EXHIBIT B

THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF KANSAS

SPRINT COMMUNICATIONS COMPANY L.P.,

Plaintiff,

v.

VONAGE HOLDINGS CORP.,
VONAGE AMERICA, INC.

Defendants.

Case No. 05-2433-JWL

REBUTTAL EXPERT REPORT OF DR. STEPHEN B. WICKER REGARDING INFRINGEMENT OF U.S. PATENT NOS. 6,665,294, 6,298,064, 6,473,429, 6,304,572, 6,633,561, 6,463,052, and 6,452,932

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I. INTRODUCTION AND QUALIFICATIONS

My name is Stephen B. Wicker. I have been retained as an expert by the Sprint Communications Company in connection with the litigation between Sprint and Vonage. In this report I will supplement my opinions set forth in my first report as to whether U.S. patent numbers 6,665,294, 6,298,064, 6,473,429, 6,304,572, 6,633,561, 6,463,052, and 6,452,932 (henceforth referred to, collectively, as the Christie patents) are infringed. In particular, I respond to statements made in the expert report submitted by Mr. Joel M. Halpern in his "Expert Non-Infringement Report," filed on February 28, 2007. This report sets forth the opinions I have formed in this case and provides the bases and reasons for those opinions.

My full *curriculum vitae* was attached as Exhibit A to the first report that I submitted in this case. That report also contains a summary of my educational background, career history, publications, and other relevant qualifications.

II. REBUTTAL OF MR. HALPERN'S REPORT

Mr. Halpern's opinion on noninfringement rests primarily on the assumption that the Christie patents do not apply to a voice over IP (VoIP) system. As discussed here and in my previous report, I do not agree.

In what follows, I will address the specific sections of Mr. Halpern's report.

A. "Ordinary Skill in the Art"

Mr. Halpern's opinion as to the characteristics of a person with ordinary skill in the art at the time of the inventions in question is in line with my opinion expressed in my initial report.

B. "Background Technology"

I note that Mr. Halpern has alluded, completely without evidentiary support, to "a discussion of off-path, or 3rd party control" in an ATM network. I saw no reference to such a discussion in Mr. Koperda's invalidity report.

C. "The Sprint Patents"

On pp. 14 – 16 of his report, Mr. Halpern asserts that the claims of the Christie continuation-in-part (CIP) patents are limited to ATM. I do not agree. To begin with, I note that Mr. Halpern has provided little support for this argument other than to cite to illustrative embodiments in the written description. I have been informed by counsel that the scope of the Christie patents is defined by the claims of those patents. The asserted claims do not contain language that limits the claims to ATM networks, nor has Mr. Halpern pointed to any such language. Furthermore, the inventions illustratively described in the Christie patents relate to packet network technologies. The inventions can be implemented using IP, ATM and other packet networking technologies. Specifically, A person of skill in the art would have been able to practice Mr. Christie's invention in an IP network without undue experimentation.

Finally, Mr. Halpern makes much of the fact that in an illustrative embodiment, the processing system chooses an identifier (VPI/VCI), which corresponds to a predefined path through the ATM cross connect network. This identifier is appended to voice packets by the ingress interworking unit and is used to route the voice packets to their destination such that no additional signaling is required between network elements. In the same fashion, the Vonage system appends an IP header to each packet, which is used to route voice packets through the network with no further signaling between network elements.

D. "The Vonage System"

I take issue with Halpern's characterization (pg. 25 of his report) of the Vonage system as a "distributed, intelligent endpoint architecture." In fact, the endpoints in Vonage's system are not able to communicate with one another without the support of the processing system. The proxy servers and signaling gateways in Vonage's network provide the intelligence that enable the setup of a call. Vonage's endpoints only provide information regarding their own location and update the processing system dynamically with a specific port number for a given call. This is hardly "intelligence," as Mr. Halpern contends, particularly in contrast to the extensive information contained in and functions performed by Vonage's proxy servers and signaling gateways.

On pg. 33 of his report, Mr. Halpern mentions a pre-2003 outbound call architecture that differs from the current architecture on which I based the analysis in my infringement report. I understand that information on this alternate architecture has been requested and I reserve my right to supplement my opinions in a timely manner when this information is provided by Vonage. I have also reviewed Mr. Halpern's description of this earlier system and have reached certain conclusions based on that description pending my review of further detailed information.

E. "Non-Infringement Opinion"

On pg. 33, Mr. Halpern takes issue with my infringement analysis of a NAT'd call scenario. As I made clear in my initial report, it is my opinion that an inbound or outbound call employing RTP Relays as part of Vonage's NAT solution does not depart from the intent or scope of the asserted claims and, in fact, does not alter the infringement analysis in any significant manner. That being said, per Mr. Halpern's request, I provide below a limitation-by-limitation analysis of representative claims that provide further detail with regard to NAT'd calls employing RTP Relays.

1. U.S. Patent 6,452,932

Claim 1 reads as follows:

> *1. A method for handling a call having a first message and communications, the method comprising:*
>
> *receiving and processing the first message in a processing system external to narrowband switches to select one of the narrowband switches;*
>
> *generating a second message in the processing system based on the selected narrowband switch and transmitting the second message from the processing system; and*
>
> *receiving the second message and the communications in an asynchronous communication system and transferring the communications to the selected narrowband switch in response to the second message.*

The Vonage Call Processing Infrastructure supports the transmission of digitized voice between user agent terminal adapters and media gateways. The Vonage Call Processing Infrastructure also supports signaling for setting up and tearing down telephone calls. As such, it performs a communications method for handling a call having a first message and communications. See, for example, VON-012502-012572 and VON-012447-012501

a) receiving and processing the first message in a processing system external to narrowband switches to select one of the narrowband switches;

When a provisioned Vonage customer dials a telephone number, the telephone sends dialing signals to the user's TA. The TA receives the signals, translates them into a SIP Invite message, and sends the Invite message over the Internet (or a private IP network), using SIP over IP, to the Vonage customer's associated outbound proxy. The outbound proxy is part of the Vonage Call Processing Architecture – a processing system that is external to the narrowband switches in the PSTN.

Users may also be provided with soft phones or WiFi devices [Miron Depo, 37(15 - 17)]. In this case, the "soft phone" generates SIP messages directly and sends them to the outbound proxy.

The outbound proxy forwards an Invite message over an IP network to a signaling gateway (PGW softswitch – part of the "processing system" and external to narrowband switches) that has been selected based on the dialed number.

The signaling gateway uses the dialed number contained in the SIP Invite message to select a specific circuit connection between a media gateway and the PSTN. By selecting a circuit, the two ends of the circuit – a Vonage media gateway and a narrowband (PSTN) telephone switch – are selected as well [Miron Depo, 50(8 – 11), 63(3 – 16)].

> ***b) generating a second message in the processing system based on the selected narrowband switch and transmitting the second message from the processing system; and***

The PGW softswitch sends a CRCX/SDP message using the Media Gateway Control Protocol (MGCP) to the selected media gateway. The SDP message includes the Circuit Identification Code (CIC) corresponding to a particular narrowband switch. [Halpern Report, pg. 27] It also includes information regarding that compression algorithm that will be used to support the call [Miron Depo, 56(21) – 57(6)].

> ***c) receiving the second message and the communications in an asynchronous communication system and transferring the communications to the selected narrowband switch in response to the second message.***

The Vonage media gateway is configured to receive CRCX/SDP messages generated by signaling gateways in the Vonage Call Processing Architecture. The Media Gateway and IP transport network (e.g. routers and communication links) constitute an asynchronous communication system.

The Vonage media gateway receives the CRCX message from the signaling gateway, and responds with MGCP messages that establish a VoIP communication session between the gateway and the user TA. The media gateway seizes the selected connection to the selected narrowband PSTN switch and transfers, after the appropriate signal processing (e.g. voice decompression), voice traffic received from the user TA via the RTP relay to the selected narrowband switch.

In my opinion the accused system practices all of the steps of claim 1 of the Christie '932 patent in a NAT'd call scenario as outlined above as well as a non-NAT'd scenario as outlined in my initial report.

Claim 18 reads as follows:

> *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.

One of ordinary skill would recognize claim 18 as covering calls originating in a broadband packet network and terminating to the PSTN[1]. As shown below, examples include "outbound calls" in the Vonage system.

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

The Vonage Call Processing Infrastructure supports the transmission of digitized voice between user agent terminal adapters, RTP relays and media gateways. The Vonage Call Processing Infrastructure also supports signaling for setting up and tearing down telephone calls. As such, it constitutes a communications system for handling a call having a first message and communications. See, for example, VON_012502-012572 and VON_012447-012501

e) 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

One of ordinary skill would understand a "narrowband switch," within the context of the patent, to be a device that switches individual communication channels with data rates of up to 64 kbps (e.g., a DS0). This is supported by the written description, as well as extrinsic evidence[2].

When a provisioned Vonage customer dials a telephone number, the telephone sends dialing signals to the user's TA. The TA receives the signals, translates them into a SIP Invite message ("the first message"), and sends the Invite message over the Internet (or a private IP network), using SIP over IP, to the Vonage customer's associated outbound proxy (part of the "processing system"). The outbound proxy is part of the Vonage Call

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[1] I note in passing that this claim (and many of the other asserted claims) refers to an "asynchronous communication system." Mr. Halpern does not assert that this language would not apply to an IP network, or any other type of asynchronous packet network. Instead he imports a limitation from the written description, limiting this broad term to the specific example of ATM. Had Mr. Christie wished to so limit his claims, it would have been a simple matter to use "ATM networks" instead of "asynchronous communication system." The difference in scope between the two terms would have been obvious to one of skill in the art.

[2] ISDN has both "narrowband" and "broadband" services. Broadband ISDN is defined as "a service requiring transmission channels capable of supporting rates greater than the primary rate" (i.e. >1.544 or 2.048 Mbs) [*ISDN and Broadband ISDN with Frame Relay and ATM*, 3rd Edition, by William Stallings, 1995. See also *Reference Manual for Telecommunications Engineering*, 3rd edition, Roger Freeman, 2002, pg. 2609].

Processing Architecture – a processing system that is external to the narrowband switches in the PSTN.

The outbound proxy authenticates the TA request through an authentication challenge, to which the TA replies with another Invite message containing an appropriate response to the challenge. [VON_012528, 012533]

Users may also be provided with soft phones or WiFi devices [Miron Depo, 37(15 - 17)]. In this case, the "soft phone" generates SIP messages directly and sends them to the outbound proxy.

Having authenticated the request, the Outbound Proxy decodes the SIP Invite message to determine where to forward it. The Outbound Proxy then forwards the Invite message over an IP network to a signaling gateway (PGW softswitch – part of the "processing system" and external to narrowband switches) that has been selected based on the dialed number.

The signaling gateway uses the dialed number contained in the SIP Invite message to select a specific circuit connection between a media gateway and the PSTN. By selecting a circuit, the two ends of the circuit – a Vonage media gateway and a narrowband (PSTN) telephone switch – are selected as well. [Miron Depo, 50(8 – 11), 63(3 – 16)]

The PGW softswitch sends a CRCX message (the "second message") using the Media Gateway Control Protocol (MGCP) to the selected media gateway. The SDP message includes the Circuit Identification Code corresponding to a selected narrowband switch. It also includes information regarding that compression algorithm that will be used to support the call. [Miron Depo, 56(21) – 57(6); Halpern Feb. 28 Report, at 27 - 29]

f) 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.

The Vonage media gateway is configured to receive CRCX messages generated by signaling gateways in the Vonage Call Processing Architecture. The Media Gateway and IP transport network (e.g. routers and communication links) constitute an asynchronous communication system.

The Vonage media gateway receives the CRCX message from the signaling gateway, and responds with MGCP messages that establish a VoIP communication session between the gateway and the user TA. The media gateway seizes the selected connection to the selected narrowband PSTN switch and transfers, after the appropriate signal processing (e.g. voice decompression), voice traffic received from the user TA via the RTP relay to the selected narrowband switch.

In my opinion the accused system practices all of the steps of claim 18 of the Christie '932 patent in a NAT'd call scenario as outlined above as well as a non-NAT'd scenario as outlined in my initial report. It is also my opinion that there are no substantial differences between the accused system and the asserted claims of the '932 patent.

2. U.S. Patent 6,298,064

Claim 1 reads as follows:

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.

One of ordinary skill would recognize claim 1 as covering calls originating in a broadband packet network and terminating to the PSTN. As shown below, examples include "outbound calls" in the Vonage system.

a) A communication method for a call comprising:

The Vonage Call Processing Architecture includes proxies and one or more PGW softswitches (signaling gateways) that exchange signaling related to the setting up and tearing down of voice over IP (VoIP) telephone calls. It follows that the Vonage Call Processing Architecture implements a communication method for a call. See, for example, VON_012502-012572.

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

The "set-up" signaling referred to in this limitation covers SIP Invite messages or similar messages that are generated by a User Agent' Terminal Adapter (TA), or other user device, when the User Agent dials a telephone number. The SIP messages are received by the Outbound Proxy associated with the User Agent TA. The outbound proxy forwards the Invite message to a signaling gateway (a PGW 2200 softswitch in the Vonage system). The signaling gateways and outbound proxies in the Vonage Call Processing Infrastructure are part of a "processing system."

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

The signaling gateway uses the dialed number contained in the SIP Invite message to select a specific circuit connection between a media gateway and the PSTN. The selection is made through the use of a load balancing algorithm. By selecting a circuit, the two ends of the circuit – a Vonage media gateway and a narrowband (PSTN) telephone switch – are selected as well. [Miron Depo, 50(8 – 11), 63(3 – 16)]

The Vonage media gateway serves as an interface for the audio portion of the call between the Internet and the PSTN network. The media gateways have several circuit connections to a PSTN switch. The connections are identified by circuit identification codes (CICs). The PGW softswitch uses a translation table to make the selection [Miron Depo, 65(10 – 18)]. As seen in the following excerpt, the CIC selection is equivalent to the selection of a DS0.

> *Q. How is the particular DSO selected from among the multiple DSO's on the fiberoptic link?*
>
> *MR. McPHERSON: Object to the form of the question.*
>
> *THE WITNESS: Can you repeat, repeat the question, please.*
>
> *(The reporter read back as requested.)*
>
> *MR. McPHERSON: Object to the form of the question.*
>
> *THE WITNESS: I believe you're referring to the process in the signaling gateway where it gets the trunk group and then determines using that most algorithm which DSO or CIC to attempt initially.*
>
> ...
>
> *THE WITNESS: A CIC is essentially synonymous with a DSO.*
>
> [Miron Depo, 74(20 – 75(20))]

d) generating a message identifying the DS0 connection;

The PGW softswitch generates a CRCX message that includes the port and IP address for the RTP relay [Halpern Feb. 28 Report, at 27-29]. The message identifies the CIC (DS0 connection) that will support the call.

Q. Does the signaling gateway send that CIC to the media gateway?

A. Yes, the signaling gateway would send the CIC information to the media gateway.

[Miron Depo, 62(17 – 20)]

e) transmitting the message from the processing system;

The PGW softswitch sends the CRCX message using the Media Gateway Control Protocol (MGCP) to the selected media gateway. [Miron Depo, 55(5 – 10); Halpern Feb. 28 Report, at 27]

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

The Vonage media gateway receives the CRCX message from the PGW softswitch [Miron Depo, 62 (17 – 20); Halpern Feb. 28 Report, at 29]. The Vonage media gateway also receives asynchronous communication in the form of voice packets originating from the calling party's Terminal Adapter and passed through an RTP relay.

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

The user information is converted from packet form into a narrowband format in the Vonage media gateway. *See, e.g.*, VON_012527 and 12532.

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

The narrowband user information is transferred from the Vonage media gateway to the identified DS0 connection. See, e.g., VON_012527 and 12532.

In my opinion the accused system practices all of the steps of claim 1 of the Christie '064 patent in a NAT'd call scenario as outlined above as well as a non-NAT'd scenario as outlined in my initial report.

Claim 35 reads as follows:

35. A communication system for a call comprising:

> *a processing system configured to receive set-up signaling associated with the call, process the set-up signaling to select a DS0 connection, generate a message identifying the DS0 connection, and transfer the message; and*
>
> *an interworking unit configured to receive the message and an asynchronous communication for the call, convert the asynchronous communication into a user communication, and transfer the user communication to the DS0 connection in response to the message.*

One of ordinary skill would recognize this claim as covering a call from a VoIP customer to a PSTN customer.

i) a processing system configured to receive set-up signaling associated with the call, process the set-up signaling to select a DS0 connection, generate a message identifying the DS0 connection, and transfer the message; and

The "set-up" signaling referred to in this limitation covers SIP Invite messages or similar messages that are generated by a User Agent' Terminal Adapter (TA), or other User Device, when the User Agent dials a telephone number. The SIP messages are received by the Oubound Proxy associated with the User Agent TA. The outbound proxy forwards the Invite message to a signaling gateway (a PGW 2200 softswitch in the Vonage system). The signaling gateways and outbound proxies in the Vonage Call Processing Infrastructure are part of a "processing system."

The signaling gateway uses the dialed number contained in the SIP Invite message to select a specific circuit connection between a media gateway and the PSTN. The selection is made through the use of a load balancing algorithm. By selecting a circuit, the two ends of the circuit – a Vonage media gateway and a narrowband (PSTN) telephone switch are selected as well [Miron Depo, 50(8 – 11), 63(3 – 16)].

The Vonage media gateway serves as an interface for the audio portion of the call between the Internet and the PSTN network. The media gateways have several circuit connections to a PSTN switch. The connections are referred to by circuit identification codes (CICs). The PGW softswitch uses a translation table to make the selection [Miron Depo, 65(10 – 18)]. As seen in the following excerpt, the CIC selection is equivalent to the selection of a DS0 [Miron Depo, 74(20 – 75(20)].

> *Q. How is the particular DSO selected from among the multiple DSO's on the fiberoptic link?*
>
> *MR. McPHERSON: Object to the form of the question.*
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> *THE WITNESS: Can you repeat, repeat the question, please.*
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> *MR. McPHERSON: Object to the form of the question.*
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> *THE WITNESS: I believe you're referring to the process in the signaling gateway where it gets the trunk group and then determines using that most algorithm which DSO or CIC to attempt initially.*
>
> ...
>
> *THE WITNESS: A CIC is essentially synonymous with a DS0.*
>
> [Miron Depo, 74(20 – 75(20))]

The PGW softswitch generates a CRCX message that includes the port and IP address for the RTP relay [Halpern Feb. 28 Report, at 27-29]. The message identifies the CIC (DS0 connection) that will support the call.

> *Q. Does the signaling gateway send that CIC to the media gateway?*
>
> *A. Yes, the signaling gateway would send the CIC information to the media gateway.*
>
> [Miron Depo, 62(17 – 20)]

j) an interworking unit configured to receive the message and an asynchronous communication for the call, convert the asynchronous communication into a user communication, and transfer the user communication to the DS0 connection in response to the message.

The Vonage media gateway receives the CRCX message from the PGW softswitch [Miron Depo, 62 (17 – 20); Halpern Feb. 28 Report, at 29]. The Vonage media gateway also receives asynchronous communication in the form of voice packets originating from the calling party's Terminal Adapter and passed through an RTP relay.

The user information is converted from packet form into a narrowband format in the Vonage media gateway. See, e.g., VON_012527 and 12532.

The narrowband user information is transferred from the Vonage media gateway to the identified DS0 connection. See, e.g., VON_012527 and 12532.

In my opinion the accused system practices all of the steps of claim 35 of the Christie '064 patent in a NAT'd call scenario as outlined above as well as a non-NAT'd scenario as outlined in my initial report. It is also my opinion that there are no substantial differences between the accused system and the asserted claims of the '064 patent.

Additionally, my previous analyses for the asserted dependent claims of the '064 patent remain unchanged for the NAT'd scenario.

3. U.S. Patent 6,665,294 – Claim 19

Claim 1 reads as follows:

> *1. A telecommunication signal embodied in a tangible medium, the telecommunication signal comprising:*
>
> *a first signal component including user information from a narrowband communication signal; and*
>
> *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.*

The Vonage Call Processing Architecture transfers telecommunication signals over communication media.
See, e.g., VON_012505

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

One of ordinary skill would also understand a "narrowband communication signal," within the context of the patent, to be a digital signal whose data rate is up to 64 kbps (e.g., a DS0).

In the Vonage Call Processing Architecture, a calling party residing on the PSTN can call a Vonage customer. In such cases, calls are routed to a PSTN switch at a point of presence based on the dialed number. At the POP, the PSTN switch exchanges ISDN/PRI signals with a media gateway. In particular, a D channel signaling link on the PRI is used for signaling [Miron Depo, 90(8 – 13)]. User information is then passed from the PSTN switch to the voice gateway in the form of a narrowband DS0 embedded in a DS3. The voice gateway will convert and transfer this user information over an IP network. Thus, user information (e.g., voice data) from a narrowband communication network, e.g. the Public Switched Telephone Network, is transferred from the Vonage media gateway as part of a telecommunication signal.
See, e.g., VON_012541-012542.

> ***b) a second signal component including an identifier for routing the user information, wherein the identifier is selected by processing a signaling message,***
> ***c) wherein an interworking device receives the narrowband communication signal and a control signal indicating the narrowband communication signal and the identifier, and***
> ***d) 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.***

When the call arrives at the Vonage media gateway, SIP messages are sent to an Inbound Proxy [Miron Depo, 92(7 – 21)]. The Inbound Proxy server determines the Outbound Proxy associated with the called party, and then sends a SIP message to this Outbound Proxy [Miron Depo 96(9) – 97(7)]. The Outbound Proxy in turn sends a SIP message to the called party's Terminal Adapter. [Miron Depo, 99(5 – 13), VON_012543]

The identifier for routing the user information takes the form of an IP address for a designated RTP relay to handle the NAT'd call. The RTP relay IP address and an indicator of the narrowband communication are transferred to the media gateway in a SIP message, or control message, from the proxy servers.

The interworking device called for in this limitation – the Vonage media gateway – converts user information from one transport format to another under the control of call signaling. In the Vonage Call Processing Architecture, SIP/SDP signaling from the customer TA indicates the desired transport format to the Media Gateway. In response to this signal, the Media Gateway converts the narrowband communication signal into IP packets that include the user information and the RTP relay IP address. These IP packets, which include user information and an identifier for routing, are then transferred across the IP network and through the RTP relay. See, e.g., VON_012541-012543.

In my opinion the accused system practices all of the steps of claim 1 of the Christie '294 patent in a NAT'd call scenario as outlined above as well as a non-NAT'd scenario as outlined in my initial report.

Claim 10 reads as follows:

> *10. A control signal embodied in a tangible medium, the control signal comprising:*
> *a first signal component indicating a narrowband communication signal having user information; and a second signal component indicating 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 the 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 user information and the identifier to form a telecommunication signal.*

The Vonage Call Processing Architecture transfers control signals over communication media.
See, e.g., VON_012505

> ***e) a first signal component indicating a narrowband communication signal having user information; and a second signal component indicating 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 the 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 user information and the identifier to form a telecommunication signal.***

One of ordinary skill would also understand a "narrowband communication signal," within the context of the patent, to be a digital signal whose data rate is up to 64 kbps (e.g., a DS0).

In the Vonage Call Processing Architecture, a calling party residing on the PSTN can call a Vonage customer. In such cases, calls are routed to a PSTN switch at a point of presence based on the dialed number. At the POP, the PSTN switch exchanges ISDN/PRI signals with a media gateway. In particular, a D channel signaling link on the PRI is used for signaling [Miron Depo, 90(8 – 13)]. User information is then passed from the PSTN switch to the voice gateway in the form of a narrowband DS0 embedded in a DS3. When the call arrives at the Vonage media gateway, SIP messages are sent to an Inbound Proxy [Miron Depo, 92(7 – 21)]. The Inbound Proxy server determines the Outbound Proxy associated with the called party, and then sends a SIP message to this Outbound Proxy [Miron Depo 96(9) – 97(7)]. The Outbound Proxy in turn sends a SIP message to the called party's Terminal Adapter. [Miron Depo 99(5 – 13), VON_012543]

The identifier for routing the user information takes the form of an IP address for a designated RTP relay to handle the NAT'd call. The RTP relay IP address and an indicator of the narrowband communication are transferred to the media gateway in a SIP message, or control message, from the proxy servers.

The interworking device called for in this limitation – the Vonage media gateway – converts user information from one transport format to another under the control of call signaling. In the Vonage Call Processing Architecture, SIP/SDP signaling from the customer TA indicates the desired transport format to the Media Gateway. In response to this signal, the Media Gateway converts the narrowband communication signal into IP packets that include the user information and the RTP relay IP address. These IP packets, which include user information and an identifier for routing, are then transferred across the IP network and through the RTP relay. See, e.g., VON_012541-012543.

In my opinion the accused system practices all of the steps of claim 10 of the Christie '294 patent in a NAT'd call scenario as outlined above as well as a non-NAT'd scenario as outlined in my initial report.

Claim 19 reads as follows:

> *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.*

One of ordinary skill would understand this claim to cover incoming calls – calls from PSTN customers to Vonage customers residing on a broadband network.

f) A method of transferring a telecommunication signal, the method comprising:

In what follows, I will refer to the accused system as the Vonage Call Processing Architecture. This architecture includes proxies and one or more signaling gateways (PGW softswitches) that exchange signaling related to the setting up and tearing down of voice over IP (VoIP) telephone calls. It follows that the Vonage Call Processing Architecture implements a method for transferring telecommunication signals. See, for example, VON_012502-012572.

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

One of ordinary skill would interpret "user information" in this limitation as user generated speech or digital information that is to be transmitted to a receiving user. I base this construction on the ordinary meaning of the language, as well as the context of this limitation within the claim. I note, for example, that this "user information" is to be routed under the control of signaling in the next limitation, indicating that user information is user payload, as opposed to signaling that controls the transport of user payload.

One of ordinary skill would also understand a "narrowband communication signal," within the context of the patent, to be a digital signal whose data rate is up to 64 kbps (i.e., a DS0). This is supported by the written description, as well as external evidence[3].

> *As a result of the processing, a narrowband switch and a DS0 port on that switch are typically selected as shown in box 620.*
>
> [Christie '572 Patent, 16(40 - 42)]

In the Vonage Call Processing Architecture, a calling party residing on the PSTN can call a Vonage customer. In such cases, calls are routed to a PSTN switch at a point of presence based on the dialed number. At the POP, the PSTN switch exchanges ISDN/PRI signals with a media gateway. In particular, a D channel signaling link on the PRI is used for signaling [Miron Depo, 90(8 – 13)]. User information is then passed from the PSTN switch to the voice gateway in the form of a narrowband DS0. The voice gateway will convert and transfer this user information over an IP network. See, e.g., VON_012541-012542.

> ***h) 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.***

When the call arrives at the Vonage media gateway, SIP messages are sent to an Inbound Proxy [Miron Depo, 92(7 – 21)]. The Inbound Proxy server determines the Outbound Proxy associated with the called party, and then sends a SIP message to this Outbound Proxy [Miron Depo 96(9) – 97(7)]. The Outbound Proxy in turn sends a SIP message to the called party's Terminal Adapter. [Miron Depo, 99(5 – 13), VON_012543]

The identifier for routing the user information takes the form of an IP address for a designated RTP relay to handle the NAT'd call. The RTP relay IP address and an indicator of the narrowband communication are transferred to the media gateway in a SIP message, or control message, from the proxy servers.

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[3] ISDN has both "narrowband" and "broadband" services. Broadband ISDN is defined as "a service requiring transmission channels capable of supporting rates greater than the primary rate" (i.e. >1.544 or 2.048 Mbs) [*ISDN and Broadband ISDN with Frame Relay and ATM*, 3rd Edition, by William Stallings, 1995. See also *Reference Manual for Telecommunications Engineering*, 3rd edition, Roger Freeman, 2002, pg. 2609].

The interworking device called for in this limitation – the Vonage media gateway – converts user information from one transport format to another under the control of call signaling. In the Vonage Call Processing Architecture, SIP/SDP signaling from the customer TA indicates the desired transport format to the Media Gateway. In response to this signal, the Media Gateway converts the narrowband communication signal into IP packets that include the user information and the RTP relay IP address. These IP packets, which include user information and an identifier for routing, are then transferred across the IP network and through the RTP relay. See, e.g., VON_012541-012543.

In my opinion the accused system practices all of the steps of claim 19 of the Christie '294 patent in a NAT'd call scenario as outlined above as well as a non-NAT'd scenario as outlined in my initial report.

Claim 28 reads as follows:

> *28. A method of transferring a control signal, the method comprising:*
>
> *transferring a first signal component indicating a narrowband communication signal having user information; and transferring a second signal component indicating 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 the 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 user information and the identifier to form a telecommunication signal.*

The Vonage Call Processing Architecture transfers control signals.
See, e.g., VON_012505

> ***i) transferring a first signal component indicating a narrowband communication signal having user information; and transferring a second signal component indicating 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 the 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 user information and the identifier to form a telecommunication signal.***

One of ordinary skill would also understand a "narrowband communication signal," within the context of the patent, to be a digital signal whose data rate is up to 64 kbps (e.g., a DS0).

In the Vonage Call Processing Architecture, a calling party residing on the PSTN can call a Vonage customer. In such cases, calls are routed to a PSTN switch at a point of presence based on the dialed number. At the POP, the PSTN switch exchanges ISDN/PRI signals with a media gateway. In particular, a D channel signaling link on the PRI is used for signaling [Miron Depo, 90(8 – 13)]. User information is then passed from the PSTN switch to the voice gateway in the form of a narrowband DS0 embedded in a DS3. When the call arrives at the Vonage media gateway, SIP messages are sent to an Inbound Proxy [Miron Depo, 92(7 – 21)]. The Inbound Proxy server determines the Outbound Proxy associated with the called party, and then sends a SIP message to this Outbound Proxy [Miron Depo 96(9) – 97(7)]. The Outbound Proxy in turn sends a SIP message to the called party's Terminal Adapter. [Miron Depo 99(5 – 13), VON_012543]

The identifier for routing the user information takes the form of an IP address for a designated RTP relay to handle the NAT'd call. The RTP relay IP address and an indicator of the narrowband communication are transferred to the media gateway in a SIP message, or control message, from the proxy servers.

The interworking device called for in this limitation – the Vonage media gateway – converts user information from one transport format to another under the control of call signaling. In the Vonage Call Processing Architecture, SIP/SDP signaling from the customer TA indicates the desired transport format to the Media Gateway. In response to this signal, the Media Gateway converts the narrowband communication signal into IP packets that include the user information and the RTP relay IP address. These IP packets, which include user information and an identifier for routing, are then transferred across the IP network and through the RTP relay. See, e.g., VON_012541-012543.

In my opinion the accused system practices all of the steps of claim 28 of the Christie '294 patent in a NAT'd call scenario as outlined above as well as a non-NAT'd scenario as outlined in my initial report. It is also my opinion that there are no substantial differences between the accused system and the asserted claims of the '294 patent.

Additionally, my previous analyses for the asserted dependent claims of the '064 patent remain unchanged for the NAT'd scenario.

4. U.S. Patent 6,473,429

Claim 1 reads as follows:

> *1. A communication method comprising:*
>
> *receiving information associated with a user communication into a processing system;*

processing the information in the processing system to select an identifier;

generating a message containing the identifier;
transmitting the message from the processing system;

receiving the message into an interworking unit; receiving the user communication into the interworking unit from a DS0 connection;
in the interworking unit, converting the user communication into an asynchronous communication with the identifier in a header in response to the message; and transferring the asynchronous communication from the interworking unit.

a) receiving information associated with a user communication into a processing system;

The media gateway receives signaling from the PSTN switch including the called number, and creates a SIP "Invite" message including the called number. The gateway sends the Invite message to an inbound proxy [Miron Depo, 92(7 – 21)].

The inbound proxy searches a database and determines the outbound proxy associated with the called number. The inbound proxy sends the Invite message to the outbound proxy [Miron Depo 96(9) – 97(7)].

b) processing the information in the processing system to select an identifier;
c) generating a message containing the identifier;
d) transmitting the message from the processing system;

The outbound proxy processes the narrowband called number to obtain the user location associated with the called number from its local database, creates an IP packet with the user TA's IP address, and sends the Invite message over the Internet to the TA [Miron Depo 99(5 – 13)].

The Invite message received by the TA includes the information in the initial Invite message transmitted by the media gateway [Miron Depo, 99(14 – 22)].

The TA returns an OK message including the IP address at which it will receive voice packets. The outbound proxy recognizes the TA is behind a NAT and communicates with an RTP relay to obtain available IP address and port numbers to receive and transfer the call's voice packets. The outbound proxy then creates an OK SIP message including the RTP relay's IP address and port number. The outbound proxy then sends the OK SIP message to the media gateway, back along the path followed by the initial Invite message. The OK message includes SDP information needed to set up the RTP/IP portion of the connection, including the RTP relay's IP address. [Miron Depo, 101(19) – 102(6) and 116-118]

See also, e.g., VON_012541–012543.

> ***e) receiving the message into an interworking unit; receiving the user communication into the interworking unit from a DS0 connection;***
> ***f) in the interworking unit, converting the user communication into an asynchronous communication with the identifier in a header in response to the message; and***
> ***g) transferring the asynchronous communication from the interworking unit.***

The media gateway receives the SIP OK message from the inbound proxy that contains the IP address for the RTP relay. When call setup is completed, the gateway uses this IP address as the destination address in RTP voice packets that are to be sent ultimately to the called party's TA. The gateway receives user signals from a PSTN switch in the form of a DS0 signal, converts the DS0 signal into payload for RTP voice packets, and transmits the RTP packets to the called party's TA through an RTP relay. The packets are transmitted over an IP network (an "asynchronous communication" network). See, e.g., VON_012541–012545.

In my opinion the accused system satisfies all of the limitations of claim 1 of the Christie '429 patent in a NAT'd call scenario as outlined above as well as a non-NAT'd scenario as outlined in my initial report.

Claim 23 reads as follows:

> *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.*

One of ordinary skill would recognize claim 23 as covering calls originating in a narrowband telephone network and terminating to a broadband network. As shown below, examples include "inbound calls" in the Vonage system.

> ***h) A communication system comprising:***

The Vonage Call Processing Architecture and the IP network it uses to transport calls together constitute a communication system.

i) 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

The media gateway receives signaling from the PSTN switch including the called number, and creates a SIP "Invite" message including the called number. The gateway sends the Invite message to an inbound proxy. [Miron Depo, 92(7 – 21)]

The inbound proxy searches a database and determines the outbound proxy associated with the called number. The inbound proxy sends the Invite message to the outbound proxy. [Miron Depo, 96(9) – 97(7)]

The outbound proxy processes the narrowband called number to obtain the user location associated with the called number from its local database, creates an IP packet with the user TA's IP address, and sends the Invite message over the Internet to the TA. [Miron Depo, 99(5 – 13)]

The Invite message received by the TA includes the information in the initial Invite message transmitted by the media gateway. [Miron Depo, 99(14 – 22)]

The TA returns an OK message including the IP address at which it will receive voice packets. The outbound proxy recognizes the TA is behind a NAT and communicates with an RTP relay to obtain available IP address and port numbers to receive and transfer the call's voice packets. The outbound proxy then creates an OK SIP message including the RTP relay's IP address and port number. The outbound proxy then sends the OK SIP message to the media gateway, back along the path followed by the initial Invite message. The OK message includes SDP information needed to set up the RTP/IP portion of the connection, including the RTP relay's IP address. [Miron Depo, 101(19) – 102(6) and 116-118]

See also, e.g., VON_012541–012543.

j) 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.

The media gateway receives the SIP OK message from the inbound proxy that contains the IP address for the RTP relay. When call setup is completed, the gateway uses this IP address as the destination address in RTP voice packets that are to be sent ultimately to the called party's TA. The gateway receives user signals from a PSTN switch in the form of a DS0 signal, converts the DS0 signal into payload for RTP voice packets, and transmits the RTP packets to the called party's TA through an RTP relay. The packets are transmitted over an IP network (an "asynchronous communication" network). See, e.g., VON_012541–012545.

In my opinion the accused system satisfies all of the limitations of claim 23 of the Christie '429 patent in a NAT'd call scenario as outlined above as well as a non-NAT'd scenario as outlined in my initial report. It is also my opinion that there are no substantial differences between the accused system and the asserted claims of the '429 patent.

Additionally, my previous analyses for the asserted dependent claims of the '429 patent remain unchanged for the NAT'd scenario.

5. U.S. Patent 6,304,572

Claim 1 reads as follows:

> *1. A method for processing telecommunications signaling that comprises:*
>
> *(a) receiving in-band telecommunications signaling into a first telecommunications device coupled to a first connection;*
>
> *(b) in the first telecommunications device, converting the in-band telecommunications signaling to an out-of-band telecommunications signaling message;*
>
> *(c) routing the out-of-band telecommunications signaling message from the first telecommunications device to a processor that is external to the first telecommunications device and a second communication device;*
>
> *(d) processing the out-of-band telecommunications signaling message in the processor to select a second connection coupled to the first telecommunications device and to the second telecommunications device;*
>
> *(e) generating a first control message and a second control message indicating the second connection;*
>
> *(f) transmitting the first control message from the processor to the first telecommunications device and transmitting the second control message from the processor to the second telecommunications device; and*
>
> *(g) in the first telecommunications device, receiving the first control message and coupling the first connection to the second connection in response to the first control message.*

The Vonage Call Processing Infrastructure supports signaling for setting up and tearing down telephone calls. For example, the Infrastructure translates a dialed number received from SS7 messages into an IP address, which is relayed using SIP messages. As such, it constitutes a system for processing telecommunications signaling. See, for example, VON-012502-012572 and VON-012447-012501

a) receiving in-band telecommunications signaling into a first telecommunications device coupled to a first connection;

Vonage customers are connected to the Vonage Call Processing Infrastructure through a terminal adapter (TA). The TA has a "first connection" to the customer telephone, and "a second connection," once a call is established, to a media gateway over the Internet. The TA receives in-band signaling from the customer telephone in the form of dialing information. This dialing information occupies the same channel as voice between the telephone and TA and is considered "in-band" signaling. [Miron Depo, at 42(4-12)]

b) in the first telecommunications device, converting the in-band telecommunications signaling to an out-of-band telecommunications signaling message;

c) routing the out-of-band telecommunications signaling message from the first telecommunications device to a processor that is external to the first telecommunications device and a second communication device;

The TA converts the dialing information into a SIP Invite message and transmits the SIP Invite message over the Internet to the Vonage customer's associated outbound proxy, which forwards the message to a Vonage PGW softswitch. One of ordinary skill would understand the Invite message to be separated from the voice traffic, and thus "out of band" as this term is used in the written description . The PGW softswitch is a "processor" that is "external" to the TA and the media gateway (and RTP relays). The PGW softswitch is configured to receive SIP messages from the TA by way of an outbound proxy. [Miron Depo, at 45(5)-46(2)]

d) processing the out-of-band telecommunications signaling message in the processor to select a second connection coupled to the first telecommunications device and to the second telecommunications device;

The PGW softswitch is configured to receive SIP messages from the TA by way of an outbound proxy, process the SIP messages, and select the media gateway to handle the call. In the case of a NAT'd TA, the IP address for the RTP relay is used to define the connection between TA and media gateway. [Miron Depo, at 50(3-19)]

e) generating a first control message and a second control message indicating the second connection;

f) transmitting the first control message from the processor to the first telecommunications device and transmitting the second

control message from the processor to the second telecommunications device; and

The SIP 200 OK message sent through the outbound proxy to the TA constitutes a first control message indicating the second connection. The SIP Invite message sent to the media gateway constitutes a second control that indicates the second connection. VON_0125343.

g) in the first telecommunications device, receiving the first control message and coupling the first connection to the second connection in response to the first control message.

Once the call has been established, the TA will receive a SIP 200 OK. The TA will connect the first connection to the second by accepting voice traffic from the caller, processing and converting the voice traffic into RTP packets, and transmitting the RTP packets to the media gateway using an IP address provided in the SIP message. The RTP packets may be routed through an RTP relay in a NAT'd call scenario. VON_0125343

In my opinion the accused system satisfies all of the limitations of claim 1 of the Christie '572 patent in a NAT'd call scenario as outlined above as well as a non-NAT'd scenario as outlined in my initial report. If not literally met in a NAT'd scenario, this claim is infringed under the Doctrine of Equivalents. Transmitting RTP voice packets to a destination (i.e., to the TA or media gateway) using the destination's IP address is insubstantially different from transmitting the packets to the destination using an IP address of an RTP relay that corresponds to the destination's IP address. Both perform the same function (coupling the first and second connections) in substantially the same way (routing voice packets using an IP address corresponding to the destination) to accomplish substantially the same result (voice packets are communicated between the TA and media gateway).

Claim 38 reads as follows:

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.*

The Vonage Call Processing Infrastructure supports signaling for setting up and tearing down telephone calls. For example, the Infrastructure translates a dialed number received from SS7 messages into an IP address, which is relayed using SIP messages. As such, it constitutes a system for processing telecommunications signaling. See, for example, VON_012502-012572 and VON_012447-012501

> ***h) 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***

Vonage customers are connected to the Vonage Call Processing Infrastructure through a terminal adapter (TA). The TA has a "first connection" to the customer telephone, and "a second connection," once a call is established, to a media gateway over the Internet. The TA receives in-band signaling from the customer telephone in the form of dialing information. The TA converts the dialing information into a SIP Invite message and transmits the SIP Invite message over the Internet to the Vonage customer's associated outbound proxy. The outbound proxy forwards the message to a signaling gateway (PGW softswitch). One of ordinary skill would understand the Invite message to be separated from the voice traffic, and thus "out of band" as this term is used in the written description[4]. The outbound proxy authenticates the request through an authentication challenge, to which the TA replies with another Invite message containing an appropriate response to the challenge. [VON_012528, 012533]

Once the call has been established, the TA will receive a SIP 200 OK "first control message." The TA will connect the first connection to the second by accepting voice traffic from the caller, processing and converting the voice traffic into RTP packets, and transmitting the RTP packets to the media gateway using an IP address provided in the SIP message. The RTP packets are routed through an RTP relay in the NAT'd scenario.

> ***i) 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-***

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[4] *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.* [Christie '572 patent, 8:55 – 59, emphasis added]

> ***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.***

The PGW softswitch is a "processor" that is "external" to the TA and the media gateway and RTP relays. The PGW softswitch is configured to receive SIP messages from the TA by way of an outbound proxy, process the SIP messages, and select a "second connection" – the IP address for the RTP relay is used to define the connection between the media gateway and the TA.

The SIP 200 OK message sent through the outbound proxy to the TA constitutes a first control message indicating the second connection. The SIP Invite message sent to the media gateway constitutes a second control that indicates the second connection.

See VON_012528–012532.

In my opinion the accused system satisfies all of the limitations of claim 38 of the Christie '572 patent in a NAT'd call scenario as outlined above as well as a non-NAT'd scenario as outlined in my initial report. If not literally met in a NAT'd scenario, this claim is infringed under the Doctrine of Equivalents (DOE). Transmitting RTP voice packets to a destination (i.e., to the TA or media gateway) using the destination's IP address is insubstantially different from transmitting the packets to the destination using an IP address of an RTP relay that corresponds to the destination's IP address. Both perform the same function (coupling the first and second connections) in substantially the same way (routing voice packets using an IP address corresponding to the destination) to accomplish substantially the same result (voice packets are communicated between the TA and media gateway). In addition, this analysis holds true for the asserted claims of the '561 claims.

Additionally, my previous analyses for the asserted dependent claims of the '429 patent remain unchanged for the NAT'd scenario.

6. Alleged Non-Infringement of the '429 Patent

a) Identifier

Mr. Halpern's first position regarding infringement of the '429 patent is purely an issue of claim construction. He contends that "identifier" in claim 23 should be construed as "VPI or VCI," which constitutes a clear case of reading in limitations from an illustrative embodiment despite clear disclosure that the scope of the invention is broader. Throughout the '429 specification (and that of the '064 and '294 patents) an identifier is referred to generically as corresponding to a "virtual connection." [e.g., '429, at col. 7, ll. 13-16; col. 8, ll. 61-65; col. 9, ll. 1-2]. An identifier corresponding to a virtual connection is used in the header to route voice cells/packets across the network ['429, at col. 17-31]. The inventors disclosed an ATM cross connect system and corresponding identifiers for providing these virtual connections, but recognized "numerous other techniques for providing virtual connections will be appreciated by one of skill in the art" [Christie '429 Patent, 8(61-65)].

It is my opinion that one of skill in the art that would not have construed "identifier" as used in claim 23 of the '429 patent so narrowly. In the context of the '429 patent, "identifier" should be construed as "a logical address enabling the transport of data through a network."

On pg. 36, Mr. Halpern concludes that Vonage does not "select an identifier" either literally or equivalently under his construction, i.e., that "identifier" means "VPI or VCI." His support seems to lie in a purported distinction he draws between the underlying network technology used in the illustrative ATM embodiment of the '429 patent and that used by the accused Vonage system. Specifically, Mr. Halpern contends the claim scope should be limited to "ATM cells carried over a pre-provisioned virtual connection" "identified by VPI, VCI, or a combination thereof." As discussed above, the patent explicitly recognized that "numerous other techniques" were available for providing virtual connections to route information through a network.

In fact, Mr. Halpern appears to recognize that, even given a narrow construction of "identifier," no substantial differences exist between the IP addresses used in Vonage's system and the VPI/VCI's disclosed in the patent. He provides no analysis of the identifiers themselves, but rather states that Vonage's voice packets travel over the Internet and may "travel a different path to reach the ultimate destination." He then makes the conclusory statement that "(v)oice packets carried over the Internet are substantially different from the use of ATM cells carried over a pre-provisioned virtual connection."

To begin with, Mr. Halpern seems unaware that many of Vonage's switches support MPLS (multi-protocol label switching), which would preclude Vonage's packets from "travel[ling] a different path to reach the ultimate destination." In fact, Mr. Halpern has offered no basis for his statement.

Furthermore, it is my opinion that, even given an overly narrow construction of "identifier," Vonage's use of an IP address and port number is insubstantially different from the use of VPI/VCI's as described in the '429 patent. Both are used in the packet/cell header to route packets through a network and both enable the packet network to transfer packets/cells without additional call processing and signaling between intermediate network elements. The fact that IP routing *may* result in different paths being taken by the packets constituting a given call has no impact on the fact that an IP Address is an "identifier." In addition, if an IP addressis not an "identifier," it performs the same function as a VPI/VCI (to route packets through a network), in substantially the same way (information is included in the header of an asynchronous packet to enable routing through the network without additional signaling), with substantially the same result (asynchronous packet communications are routed through the network using the identifier).

Finally, Mr. Halpern takes issue with the support I offer for my construction of "identifier," which I've addressed above as well as my failure to explicitly mention the port number as a purported component of the "identifier." An IP address identifies the host, i.e., point of egress, while a port number identifies a software process on the network node. Mr. Halpern's attempt to unnecessarily narrow the scope of this claim is without merit. An identifier in the context of the Christie patents is utilized to route packets through a packet network. Mr. Halpern points to no support in the '429 patent specification in support of his contention that "identifier" must also identify a software process or its equivalent.

b) "Generate Message Containing the Identifier"

On pg. 37, Mr. Halpern attempts to distinguish the Vonage system from asserted '429 claim 23 on the basis that the Vonage processing system does not generate a message containing the identifier. His argument begins with an unsupported assertion that the '429 Patent defines "generate a message" as "creat(ing) a new signaling message." He appears to contend that only the first message containing a particular piece of information is "generated" and that any additional messages containing this information were pre-existing. This is a contrived argument that attempts to create a distinction where none really exists. Mr. Halpern's logic does not comport with the illustrative embodiments of the invention, which include querying external network components as part of processing signaling to select an identifier. At Col. 9, ll. 60-64, the patent describes the processing of a dialed number by the processing system. It states the processing system translates the dialed number "either through its own database or by accessing a service control point (SCP)." The following passages from the '429 specification also teach the processing system querying a Service Control Point as part of processing signaling to select an identifier:

> *A SIB is a set of functions. An example of a function would be to retrieve the called number from a signaling message. SIBs are combined to build a service.* ***An example of a SIB is translating a called number.***
>
> [Christie '429 Patent, 16(2-5)]

> ***In the execution of the SIB to provide the service,*** *feature process 934 would invoke service data center 935 to create an instance of service data manager 936.* ***Service data manager 936 accesses the network databases that provide the data required for the service. Access could be facilitated by TCAP messaging to an SCP.***
>
> [Christie '429 Patent, 16(28-33)]

One of skill in the art would understand that the '429 patent disclosed the processing system querying an external database or network component as part of processing signaling to select an identifier. One of skill in the art would also understand that receiving an identifier from an external database would not then preclude the processing system from generating a message containing said identifier.

It is my opinion that this limitation is literally met by the accused Vonage system. Given the '429 disclosure of querying external components as part of generating a message containing an identifier, I conclude that, if not literally met, a SIP Invite message is generated by the Vonage processing system in substantially the same way to achieve substantially the same result as the claimed invention. Like the '429 disclosure, the Vonage Call Processing Architecture receives information from external network components to select an identifier and generates a message containing the identifier, which literally meets the claim limitation. However, if not literal, the Vonage system is an equivalent to the disclosure and asserted claims of the '429 patent.

c) "Interworking Unit"

Mr. Halpern next argues that the accused Vonage system does not have an "interworking unit" as required by claim 23. As with "identifier," this position appears to be solely rooted in a claim construction argument, as he contends that "interworking unit" should be construed as "ATM interworking multiplexer."

In support, Mr. Halpern cites portions of the Abstract and Summary of the invention disclosure and contends "(u)nlike other portions of the specification which describe preferred embodiments, the specification makes clear that the ATM interworking multiplexer is an important and necessary component of the invention." In fact, this is not the case. The '429 patent makes clear that the ATM interworking multiplexer is nothing more than an illustrative embodiment of the interworking unit and is not the only type of multiplexer, or mux, contemplated by the disclosure.

> ***Mux 130 could be any muxing system operable to place user information arriving over connection 180 on the virtual connection selected by signaling processing system 160.*** *Typically, this involves receiving signaling messages from signaling processing system 160 that identify assignments of virtual connections to an access connection on a call by call basis. The mux would convert user traffic from access connection 180 into ATM cells that identify the selected virtual connection. Mux 140 is similar to mux 130.* ***A preferred embodiment of these muxes are also discussed in detail below.***
>
> [Christie '429 Patent, 4(29-39)]

In fact, Mr. Christie didn't consider the packet network to be limited to ATM at all.

> *FIG. 4 depicts virtual connections provided by the ATM cross connect system in a version of the invention, although* ***numerous other techniques for providing virtual connections will be appreciated by one skilled in the art, and the invention contemplates any such system.***
>
> [Christie '429 Patent, 8(61-65), emphasis added]

It is interesting to note that the patentee chose to claim his invention using the term interworking unit when he was obviously aware of an ATM multiplexer. However, it is clear that the '429 patent uses the phrase "interworking unit" to describe a network component that interworks or provides a gateway functionality between narrowband and packet networks. It receives routing information from the processing system and converts user information, or voice, received from a circuit switched network to packet form with the routing information appended thereto. Vonage's media gateways literally are interworking units under the description disclosed in the '429 patent.

Mr. Halpern argues that Vonage's implementation does not have an equivalent of the interworking unit. His analysis is nothing more than the conclusory statement that "an ATM cross-connect system having fixed-length ATM cells is substantially different than the operation of the Internet using RTP voice packets." (Halpern, at pg. 39) Even assuming that "interworking unit" is construed as "ATM interworking multiplexer," Mr. Halpern's analysis regarding fixed length ATM cells is entirely irrelevant to an analysis of whether a Vonage media gateway is equivalent to an interworking unit under the doctrine of equivalents. At no point does Mr. Halpern even attempt to argue that packet or cell length is relevant to the actual claim limitations. Furthermore, he is apparently unaware that many IP switches segment packets into fixed-length pieces before routing them, as separate pieces, through a switch matrix. In short, his comment is completely irrelevant.

It is my opinion that the "interworking unit" claim limitation is literally met by the accused Vonage system's media gateway under a reasonable claim construction. Even given the overly narrow construction proposed by Mr. Halpern, Vonage's media gateways provide identical functionality to the ATM interworking multiplexers described in the '429 patent and are insubstantially different. As noted above, the Vonage media gateway provides the same function as an ATM interworking multiplexer – it converts user information, or voice, received from a circuit switched network to packet form with the routing information appended thereto. The two devices perform this function in substantially the same way – by converting synchronous user information into packet format. And, the result is the same – synchronous communications are converted into packet communications that are routed based on information contained in headers. The equivalence is further evidenced by Mr. Halpern's inability to point out any relevant distinctions between the components.

d) "Convert the User Information into Asynchronous Communication with the Identifier in a Header"

Mr. Halpern's final non-infringement position is also rooted in claim construction. He contends, as he did with "interworking unit," that "asynchronous communication" should be limited to a specific type of asynchronous communication, i.e., ATM, as opposed to any other asynchronous communication.

In the previous section above, I cited portions of the '429 specification that make clear that the disclosed communication system is compatible generally with packet technologies. Similarly, the asserted claims are not limited to any single packet technology. One of skill in the art at the time of Mr. Christie's invention would have recognized that numerous asynchronous packet networks were known and could be utilized in the context of the '429 invention. One of the primary benefits of this invention is the use of asynchronous communications to replace the inefficient synchronous circuit-switched technologies that were widely used at the time and continue to be used today, a benefit discussed at length in my initial report. Mr. Halpern does not point to any aspect of the claimed invention that would be incompatible with non-ATM asynchronous communications or require undue experimentation to implement with non-ATM asynchronous communications.

It is my opinion that "asynchronous communication" should be construed as "communication in which the transmitter and receiver do not need to be synchronized in time." The scope of the Christie patent claims include a communication system utilizing any one of multiple forms of asynchronous communications. This would include ATM communications and IP communications, both of which are identified by information in a header as opposed to their position in time. Even given the overly narrow construction proposed by Mr. Halpern, it is my opinion that this limitation is met by Vonage under the doctrine of equivalents. In an illustrative embodiment, a VPI/VCI identifier is inserted into the ATM cell header and used to route the cell through an ATM cross-connect network without further signaling within the network. Vonage's IP implementation is functionally identical, using an IP address appended to a packet header, which is used to route the packet through the Internet without signaling within the network. The ways are substantially the same – both ATM and IP switches examine the header contents and route the packets/cells accordingly. Finally, the results are the same – IP packets and ATM cells are routed through the network based on information contained in the header of the asynchronous communication packets.

e) Additional Limitations

Mr. Halpern addresses additional limitations he believes are not met by the accused Vonage system in Appendix F. Aside from those limitations addressed in the body of his report, he take issue with only one other limitation, "processing the information in the processing system to generate a compression instruction," which appears in dependent claims 21 and 43. Specifically, Mr. Halpern contends the analysis put forth in my initial expert report was unclear as to how this limitation is met by the accused Vonage system. It appears from his statement, "(i)t is not understood how can *(sic)* both the processing system and TA can generate the same SIP message," that Mr. Halpern is relying on a contrived argument – if compression information is received in a SIP message by the outbound proxy, the proxy server cannot then "generate" a message containing this compression information. As I discussed above with regard to "generating a message containing the identifier," receiving information from an external source does not preclude the processing system from generating a message containing said information. The outbound proxy does generate a SIP message containing compression instructions, which are contained in the SDP header.

7. Non-Infringement of the '294 Patent

a) Identifier

I incorporate my above discussion of "identifier."

b) Interworking Device

I incorporate my above discussion of "interworking unit."

c) Packet Format

In Sections 5 and 6 under Mr. Halpern's '294 analysis, he contends Vonage does not infringe claim 19 because they do not convert narrowband communication signals into a packet format. I incorporate my discussion of "asynchronous communication" from above.

As with the '429 patent, Mr. Halpern contends "packet format" in the '294 claims is limited to ATM cells. Finding no support for this in the specification, he makes the following unsupportable argument: "[t]he 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," which Mr. Halpern previously pointed to for non-ATM disclosure (Halpern report, at pg. 41). Therefore, "Sprint's use of the limitation 'packet format' refers to the ATM cells." I am at a loss to follow this argument. The phrase "packet format" in the asserted claims is obviously referring to user communications, but Mr. Halpern contends that the term in the '429 patent is only applicable to signaling messages. This ignores the first and primary source of guidance – the claim itself. It is my opinion that "packet format" requires no construction other than its plain and ordinary meaning. As seen in the following excerpt, the patent accounts for alternative packet technologies that may be used to implement the invention.

> *FIG. 4 depicts virtual connections provided by the ATM cross connect system in a version of the invention, although **numerous other techniques for providing virtual connections will be appreciated by one skilled in the art, and the invention contemplates any such system.***
>
> [Christie '429 Patent, 8(61-65), emphasis added]

Examples of non-ATM packet technologies disclosed in the patent for signaling, which Mr. Halpern points out, further support my opinion that one of skill in the art would have recognized that the asserted claims' use of the phrase "packet format" encompasses any of numerous available packet formats and would understand any of these could be used for user communication transport in the context of the invention of the '294 patent.

I incorporate my above discussion of "asynchronous communications" and conclude, for the same reasons, this limitation is met literally and/or under the doctrine of equivalents.

d) Additional Limitations

Mr. Halpern addresses additional limitations that he believes are not met by the accused Vonage system in Appendix F. Aside from those limitations addressed in the body of his report, he takes issue with only one other limitation, "wherein the user information comprises compressed communications," which appears in dependent claims 4 and 22. Mr. Halpern appears to confuse the antecedent of "user communications" in these dependent claims. Independent claims 1 and 10 (on which 4 and 22 depend) discuss "user information" in two contexts; 1) user information received from the narrowband network and 2) the same user information converted to packet format. Compression, as discussed in the patent, is applied to packetized user information for transport over a packet network, not user information transferred to or from the narrowband network.

> *In addition to echo control, the CCM and the mux can work to provide other digital signal processing features on a call by call basis.* ***Compression algorithms can be applied, either universally, or on a per call basis.***
>
> [Christie '294 Patent, 8(37-40)]

One of skill in the art would recognize that the discussion of compressed user information is only relevant, within the context of the patent, to transport within packet networks. This is particularly true in light of the disclosure that narrowband connectivity could be provided from a LEC as DS0 signals, which incorporate uncompressed[5] digitized voice data.

> *User 110 and user 120 could be any entity that supplies telecommunications traffic to network 100.* ***Some examples would be a local exchange carrier (LEC)*** *switch or customer premises equipment (CPE). Typically,* ***the user traffic would be provided to system 100 in DS3. DS1. or OC-3 format that have embedded DS0 and VT 1.5 circuits.***
>
> [Christie '294 Patent, 3(58-63)]

8. Non-Infringement of the '064 Patent

a) Asynchronous Communication into an Interworking Unit

I incorporate my above discussions of "asynchronous communication" and "interworking unit."

b) Single Gateway

Mr. Halpern mentions a pre-2003 outbound call architecture that differs from the current architecture on which my analyses are based. I understand that information on this

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[5] I consider companding, as used in the digitization of voice in telephone networks, as a form of non-uniform digitization, as opposed to compression.

alternate architecture has been requested and I reserve my right to supplement my opinions in a timely manner if this information is provided by Vonage.

Although I have not seen documentation regarding this alternate architecture, based on Mr Halpern's description, it would appear that infringement of the asserted '429 claims is not avoided by use of ISDN PRI connectivity as opposed to IMT's with separate signaling gateways. The '064 patent requires the processing system to select a DS0 connection. Vonage's 30(b)(6) witness, Peter Miron, testified that bearer channels on an ISDN PRI link are synonymous with a DS0.

> *Q. Earlier we talked briefly about B channels on ISDN. I just wanted to clarify that a B channel is simply a DS0; is that correct?*
> *A. Yes,* ***a B channel is a DS0.***
>
> [Miron Depo, at 109:5-8]

Given that the signal format between the two architectures is identical and a channel must be chosen to transmit voice to the PSTN, it is my opinion that Vonage's pre-2003 architecture does not avoid infringement of the asserted '429 claims. As noted, I reserve the right to update or modify this analysis once further information on the pre-2003 system is obtained.

c) Additional Limitations

Mr. Halpern addresses additional limitations he believes are not met by the accused Vonage system in Appendix F. Aside from those limitations addressed in the body of his report, he take issue with only one other limitation, "processing the set-up signaling in the processing system to generate a compression instruction," which appears in dependent claim 29. This is the same argument Mr. Halpern presented for '429 patent claims 21 and 43. Thus, I incorporate my above discussion of this issue.

9. Non-Infringement of the '932 Patent

a) Processing System Receives First Message

On pg. 51, Mr. Halpern argues that "receiving and processing the first message" in claim 1 should be limited to an SS7 or Q.931 message received directly by the processing system. Presumably because he could find no basis for this claim interpretation within the '932 patent itself, he cites an argument made in the prosecution of the unasserted '780 patent regarding an amendment to one particular claim. This citation follows commentary distinguishing the '780 claims from prior art of record. Specifically, the prosecuting attorney notes that the claims embody an invention in which a processing system receives and processes an IAM, containing the dialed number, as opposed to a switch receiving the IAM, as in traditional networks.

> *The claims are clearly distinguished from the system taught and suggested by the references. The invention is based on the concept of routing signaling messages*

> *directly to a signaling processor instead of routing those signaling messages to a switch in order to invoke an SCP.* ***In SS7 terms, this would mean routing IAMs to the signaling processor.***
>
> *[Christie '780 Patent Office Action Response dated Dec. 12, 1995, pg. 15]*

Mr. Halpern appears to agree that the dialed number is a signaling message in the context of the Christie invention.

> *"**The call setup dialed digits** is the above subscriber loop example **is one form of signaling**.*
>
> *[Halpern report, at pg. 8]*

> *"**(T)he signaling message** received with the telephone call **is typically the dialed digits**, i.e., narrowband signaling."*
>
> *[Halpern report, at pg. 51]*

Furthermore, Mr. Halpern seems to ignore that the term "first message" does not refer to a chronological progressions of signals during call set-up. In fact, the asserted claims do not require any particular sequence of events. Instead, the phrase "first message" is simply used to distinguish from a "second message." The claim itself describes the characteristics of the "first message" and the "first message" is certainly received in the processing system. Mr. Halpern's attempts to limit the term "first message" to a chronologically "first" message is unsupported by the claim language and I do not agree with his approach. The Vonage system and its processing system literally receive a "first message" within the meaning of the asserted claims.

Further, even assuming Mr. Halpern's narrow definition of "first message," the call flow appendices attached to Mr. Halpern's report show that the processing system in the Vonage system do receive information reflecting the dialed number. On the first page of Appendix D, data fields for the SIP Invite message are listed. Included in this information is a line "To: '17329102240…," which is the destination dialed number entered by a Vonage user and sent to the outbound proxy via a similar SIP Invite message. Thus, it is beyond dispute that the Vonage processing system, i.e., the proxy servers and signaling gateways, receives a dialed number for processing.

```
Outbound Vonage Call Trace

Signaling Gateway = 69.59.231.126
Proxy Server = 216.115.23.30

Received:
INVITE sip:17329102240@69.59.231.126:5060 SIP/2.0
Via: SIP/2.0/UDP 216.115.21.30:5061
Via: SIP/2.0/UDP 192.168.2.104:14332;branch=z9hG4bK-d87543-0740b76fb610b856-1--d87543-;rport
From: "Marek Niemiec" <sip:17329275556@1.voncp.com:5061>;tag=1282316131;natted=68.82.201.139
To: "17329102240" <sip:17329102240@1.voncp.com:5061>
Call-ID: 681b117004439d28NjNiNmQyYjAyZDRhMzQ4ZThiMDYxMDIxNTY5YmI1YjA.
CSeq: 2 INVITE
Contact: <sip:17329275556@216.115.21.30:5061>
Max-Forwards: 15
Content-Type: application/sdp
Content-Length:   429
```

Not only does Mr. Halpern's call flow appendix show the proxy server receiving a dialed number, but the diagram on pg. 36 labels the message sent from the signaling gateway to the signaling element as an IAM.

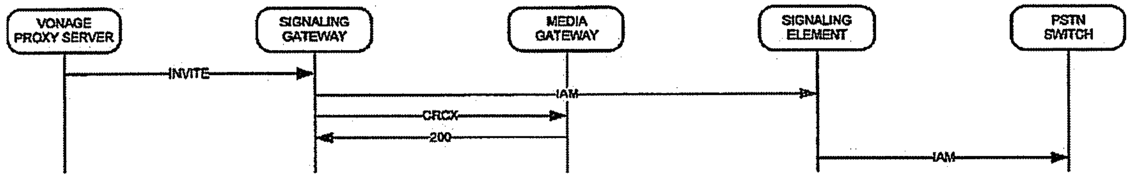

Figure A: Call Flow Appendix, Halpern Report

The information contained in Vonage's SIP Invite message sent from the TA to the processing system contains the same information necessary to form an IAM. Thus, Mr. Halpern's position that Vonage's processing system doesn't receive a "first message" in the context of the invention is based solely on nomenclature as opposed to content[6]. It is my opinion that Vonage's accused system literally meets the claim language under a reasonable interpretation of the term "first message." Even given an overly narrow construction of "first message" as proposed by Mr. Halpern, the content of the SIP Invite message received by the Vonage processing system is virtually identical to that of an SS7 IAM, performing the same function (setting up a call) in substantially the same way (providing call setup information in the form of a control packet) to achieve substantially the same result (the call is set up). It follows that the two are at least equivalent under the doctrine of equivalents.

The only other element of Mr. Halpern's argument is the reading in of a limitation that the "receiving a first message" somehow requires the message be received directly with no intervening components. Mr. Halpern, again, provides no support from the '932 patent for this position and ignores clear teachings to the contrary. The following are citations from the '932 specification that make clear the scope of the claimed invention includes routing a first message to the processing system through intermediate components:

> *The processor may also employ information received from the network elements or operational control when making selections.* ***In one embodiment, the method includes receiving the first signal into a network from a point and routing the first signal to the processor.***
>
> [Christie '932 Patent, 3(48-52)]

> *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.* ***The initial network switch typically removes the***

[6] I also note that this is one of the more extreme instances where Vonage's noninfringement and invalidity reports offer wildly different constructions for claim terms.

> ***signaling from the communications path and transfers it to an out-of-band signaling system.*** *The current invention is fully operational in this context.* ***Although the switch may receive the signaling initially, it will only route the signaling to the CCP for processing.*** *Even if in-band signaling is used within the network,* ***the switches could remove signaling from the communications path and route it to the CCP for processing in accord with the present invention.*** [Christie '932 Patent, 7(50 - 63)]

Mr. Halpern's analysis of the Vonage system in which in-band signaling is received by the TA and sent to the processing system as a SIP Invite message is precisely what is described in the above passages. It is my opinion that limiting the claim to "received directly" is in no way supported by the '932 patent's disclosure. Given the patent's teaching of a first switch or network element receiving signaling and routing it to the processing system as an out-of-band message, it is my opinion that the Vonage system meets this claim limitation, if not literally, then certainly under the doctrine of equivalents.

b) Select a Narrowband Switch

Mr. Halpern next argues that Vonage's accused system does not select a narrowband switch as required by claim 1, but rather selects a DS0 to a narrowband switch. He argues that the patent distinguished between selecting a connection (DS0) and a network element (switch), but only claimed selecting a switch, thus dedicating to the public claim coverage of selecting a connection. He relies on two embodiments disclosed in the '932 patent, one in which the processing system selects both a DS0 and the switch and another in which the processing system selects only the switch and not a particular DS0.

This argument is fundamentally flawed for two reasons. First, Mr. Halpern assumes incorrectly that an embodiment was disclosed in which a specific connection is selected, but a switch is not. Not only is this incorrect, it is logically impossible. A DS0 defines a link or a time slot on a link between two components; in this example, a network element and a switch. By selecting a DS0, the switch on the other end of the link is necessarily selected; i.e., a DS0 cannot be associated with more than two switches, one at each end of the connection. The second flaw in Mr. Halpern's logic ties in with the first. His assertion of "dedication to the public" presumes selecting a switch precludes selecting a DS0. Because both embodiments Mr. Halpern points to in the specification include selecting a switch, the claim language is properly construed to cover both scenarios.

This is further exemplified in dependent claim 6, which requires a "circuit identification code" be processed as part of selecting a narrowband switch. Vonage's 30(b)(6) witness testified that a circuit identification code (CIC) is synonymous with a DS0.

> *THE WITNESS: A CIC is essentially synonymous with a DSO.*
> [Miron Depo, 75(20)]

It continues to be my opinion that selecting a DS0 necessarily includes selecting a switch, and that Vonage literally meets this limitation. In light of the fact that each DS0 originates at a single switch, if Vonage is found to not infringe this limitation literally, it is my opinion that selecting a DS0 is insubstantially different from selecting a switch, and that Vonage infringes under the doctrine of equivalents.

c) Single Gateway

Mr. Halpern mentions a pre-2003 outbound call architecture that differs from the current architecture on which my analyses are based. I understand information on this alternate architecture has been requested and I reserve my right (within the guidelines of the Court) to supplement my opinions in a timely manner if this information is provided by Vonage.

Although I have not seen documentation regarding this alternate architecture, based on Mr Halpern's description, it would appear that infringement of the asserted '932 claims is not avoided by use of ISDN PRI connectivity as opposed to IMT's with separate signaling gateways. The '932 patent requires the processing system to select a narrowband switch. As discussed above, selecting a DS0 necessarily implies selecting a switch. I incorporate this discussion of switch selection and my discussion of the pre-2003 system from above.

d) Additional Limitations

Mr. Halpern does not address additional limitations other than those in the body of his report in Appendix F.

10. Non-Infringement of the '561 Patent

a) Processing System Selects a Network Code

On pg. 61 of his report, Mr. Halpern argues that Vonage's processing system does not select a network code for their media gateway because the media gateway responds to a query from the processing system with an RTP port number to be used for the call. He argues that since the media gateway provides this information, the processing system is not performing the selection.

As with many of the non-infringement positions addressed above, this flies in the face of the patent's disclosure. Even in the '561 patent's Summary, a section to which Mr. Halpern has given much weight, it is clear that the inventor envisioned a processing system that received information from network elements as part of the selection process. In fact, the only way that the processing system could select a code would be to obtain the codes from somewhere else. The processing system would not be aware of a given network element without that element somehow being identified to the processor. It follows that Mr. Halpern's claim interpretation would leave the claim with no scope (and in particular, would reduce the scope to the point that it did not cover the embodiments described in the patent).

> ***The processor may also employ information received from the network elements or operational control when making selections.***
> [Christie '561 Patent, 3(48-50)]

Vonage's media gateways and TA's are incapable of establishing calls without the processing system performing call setup, which includes the selection of network codes. The processing system described in the '561 patent is responsible for the same call setup functionality, which include querying network elements and external databases as part of the selection process. It is my opinion that the accused Vonage system literally meets this claim limitation. Furthermore, the Vonage processing system selects a network code of the media gateway to serve the same function of this limitation in substantially the same way while obtaining substantially the same result as disclosed in the patent. Thus, if not met literally, Vonage meets this limitation under the doctrine of equivalents.

b) Single Gateway

Mr. Halpern mentions a pre-2003 outbound call architecture that differs from the current architecture on which my analyses are based. I understand information on this alternate architecture has been requested and I reserve my right to supplement my opinions in a timely manner if this information is provided by Vonage.

Although I have not seen documentation regarding this alternate architecture, based on Mr Halpern's description, it would appear that infringement of the asserted '561 claims is not avoided by use of ISDN PRI connectivity as opposed to IMT's with separate signaling gateways. The '561 patent requires the processing system to select a network element to provide egress to a narrowband network. I am uncertain if Mr. Halpern is contending that the pre-2003 media gateway does not provide egress or if it is not selected. It is my opinion that the relevant aspects of the pre-2003 Vonage system are identical to the current system on which my initial report analysis is based.

c) Additional Limitations

Mr. Halpern addresses additional limitations he believes are not met by the accused Vonage system in Appendix F. Aside from those limitations addressed in the body of his report, he take issue with the limitation "generating a control message indicating the network code" of claim 1. Mr. Halpern appears to confuse this limitation in his chart, which reads on the SIP message indicating an IP address of the TA. He cites a portion of my initial report discussing the "receiving signaling formatted for a narrowband system into a processing system" limitation in claim 1 of the '052 patent. This is obviously describing an unrelated step in an inbound call setup process. Regardless of this oversight, Vonage's processing system does generate and transmit a SIP message indicating the TA IP address as I've discussed in my initial report.

11. Non-Infringement of the '572 Patent

a) Convert In-Band Signaling to Out-of-Band Signaling

On pg. 65, Mr. Halpern argues that the Vonage TA does not convert in-band signaling to out-of-band signaling because SIP messages destined for the processing system exit the TA on the same physical medium as RTP voice packets. As stated in my initial report on pg. 5, in-band signaling is the sending of control information in the same band, or on the same channel, as is used to carry voice and data signals. As the patent discusses, typical user connections to the PSTN consists of only a single analog communications path, thus, signaling is placed on the same channel as voice, e.g., the voice band. Unlike the links from a user to the PSTN, packet connections are not limited to a single channel. Each packet channel is defined by its source and intended destination, which are contained in the packet header. Thus, control packets addressed to the processing system may be sent out-of-band from the voice packets despite traversing the same physical medium.

Mr. Halpern's colleague, Frank Koperda, supports this interpretation of out-of-band signaling in his Feb. 28 report on invalidity. On pg. 12, he defines out-of-band signaling as the use of a separate dedicated signaling channel from the access devices. He mentions ISDN as an example of a "service that uses a separate signaling channel."

> *For call setup and control (and other administrative purposes), **it is possible to use a separate dedicated signaling channel** from the access devices into the network. **This is called out of band signaling. ISDN is one such service that uses a separate signaling channel** while Plain Old Telephone Service ("POTS") uses in-band signaling (e.g. the dialing tones). (Koperda Feb, 28, 2007 invalidity report, at pg. 12)*

ISDN signaling and voice/data are often communicated over the same physical medium, but in different channels. Mr. Halpern recognizes this on pg. 23 of his report in which he discusses ISDN signaling received on a "D-channel" by the media gateway in a Vonage inbound call.

Mr. Halpern provides no citations to the '572 patent that would in any way suggest out-of-band signaling should be construed in a way contrary to that accepted by those of skill in the art. His contention that out-of-band signaling is limited to signaling transmitted on a separate physical medium from voice/data is without merit. It is my opinion that this claim limitation is literally met by the accused Vonage system. SIP signaling messages destined for the Vonage processing system travel entirely different routes than voice packets sent to the media gateway or RTP relay. The fact that they may both traverse the same physical medium out of the TA to the packet network is insubstantially different than a situation in which two physical mediums are used to send signaling and media from the TA to their respective destinations. Thus, if this limitation is not met literally, Vonage infringes this claim limitation under the doctrine of equivalents.

b) Processor Selects a Second Connection

On pg. 66, Mr. Halpern argues that the Vonage processing system does not select a second connection between telecommunications devices as required by claim 38. This argument is akin to his '561 argument that the processing system does not select a network code. I incorporate my above discussion on that point and conclude that Vonage's processing system meets this claim limitation literally or under the doctrine of equivalents.

c) Processor Transmits Second Message

Mr. Halpern's final argument with respect to the '572 patent is not one of substance. He appears to be claiming that I have an inaccuracy in my report, taking issue with my analysis of the limitation requiring the processing system to send a second message to the second communications device. In my report, I state that this second message is a SIP invite received by the media gateway. According to Mr. Halpern's analysis of the Vonage system on pg. 27 of his report, the message sent to the media gateway is a CRCX message containing the same information contained in a SIP Invite message. Regardless of the name or form of this message, Vonage's media gateway receives a second message from the processing system identifying a second connection. This limitation is literally met by the Vonage system.

d) Additional Limitations

Mr. Halpern does not address additional limitations other than those in the body of his report in Appendix F.

III. CONCLUSION AND RESERVATION OF RIGHTS

I reserve the right to amend and/or supplement the foregoing in accordance with applicable Court rules, orders and procedures. In this and my other reports in this case, I have attempted to present sufficient technical background in response to the issues raised by Vonage's experts. However, I reserve my right, within the guidelines and rules of the Court, to provide tutorials to the Court and jury, including a tutorial and demonstratives on background technology, the patented technology and Vonage's system and related technology.

3/27/07
Date:

Dr. Stephen B. Wicker