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January 17, 2007

Via Federal Express
Philip R. Schenkenberg
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2200 IDS Center
80 South Eighth Street
Minneapolis, MN 55402

Re: : Verizon, et al vs. PUC vs. SDTA and Venture
USDC Central Division Civ. 04-3014

Dear Philip:

Enclosed please find the expert report of Larry Thompson, complete with Exhibits 1-17 in the above-referenced matter.

Sincerely,

Margo D Northrup

Darla Pollman Rogers
Margo D. Northrup
Enclosures

cc: Mr. Rich Coit
Ms. Rolayne Ailts Wiest
Mr. Randy Houdek

Expert Report

Prepared for

Civil No. 04-3014, U.S. District Court,
District of South Dakota, Central Division

Prepared by

Larry D. Thompson

Vantage Point

Customer Focused. Technology Driven.

September 1, 2005
Revised January 16, 2007

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Expert Report of Larry Thompson

I am a Professional Engineer and Chief Executive Officer of Vantage Point Solutions (VPS). VPS is a telecommunications engineering and consulting company providing a full range of services including Professional Engineering, Outside Plant Engineering, strategic planning, technology evaluations, network architecture design, regulatory expertise, and feasibility studies. VPS is headquartered in Mitchell, South Dakota and employs approximately 75 fulltime staff.

I have been an active participant in the telecommunications industry since 1985. I received a Bachelors of Arts in Physics (1983) from William Jewell College, a Bachelors of Science in Electrical Engineering (1985) from the University of Kansas, and a Masters of Science in Electrical and Computer Engineering (1986) from the University of Kansas. Prior to Vantage Point Solutions, I was General Manager for the Telecom Consulting and Engineering (TCE) Business Unit of Martin Group and previous to this, was a consultant for CyberLink Corporation (Boulder, Colorado) and a satellite systems engineer for TRW (Redondo Beach, California).

I have not testified as an expert at trial or by deposition, but have been engaged as an expert witness in a dispute between Western Wireless License L.L.C. (WWC) and several telephone companies in South Dakota[1]. I have testified before state regulatory commissions, most recently in a complaint filed by WWC and the Golden West

[1] Alliance Communications Cooperative, Inc., Beresford Municipal Telephone Company, Kennebec Telephone Company, Inc., McCook Cooperative Telephone Company, Santel Communications Cooperative, Inc., and West River Cooperative Telephone Company, Inc. vs. WWC License, L.L.C.

Companies[2]. Within the last 10 years, I have been published in United States Telecom Association's "USTA Telecom Executive"[3] magazine and National Telecom Cooperative Association's "NTCA Rural Telecommunications Magazine."[4] Several of my white papers have been included in various regulatory filings. I recently published a white paper titled, "Demystifying VoIP: Rural America's Connection to the IP-Enabled National Telecommunications Network" as part of the Foundation for Rural Service's Rural Telecom Educational Series. These publications can be provided upon request. I am being compensated for my work on an hourly basis at my regular billing rate of $115 per hour.

VPS provides engineering services to our clients for both their wireless and wireline networks. I have been involved in the design and implementation of many voice, data, video, and wireless networks. VPS provides engineering services for many of the rural local exchange carriers (RLECs) in South Dakota and I am familiar with their switching networks and capabilities. I am also an associate member of the National Exchange Carrier Association (NECA) rate development task force and am familiar with the settlement process and cost separations used by the RLECs on both the state and interstate levels.

I am familiar with South Dakota bill SB144 as well as South Dakota Codified Laws 49-31-109 through 49-31-115. On February 3, 2004, I provided testimony before the South Dakota State Senate committee regarding SB144. My handouts for this

[2] CT05-001 In the Matter of the Complaint filed by WWC License LLC against Golden West Telecommunications Cooperative, Inc., Vivian Telephone Company, Sioux Valley Telephone Company, Armour Independent Telephone Company, Bridgewater-Canistota Independent Telephone Company and Kadoka Telephone Company Regarding Intercarrier Billings

[3] "Look Who's Talking Now – Do Video and Voice Mix?", USTA Telecom Executive, September/October 2004, pg. 30-32.

[4] "A Technology for the Next Generation", NTCA Rural Telecommunications Magazine, November/December 2003, pg. 23-26.

testimony have been attached as **Exhibit 1**. On February 17, 2004, I provided testimony before the South Dakota State House of Representative committee regarding SB144. My handouts have been attached as **Exhibit 2**. The South Dakota legislation was crafted in such a way so that it would not be limited by today's signaling standards. It is recognized in the legislation that signaling standards are constantly being changed and, furthermore, there are other provisions in the legislation that allow for originating carriers to provide separate information, regardless of actual signaling capabilities, that can assist in reasonably categorizing terminated telecommunications traffic.

During the past three years, I have assisted several RLECs in identifying "phantom" traffic, so that they could bill the proper carriers the correct amount for use of the RLEC's network. During this time South Dakota RLECs have increasingly expressed their concern regarding the difficulties they encounter trying to ensure that they are able to identify all of the traffic terminating onto their networks. Many of the South Dakota RLECs' networks are behind the SDN Centralized Equal Access Services (CEAS) Tandem in Sioux Falls, South Dakota. One of the original benefits for the SDN members connecting to the SDN CEAS tandem was that all of the access records needed for billing purposes came from one source, SDN, since all access traffic was to be terminated via SDN, per the Local Exchange Route Guide (LERG). This allowed for more ease of accounting and accurate billing of traffic. However, as the frequency of other carriers using indirect connections through the RBOC tandem or direct connections into the RLEC network has increased, it has made it more difficult for the RLECs to account for the traffic terminating to their networks and bill the appropriate carrier.

In assisting the RLECs with the identification of phantom traffic, I have analyzed the Signaling System 7 (SS7) messages from the signaling network and the Automatic Message Accounting (AMA) records and Exchange Message Interface (EMI) records from various switching networks to determine the amount and type of traffic that is terminating to their networks. Some of this traffic could not be properly identified and properly billed. This type of traffic is often referred to as phantom traffic.

Phantom traffic is commonly defined as traffic for which the terminating carrier is unable to determine either the carrier responsible for payment of the call or traffic for which the terminating carrier is not able to determine the appropriate jurisdiction for properly rating the call. Phantom traffic can originate from both landline and wireless carriers. If the wireless traffic, for example, can not be properly categorized by jurisdiction (intraMTA or interMTA and interstate, or interMTA and intrastate), then the wireless traffic would be considered phantom traffic.

In performing phantom traffic studies, VPS performs a matching process between Automated Message Accounting (AMA)[5] data recorded by the Local Exchange Carrier (LEC) switch and the Exchange Message Interface[6] (EMI) received from outside sources such as the Regional Bell Operating Company (RBOC) for billing purposes. If a LEC does not have the capability to record AMA data, the matching process is completed between Signaling System 7[7] (SS7) data received from the LEC's Signal Transfer Points

[5] The automatic collection, recording, and processing of information relating to calls typically used for billing purposes. In this report, AMA is referred to as the recording of the LEC's switch traffic.
[6] The standard format used for exchange of telecommunications message information among LECs for billable, non-billable, sample, settlement and study data. In this report, EMI is referred to as the information an outside source, such as the RBOC, supplies the LEC for billing purposes.
[7] The SS7 signaling system is a packet-switched data network that forms the backbone of the international telecommunications network. The SS7 network allows call control and transaction messages from the integrated voice and data network to be transferred on communications paths that are separate from the voice and data connections. It delivers out-of-band signaling that provides fast call setup by means of high-

(STPs) and the EMI data. In some cases, all three sources of data are utilized in the matching process. Figure 1.0 in **Exhibit 3**, which outlines the Phantom Traffic Study procedures, summarizes the call recording process of a SS7/AMA network. As stated in Exhibit 3, the goal of the phantom traffic analysis is to identify the various types of traffic that are present on the EMI, AMA, and SS7 recordings and to identify the traffic types on the EAS and toll routes between the connecting carriers and the LEC exchanges. Once the traffic types are identified, these analysis results are compared to the wireless terminating records that the LEC receives from the RBOC and/or the wireless carriers.

Multiple methods are used to analyze the traffic records. VPS has utilized a specialized software program for completion of the matching process in order to compare AMA and SS7 records to the EMI records. The matching criteria are based on the call date, FromNumber and ToNumber, call start and end time variances, conversation time duration variances, and trunk duration variances. A call record is considered a match when the call date time falls within a determined number of seconds and the conversation time/trunk duration falls within a determined number of tenths of a second.

After the matching process is complete, a summary of the unmatched AMA traffic is prepared. This summary categorizes the unmatched calls based on the various types of traffic remaining, i.e., whether the call's responsible carrier and jurisdiction can be identified to allow for proper billing and if so, which carrier and which jurisdiction.

Along with the above procedures, VPS has also performed numerous wireless InterMTA studies for our clients in South Dakota. There is no field in the signaling data that identifies whether a call should be categorized as interMTA or intraMTA, which can

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speed, circuit-switched connections and transaction capabilities which deal with remote database interactions.

often lead to miscategorization of the calls. Based on my understanding of the FCC First Report and Order,[8] Commercial Mobile Radio Service (CMRS)[9] calls originating in one Major Trading Area (MTA) and terminating in the same MTA are considered to be local calls and are subject to reciprocal compensation. Wireless calls that originate in one MTA and terminate in another MTA are considered to be toll calls and are subject to switched access charges. To ensure the landline carrier is properly compensated for terminating toll calls, it is important to determine the amount of interMTA traffic that is being delivered by the wireless carrier to the landline carrier. Proper classification of wireless traffic is especially important for RLECs operating in states that have multiple MTAs such as South Dakota. South Dakota has three different MTAs (Minneapolis, Denver, and Des Moines), which can be seen in Exhibit 4. In addition, much of the southern part of South Dakota borders the Omaha MTA, which also contributes to an increased InterMTA factor for South Dakota.

As mentioned above, VPS has performed numerous wireless InterMTA studies for our clients in South Dakota. The goal of these studies has been to determine the amount of interMTA traffic that is being delivered by a CMRS provider to a landline carrier, excluding the traffic that is delivered using an Interexchange Carrier (IXC). These studies consist of processing thousands of records to determine the amount of InterMTA traffic that is being delivered by a CMRS carrier to a landline carrier. The methodology for determining the interMTA amount is straightforward, as outlined in Exhibit 5. It consists of determining which wireless calls terminating to a given landline

[8] *In the Matter of Implementation of the Local Competition Provisions of the Telecommunication Act of 1996*, CC Docket No. 96-98, 11 F.C.C.R. 15499, FCC 96-325 First Report and Order (released Aug. 8, 1996) ("*First Report & Order*").

[9] For purposes of this document, we assume that references to a wireless carrier or wireless provider mean a CMRS carrier.

carrier originated in the same MTA and which calls originated in a different MTA. For those that originated in a different MTA, it is also important to know which of these calls originated in the same state and which originated in a different state, so the landline carrier can apply the appropriate tariffed switched access rate to the call.

If the interMTA calls originate and terminate within South Dakota, the LEC's intrastate switched access tariffed rates would apply to these calls. For most of our South Dakota clients, the applicable tariff for intrastate switched access rates is the Local Exchange Carrier Association (LECA) Tariff No. 1. LECA is an association of approximately 30 South Dakota local exchange carriers, which acts as a switched access revenue-pooling, rate-averaging association. The current applicable switched access rates, approved by the South Dakota Public Utilities Commission, are shown in **Exhibit 6** and the complete tariff is accessible from the SDPUC website.[10] If the interMTA calls terminating in South Dakota originate from a different state, the LEC's interstate switched access tariffed rates would apply. For most of our clients, the applicable tariff for interstate switched access rates is the National Exchange Carrier Association, Inc. (NECA) Tariff FCC No. 5. The current applicable switched access rates are shown in Exhibit 7 and the complete tariff is accessible from the NECA website.[11]

Since the CMRS caller can be mobile, the FCC recognized that it may be administratively more difficult to determine the exact location of the CMRS customer at the start of the call, so the FCC allowed the connecting tower location (connecting cell site) to be used. The First Report and Order states, "For administrative convenience, the location of the initial cell site when a call begins shall be used as the determinant of the

[10] http://www.state.sd.us/puc/commission/tariffs/telecommunications/telecommunication.htm
[11] http://www.neca.org/media/tariff5.pdf

geographic location of the mobile customer."[12] Thus, for purposes of categorizing traffic as either intraMTA or interMTA, it is only necessary to know the originating or connecting cell site location, not the physical location of the CMRS customer making the call.

Some of the interMTA studies performed by VPS have used the NPA-NXX in the SS7 messages to provide an estimate of the amount of InterMTA traffic. SS7 is the industry standard signaling method used by carriers to communicate call information. The SS7 network is separate from the voice network, and is used solely for the purpose of switching data messages pertaining to the business of connecting telephone calls and maintaining the signaling network. Packet switching is the method used for transferring messages through the network. SS7 automatically enables carriers to provide their subscribers with the calling party number because this information is carried in call setup messages.[13,14] Therefore, when using SS7 records, the calling party NPA-NXX and the called party NPA-NXX are used to estimate the location of the calling and the called party, respectively. The goal of these studies has been to determine the amount of InterMTA traffic delivered from a CMRS carrier to a landline RLEC. The interMTA studies performed by VPS also determine the amount of the InterMTA traffic that is Interstate and Intrastate in nature so the originating carrier can be billed the correct switched access tariff rate.

For some of the interMTA studies, VPS has been able to acquire the CDRs from the wireless carriers. The CDR data allows for a more accurate determination of the

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[12] *In the Matter of Implementation of the Local Competition Provisions of the Telecommunications. Act of 1996*, CC Docket No. 96-98, 11 F.C.C.R. 15499, FCC 96-325 First Report and Order (released Aug. 8, 1996) (*"First Report & Order"*), para. 1044.
[13] Travis Russell, Signaling System #7, Third Edition. (McGraw-Hill, 2000) 79, 93.
[14] GR-246-CORE, *Telcordia Specification of Signaling System Number 7* (GR-246)

interMTA factor, since the location of the wireless caller at the start of the call (or the connecting tower location) can be provided by the CMRS carrier as part of the CDR records. As with most CMRS carriers, the caller location or initial cell site of the start of the call is available to Verizon with respect to each wireless originated call, but is not passed along in the SS7 message. One common switching platform used by CMRS carriers is the Lucent Technologies 5ESS wireless switch. This switch can identify the cell site number as part of the Automatic Message Accounting ("AMA") setup internal to the switching system per Lucent Table 2003 – Radio/Channel/Cell Information,[15] as illustrated in **Exhibit 8**. Another common switching platform for CMRS carriers is the Nortel Network MTX wireless switch, which identifies the originating trunk group from a specific cell location as a field in the AMA recording called the First Originating Trunk Common Language Location Identifier ("CLLI") field,[16] as illustrated in **Exhibit 9**. Because this information is not passed along to the landline carrier in the SS7 signaling, gathering the CDR data requires cooperation of the CMRS carrier to collect this data. **Exhibit 10** illustrates the process of extracting interMTA CDRs utilized by other wireless carriers we have worked with.

The interMTA studies that have been performed by VPS for RLECs in South Dakota, have found that more than half of the RLECs have interMTA factors that are estimated to be greater than 10%, several have interMTA factors that are estimated to be greater than 20%, and some have an interMTA factor of more than 30%. The interMTA (toll) traffic being terminated by other wireless carriers to most of the RLEC networks is

[15] Lucent Technologies Document 401-610-133 Issue 28 - Flexnet®/Autoplex® Wireless Networks Executive Cellular Processor (ECP) Release 24 pp 4-125 to 4-127

[16] Nortel Networks Document 411-2131-204 – MTX 12 (February 2004) – DMS-MTX CDMA/TDMA Billing Management Manual Standard Issue 11.11 p 6-147

primarily intrastate rather than interstate in nature. In fact, it is common for more than 85% of the CMRS originated interMTA traffic terminated to an RLEC in South Dakota to be intrastate in nature.

As CMRS carrier networks become larger and more complete, the amount of interMTA traffic delivered over the interconnection facilities becomes larger and the potential for phantom traffic also increases. When CMRS carrier networks grow, it is common for the CMRS carrier to interconnect their switches with Inter-Machine Trunks (IMTs). These IMTs allow the CMRS carrier to transport the traffic over large distances without the need of an Interexchange Carrier (IXC). The CMRS networks can transport the traffic across state boundaries and even across MTA boundaries. **Exhibit 11** shows a simplified diagram of two CMRS wireless switches in two separate MTAs which are not interconnected with IMTs. When the CMRS customer connected to Wireless Switch #1 calls the landline customer connected to the end office switch, the CMRS provider routes the call across the local interconnect facilities between Wireless Switch #1 and the landline end office. When the CMRS customer that is located near wireless switch #2, however, places a call to this same landline customer, there is no direct way for the CMRS carrier to route the traffic to the landline customer. Therefore, the CMRS provider often routes this call to an IXC for delivery to the landline provider. Since the wireless customer and the landline customer in this example are in different MTAs, the call would be a toll call. When the traffic is delivered to the landline customer using an IXC, the IXC is responsible for compensating the landline carrier for this toll traffic.

However, the CMRS provider may lease or build facilities to establish IMTs between Wireless Switch #1 and Wireless Switch #2 as shown in **Exhibit 12**. With this

IMT in place, the CMRS carrier would have the ability to route the call between the switches in the two MTAs without the use of an IXC. When the wireless customer near Wireless Switch #2 places a call to the landline customer in this example, the call can be routed from the Wireless Switch #2 to Wireless Switch #1 and then delivered to the landline provider over the local interconnection facilities. This toll traffic is most often intermixed with the local traffic. As the quantity of IMTs increase, so does the potential for phantom traffic.

I have reviewed the claims of Verizon Wireless in its proposed Stipulation of Facts. Verizon Wireless delivers both local and access traffic over both direct and indirect trunks. The indirect trunks between an RLEC and Verizon Wireless are often common trunks and the Verizon Wireless traffic is intermixed with other carrier traffic. The South Dakota statutes require carriers to "transmit signaling information in accordance with commonly accepted industry standards."[17]

The Ordering and Billing Forum (OBF) has been working to expand the SS7 signaling format to better identify telecommunications traffic so the terminating carrier can more accurately bill for the traffic. Many involved with the OBF would like to see the Jurisdictional Information Parameter (JIP) field in the SS7 used to identify the wireless caller's connecting tower at the start of the call. In May 2005, the JIP was expanded to include information regarding the originating wireless switch.[18] This was certainly a step in the correct direction. I would expect that the use of the JIP will

[17] South Dakota Codified Laws SDCL 49-31-110 and SDCL 49-31-111.
[18] Alliance for Telecommunications Industry Solutions, ATIS-0300011, Network Interconnection Interoperability (NIIF) Reference Document, Part III, Installation and Maintenance Responsibilities for SS7 Links and Trunks.

continue to be enhanced to provide more detailed information regarding the location of the originating wireless caller.

Because the commonly accepted industry standards for signaling continue to evolve and are not yet adequate to quantify nonlocal traffic, the South Dakota Codified Laws allow the originating carrier to "separately provide the terminating carrier with accurate information including verifiable percentage measurements that enables the terminating carrier to appropriately classify nonlocal telecommunications traffic as being either interstate or intrastate, and to assess the appropriate applicable access charges."[19] The form and substance of the accurate information required in this statute is not defined, except that it be adequate for the terminating carrier to appropriately classify the traffic and assess the applicable charges.

Because the current commonly accepted industry standards for signaling may not be adequate to determine the precise location of a wireless caller, wireless carriers often establish their delivered local and toll (interstate and intrastate) traffic ratios in an agreed upon contract. Normally the contract ratios are based on historical experience or using a special study. Since wireless carriers have the ability to determine the connecting tower of their wireless customer, a special study can accurately determine the local and toll (interstate and intrastate) mix for a given test period. This is the same process Verizon uses to determine their factors in their own contracts and tariffs.[20]

It also appears that Verizon Wireless would need to know the calling party or tower location to determine appropriate taxes and Universal Service Fund contributions. All intrastate, interstate and international providers of telecommunications within the

[19] South Dakota Codified Law SDCL 49-31-110.
[20] Verizon's Proposed Regulatory Action to Address Phantom Traffic, In the Matter of Developing a Unified Intercarrier Compensation Regime, CC Docket 01-92, December 20, 2005, Ex Parte, pg. 11-12.

United States are required to file the FCC Form 499-A (Telecommunications Reporting Worksheet). The worksheet and associated instructions are included as **Exhibit 13**. This form requires that these providers separately identify the portion of gross revenues that arise from interstate and international service. All filers must report the actual amount of interstate and international revenues for these services. For example, toll charges for itemized calls appearing on mobile telephone customer bills should be reported as intrastate, interstate or international based on the origination and termination points of the calls.

To be clear, phantom traffic is not just a South Dakota issue; it is an industry-wide concern. The FCC has recognized that it is a significant problem, as evidenced by its effort to seek comments, attached as **Exhibit 14**, regarding the Missoula Plan Phantom Traffic Interim Process and Call Detail Records Proposal (Proposal), attached as **Exhibit 15**. Even though the Proposal has been criticized by some carriers regarding specific details of the proposal, there is general support from a diverse group of commenters for the Proposal's call signaling rules.[21] Most ILECs, including SDTA members (see **Exhibit 16**), believe that phantom traffic is a serious concern, as evidenced by the overwhelming support of the Proposal. The need for call signaling rules such as the ones South Dakota legislators have passed are needed to stop the abuse of the RLECs who continue to lose compensation due them every day. VPS has found that phantom traffic could be as high as 15% of the total traffic studied. Based on the results of the wireless traffic studies, VPS has found that it is not uncommon for 10%-30% of the total terminating wireless traffic to be interMTA in nature. If, for example, Venture Communications' percentage

[21] Reply Comments of the Supporters of the Missoula Plan On Their Phantom Traffic Proposal, CC Docket No. 01-92.

of phantom traffic was only 5% of their total terminating traffic, Venture's lost revenue could be approximately $50,000 per year, with the potential to be much greater[22].

Even Verizon Wireless' sister company, Verizon Communications, which is a LEC headquarterd in New York, NY recognizes the significance of the phantom traffic problem. Craig Bellinghausen of Verizon included a statement in his September 24, 2004, presentation regarding Phantom Traffic in which Verizon acknowledges that it is a growing concern.[23] Mr. Bellinghausen states in his presentation that Verizon's "Measured Phantom Transit Traffic is in the 3% to 6% range. Phantom Calls Terminating on Verizon's network is in the 12% to 15% range. Bottom Line: Significant Issue at Verizon." Verizon has also publicly offered suggestions in this presentation as to how the industry should work together regarding phantom traffic. These suggestions included establishing industry standards, such as an interMTA record field, and seeking "legislation requiring that certain data legally must be passed on traffic." This presentation has been included as Exhibit 17.

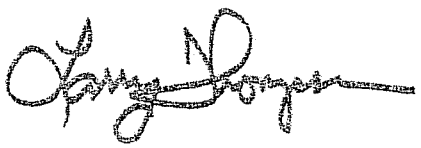
In Verizon's Ex Parte[24] to the FCC regarding phantom traffic, they claimed, "approximately 20% of the traffic that either transits over or terminates on Verizon's network either is missing calling party information entirely or contains plainly invalid calling party data in the Signaling system 7 (SS7) stream, affecting Verizon's ability to bill for both terminating and transit." In this Ex Parte, Verizon explains how they deal

[22] VPS is currently compiling data for a possible phantom traffic study for Venture Communications (Venture). If, or when, the decision is made to proceed with a phantom traffic study for Venture and the study is completed, I will supplement this report to include a copy of the completed phantom traffic study. This report would include an analysis of all traffic (wireline as well as wireless) terminating to Venture exchanges. (See Exhibit 3 for more details of the phantom traffic study process.)

[23] Craig Bellinghausen, Phantom Traffic Pennsylvania Telephone Association New York State Telecommunications Association, September 24, 2004 (note that Mr. Bellinghausen made these statements as a representative of "Verizon" and not "Verizon Wireless.")

[24] Verizon's Proposed Regulatory Action to Address Phantom Traffic, In the Matter of Developing a Unified Intercarrier Compensation Regime, CC Docket 01-92, December 20, 2005, Ex Parte, pg. 11-12.

with carriers that deliver traffic that does not contain enough information in the signaling, such as the Calling Party Number (CPN), to properly bill for the traffic. They state, "If, however, traffic with missing or invalid CPN exceeds that threshold (again, usually 5% or 10%), the great majority of Verizon's agreements provide that Verizon will charge the originating carrier or IXC the highest possible rate for *all* traffic with missing or invalid CPN." This method is not significantly different than what is required by the South Dakota Codified Laws.



Larry Thompson, P.E.
Chief Executive Officer
Vantage Point Solutions, Inc.

January 16, 2007
Date