BEFORE THE WASHINGTON UTILITIES AND TRANSPORTATION COMMISSION

IN THE MATTER OF THE CONTINUED COSTING AND PRICING OF UNBUNDLED NETWORK ELEMENTS, TRANSPORT AND TERMINATION	)	**DOCKET NO. UT- 003013**
	)	**PART D**

DIRECT TESTIMONY OF

JOSEPH CRAIG

ON BEHALF OF

QWEST CORPORATION

NOVEMBER 7, 2001

IDENTIFICATION OF WITNESS

Q. PLEASE STATE YOUR NAME, JOB TITLE AND BUSINESS ADDRESS.

A. My name is Joseph Craig. I am employed by Qwest Corporation ("Qwest") as a Director, Technical Regulatory in the Local Network Organization. My business address is 700 W. Mineral, Littleton, Colorado, 80120.

Q. PLEASE REVIEW YOUR WORK EXPERIENCE AND PRESENT RESPONSIBILITIES.

A. I have been in the telephone business since 1974. I began as a directory assistance operator for Mountain Bell. After about 2½ years in that position, I transferred into Network Operations and since that time have had network-related responsibilities. My introduction to network responsibilities began in the late 1970s when I had responsibility for installing and repairing telephone service. I had responsibility for installations and repairs until 1980 when I became a Central Office Technician assigned to the Denver South Switching and Control Center in Denver, Colorado.

As a Central Office Technician, I was responsible for switch alarm surveillance, switch maintenance and repair, trunk installation, line and routing translations, switch equipment installation and software upgrades. My responsibilities as a Central Office Technician provided me with detailed knowledge of engineering issues relating to trunking, routing and alarm surveillance in the switching

network. I also worked closely with vendor equipment installers and acquired substantial knowledge about switching equipment, switch translations and the overall operation of the switching network.

In 1987, I accepted a three-year rotational assignment to Bellcore's training facility in Chicago, Illinois where I was a Switch Lab Manager. In that position, I was responsible for servicing switching equipment and modifying the equipment to update it with the latest features. My experience at the Bellcore training facility gave me the opportunity to work with switching experts from around the country and to learn about new switching technology and advanced switching repair techniques. I developed expertise in switch repair and recovery techniques, and the operations and functions of Signaling System 7 ("SS7"). While at Bellcore, I was selected for an award for exceptional performance called the Esteemed Member of Bellcore Staff.

In 1990, I returned to U S WEST working in Network Administration where I acquired additional experience in switching capacity and service measurements. After three years, I assumed responsibility for the Switching Control Center, where I managed the technicians who were responsible for monitoring the switching network for all of Colorado. In 1994, I was assigned to the SS7 Control Center, where I had responsibility for provisioning and maintaining the SS7 signaling network for the U S WEST 14-state region.

In 1997, I accepted a position in Network Planning, and became responsible for writing network plans for new switch services in the SS7 network. I also was responsible for monitoring these plans through the implementation phase. In 1998, I was honored as a recipient of Presidents Club for successfully implementing SS7 into the 911 network for the state of Minnesota.

In June 1999, I accepted a promotion to my current position in Technical Regulatory, Interconnection Planning. In my current position, I provide litigation support before federal and state commissions on issues relating to switching, SS7, trunking, and routing. As of June 30, 2000 I assumed the same job responsibilities for Qwest.

PURPOSE OF TESTIMONY

Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY?

A. The purpose of my testimony is to explain the Qwest Unbundled Packet Switching network and to identify the network components used with this product.

UNBUNDLED PACKET SWITCHING

Q. WHAT IS A PACKET?

A. As defined by Newtons' Telecom Dictionary, a packet is the "Generic term for a bundle of data, usually in binary form, organized in a specific way for

transmission. . . . A packet consists of the data to be transmitted and certain control information. The three principal elements of a packet include: 1. Header – control information such as synchronizing bits, address of the destination or target device, address of originating devices, length of packet, etc. 2. Text or payload – the data to be transmitted. The payload may be fixed in length . . . or variable in length . . . 3. Trailer – end of packet, and error detection and correction bits." Newton's Telecom Dictionary, 17th Edition at page 509 (2001).

Q. WHAT IS PACKET SWITCHING?

A. Packet switching is the technology of sending data in packet form through a network to some remote location. Each data packet has a unique identification and carries its own destination address. Each packet is, therefore, independent of other packets. With packet switching, multiple packets traverse the network in a stream of packets that flows from the originating packet switch to the packet switch or node that is the destination. These packets sometime travel by different routes, therefore making packet switching more efficient when compared to circuit switching.

Q. WHAT IS UNBUNDLED PACKET SWITCHING?

A. Unbundled Packet Switching ("UPS") is an Unbundled Network Element ("UNE") offered in compliance with the FCC's UNE Remand Order to provide access to the Qwest packet switched network. The Qwest packet switched

network is based on Asynchronous Transfer Mode ("ATM"), or a packet like switch, that is used to provide DSL Service offerings.

Q. WHAT ARE DSL SERVICE OFFERINGS?

A. Digital Subscriber Line ("DSL") Service offerings involve the use of the frequencies of the copper wires other than the frequencies used for analog voice. This access to the frequencies other than voice, for example, Asymmetric Digital Subscriber Line ("ADSL") allows the customer to use their phone for voice conversation at the same time they are using their computer for various different purposes, including, for example Internet access.

DSL technology has many different versions. Other versions of DSL include VDSL, HDSL, RADSL, IDSL and SDSL to name a few. Each version of DSL has unique characteristics, such as frequency, bit rate or speed, and require different modem equipment both at the users location and the remote device or node the user is connecting to. ADSL service is the most common type, and it can be provisioned over a customers existing copper line, or twisted pair loop. ADSL, although originally developed by Telcordia, is now standardized by the American National Standards Institute ("ANSI") as T1.413.

Q. WHAT IS A PACKET SWITCHING NETWORK?

A. Packet switched networks are shared networks that deliver traffic in bursts called packets. As stated in Newton's Telecom Dictionary, "packet switched networks

are shared networks, based on the assumption of varying levels of latency and, thereby, yielding a high level of efficiency for digital data networking." Newton's Telecom Dictionary, 17th Edition at page 510 (2001).

Q. PLEASE CONTRAST HOW PACKET SWITCH NETWORKS AND CIRCUIT SWITCH NETWORKS ROUTE CALLS.

A. In a packet switched network, data is divided into individual packets, and each packet is assigned the address of the recipient of the call, much like a letter that one drops into a mailbox. Each packet is sent over the network to the recipient of the call, and the packets that comprise one call can take different routes to the recipient. The individual packets arrive at the destination address and are delivered in the proper sequence to the recipient. Significantly, the packet switched network over which these packets travel is a shared network, meaning that multiple calls traverse the network simultaneously.

In contrast, voice calls are carried over a circuit switched network. This network creates private paths for each call that are dedicated to the user for the entire length of the call. Once a connection is established, the path is used for one purpose and by a single user for the entire length of the call. No other user can use this dedicated path until the user vacates or disconnects the use of the dedicated path. In other words, unlike the routes in a packet switched network, the routes created in a circuit switched network are dedicated to a user for the length of a call and are not shared. In addition, the circuit switch network creates

direct routes that a call must follow, while the packets in a packet switched network can follow multiple routes.

Q. WHAT NETWORK COMPONENTS MAKE UP THE RATE ELEMENT FOR QWEST'S UNBUNDLED PACKET SWITCHING?

A. The network components that go into the rate elements are identified in exhibit JPC-2, attached to my testimony, that depicts the network configuration for Qwest's UPS service. Specifically, the rate elements are the loop, the line splitter, the DSLAM, the DSLAM trunk port, and, finally, the ATM trunk port.

Q. DOES THIS COMPLETE YOUR TESTIMONY?

A. Yes it does.