BEFORE THE WASHINGTON STATE
UTILITIES AND TRANSPORTATION COMMISSION

In the Matter of the Joint Petition for Enforcement of Interconnection Agreements With Verizon Northwest, Inc.	DOCKET NO. UT-041127 DECLARATION OF ROBERT WILLIAMSON

1 I, Robert Williamson, under penalty of perjury under the laws of the State of Washington, hereby declare and state as follows:

2 I am over 21 years of age and I make this declaration on the basis of my personal knowledge, and if called upon to testify in this matter I could and would competently do so as set forth herein.

3 I am a telecommunications engineer employed by the Washington Utilities and Transportation Commission. I have over thirty years of telecommunications and management experience and received my formal engineering education at the Bell Core Technical Training Center, the Lucent Hickory Ridge Facility, the Lucent facility in Dublin, Ohio, and Bell Labs Naperville, Illinois. I held various technical management and engineering positions with Qwest, TCG, the AT&T Hawaii Information Transfer System in Honolulu, and NeuStar, Inc.

4 In May of 2000 I joined NeuStar, Inc. as the Director of Deployment for the planned deployment of a large New Generation C7 (C7 at the edge and IP in the core) signaling network to provide Intelligent Network functionality and signaling in 12 European countries. Later, as Director of New Business Technical Development, I led a team of developers and engineers in the successful development of a Session Initiation Protocol (SIP) based service to provide Local Number Portability for Voice Over Internet Protocol (VoIP) providers. While at NeuStar I upgraded my technical knowledge in New Generation Networks by attending meetings for the Internet Engineering Task Force (IETF), the International Engineering Consortium (IEC), as an active member of the World C7 Planning Meeting held at Cape Town South Africa in 2000, as well as attending Voice On the Network (VON) meetings.

5 This docket raises the issue of whether ILECs, like Verizon, must unbundle packet switches for the provision of local switching for voice traffic. In this context, it is helpful to understand the technical differences between the way voice traffic and data traffic are handled in the network. Specifically, it is important to understand how the legacy public switched telephone network (PSTN) uses time division multiplexing (TDM) and how a packet switch can be used to provide the same service (packet switches historically have been deployed for handling data, rather than voice).

6 Prior to September 10, 2004, Verizon's Mount Vernon central office was served by a Nortel DMS-100 switch. On September 10, 2004, Verizon replaced that switch with a

Nortel Succession switch, which is a type of packet switch. Both switches have the capability to switch voice traffic on the PSTN.

7 All voice communication starts as natural acoustic compression waves that transmit voice through the air. When a person speaks into a telephone handset, a microphone converts the compression waves into an analog (*i.e.* analogous) electrical signal that represents the acoustical waves. At some point in the PSTN (such as at the LEC's central office), the analog signal is sampled, most commonly 8000 times a second, then encoded into a binary (digital) number consisting of zeros and ones. This sampling is accomplished with interface equipment. At its Mount Vernon central office, Verizon uses the same physical interface equipment that it used when the old Nortel DMS-100 switch was in place.

8 Packet networks use addresses to route packets, while the PSTN uses telephone numbers to route calls through circuits. Unlike the PSTN, packet networks were designed to facilitate the transportation of packet data rather than real-time voice communications. LECs most commonly use packet switching for SS7 signaling and in the provision of advanced services, such as DSL service.

9 The PSTN uses TDM protocol to establish dedicated circuits between telephone users through a maze of local circuit switches and connecting trunks, which ensures sufficient bandwidth between the two users for the duration of a telephone call. Once a call is terminated, the local switches release all of the interconnected circuits so that the

bandwidth can be used for other calls. The PSTN is a "connection-oriented" network and as such, circuit bandwidth is allocated for the duration of a call even if no conversation is taking place. When all circuits are in use, subsequent call attempts are blocked and the calling party hears a busy signal.

10 In contrast to the PSTN, packet switching networks (such as the Internet) divide information into individual packets of digital bits, which are individually transmitted. The packets may be switched via different routes but ultimately arrive at the correct destination where they are reassembled. Packet networks are "connectionless," meaning there is no end-to-end PSTN-like circuit created for each call. Because packet networks are "connectionless," no calls are blocked as they can be in the connection-oriented PSTN. However as the traffic load builds in a data network, data is continually delayed until it can no longer be trusted to be accurate, or the connection is dropped. Thus, as mediums for transmitting voice or data, both the PSTN and packet networks have capacity limitations. End-users, however, experience the capacity limitations in different ways. Under heavy traffic conditions, the PSTN blocks voice traffic by denying access to the network, while the packet network degrades traffic by causing long delays between transmission and receipt of data packets.

11 Although sometimes referred to as a packet switch, the newly installed Nortel Succession local switch relies on Asynchronous Transfer Mode (ATM) technology as its core fabric for switching voice calls. ATM technology provides a high bandwidth, low

delay, connection-oriented, packet-like, switching and multiplexing system to switch calls. *See* Newton's Telecom Dictionary, (19th ed. 2003). ATM is a hybrid TDM/packet system (ATM carries data in "packet like" cells in a similar manner as a packet network, but creates "virtual circuits" through its fabric and is a connection-oriented protocol like TDM). As a circuit-oriented protocol, ATM creates a "virtual circuit" that assigns bandwidth that is dedicated for the duration of a call. Where packet switching uses variable size packets to transport data, ATM uses "cells" that are all of the same standard size (48 octets).

12 Telephone switches like the Nortel DMS 100 use a number of peripheral interfaces to connect to analog line customers, digital customers (such as PBXs), and trunk interfaces to other central office switches (*i.e.* other Verizon switching offices, CLECs, other ILECs, IXCs, etc.). The action of switching is to provide the basic functionality of connecting lines to lines, lines to trunks, trunks to lines, and trunks to trunks, which is accomplished by internal switch fabric.

13 Customers in Verizon's Mount Vernon exchange have access to broadband services via Verizon's DSL service. Voice and broadband signals share the same copper loop from the customer location. At the Mount Vernon central office, a specialized piece of equipment called a Digital Subscriber Line Access Module (DSLAM) routes the voice analog signal to the PSTN via the local voice switch, and the data signal is converted to

packet data and a packet switch routes the data to the subscriber's Internet Service Provider (ISP) via a router.

14 In general, PSTN customers are connected to a central office local switch via a copper loop. The customer's analog signal is converted to a digital signal (most commonly at the central office), switched via the local switch's TDM fabric to any other PSTN customer directly or by a connection to other central office switches. The same PSTN customer may be connected to the Internet via a DSL modem. The DSL modem's signal may be shared on the same copper loop as voice, but is routed separately by the DSLAM to the customers ISP via packet switching.

15 Recognizing the technological differences between how voice and data traffic travel through the network, the FCC consistently has defined packet switching as including the use of DSLAMs. This is evident in the FCC's UNE Remand Order, in which the FCC stated:

> We find that a component of the packet switching functionality, and included in our definition of packet switching is the *Digital Access Subscriber Line Access Multiplexer (DSLAM)*. The DSLAM splits voice (low band) and data (high band) signals carried over a copper twisted pair. DSLAM equipment sometimes includes a splitter. If not, a separate splitter device separates voice and data traffic. The *voice traffic is transmitted toward a circuit switch, and the data from multiple lines is combined in a packet or cell format and is transmitted to a packet switch, typically ATM or IP.*

UNE Remand Order, ¶ 303. The FCC declined to adopt proposed definitions of packet switching that would exclude DSLAMs from the packet switching functionality. *Id.*, ¶ 304

16 In 2003, the FCC again declined to change the definition of packet switching to exclude the functionality performed by the DSLAM. *Triennial Review* Order, ¶ 535. Thus, the FCC intended packet switching as an advanced services function, not a voice service function.

17 DSLAMs are not used in the provision of voice switching, but are used only in the provision of advanced services, such as DSL data packet switching. Therefore, the FCC did not intend to exclude packet switches from the local switching UNE when those switches are used for PSTN voice traffic.

18 Verizon's new Nortel Succession ATM-based local switching fabric provides nothing more than narrow band voice switching capability. The new ATM switch provides no new capabilities and only provides the same capability previously provided by the Nortel DMS-100's legacy switching fabric (the basic switching function of connecting lines to lines, lines to trunks, trunks to lines, and trunks to trunks). There is no provision of broadband or advanced services nor is there any direct connection from the new switch fabric to a DSLAM. Therefore, there is no reason why Verizon should not provide unbundled access to the new Nortel Succession switch under cost-

based rates and the same terms and conditions as it was required to provide access to the old Nortel DMS-100 switch.

19 There is a standard engineering test for software and hardware known as a "Black Box Test." The Black Box Test is a strategy for investigating a complex object without knowledge or assumptions about its internal configuration, structure, or parts. Essentially the test requires the engineer to know the exact input and output characteristics, without having any idea of what is going on inside. A Black Box test of the Mount Vernon central office would reveal that there are no technical differences in the expected input and output characteristics between the old switch and the new switch. Analog lines and digital lines continue to exhibit the exact same interface requirements. There are no changes to the technical interface requirements for trunking, nor are there changes to SS7 signaling requirements. A Verizon customer would have no idea that any change had been made, nor would any connecting LEC. There are no advanced services being provided by the new Nortel switch fabric. Advanced services that exist at the Mount Vernon Central Office, such as DSL, remain as they did before the installation of the new ATM switch fabric. The provision of advanced services has not changed in any technical or physical manner. In fact, a DSLAM is still required at the Mount Vernon site to provide DSL and there is no physical connection between the packet switch required by DSL and the new ATM switch fabric. The functionality of the new Verizon ATM switch fabric is the exact same

define local circuit switching, which includes, "The features, functions and capabilities of the switch include the basic switching function of connecting lines to lines, lines to trunks, trunks to lines, and trunks to trunks." *UNE Remand Order*, ¶ 244 & n.474. An external analysis of the new switch fabric reveals that what you see is what you get, or in this case what you saw before the conversion is what you see today. The functionality that remains following the conversion to the new Mount Vernon ATM switch fabric, is the same functionality that was provided by the old legacy switch, the features, functions, and capabilities of the basic switching function of connecting lines, to lines, lines to trunks, trunks to lines and trunks to trunks.

Robert Williamson

October 25, 2004
(Date signed)

Olympia, WA
(Place signed)