowband communication system.

(a) The Processing System Of The Vonage Does Not Select a Network Code

A network code is the logical address of a network element. For a network element attached to the Internet, the logical address is the IP address and port that is used by the Internet to route the communication.

As I described above in Sec. III(F)(3), for an Outbound Call from a Vonage customer to a PSTN customer, the Media Gateway generates an MGCP message containing SDP information that identifies the IP address and RTP port of the Media Gateway. Thus, it is the Media Gateway which selects the network code and not the processing system and therefore this limitation is not literally present in the Vonage System.

(b) The Processing System Does Not Select the Equivalent Of The Network Code For The User Communication

I understand that the doctrine of equivalents cannot be applied to a claim limitation in a manner that would effectively ignore or eliminate that limitation from the claim. In the present case, the claim limitation "selecting a network code to provide egress for the user communication" would be eliminated if the processing system received the network code from the Media Gateway instead of selecting it itself. For example, the specification describes the importance of centralized control of the switching so less expensive switches may be used. Thus, this limitation is not present in the Vonage System under the doctrine of equivalents.

(c) Dr. Wicker Has Not Shown That The Processing System In The Vonage System Receives Signaling Formatted for a Narrowband System

In his report at page 41, Dr. Wicker agrees that a network code is the IP address and port of the Media Gateway. However, Dr Wicker incorrectly assumes that the Signaling Gateway selects the IP address and UDP port of the Media Gateway to receive RTP voice packets. As I described above in Sec. III(F)(3), the Signaling Gateway selects a private IP address and port to send MGCP messages to the Media gateway. This private IP address and port is not the network code that provides egress for the user communication system. Rather, the TA uses the public IP address and UDP port of the Media Gateway as selected by the Media Gateway in response to the CRCX message form the Signaling Gateway.

(2) Dr. Wicker Does Not Provide Support For Infringement Of The Vonage System Utilizing A Single Gateway

As I described above in Sec. III(F)(6), the Vonage System previously utilized a SIP Gateway (instead of a separate Media Gateway and Signaling Gateway) for Outbound Calls. In

his report, Dr. Wicker relies on the Media Gateway and Signaling Gateway being separate entities, the Signaling Gateway in the processing system and the Media Gateway in the packet communication system. Dr. Wicker does not provide any support for infringement in the case where the Vonage System uses a single gateway.

b. The Other Asserted Claims of the '561 Patent Are Not Infringed

In Appendix F, I have included a claim chart expressing my opinion that the remaining asserted claims of the '561 patent are likewise not infringed, either literally or under the doctrine of equivalents.

7. Non infringement Of The '572 Patent

In my opinion, the Vonage System does not infringe any of the asserted independent claims of the '572 Patent. Therefore, the asserted dependent claims cannot be infringed as well. The basis for my opinion is that there are limitations in the asserted claims of the '572 Patent that are not present in Vonage's System either literally, or under the doctrine of equivalents.

a. Opinion Regarding Non-infringement Of Claim 38

Claim 38 recites:

38. A system for processing telecommunications is signaling that comprises:

a first telecommunications device coupled to a first connection and a second connection and configured
to receive in-band telecommunications signaling,
to convert the in-band telecommunications signaling to an out-of-band telecommunications signaling message and
to transmit the out-of-band telecommunications signaling message,
to receive a first control message, and
to couple the first connection to the second connection in response to the first control message; and

a processor that is external to the first telecommunications device and a second telecommunications device and configured

to receive the out-of-band telecommunications signaling message from the first telecommunications device and

to process the out-of-band telecommunications signaling message to select the second connection,

to generate the first control message and a second control message that indicate the second connection, and

to transmit the first control message to the first telecommunications device and to transmit the second control message to a second telecommunications device.

Sprint has asserted that Claim 38 is infringed by Vonage when processing an Outbound Call. However, at least the following claim limitations do not exist in the Vonage System:

1. *A first telecommunications device coupled to a first connection and a second connection and configured to convert the in-band telecommunications signaling to out-of-band telecommunications signaling message.*

2.. *A processor that is external to the first telecommunications device and a second telecommunications device and configured*

a. to process the out-of-band telecommunications signaling message to select the second connection

b. to transmit the second control message to a second telecommunications device.

Each of these limitations is addressed below

(1) The First Telecommunications Device Does Not Convert In-Band Signaling to Out Of Band Signaling in The Vonage System

Claim 38 requires that the first telecommunications device convert in-band signaling to out of band signaling.

(a) The Telephone Adapter Only Provides In Band Signaling

Sprint asserts that the TA is the first device. The specification makes it clear that in-band signaling is signaling which is placed on the actual communications path, such as when only one actual connection is provided to a user premises:

> As is known in the art, in-band signaling is typically used in many user to network connections, such as the local loop. This is because only one connection or link is typically provided to the user premises and thus, the signaling must be placed on the actual communications path. ('572 7:50-54)

In the Vonage System, a TA is provided at a Vonage subscriber's premise and is connected between a cable head or DSL head and the subscriber's telephone. Typically, there is only a single connection to the cable system (or DSL system) and the single connection carries both signaling and user communication. Thus, all signaling generated by the TA is in-band since it must be placed on the actual communications path.

Further the specification describes that in-band signaling can be converted to out of band signaling when it is sent on a path that is not the actual communication path:

> "If in-band signaling is employed on connections 222 and 232, network 210 would separate at least a portion of the signaling out-of-band and transmit it to CCP 250 over link 214." ('572 8:56-59.)

Thus, because the TA does not convert in-band signaling to out of band signaling, this limitation is not literally present in the Vonage system. Moreover, because the signaling generated by the TA must be in-band signaling, and the claim requires out of band signaling, this limitation is not present under the doctrine of equivalents.

(b) Dr. Wicker Has Not Shown That The First Telecommunications Device Converts In Band Signaling To Out Of Band Signaling

In his report at page 38, Dr. Wicker asserts that an SIP Invite messages that is generated by the TA is out-of-band signaling because it is separated from the voice traffic. In support of this interpretation, Dr. Wicker identifies a portion of the specification quoted above that states:

> "If in-band signaling is employed on connections 222 and 232, network 210 would separate at least a portion of the signaling out-of-band and transmit it to CCP 250 over link 214." ('572 8:56-59.

Note, however, that this quote plainly identifies the signaling as out of band because it is being transmitted on link 214, which is separate from the actual communications path. When the signaling is received on the same actual communication path 222 or 232 it is considered in-band signaling. Because the SIP Invite message that is generated by the TA is transmitted on the actual communication path by the TA, it is in-band signaling as that term is defined in the specification for the '572 Patent.

(2) An External Processor In The Vonage System Does Not Select A Second Connection.

Claim 38 requires that the external processor select a second connection.

(a) A Connection in the Vonage System Requires a 4-Tuple

As I described above in Sec III(F)(2), in order to establish a connection between the TA and the Media Gateway, each of the devices must receive 4-tuple information. In an Outbound Call scenario, the connection between the TA and the Media Gateway cannot be established until the Media Gateway receives the MGCP message with the SDP of included in the SIP invite generated by the TA which provides the IP address and UDP port for the TA, and the TA

receives the 200 OK message generated by the Signaling Gateway which provides the IP address and UDP port selected by the Media Gateway. A processor external to TA and Media Gateway does not select this 4-tuple information, and thus this limitation is not present in the Vonage System.

(b) Dr. Wicker Has Not Shown That The Second Connection is Selected By An External processor.

In his report at page 39, Dr. Wicker asserts that the second connection is the "IP addresses for the media gateway and the TA define the IP portion of the call." However, the IP addresses and UDP ports of the TA and Media Gateway are not selected by an external processor as described above. Alternately, Dr. Wicker asserts that the IP address for the RTP relay is used to define "the connection", but does not provide sufficient description to understand what connection Dr. Wicker is referring to. I will note that when an RTP relay is used, the Vonage system SIP proxies and signaling gateway (alleged to be processing system recited in the claim) does not select the UDR port numbers of the RTP relay. So even if Dr. Wicker provides a clear explanation of how the RTP relay is "equivalent," the processing system still would not "select a second connection."

(3) An External Processor Does Not Transmit A Second Message To The Second Device

Claim 38 requires that the external processor transmit the second control message to a second communications device. In his report at page 39, Dr. Wicker asserts that "The SIP Invite message sent to the media gateway constitutes a second control that indicates the second connection". However, the SIP Invite is generated by the TA, which Dr. Wicker has asserted is the device. Thus, it is not clear how Dr. Wicker is reading the TA to be the first device, as well as a processor external to the first device.

b. The Other Asserted Claims of the '572 Patent Are Not Infringed

In Appendix F, I have included a claim chart expressing my opinion that the remaining asserted claims of the '572 patent are likewise not infringed, either literally or under the doctrine of equivalents.

III. RESERVATION OF RIGHTS

This report presents my opinions to date regarding the matters set forth above. As additional data, information, or testimony becomes available to me or is provided to me, I intend to consider this information. For example, I understand that the Court has not yet construed the claims. I expect to supplement my report when the Court construes the claims or if Sprint, through Dr. Wicker, or otherwise, changes its claim construction. I thus reserve the right to modify or supplement this report or the opinions contained herein if I find it appropriate to do so in light of any additional information. I may also be called upon to, and intend to if asked, provide expert testimony in rebuttal to any proofs put forth by Sprint or any opinions expressed in expert reports on behalf of Sprint

Date: 28-Feb-2007

Joel M. Halpern