Exhibit No. ___ (RP-1T)
Docket No. UT-023003

BEFORE THE WASHINGTON UTILITIES AND TRANSPORTATION COMMISSION

In the Matter of the Review of Unbundled Loop and Switching Rates; the Deaveraged Zone Rate Structure; and Unbundled Network Elements, Transport, and Termination	)	DOCKET NO. UT-023003

PANEL TESTIMONY OF VERIZON NORTHWEST INC. ON RECURRING COSTS

Witnesses:
William Jones
Thomas Mazziotti
Michael Norris
Randall Patton
Willett Richter
Gary Sanford

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Table of Contents

I. THE WITNESS PANEL

Q. WHO ARE THE MEMBERS OF THE WITNESS PANEL SPONSORING THIS TESTIMONY?

A. The members of this Panel are: William Jones, Thomas Mazziotti, Michael Norris, Randall Patton, Willett Richter, and Gary Sanford.

The Panel also relies on other testimony presented in this case by Dr. Howard Shelanski of the University of California at Berkeley, who discusses the economic principles guiding the development of the cost studies submitted by Verizon Northwest Inc. ("Verizon NW"). In addition, the panel relies on the testimony of Dr. James Vander Weide on the cost of capital, and of Mr. Allen Sovereign on depreciation (asset lives).

Q. WHAT ROLE DID EACH MEMBER OF THIS PANEL PLAY IN THE PREPARATION OF THIS TESTIMONY AND THE ASSOCIATED STUDIES?

A. Although all members of this Panel have reviewed and support this testimony in its entirety, each Panel member assumed primary responsibility for specific segments of the testimony and was involved in the development of the cost studies relevant to his area of responsibility. Each Panel member relies on the facts and analyses developed by the other Panel members in their areas of primary responsibility. Specifically:

1) William Jones discusses the investment loadings and annual cost factors used in the cost studies.

2) Willett Richter discusses network construction and technology assumptions underlying the studies.

3) Michael Norris discusses the structure and features of the VzCost system.

4) Randall Patton discusses the preprocessing of customer location routing and customer demand information for the recurring cost model.

5) Thomas Mazziotti discusses the costs associated with the switching, signaling, and shared transport unbundled network elements ("UNEs").

6) Gary Sanford discusses the recurring costs and assumptions associated with all loop and interoffice transport UNEs.

Q. MR. JONES, PLEASE DESCRIBE THOSE ASPECTS OF YOUR PROFESSIONAL BACKGROUND MOST PERTINENT TO YOUR TESTIMONY.

A. I am employed as a Senior Staff Consultant in Verizon's Service Costs organization in the Finance Department, which is responsible for developing the costs for services provided by Verizon. I received a Bachelor of Science degree from Mount Saint Mary's College in 1975 with a Business and Finance major. I also received a Master of Business Administration degree from Drexel University in 1989 with a major in Financial Management. I have over 16 years of experience in various Finance positions at Verizon or its predecessor companies. I was also a member of the team that developed the Verizon costing tool, VCost, which is the predecessor of the current Verizon cost model, VzCost. My current responsibilities include conducting, reviewing, analyzing, and supervising cost studies and cost study methodologies. I have also sponsored testimony before the public utility commissions in Maine, Rhode Island, and West Virginia.

Q. MR. MAZZIOTTI, PLEASE DESCRIBE THOSE ASPECTS OF YOUR PROFESSIONAL BACKGROUND MOST PERTINENT TO YOUR TESTIMONY.

A. I am currently employed as a Senior Staff Consultant in Verizon's Service Costs organization, with responsibility for economic analysis involving Central Office based services. I received my Bachelor of Science in Electrical Engineering Technology from New York Institute of Technology in 1981 and a Master of Science degree in Telecommunications and Computing Management from Polytechnic University in 1991. In 1999, I completed a program at the Stanford University Graduate School of Business in Managing Technology and Strategic Innovation. In June of 1981, I joined New York Telephone as a Central Office Engineer with responsibility for the engineering and project management of replacement and augmentation jobs for telephone switches, voice and data transmission systems and Central Office power systems (both AC and DC). In August of 1990 I was promoted to my current position. I also have sponsored testimony before the public utility commissions in New York, Pennsylvania, Massachusetts, Maine, Rhode Island, and Delaware.

Q. MR. NORRIS, PLEASE DESCRIBE THOSE ASPECTS OF YOUR PROFESSIONAL BACKGROUND MOST PERTINENT TO YOUR TESTIMONY.

A. I am employed as a Manager in Verizon's Service Costs organization. In this capacity, I am responsible for the design, architecture and building of systems used by the Service Costs organization. I received a Master of Business Administration degree from Southern Illinois University - Edwardsville in 1988 and a Bachelor of Science degree in Business Administration from Lindenwood University. I began my telecommunications career as a Staff Engineer with Continental Telephone ("Contel") in 1969. I became a GTE employee in 1991, when Contel and GTE merged. During my career, I have held various positions dealing with capital recovery, rate design, tariff development, toll settlements and cost studies, rate case preparation, regulatory accounting, and strategic planning. I assumed my current position upon the merger of GTE and Bell Atlantic. I have sponsored testimony before the public utility commissions of Arkansas, California, Florida, Hawaii, Indiana, Michigan, New Mexico, Oklahoma, South Carolina, Texas and Washington.

Q. MR. PATTON, PLEASE DESCRIBE THOSE ASPECTS OF YOUR PROFESSIONAL BACKGROUND MOST PERTINENT TO YOUR TESTIMONY.

A. I am employed as a Manager in Verizon's Service Costs organization. In this capacity, I am responsible for the design and development of loop preprocessing tables used in the VzLoop portion of the VzCost model. I received a Bachelor of Science degree in Industrial Engineering from the University of Alabama in 1982. I obtained a Master of Business Administration degree from the University of South Florida in 1992. I joined GTE Florida in 1982 as a Switching Services Supervisor-Management Trainee. Between 1983 and 1986, I held various positions as an Outside Plant Planner. I joined GTE South in 1986 as a Central Office Planner, returning to GTE Florida in 1989 as a Section Manager-Exchange Planning. From 1993 to 1997, I was a Planning Manager-Network Planning, where my responsibilities included planning and deployment of new network access technologies and architectures. I assumed the position of Manager-Costing in 1997, where my responsibilities included support of various network cost models. With the merger of GTE and Bell Atlantic, I assumed my current position. I have provided testimony before the state utility commissions of California and Michigan.

Q. MR. RICHTER, PLEASE DESCRIBE THOSE ASPECTS OF YOUR PROFESSIONAL BACKGROUND MOST PERTINENT TO YOUR TESTIMONY.

A. I am employed by Verizon Communications as a Senior Specialist - Engineering Regulatory Support. In this capacity, I serve as a liaison between state and federal regulatory entities (both internal and external to Verizon), and the Engineering and Planning organization, under the Network Services Group. I received my Bachelor's degree in Computer Science from Clarkson University in 1986 and my Masters of Business Administration degree from Bryant College in 2000. I have been employed by Verizon and its predecessor companies for over 17 years in a variety of capacities, primarily engineering. My positions in Verizon have included Outside Plant Engineer and Network Planner. In 1993 I was assigned the position of Technical Transfer Manager in South East Asia (Bangkok), where I was responsible for part of the design and construction of a 2.6 million line expansion project in the Bangkok Metropolitan area. Since returning to the United States in 1995, I have worked as a Strategic Business Planner and as Staff Director and Engineering Manager in Massachusetts, Rhode Island, and Maine.

Q. MR. SANFORD, PLEASE DESCRIBE THOSE ASPECTS OF YOUR PROFESSIONAL BACKGROUND MOST PERTINENT TO YOUR TESTIMONY.

A. I am employed by Verizon's Service Costs organization in the Service Cost organization in the Finance Department. I have 34 years of work experience at

Verizon and its predecessor companies, encompassing numerous positions with increasing levels of responsibility, including assignments in the outside plant department and marketing. I have spent 20 years in the Service Cost organization, with 13 years in my current position. My current responsibilities include conducting, reviewing, analyzing and supervising cost studies and cost study methodologies. In addition, I have attended many courses and seminars on relevant topics, including Economic Principles for Cost Analysis, Costs for Pricing Decisions, Network Services Costs, and Concepts of Service Cost Studies. I have sponsored testimony before the public utility commissions in Pennsylvania, Delaware, Washington, DC, West Virginia, Rhode Island, and New Hampshire. I also have sponsored testimony before the Federal Communications Commission ("FCC") in the Virginia UNE proceeding.

II. INTRODUCTION AND SUMMARY OF VERIZON NW'S BASIC COSTING APPROACH

A. Summary

Q. PLEASE SUMMARIZE THE TESTIMONY THAT IS SUBMITTED TODAY.

A. The testimony Verizon Northwest Inc. ("Verizon NW") submits today is designed to assist the Commission in its review of the accompanying cost studies supporting Verizon NW's TELRIC costs for unbundled network elements ("UNEs") and related services. Verizon NW respectfully submits that the Washington Utilities and Transportation Commission ("Commission") should adopt Verizon NW's cost studies and the resulting costs and rates because (1) Verizon NW's costs are the product of a cost model and cost studies that fully comply with the Commission's previous orders, particularly as regards transparency, openness and ease of use; and (2) Verizon NW's costs and the resulting TELRIC rates are fully consistent with the cost principles adopted by this Commission and the FCC.

Verizon NW's cost studies are the product of a new model, VzCost, that is designed to address alleged shortcomings that were identified in the cost model previously used by Verizon NW. Over the past 18 months, the Verizon companies have invested substantial time and funds into developing, testing and refining VzCost. The result is an easy-to-use, web-based model that allows users to view its underlying data, assumptions, algorithms, inputs and outputs. VzCost users can easily substitute different assumptions and data, run studies using the new information, compare the results of different study runs, and save both the inputs and outputs of various study runs for later use. Because the model is Internet based, it can be used from any location where the Internet is available. VzCost thus represents a new generation cost model that we believe will greatly assist the Commission, Staff, and the parties in the conduct of this proceeding.

The recurring rates proposed by Verizon NW are attached hereto as Exhibit RP-2. The testimony submitted today explains how those rates fully comply with the costing principles adopted by this Commission and the FCC. For example, Verizon NW's cost studies are based on efficient, "forward-looking" economic principles that account only for the incremental costs of using the network elements at issue. Further, pursuant to the TELRIC requirements, the studies do not consider the embedded cost of Verizon NW's existing network facilities. Rather, the studies assume current, network-wide deployment of a more efficient mix of network technologies than Verizon NW could ever hope to deploy in the real world. These assumptions include, for example, the extent to which fiber, digital loop carrier ("DLC") technologies, and SONET rings are reflected in the network modeled for purposes of these cost studies. And the studies consider only the forward-looking expenses associated with such forward-looking technologies. Also, the studies conservatively account for competitive and regulatory risks that Verizon NW faces in providing UNEs to CLECs, particularly in light of the growing competition for customers from CLECs as well as wireless and cable providers.

As the testimony demonstrates, given the assumptions and constraints of TELRIC, the rates proposed by Verizon NW cannot fully compensate the company for the full real-world costs it incurs in providing UNEs to CLECs. Accordingly, were the Commission to adopt rates even *lower* than those proposed by Verizon NW, the company would incur even greater losses in providing UNEs and services to CLECs, and thus would have little incentive to invest in improving the relevant network facilities. Further, the adoption of rates lower than those proposed by Verizon NW would further encourage CLECs to continue using Verizon NW's facilities at artificially low prices when, in truth, it would be more economically efficient — and therefore more beneficial to consumers over the long term — for those CLECs to build and use their own facilities.

Accordingly, there are substantial economic downsides to the adoption of rates that do not reasonably compensate Verizon NW for its costs. As the Commission has previously recognized, "healthy competition rests on accurate price signals that tell competitors when to invest and when to use other strategies" — not on "striving for the lowest possible price" for UNEs.[1/]

Q. PLEASE EXPLAIN THE STRUCTURE OF THE TESTIMONY.

A. Verizon NW is filing the written testimony of a panel of six witnesses along with its cost studies. The testimony explains the particular assumptions and methodology used by Verizon NW to produce the various outputs associated with the UNEs services at issue in the studies. These witnesses collectively represent well over a century of experience in telecommunications. By virtue of education, training and experience, each panel witness is an expert on the subjects to which he testifies. Moreover, each is familiar with the operation of VzCost as it relates to the subject of his testimony. In addition to the panel testimony, Verizon NW is submitting testimony from a variety of experts in the fields of economics, finance, and depreciation. These witnesses further explain and attest to the reasonableness of Verizon NW's cost studies and their compliance with all relevant legal and regulatory mandates. As with the panel witnesses, each of Verizon NW's supporting witnesses is an expert on the subjects to which he testifies.

1/ *Thirty-first Supplemental Order* in Docket No. UT-960369, UT-960370, UT-960371, at ¶ 24.

Q. COULD YOU PLEASE SUMMARIZE VERIZON NW'S BASIC METHODOLOGY FOR CALCULATING ITS UNE COSTS?

A. The process of determining the costs for UNEs necessarily involves some complexity. Even so, the basic steps in the process can be easily summarized. There are recurring and non-recurring UNE costs. Recurring costs are the costs of the capital and operating costs of the facilities used in providing UNEs; non-recurring costs are primarily the labor costs involved in processing and provisioning CLEC UNE orders. Only recurring costs are addressed in this testimony.

As the witnesses explain in greater detail, Verizon NW's recurring studies begin by determining the cost of the materials and equipment that would be necessary to provide various UNEs (*e.g.,* local loops, switching, and interoffice transport) in the forward-looking, efficient network that is assumed for cost study purposes. Once the forward-looking material and equipment costs are determined, the studies add the costs associated with making the materials and equipment usable in the forward-looking network — for example, installing copper into the network as part of a loop. These costs are referred to in the testimony as "investment loadings." They include such things as engineering and installation costs, power costs, and the like. Once the cost of the installed material and equipment is determined, the studies add the costs that will be needed to operate and maintain the equipment and facilities — such as maintenance and repair costs, as well as common overhead costs — and the related capital carrying costs, such as interest and depreciation expense, common overhead costs, and the like. These costs are referred to in the testimony as Annual Cost Factors ("ACFs") and expense loadings. Based on these calculations, Verizon NW determines the total annual cost for each network element. It then either divides by 12 to arrive at a monthly rate, or, in some cases (such as switching), divides by the average number of minute of use to derive a cost per minute of use.

B. Scope Of UNEs Considered In This Filing

Q. WHAT UNE COSTS ARE DISCUSSED IN THIS FILING?

A. Verizon NW's cost studies include the following UNEs required by the FCC: local loops, network interface devices, switching, interoffice transport, and certain call related databases. This testimony addresses all of Verizon NW's recurring costs identified by the Commission in Attachment A to the Fourth Supplemental Order in Docket No. UT-023003 except for those associated with Verizon NW's loop deaveraging proposal, which are discussed in the accompanying testimony of Terry Dye, and except for some network elements no longer required to be unbundled by the FCC (*e.g.*, packet switching). Pursuant to the Commission's scheduling order, Verizon NW's non-recurring and OSS costs will be discussed in separate testimony. The recurring costs incurred in connection with all of the required UNEs, as well as certain UNE combinations, are included in Verizon NW's cost studies.

C. Summary Of Costing Approach

Q. ARE THE COST STUDIES VERIZON NW IS SUBMITTING IDENTICAL TO PRIOR STUDIES SUBMITTED BY THE COMPANY IN WASHINGTON?

A. No, Verizon NW's cost studies have been updated and revised to reflect a number of developments since Verizon NW (formerly known as GTE Northwest Incorporated) last performed UNE cost studies. These developments include clarifications of TELRIC by the FCC and the courts, greater understanding of how to apply TELRIC in designing and performing cost studies, and insights gained from instances when prior studies needed improvement. The studies also reflect improved data on actual customer locations and network characteristics and greater experience with respect to the amount of growth and usage expected in the UNE market.

Q. ARE THE UNE COSTS VERIZON NW IS SUBMITTING FORWARD-LOOKING?

A. Yes. As explained above, all of the cost studies included in this filing are forward-looking and are based on long-run incremental cost methodologies designed to comport with the FCC's TELRIC principles, as explained in the separate testimony of Dr. Shelanski. The inputs Verizon NW used were based on forward-looking assumptions about the network plant mix and about improved operational methods that Verizon NW could achieve using the most efficient currently available technology mix that it expects to deploy. Verizon NW based its recurring cost studies not on the costs that it will in fact incur but instead on the costs that it hypothetically would incur if it were to deploy the forward-looking mix of technology it assumes network-wide.

D. Avoidance Of Double Recovery

Q. HOW DO VERIZON NW'S STUDIES AVOID DOUBLE RECOVERY?

A. Verizon NW's general approach is designed to avoid the double recovery of costs. Thus, in determining the investment associated with a particular element, Verizon NW first identified the discrete separate assets dedicated to providing that element and calculated the investment associated with those assets. The ability to assign particular investments unambiguously to particular elements in this manner is a key factor in avoiding double recovery under TELRIC approaches.[2] However, some assets are necessarily used by more than one element (*e.g.*, sharing of structure between loops and transport, and sharing of building and power assets among elements located in the central office). In these cases, Verizon NW used explicit allocation methodologies to identify and apportion the total amount of the relevant shared investments among the different elements to prevent double recovery of those costs.

Similarly, Verizon NW's approach to the estimation of expenses, which depends on the application of ACFs and expense loadings, is designed to recover no more than the total forward-looking wholesale expense in element rates.

Q. HOW DOES VERIZON NW ENSURE THAT THERE IS NO DOUBLE RECOVERY OF NON-RECURRING COSTS?

A. As explained more fully below, Verizon NW adjusts the Wholesale Marketing Loading and Network ACFs (discussed below) to exclude non-recurring revenues, thus ensuring that these ACFs and loadings do not reflect the non-

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[2] *See* First Report and Order, *In the Matter of Implementation of the Local Competition Provisions in the Telecommunications Act of 1996*, 11 FCC Rcd 15499 ¶ 678 (1996) ("*Local Competition Order*").

recurring expenses that Verizon NW will propose to recover through non-recurring rates.

III. OVERVIEW OF VZCOST MODEL

A. Description of VzCost

Q. WHAT COST MODEL HAS VERIZON NW USED TO DEVELOP ITS COST STUDIES IN THIS PROCEEDING?

A. As noted, Verizon NW has used VzCost, a new Internet-based cost model that has been designed and developed by Verizon's Service Costs group, for Verizon's cost studies. VzCost is accessible at http://www.verizon.com/vzcost/ and requires a valid user identification and password.

Q. PLEASE DESCRIBE VZCOST'S GENERAL APPROACH TO CALCULATING RECURRING COSTS.

A. VzCost is designed around four basic modules: the Investment Calculators, the Investment Generator, the Costing Generator, and the Report and Documentation Generator. These modules are depicted in Exhibit RP-3 to this testimony.

The Investment Calculators calculate investments based on various inputs and assumptions provided by Service Costs analysts. These inputs and assumptions are designed to account for factors such as customer demand, technology assumptions, and input prices. The loop investment calculator, VzLoop, is contained within the VzCost system and accessible through the same Internet interface used to access the other VzCost modules. The investment calculators for other portions of the network (*e.g.*, switching, interoffice facilities, SS7) are currently external to the online VzCost system and must be accessed independently. Whether the modeled investments are developed from internal or external calculators, they all represent investments at a very granular level called "investment elements."

After the investment elements have been calculated and loaded into VzCost, they pass through the Investment Generator module. The Investment Generator performs three primary functions. First, it applies to the investment elements any loadings that are needed to calculate total installed investment. Second, it assembles the investment elements into larger groupings, called "basic components" (or "BCs"), that can be used to build the costs of UNEs. Third, where necessary, it converts aggregate BC investment into per-unit BC investment. At this stage, all investments have been converted to total installed investment, at the per-unit level, for each basic component.

In the Costing Generator, VzCost maps the per-unit BC investments to the UNEs that are being modeled and then converts those investments to recurring costs by applying various ACFs and expense loadings. The ACFs and expense loadings account for depreciation, return, operating expenses, overhead, and various other costs of providing network elements.

Finally, the Report/Documentation Generator allows users to generate documentation and reports for each cost study run using VzCost. Users can view the list of available reports, request reports for studies that have been run, and assemble a complete documentation package that can be filed with the Commission. For comprehensive detail on the operation of the VzCost model, see Exhibits RP-4 (Cost Study Overview), RP-5 (VzLoop Cost Manual), RP-6C (Element Development Tool), RP-7 (VzLoop Pre-Processing), RP-8 (IOF Methodology), RP-9C (Container Program User Guide), RP-10 (Switching Cost Methodology), RP-11 (Switch Container Program), RP-12C (CostMod User Guide), RP-13C (SCIS/MO User Guide), RP-14C (SCIS/IN User Guide), RP-15 (Development of Cost Factors and Loadings), RP- 16 (VzCost User Guide), RP-17C (VzCost User Manual), RP-18C (IOF-HiCap Process), RP-19C (DS1 Transport), RP-20C (IOF-Designs), RP-21C (Entrance Facilities), and RP-22 (SS7 Container Program User Guide).

Q. IS VZCOST AN OPEN AND TRANSPARENT MODEL, AS PRESCRIBED BY THE EIGHTH SUPPLEMENTAL ORDER IN DOCKET NOS. UT-960369, UT-960370, UT-960371?

A. Yes. As noted above, in light of concerns about the closed nature of prior models raised by the Commission and other state commissions in their UNE pricing orders, Verizon invested significant time and resources in the development of VzCost, an Internet-accessible model that addresses those concerns. The result is an easy-to-use, web-based cost model that gives users the ability to view significant engineering assumptions and other cost study inputs. VzCost's readily accessible online interface also allows users to modify all of the formulae that VzCost applies to the initial investment elements to develop final costs. In addition, it allows users to conduct sensitivity analyses in two different ways. First, VzCost has built-in tools that allow users to perform sensitivity analyses based on variations of certain inputs and/or assumptions.

These tools are available from the VzCost main menu. Second, users can run VzCost with different sets of inputs and assumptions and then compare the results of model runs using these different parameters. Thus, VzCost allows users to analyze the effect of varying almost all of the parameters used to develop costs. And it does so without requiring the user to make complex adjustments to subsidiary assumptions that may change with the varying of those parameters.

Q. WHAT IMPROVEMENTS DOES VZCOST OFFER OVER OTHER COST MODELS?

A. First, as a web-based model, VzCost allows for easy access from any location at which the Internet is available, and without the requirement of purchasing and installing any additional software. Second, it permits easy storage and retrieval of a great deal of data relevant to the cost studies run with the model. Third, it enhances considerably the ability of users to conduct sensitivity analyses to trace their effects, and to do so without having to readjust subsidiary assumptions.

Q. HOW DOES VZCOST MANAGE SECURITY WITHIN THE SYSTEM?

A. VzCost requires each user to have a user identification ("user_id") and password to log on to the system. An initial password and user_id is assigned to each new user. When logging onto the system for the first time, the user is required to change this password to something only the user will know. Passwords are encrypted by the system and not viewable by system administrators. A user of the VzCost system cannot access the data and studies of another user within the VzCost system without obtaining specific permission.

B. Compliance with TELRIC Methodology

Q. DOES VZCOST COMPLY WITH THE FCC'S TELRIC METHODOLOGY?

A. Yes. As we state above and as explained in the testimony of Dr. Shelanski, Verizon's cost studies develop the forward-looking, long-run incremental costs of providing unbundled network elements using a methodology fully consistent with the FCC's TELRIC methodology. In particular, VzCost follows TELRIC methodology in the following ways, among others:

1) To the greatest extent possible, VzCost attributes forward-looking costs to specific network elements.[3/] VzCost accomplishes this by assigning all costs to specific network components (*i.e.*, basic components) as much as possible.

2) VzCost attributes costs only to those network elements that cause the costs to be incurred. VzCost accomplishes this by mapping the costs of each component only to the specific UNEs that use that component.

3) VzCost measures the incremental cost of providing each UNE or service based on the total quantity of the service provided.[4/]

4) VzCost identifies common costs so that they can be included in rates for UNEs.[5/]

3/ *See Local Competition Order* ¶ 682.

4/ For some network elements such as interoffice transport, VzCost uses a capacity costing approach that calculates the weighted average cost of typical equipment configurations used to provide services throughout the network. Though this approach does not attempt to calculate the total cost of the facilities across the whole network, it nevertheless produces the average cost of providing the services across all of the demand in the network. *See infra* Part VII.B.

5/ *Local Competition Order* ¶ 696 (UNE rates should include a reasonable allocation of common costs).

As explained in more detail below, Verizon's Investment Calculators further comply with the TELRIC methodology by assuming the use of the most efficient technology that is currently available and capable of providing the services that a forward-looking network must provide.[6]

IV. LOCAL LOOPS

Q. WHAT IS A LOCAL LOOP?

A. The local loop is the first major functional component of a local exchange network and is comprised of the facilities that connect an end user customer location to a wire center (also called a central office). At the wire center, loop facilities serving a particular geographic area terminate on physical arrays called "distribution frames." Heavily populated suburban wire centers typically have a large number of shorter loops. Rural wire centers cover larger areas with fewer customers, and thus have fewer total loops, but a higher proportion of longer and more expensive loops.

Q. HOW DOES THE FCC DEFINE THE "LOCAL LOOP" NETWORK ELEMENT?

A. FCC Rule 47 C.F.R. § 51.319(a) defines the unbundling requirement for the "local loop" network element as follows:

> (a) Local loop and subloop. An incumbent LEC shall provide nondiscriminatory access, in accordance with § 51.311 and section 251(c)(3) of the Act, to the local loop and subloop, including inside wiring owned by the incumbent LEC, on an unbundled basis to any requesting telecommunications carrier for the provision of a telecommunications service.

[6] *See Local Competition Order* ¶ 685.

(1) Local loop. The local loop network element is defined as a transmission facility between a distribution frame (or its equivalent) in an incumbent LEC central office and the loop demarcation point at an end-user customer premises, including inside wire owned by the incumbent LEC. The local loop network element includes all features, functions, and capabilities of such transmission facility. Those features, functions, and capabilities include, but are not limited to, dark fiber, attached electronics (except those electronics used for the provision of advanced services, such as Digital Subscriber Line Access Multiplexers), and line conditioning. The local loop includes, but is not limited to, DS1, DS3, fiber, and other high capacity loops ...

(2) Subloop. The subloop network element is defined as any portion of the loop that is technically feasible to access at terminals in the incumbent LEC's outside plant, including inside wire. An accessible terminal is any point on the loop where technicians can access the wire or fiber within the cable without removing a splice case to reach the wire or fiber within. Such points may include, but are not limited to, the pole or pedestal, the network interface device, the minimum point of entry, the single point of interconnection, the main distribution frame, the remote terminal, and the feeder/distribution interface ...

A. Types of Loops

Q. WHAT TYPES OF LOOPS DOES VERIZON NW OFFER?

A. Verizon NW offers the loop types described in FCC Rule 47 C.F.R. § 51.319(a). Specifically, Verizon NW offers:

(1) Two- and four-wire analog loops (also referred to as two-and four-wire non-loaded loops);

(2) Two- and four-wire Customer Specified Signaling loops;

(3) ISDN/BRI (two-wire digital loops);

(4) Digital four-wire (56 and 64 Kbps) loops;

(5) DS1/ISDN PRI loops;

(6) DS3 loops;

(7) xDSL-compatible loops;

(8) Subloops; and

(9) Dark fiber loops; and

(10) ISDN loop extenders.

Q. PLEASE DESCRIBE THESE DIFFERENT TYPES OF LOOPS.

A. A two-wire analog loop is a transmission circuit consisting of two wires that are used both to send and to receive voice conversation in the 300-3000 Hz frequency range. This is the basic loop type used for providing voice-grade service (also known as "plaintiff old telephone service" or "POTS"). The amount of capacity required to carry a voice-grade transmission frequently is referred to as a "DS0."[7/]

A four-wire analog loop consists of two pairs, one to transmit and one to receive. It is used in certain private line and data service applications.

A two-wire Customer-Specified Signaling loop is the same as a two-wire analog loop but operates with one of the following signaling types specified by the customer when the loop is ordered: loop-start, ground-start, loop-reverse-battery, or no signaling. Similarly, a four-wire Customer-Specified Signaling loop

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[7/] DS0 (Digital Signal 0 Level) is a unit of digital signal (64 Kbs) that provides an information-carrying channel within a digital facility. As noted above, a DS0 channel generally provides sufficient digital signal capacity to carry one standard voice grade signal with a 3Khz bandwidth. Higher-capacity digital signals such as DS1s and DS3s can be constructed by grouping together (multiplexing) lower-capacity signals. A DS1 channel can carry 24 DS0 channels, and a DS3 channel can carry 28 DS1 channels. This is called the "channelized" format of these signals. The same signal rates can be structured in an unchannelized format that provides access to the whole digital signal capacity for a single high speed data pipe. Thus, the "integrated group of 24 DS0s" refers to a group of 24 DS0 channels that are multiplexed and delivered on a single DS1 1.544 Mbs digital line interface.

is the same as a four-wire analog loop but operates with one of the following signaling types specified by the customer when the loop is ordered: loop-start, ground-start, loop-reverse-battery, duplex, or no signaling.

An ISDN/BRI loop is a two-wire digital loop that is engineered for the transmission of certain high-speed data services.

A digital four-wire loop is a four-wire loop that is engineered for the transmission of digital data service applications.

A DS1/ISDN PRI loop is a four-wire loop engineered to support DS1 transmission. DS1 transmissions have the same capacity as 24 DS0s. A DS1/ISDN PRI loop can be used, among other things, to provide ISDN – Primary Rate Interface ("PRI") service to an end-user customer.

DS3 high capacity loops provide for the equivalent of 28 DS1 channels or 672 analog voice-grade channels. DS3 high capacity loops are addressed in Part VII below.

xDSL-compatible loops, subloops, and dark fiber loops are each addressed in separate subsections below.

B. Overview of Loop Architecture

Q. WHAT TYPES OF FACILITIES COMPRISE LOCAL LOOPS?

A. The primary components of a loop are:

(1) copper and fiber cable (*i.e.*, the physical media that actually carries the signal);

(2) structure facilities that physically support the cable (*e.g.*, poles and conduit);

(3) equipment needed to convert and combine signals (*e.g.*, digital loop carrier ("DLC") equipment, multiplexers);

(4) terminals, including serving area interfaces and distribution terminals;

(5) drop wire that connects the distribution terminal to the network interface device (NID); and

(6) the NID (*i.e.*, the connection point between the drop wire and the subscriber's inside wiring).

Q. WHAT TYPES OF CABLE ARE UTILIZED IN LOOPS?

A. In general, loop cables can be either copper (which conducts them as electrical impulses) or optical fiber (which conducts signals as light pulses). The copper cable consists of a flexible outer tube or sheath containing dozens, hundreds, or even thousands of individual copper wires. The fiber cable consists of a flexible outer tube or sheath containing many hair-thin fiber strands. Large fiber cables can contain several hundred strands that are usually grouped in 12-strand units called "ribbons."[8/] Fiber cables must be connected to special electronic equipment in order to transmit signals.

Q. PLEASE DESCRIBE THE ELECTRONIC EQUIPMENT USED WITH FIBER CABLES.

A. The fiber electronic equipment used in the loop plant combines digital electronic systems with optical transmission utilizing what is known as "digital loop carrier" ("DLC") technology. DLC technology converts voice and other analog signals into a digital signai that can be combined (or "multiplexed") with other such signals and sent over a shared facility. For example, individual voice-grade

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8/ Smaller fiber cables also may have their fibers grouped into ribbons, as well.

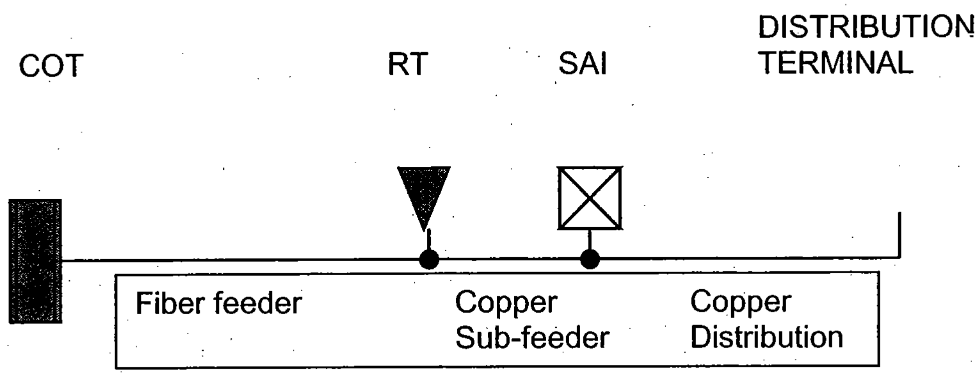
transmissions (called DS0s) are multiplexed into DS1 signals for transmission across the network. The first DLC systems used copper pairs for transmission of the digital signal back to the wire center, but today DLC systems using optical fiber systems are the forward-looking DLC technology. The cost of DLC technology initially made it economically efficient only for use on longer subscriber loops that required coarser gauge cable and a greater number of costly add-ons (such as load coils) when served with copper feeder facilities, or on routes with highly concentrated demand. As the cost to deploy fiber-fed electronic systems has decreased, its use has become increasingly economical on shorter feeder routes and on routes with less concentrated demand.

Q. PLEASE DESCRIBE THE ARCHITECTURE OF A TYPICAL DLC LOOP.

A. The typical modern DLC loop facility contains a mix of fiber feeder cable and copper distribution cable. On most modern DLC loops, the facility consists of a fiber optic feeder facility extending from the wire center to a point close to the serving area interface ("SAI"),[9/] where the feeder cable branches off to the distribution cable. At this point, the fiber connects to an electronic device called a remote terminal ("RT"), which converts the optical signals to electrical signals that can be carried over copper cable. The RT then connects to the SAI using copper sub-feeder cable. Distribution cable (typically copper) connects the SAI to distribution terminals, which are typically connected to the customer premises by a copper drop wire. Figure A below shows a typical DLC loop configuration.

[9/] The SAI is also known as the feeder/distribution interface ("FDI") or cross-connect box.

Figure A: Typical DLC Loop Configuration



The RT and SAI are located as close to the customers as is reasonably possible to decrease the length of the copper sub-feeder and distribution cable and increase the substitution of fiber for copper. In very concentrated applications – such as high-rise, multi-unit dwellings, or business locations with large numbers of lines – it may be economically efficient to install the optical RT in the basement or other common space in the building, eliminating the need for copper sub-feeder and distribution cable. In other applications, copper sub-feeder and distribution cable are used to bring together enough customer lines to use the RT facility more efficiently.

Q. HOW DO OPTICAL DLC FACILITIES TERMINATE AT THE WIRE CENTER?

A. In the wire center, the optical DLC cable terminates on the wire center's fiber distribution frame and is connected from there, by fiber cabling, to a piece of equipment called the central office terminal ("COT"). The COT has the same basic components as the RT; it contains the mate of the RT's SONET multiplexer, a time-slot interchanger system, and a channel interface system. The COT channel interfaces are used to connect DS0 or DS1 loop channels to digital circuit switches, interoffice transport facilities or other loops. DLC systems support a variety of channel interface units that allow the DLC system to interconnect with the whole range of physical switch and transport interfaces employed in the industry. These interfaces include several types of DS1 connections, basic rate ISDN ("BRI"), and a number of analog wire connections. Channelized DS1 (groups of 24 multiplexed DS0s) connection options for DLC are called "integrated" or IDLC because they allow interconnection to a digital switch or transport facility without decoding the DS0 channels — that is, they allow the entire, integrated group of 24 DS0s to interconnect directly to the digital switch. The analog wire DLC connection options are called "universal" or UDLC, and they provide the reverse functionality of the RT channel units: they return the customer signal to its original analog line format, allowing interconnection of an individual analog channel via a copper wire interface. The universal interface can be connected to any type of voice frequency switch port or telecommunications equipment on the main distribution frame in the central office.

Exhibit RP-23 to this testimony contains a diagram showing the different types of loop architecture.

Q. WHICH OF THE TWO COT INTERFACES — INTEGRATED OR UNIVERSAL — WOULD BE USED IN DESIGNING AN EFFICIENT, FORWARD-LOOKING NETWORK?

A. Both would be used, depending on the application. Fiber-fed DLC switched services would be provisioned using IDLC. However, either UDLC or all-copper facilities are necessary to provide other services, such as individual two-wire unbundled analog loops, private non-switched services, some types of payphone services, data services such as DDS, and others.

Q. WHY IS IT NECESSARY TO USE UDLC TO PROVIDE ACCESS TO AN UNBUNDLED LOOP?

A. In order to access a single UNE loop, a physical point of interconnection is needed. As noted above, in an IDLC configuration, digital interface ports on digital circuit switches are provided in groups of 24 DS0 channels called DS1s. Once multiplexed at the RT, the individual, dedicated DS0 channels remain grouped in a 24-channel DS1 format all the way to the digital interface ports on the switch. Because IDLC delivers signals directly to the switch in a multiplexed DS1 format, IDLC does not allow CLECs to connect to individual loops (such as through a physical two-wire connection), and UDLC or copper cable must be used instead. Thus, based on currently available technology, to unbundle a loop from an IDLC assignment, the distribution subloop must either be reconnected to a different RT channel unit associated with a UDLC interface, or rearranged to connect to an all-copper feeder pair.

Q. IS IT POSSIBLE TO SUPPORT UNBUNDLING OF INDIVIDUAL LOOPS USING ANY OTHER CURRENTLY AVAILABLE TECHNOLOGY SUCH AS GR-303?

A. No. The technology and products necessary to support such unbundling are not presently available. The GR-303 interface allows RTs to rearrange a DS0 connection for an RT channel from one GR-303 DS1 group to another; thus, in theory, one of the GR-303 DS1 groups could be assigned to a CLEC, thus permitting the individual loops within other DS1 groups to be reassigned to the CLEC's DS1 group. However, this would be different from accessing a single, standalone loop, and it would require developing industry standards for OSS and other technical interfaces to support an environment in which multiple carriers' switches are connected to the same RTs. It would thus require RT suppliers to develop security, error-protection, and other operational capabilities necessary to support multiple users. To date, no such standards or capabilities have been developed, and Verizon NW is unaware of any efforts by the suppliers of OSS, RT and COT equipment to develop or make such functionality available. Thus, it is not possible, based on presently-available technology and products, to unbundle individual loops that are served with a GR-303 IDLC interface.

Q. **ARE THERE CIRCUMSTANCES IN WHICH IT IS MORE COST-EFFECTIVE TO DEPLOY AN ALL-COPPER LOOP?**

A. Yes. Where customers are located close to the central office, an all-copper solution often will be economically more efficient than fiber-fed DLC. On these shorter routes, it is not necessary to use the costly network add-ons (*e.g.*, load coils) used on longer copper loops. Using copper cables for these shorter loops also eliminates the DLC equipment and associated site preparation costs required for fiber-fed facilities.

Q. **DOES VERIZON NW ALSO PROPOSE RATES FOR UNBUNDLED NIDS?**

A. Yes. Verizon NW's proposed rates for unbundled NIDs were developed consistent with the methodology used to develop the other loop UNE rates.

C. Overview of Costing Methodology

Q. PLEASE DESCRIBE HOW VZCOST DEVELOPS FORWARD-LOOKING LOOP COSTS.

A. The forward-looking local loop network is modeled by VzLoop, VzCost's loop investment calculator.[10/] VzLoop develops forward-looking loop investments by modeling from the ground up all of the facilities required in the forward-looking local exchange network and identifying the investments for those facilities based on the prices that Verizon NW would pay for those facilities. VzCost then maps VzLoop's modeled investments to specific UNEs and converts these investments to recurring monthly costs. As explained below and in more detail in the Loop Pre-Processing Manual, *see* Exhibit RP-7, the modeled local exchange network is based on detailed information describing the current location of all real customers and the services they receive over Verizon NW's existing network; forward-looking technology; and forward-looking costs for material and labor. The investments produced by VzLoop are referred to as Investment Elements ("IEs") and correspond to total investment at the wire center level for network components such as poles, cables, and conduit. Except for IEs related to DLC equipment, all of the IEs produced by VzLoop include the cost of materials, sales tax, freight, and provisioning, as well as engineering and placement. The IEs for DLC equipment include only the cost of materials, sales tax, and freight and

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10/ VzLoop is written in Pascal, using the Delphi development package. The source code is included with Verizon NW's filing in both PDF and text file formats.

provisioning. The DLC IEs are multiplied by investment loading factors within VzCost to account for the cost of engineering and placement.

Once VzLoop has calculated the IEs, VzCost follows the process explained in Part II.A above. Specifically, VzCost divides the IEs by the appropriate units of demand to determine per-unit costs, and then maps the per-unit investments to pre-defined Basic Components ("BCs"). The BCs represent basic components of the loop network, such as copper distribution facilities, copper feeder facilities, fiber feeder facilities, etc. VzCost then uses its Cost Study Templates to map the BCs to the appropriate loop UNEs, and to apply annual cost factors to convert the BC investments into recurring costs that reflect depreciation, cost of capital, maintenance and other expenses.

Q. WHAT IS THE SOURCE OF THE MATERIAL COSTS USED IN VZLOOP?

A. The material costs used by VzLoop are found in the MATERIALS table. These costs reflect input prices that Verizon has been able to negotiate with its vendors. The vast majority of the base material prices reflect the current prices in Verizon's vendor contracts. Where Verizon did not have a current contract price for a particular item, Verizon developed base material prices from Verizon's recent purchases. Adjustments for sales tax, freight and provisioning expense were made to these prices. These adjustments are shown on the spreadsheet included in the cost study documentation and titled "WA_VZMATLCSTRCOMBINEDREV7_2C.XLS."

Q. WHAT IS THE SOURCE OF THE PLACEMENT COSTS USED IN VZLOOP?

A. The placement costs used by VzLoop for network components such as cables and poles are found in the PLACEMENT table and reflect Washington-specific costs reflected in Verizon NW's Single Source Provider contracts. The costs specified in these contracts have been adjusted to include engineering costs. The spreadsheet showing these adjustments is included in the cost study documentation and is named "WA_ECF_ADJ_51203.XLS." Placement costs for DLC equipment are calculated through investment loading factors, as explained in Part X.A below.

Q. HOW DOES VZCOST MAP THE MODELED INVESTMENT TO INDIVIDUAL UNES?

A. As noted above, VzCost maps the IEs produced by VzLoop to individual UNEs in two steps. First, VzCost's BC Family Mapping process arranges the loaded IEs (i.e., investments that include placement costs) into the following groupings:

(1) copper feeder
(2) fiber feeder
(3) SAIs
(4) copper distribution
(5) DLC common investment
(6) DLC line cards
(7) drop cable
(8) NIDs
(9) Terminal

For each of these groupings, investment for each wire center is converted to per-unit investment by dividing by the appropriate demand levels for each wire center. For each resulting BC, VzCost identifies the applicable USOA account(s), the portion of investment that is direct vs. shared, and the portion that is attributable to business vs. residential service.

The second step involves mapping the BCs to specific UNEs. VzCost uses Cost Study Templates to map BCs to the associated UNEs (such as a 2-wire loop). The Cost Study Templates then convert investments for each UNE to recurring costs by applying capital cost factors (for depreciation, return and taxes), expense factors (for network expense, marketing, and other expenses), and other loading factors (for other costs such as regulatory assessments, uncollectibles, and common overhead).[11]

Q. WHAT IS HOUSE AND RISER CABLE?

A. In large, multi-floor, multi-tenant buildings ("MTE"), the outside plant ("OSP") or "distribution" loop cable usually terminates in the basement of the building. Inside the building, shared premises cables are placed from the basement up through the floors. There may also be shared cables on each floor, with interface devices at each floor to connect the vertical riser cable to the horizontal cable on each floor. These cables allow loops from individual customer premises to be connected to the OSP loops. This cable is called "house and riser," or "H&R."

Q. HOW IS H&R CABLE NORMALLY CONFIGURED?

A. Verizon NW encounters many configurations of H&R in operation. Typically, the OSP and H&R cable connect in the basement. This point of connection is known as the "NID" (Network Interface Device), which the FCC defines as "all

[11] The application of factors is discussed in more detail in Part X.B below.

features, functions, and capabilities of the facilities used to connect the loop distribution plant to the customer premises wiring."[12/] Because Verizon follows MPOE regulation of cable inside MTE buildings in Washington,[13/] the demarcation point (at which Verizon's control ceases and the landlord's control begins) is at the minimum practical distance into a customer building. Accordingly, the demarcation point ordinarily is at or very close to the NID. Verizon thus owns little or no wire beyond the NID in multi-unit buildings.

Q. DOES VERIZON NW OWN H&R FACILITIES IN THE STATE OF WASHINGTON?

A. None of which we are aware. Because Washington is a MPOE state, LEC ownership and control of OSP facilities ends at or very near the NID, which is ordinarily in the basement at the minimum practical distance into the building. Thus, all H&R cable and associated network interface hardware is owned by the building owner, not by Verizon.

Q. HAS VERIZON NW PROVIDED COSTS FOR H&R IN THIS PROCEEDING?

A. Yes. In Docket No. UT-003013, the parties agreed to and the Commission accepted on an interim basis the use of Verizon NW's monthly recurring rate for the NID as a proxy for intrabuilding riser cable. However, the Commission further noted that it would consider additional evidence with respect to permanent rates

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12/ Third Report and Order and Fourth Further Notice of Proposed Rulemaking, *Implementation of the Local Competition Provisions of the Telecommunications Act of 1996*, 15 FCC Rcd 3696 ¶ 233 (1999) (subsequent history omitted).

13/ The Minimum Point of Entry is the closest practicable point to where the wire crosses a property line or enters a building.

in a later phase of the proceeding, which has now been consolidated in this docket. In compliance with Commission direction, Verizon NW has provided costs for H&R cable. Because Verizon NW has no recent experience placing H&R cable in Washington, there is no engineering information available to inform a cost study reliably. Accordingly, Verizon NW has identified as the H&R costs only the cost associated with the NID and other interface devices used at each floor access point. These devices are required to provide H&R facilities, and are similar in cost to other interface devices used by Verizon NW. Verizon NW has not assigned any cost to the cable that would be required to provision H&R, because Verizon does not own any such cable and thus has no data upon which to base those costs.

Q. ARE THERE ANY OTHER RECURRING COSTS THAT MAY BE ASSOCIATED WITH H&R CABLE?

A. Yes. If Verizon NW actually possessed and provided access to H&R, there would be the recurring cost associated with the cable and interface devices. The Commission has decided to address the terms and conditions under which Verizon must provide access to H&R cable in Docket No. UT-011219, and in doing so it has recognized that "the resolution of those issues [will] affect the determination of relevant costs."[14] Verizon NW reserves the right to revisit the costs associated with H&R cable in light of the outcome of that proceeding.

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[14] Thirty-Second Supplemental Order; Part B Order, *In the Matter of the Continued Costing and Pricing of Unbundled Network Elements, Transport, and Termination*, Docket No. UT-003013 ¶ 422 (June 21, 2002).

Q. DOES VZLOOP DISTINGUISH BETWEEN DIRECT AND SHARED COSTS?

A. Yes. For DLC equipment, direct costs are equal to the cost of the line cards, plus the cost of common equipment capacity[15/] used for working lines. For example, suppose that a 96-line RT has 72 working lines and that the common equipment investment is $43,000. Suppose further that the cost of the line cards is $50 per line. The direct and shared costs would be identified as follows:

Description	Cost
1. Total DLC investment	$43,000
2. Total line card investment (72 x $50)	$3,600
3. Total DLC investment (Line 1 + Line 2)	$46,600
4. Capacity cost of common equipment (Line 1 / 96)	$447.92
5. Cost of common equipment capacity used for working lines (Line 4 x 72)	$32,250
6. Total direct costs (Line 2 + Line 5)	$35,850
7. Total shared costs (Line 3 – Line 6)	$10,750

The costs of conduit systems, poles, anchors and guys are treated as shared. All other loop costs are treated as direct costs.[16/]

D. Physical Characteristics of the Modeled Network

1. Determining Customer Locations, Cable Routing and Demand

Q. WHAT SOURCES OF DATA DOES VERIZON NW USE IN ITS COST STUDIES TO DETERMINE THE LOCATION OF CUSTOMERS TO BE SERVED BY THE FORWARD-LOOKING NETWORK?

15/ DLC common equipment includes components such as the DLC enclosure and the shelf units into which individual line cards are inserted.

16/ The treatment of direct and shared costs is discussed in more detail in the VzLoop Manual.

A. Verizon NW relies on data about the location of serving terminals[17/] obtained from Verizon's Assignment Activation and Inventory Services ("AAIS") system, a Verizon legacy system used in day-to-day facilities assignment and inventory management. Verizon NW also relies on data obtained from Verizon's facilities and plant records systems.

Q. WHY DOES VERIZON NW USE SERVING TERMINAL LOCATIONS INSTEAD OF THE ACTUAL CUSTOMER LOCATIONS?

A. First, serving terminals are located very close to customer locations, because the connection between the serving terminal and the customer location is no longer than the length of a drop cable. Second, Verizon NW's serving terminal data allows Verizon NW to identify the location of a far greater number of customers than data about individual customer locations would permit. If Verizon NW were to rely on customer locations alone and did not have sufficient address information to allow geocoding of a particular customer location, Verizon NW would not be able to locate that customer with any precision. However, if Verizon NW can geocode or otherwise identify the location of a serving terminal, Verizon NW can identify the location of all customers served by that terminal to within the length of a drop cable, without requiring precise address information for each individual customer served by that terminal. Moreover, Verizon NW can improve the results of the geocoding process for serving terminals by comparing the geocoded data to information from Verizon NW's facilities and plant records

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[17/] Serving terminals (also called "distribution terminals") are used to connect distribution cables to drop wires, which in turn connect to the customer premises.

about the locations of cables that connect to the terminals. This in turn allows Verizon NW to identify the location of a significant number of serving terminals for which the terminal address information was insufficient to identify a precise location through geocoding alone.[18]

Third, because serving terminals typically are located along existing rights of way, the serving terminal locations can be analyzed together with cable routing information from the existing network to account for the location of roads, geographical features, buildings, and other obstacles that determine routing in the real world. Consequently, using the serving terminal data allows Verizon NW to model much more realistic cable routes than would otherwise be the case.

Q. HOW DID VERIZON NW DETERMINE CABLE ROUTING FOR THE FORWARD-LOOKING NETWORK?

A. Verizon NW determined cable routing through a three step process. First, Verizon NW used cable assignment records from the AAIS system to identify the SAIs to which serving terminals are connected. Second, Verizon NW used a minimum spanning tree algorithm to determine the minimum distance required to connect all of the serving terminals that were to be connected to the same SAI. Third, Verizon NW used its outside plant records to determine feeder cable routing from the SAI back to the central office. This process is explained in more detail in the Loop Pre-Processing Manual.

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[18] Verizon NW's methodology for identifying serving terminal locations is discussed in greater detail in the VzLoop Manual.

Q. HOW DID VERIZON NW IDENTIFY THE CUSTOMER DEMAND AT EACH SERVING TERMINAL?

A. Verizon NW obtained data from the AAIS system concerning switched and non-switched narrowband services provided to customers at each serving terminal. Verizon NW also matched DS1 customer location data from the AAIS system to the closest serving terminal to allow Verizon NW to model DS1 demand at each serving terminal.

Q. IS THE RESULTING DATA CONCERNING CUSTOMER LOCATIONS, ROUTING, AND DEMAND AVAILABLE ONLINE IN VZCOST?

A. Yes. The resulting customer location, routing and demand data is contained in VzLoop's NETWORK table which can be accessed online via VzCost.

Q. HOW DOES VZLOOP USE THE INFORMATION IN THE NETWORK TABLE TO MODEL THE LOCAL EXCHANGE NETWORK?

A. VzLoop uses the information in the NETWORK table as the starting point for the modeled network. Specifically, VzLoop uses the information in this table, along with certain tables containing user-specified inputs, to determine the routing of the modeled network, the appropriate cable size and structure type for each cable segment, and the size and placement of poles and conduit systems. VzLoop also uses the existing SAI and DLC locations in the NETWORK table as potential sites for the placement of DLCs.

Q. WHY IS IT APPROPRIATE TO RELY ON THE EXISTING ROUTING, AND EXISTING SAI AND DLC LOCATIONS IN A FORWARD-LOOKING COST MODEL?

A. In a real-world network, cables must be routed by following the paths of the actual streets and secured easements. These will not change in the real world on a forward-looking basis and should thus be incorporated in the modeled network. Likewise, the placement of SAIs and DLCs is determined by a large number of real-world constraints. For example, engineers must take into account factors such as limitations on access to rights of way; the location of physical obstructions such as buildings, lakes, and rivers; permitting regulations that impose, among other things, minimum spacing requirements between terminals; safety issues arising from high-voltage power equipment and heavily traveled roads; flooding considerations; private homeowner concerns; and ease of access to the site for technicians (including availability of parking). It would be virtually impossible to design a computer model that took into account all of these factors. However, Verizon NW's engineers have taken these factors into account when establishing the SAI and DLC locations in the existing network. Thus, it is far more realistic and reasonable for a forward-looking cost model to rely on the existing locations than it is to ignore those locations and rely solely on mathematically-derived locations that might not even be feasible in the real world.

2. Cable Sizing and Fill Factors

Q. DOES VZLOOP RELY ON FILL FACTORS AS INPUTS?

A. No. Fill factors are not used as inputs in VzLoop, but are outputs that result from the sizing calculations described below and the available discrete sizes for cable.

Q. HOW DOES VZLOOP SIZE COPPER FEEDER CABLES?

A. On each route segment in the modeled network, VzLoop sizes copper feeder cables based on cumulative demand (*i.e.*, the total number of working lines), the copper cable sizing factor (which Verizon NW set to 1.2), the administrative spare factor (which Verizon NW set to 1.02), and available cable sizes. The total required number of pairs is calculated as the product of the cumulative demand, the sizing factor and one plus the administrative spare factor. Assume, for example, that for a given aerial feeder cable segment, there are 450 working lines. The total required number of pairs would be 450 x 1.2 x 1.02 = 551, and VzLoop would model the cost of the smallest sized aerial cable (600 pairs) that accommodates 551 pairs.

Q. WHY DID VERIZON NW SELECT A VALUE OF 1.02 FOR THE ADMINISTRATIVE SPARE FACTOR?

A. This value allows spare of approximately 2% for bad or broken pairs, and pairs used for diagnostic and testing purposes. One of the most common causes of bad cable pairs is the physical deterioration of cables over time. Over the life of a cable, the number of bad cable pairs will often grow to well above 2% of total installed capacity. Thus, 2% reflects a very conservative estimate of administrative spare requirements.

Q. HOW DOES VZLOOP SIZE COPPER DISTRIBUTION CABLE?

A. VzLoop also sizes copper distribution cables by applying a sizing factor to the number of total working lines (residential plus business) to be served by each distribution cable segment. Verizon NW selected a value 2.19 for this sizing factor. This value represents the midpoint of the number of pairs per residential living unit called for in Verizon NW's engineering guidelines (2.5 pairs), divided by the average number of working residential lines per customer in Verizon NW's network (1.14).

Q. WHY IS THE DISTRIBUTION CABLE SIZING FACTOR FORWARD-LOOKING?

A. Distribution cable sizes must be sufficient to meet customer demand for multiple lines. However, this demand is not spread uniformly over every customer. Individual residential customers demand one, two, three or even more lines in special cases, and business customers frequently order multiple lines at each location. Furthermore, concentrations of customers requiring more than one line occur randomly and change over time. To account for these variations, industry experience has proven that it is much more economically efficient to build a network with at least two pairs of distribution cables per subscriber to avoid the higher cost and delay associated with installing a new cable each time a group of subscribers on a particular street orders an above-average number of additional lines. In Verizon's experience, the 2-3 pair distribution cable sizing guideline reflects the most efficient way to serve unpredictable customer demand for additional lines.

Indeed, Verizon NW's distribution cable sizing factor is conservative for two reasons. First, temporarily vacant customer locations are not included in the calculation of the average number of pairs per customer; thus, the factor does not account for cables in place to serve temporarily vacant locations. Second, Verizon's engineers typically design distribution facilities to have more than 2.5

pairs per business location. Because Verizon NW applies the same 2.19 sizing factor to residential and business demand, Verizon NW's cost studies understate the number of distribution pairs that would be installed to serve business customers.

Q. HOW DOES VZLOOP SIZE FIBER CABLES?

A. The sizing of fiber cables is based on the cumulative number of fibers, and on the available discrete sizes of fiber cables. VzLoop models a fixed number of fibers per fiber-fed DLC – Verizon NW's cost studies assume a value of 12 corresponding to the number of strands in a single ribbon. For example, along a route serving two DLCs, the DLC farthest from the wire center would require 12 fibers. On the segment of the route between this DLC and the second DLC closer to the central office, VzLoop would model a 12-strand fiber cable. From the second DLC to the central office, 24 fibers (12 for each RT) would be required, and VzLoop would model a 24-strand fiber cable. If the required number of strands on any given route segment does not correspond to an available fiber cable size, VzLoop models the next largest fiber cable for that route segment.

To reflect sharing of cables and support structures with the transport network and with high-capacity services, only a fraction of the fiber route investment is included in costs for the loop portion of the network. In the current filing, this fraction was set to one half. Thus, only half of the fiber investment modeled by VzLoop is included in Verizon NW's loop costs. As is explained more fully in Part VII below, fiber facility costs for transport and high-capacity circuits are based on the per-strand, per-foot costs modeled by VzLoop. These per-strand-foot costs reflect the total installed investment for the fibers, including the corresponding share of placement and support structure costs.

Q. HOW DOES VERIZON NW'S CABLE SIZING METHODOLOGY COMPLY WITH THE FCC'S TELRIC STANDARD?

A. The FCC requires that "[p]er-unit costs shall be derived from total costs using reasonably accurate 'fill factors' (estimates of the proportion of a facility that will be 'filled' with network usage)."[19] As noted above, although VzLoop does not use fill factors — *i.e.*, the percentages of modeled network facilities that actually would be used to provide service as inputs into the model, VzLoop produces fill factors as outputs. As explained above, these fill factors result from the application of efficient cable sizing assumptions to the demand in each portion of the network, taking into account the available discrete cable sizes. Thus, the resulting fill factors reflect "a reasonable projection of the actual total usage"[20/] of cables in a forward-looking network.

E. Technology Inputs and Assumptions

1. Mix of Copper and Fiber

Q. HOW DOES VZLOOP DETERMINE WHERE TO MODEL COPPER VERSUS FIBER FACILITIES IN THE FORWARD-LOOKING NETWORK?

A. VzLoop uses a combined design strategy (copper and fiber) that recognizes the cost-effectiveness of all-copper loops on many shorter routes while eliminating

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19 *Local Competition Order* ¶ 682.

20/ *Id.*

costly network components required for longer copper loop designs (*e.g.*, load coils). On each feeder route leaving the wire center, the first DLC is modeled at the nearest of (1) the existing DLC that is closest to the wire center on that route, (2) the first SAI at which it is cheaper to place a fiber-fed DLC (including the cost of fiber cable) than copper feeder cable, or (3) the first SAI location beyond the 12,000-foot threshold for the first DLC.[21/] After the first DLC on each route is modeled, lines whose total copper loop length would otherwise exceed the 12,000-foot copper loop length restriction are served with a fiber-fed DLC. Compliance with this cooper loop length restriction is determined by the distance from the most distant terminal served by an existing cross connect to the DLC that serves the cross connect. If the restriction is exceeded, an additional DLC is placed at the cross connect location.

Finally, VzLoop is capable of recognizing that, for shorter loops with a large number of customers at a single location, it is more efficient to use fiber-fed DLC instead of copper feeder facilities, with the RT located in the same building as the customer. Consistent with forward-looking economics, Verizon NW has assumed a fiber-to-the-premises loop architecture for all locations having a demand greater than 160 lines. In the fiber-to-the-premises application, VzLoop models a building terminal in lieu of a NID and does not model a drop cable for the customer. The fiber is considered to be distribution plant from the customer

21/ The 12,000-foot threshold is specified by the CU_FI_CROSSOVER variable in the MASTER table.

location until it reaches an SAI location or is combined in a sheath with fiber serving another DLC along the same route.

Q. HOW DID VERIZON NW DETERMINE THE DISTANCE THRESHOLDS FOR DEPLOYING OPTICAL DLC FEEDER FACILITIES?

A. Verizon NW set the copper distance threshold at 12,000 feet so that the modeled network would not impede the provision of advanced services (such as xDSL) for most customers. With a 12,000-foot maximum copper length and no load coils or repeaters, the modeled network would permit transmission speeds of up to 6.1 megabits per second ("mbps") for most customers.[22/] VzLoop applies this threshold by modeling additional DLCs at SAI locations where the total copper loop length would have otherwise exceeded 12,000 feet.

Q. WHAT IS THE RESULT OF VERIZON NW'S ASSUMPTIONS ABOUT DEPLOYMENT OF DLC IN THE MODELED NETWORK?

A. In the network modeled by VzLoop, 46% of all narrowband loops are served with fiber feeder facilities or fiber to the premises, and 54% of all loops are served with copper feeder facilities.

Q. DO VERIZON NW'S ASSUMPTIONS ABOUT THE MIX OF COPPER AND FIBER COMPLY WITH THE TELRIC STANDARD?

A. Yes. The TELRIC standard requires a forward-looking model to assume the use of the most efficient technology that is currently available for purchase and can

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[22/] Because VzLoop models additional DLCs only at existing SAI locations, the relatively small number of customers located more than 12,000 feet from the closest SAI would still be served by loops with more than 12,000 feet of copper.

provide the required services.[23/] As explained above, Verizon NW's cost studies assume the deployment of fiber facilities where doing so is cost-effective or otherwise required to support the services that a forward-looking network must provide.

2. DLC Technology Assumptions

Q. WHAT MIX OF DLC TECHNOLOGIES DID YOU ASSUME IN THE LOOP COST STUDIES?

A. Verizon NW assumed that all of the IDLC would use the GR-303 interface. Verizon NW further assumed that 90.2% of the loops served by DLC would use IDLC, and the remaining 9.8% would use UDLC.

Q. HOW WAS THIS MIX DETERMINED?

A. The percentage of loops using IDLC versus UDLC was based on Verizon NW's experience deploying these technologies in the current network.[24/] Because of the need to support unbundled loops and private lines (non-switched services), Verizon NW has found it necessary in the existing network to install UDLC for approximately 9.8% of the loops served by DLCs. Verizon NW continues to install UDLC because of the need to support these UNEs and services. Thus, in a forward-looking network in which Verizon NW continues to have obligations under § 251 of the Telecommunications Act, Verizon NW would have to maintain

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23/ *See Local Competition Order* ¶ 685 (Forward-looking costs must be based on "the most efficient technology for reasonably foreseeable capacity requirements.").

24/ The calculation of the percentage of UDLC and IDLC is shown on the worksheet titled "WA3030_01_RU_direct-cotted%.xls" in Verizon NW's filing.

a share of UDLC and could not install an all-IDLC network. For the remaining loops served by DLCs, Verizon NW has been able to use IDLC.

Q. IS THERE ANY REASON TO BELIEVE THAT THE NEED FOR UDLC WILL DECREASE IN THE FORESEEABLE FUTURE?

A. No. In fact, Verizon NW expects that the need for UDLC could actually increase as the demand for UNE loops and non-switched data services increases. In any event, there is no indication that loops could be unbundled efficiently without UDLC, using commercially available products, at any time in the foreseeable future.

3. Determining DLC Investment

Q. HOW DOES VZLOOP MODEL DLC INVESTMENT?

A. To calculate the total DLC investment within each wire center, VzLoop first selects the size of each DLC based on the total demand measured in DS0s – *i.e.*, the sum of residential and business lines, plus 24 times the number of DS1s – to be served by that DLC. For each DLC location, VzLoop then models both a 100% IDLC configuration and a 100% UDLC configuration, with each configuration terminating on a COT. Line card investment is calculated on a per-loop basis by service type (*e.g.*, POTS or coin) and DLC type, and then added to the cost of the loop. After the total DLC investment is calculated for each wire center, VzCost calculates the weighted average of the IDLC and UDLC configurations based on the IDLC/UDLC mix described above. VzCost then maps total investment for each wire center to the individual services and elements based on the demand for each element/service within the wire center, taking into account the capacity required for each element or service. For example, VzCost would map 24 times as much DLC common equipment investment for each DS1 provided as it would for each POTS line, because DS1 services use 24 times the DLC transmission capacity of a POTS line. Finally, VzCost uses loading factors as explained in Part IX.A below to calculate the DLC engineering and placement costs, and the associated land and building investment. This produces total installed fiber investment per unit of service.

F. Support Structures

Q. WHAT ARE SUPPORT STRUCTURES?

A. Support structures are the physical structures that support cables in the outside plant. The most common structure types are aerial (cable placed on poles), buried (cable placed directly in the ground in trenches or ditches), and underground (cable placed in underground conduit).

Q. WHAT FACTORS INFLUENCE VERIZON NW'S STRUCTURE COSTS?

A. A variety of factors. For example, when placing buried or underground cable, soil characteristics and surface restoration requirements can have a significant impact on installation costs. Plowing cables in an area with deep, soft soil is relatively less expensive than placing cables in an area where the bedrock is close to the surface and rock sawing is required. Having to restore paved streets and sidewalks after installation in developed areas also increases the costs of installing buried or underground cable. The ability to share support structure costs with other carriers also influences Verizon NW's structure costs. For example, in some neighborhoods, Verizon NW is able to share the cost of poles with the electric utility. In such an arrangement, Verizon NW might pay to install half of the poles needed to serve a neighborhood, and the electric utility might pay to install the remaining poles. It also is possible to share with other parties the structure costs for buried and underground cable, though such sharing is less common than for aerial cable. Apart from these cost considerations, local zoning regulations and clearance considerations often determine the type of support structure used in the network.

Q. PLEASE EXPLAIN HOW THE STRUCTURE TYPE FOR EACH CABLE SEGMENT IS MODELED.

A. VzLoop determines the structure type (aerial, buried or underground) for each route segment based on the information found in the NETWORK table. VzLoop generally relies on the existing structure type for each route segment, unless the number of required aerial or buried cables in the modeled network exceeds the maximum number for the existing structure type. Verizon NW set a maximum of three cables per aerial route segment and two cables per buried route segment. The three-cable limit for aerial cable reflects the need to ensure that aerial cables do not sag below the 18' foot clearance threshold required for larger vehicles. The two-cable limit for buried cable recognizes that, where multiple cables are being placed below the surface, the standard practice is to use underground conduit instead of direct buried cable. If these maximums are exceeded on a route segment, VzLoop models underground cable for that segment.

This methodology produces a conservative measure of forward-looking costs, because permitting requirements, local ordinances, and environmental concerns would require the use of far more below-surface cable (with much of that cable in conduit) than exists in the current Verizon NW network.[25]

Q. HOW DOES VZLOOP DETERMINE THE QUANTITY OF POLES, ANCHORS AND GUYS, AND AERIAL STRAND?

A. Verizon NW assumed in its cost studies that poles would be placed every 150 feet. Verizon NW further assumed that 17% of poles would require anchors and guys.[26] VzLoop models the aerial strand used to suspend cables between the poles based on the length of each aerial cable segment.

Q. HOW DOES VERIZON NW ACCOUNT FOR THE SHARING OF POLES WITH OTHER UTILITIES?

A. Verizon NW accounts for pole sharing in the calculation of both pole investments and pole expenses. On the investment side, VzLoop divides the total number of required poles between Verizon NW-owned and non-Verizon NW-owned ("foreign") poles. VzLoop does not model any investment for foreign poles, and VzLoop further divides the Verizon NW-owned poles between shared and nonshared poles. The modeled investment for the shared poles reflects a 40-foot pole; the modeled investment for the nonshared pole reflects a 30-foot pole. Verizon NW's cost studies assume that the percentages of foreign and shared

[25] The methodology for determining the structure type on each route segment is explained in more detail in the VzLoop Cost Manual.

[26] Anchors and guys are used to stabilize poles for which the cable tension would otherwise tend to pull the pole in one direction. For example, if the cables attached to a pole extended to the North, South, and East, tension from the cable extending to the East might have a tendency to pull the pole toward the East. Thus, anchors and guys would be used to stabilize the pole.

poles are equal to the respective percentages in the existing network. These assumptions are appropriate because they reflect Verizon NW's experience about the extent of pole-sharing opportunities in the areas that Verizon NW serves.

On the expense side, the VzCost expense module further accounts for sharing of poles with cable companies and other carriers by accounting for pole attachment revenues when calculating Verizon NW's pole maintenance expense factor. This method recognizes that, where cable companies and other carriers seek to share Verizon NW's poles, they do so through pole attachment arrangements and not through sharing the initial pole installation costs. Finally, the VzCost expense module includes pole attachment costs incurred by Verizon NW to account for situations in which Verizon NW pays pole attachment fees to other utilities instead of installing poles.

Q. HOW DOES VZLOOP MODEL THE PLACEMENT OF BURIED CABLE?

A. As explained in more detail in the VzLoop Manual, placement costs of buried fiber and copper cables on each route segment are based on a number of variables, including the number and type of cables, the placement method (either plowing or trenching), and soil conditions. VzLoop assumes plowing for both distribution and feeder cable if three conditions are met: (1) Verizon NW has determined that plowing is feasible in the wire center based on population density and local regulations,[27] (2) no more than two cables are being placed on the

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[27] For wire centers where plowing would be possible, the PLOWFLG variable is set to a value of "1" in the MASTER table used by VzLoop; for all other wire centers, that variable is set to a value of "0."

route segment, and (3) bedrock is sufficiently below the surface. If all three conditions are not met on a particular cable segment, VzLoop assumes that buried cable is placed in a trench and covered. When modeling trenching, VzLoop accounts for other costs related to hand digging, boring, and cutting and restoration of concrete. Verizon NW further accounts for the cost of pre-ripping, an activity used in conjunction with plowing cables in very hard soil conditions.[28] Verizon NW's cost studies assume that pre-ripping occurs for 10% of the plowed fiber in the network. For example, if VzLoop models 1000 feet of plowed fiber cable, VzLoop would assume that 100 feet of the cable required pre-ripping. This 10% value is based on the experience and judgment of Verizon NW's engineers about the frequency with which pre-ripping is required in Washington.

Q. DOES VERIZON NW ASSUME SHARING OF BURIED PLACEMENT COSTS WITH THIRD PARTIES?

A. No. Verizon NW's experience has been that opportunities to share its trenching costs with third parties in Washington are uncommon. Thus, Verizon NW does not assume any sharing of buried placement costs.

Q. IS VZLOOP CAPABLE OF MODELING THE SHARING OF BURIED PLACEMENT WITH OTHER UTILITIES?

A. Yes. VzLoop has three user-specified variables that determine the amount of trenching (or plowing) that shared. These variables represent (1) the proportion of buried placement for which Verizon NW shares placement costs with at least

[28] Pre-ripping involves running a plow through the ground without cables before re-running the plow with cables. Pre-ripping breaks up hard soil and reduces the chance of fiber strands breaking when installed in hard soil.

one other company, (2) if Verizon NW shares placement costs, the number of users sharing the placement costs, including Verizon NW, and (3) the proportion of buried placement for which Verizon NW bears no placement costs.

For the proportion of buried cable for which Verizon NW shares placement costs with other users, the placement cost is divided by the number of users and the resulting investment is assigned to Verizon NW.[29/] In a sharing scenario, trenched cables would be placed at a depth of 42 inches, instead of the 30-inch placement modeled for nonshared trenches, to reflect the separation requirements of shared placement.

Because plowing equipment can install only two cables at a time, plowing is not allowed in a sharing scenario if the placement is shared with more than one other company. In such cases, VzLoop assumes that trenching would be used, with each company sharing the costs of the trench.

Q. WHAT ARE THE COMPONENTS OF A CONDUIT SYSTEM?

A. Conduit systems are comprised of ducts, inner ducts, manholes, and pull boxes.[30/] All of the conduit component prices are based on Verizon NW's vendor contracts.

Q. HOW DOES VZLOOP DETERMINE THE SIZE AND CONFIGURATION OF CONDUIT SYSTEMS?

29/ Of course, Verizon NW would still bear all of the costs of the Verizon NW-owned cable in a shared trench.

30/ Pull boxes allow access to intermediate points along a conduit system so that cable can be pulled through the ducts after the conduit system is installed.

A. VzLoop first determines the number of required ducts in each segment based on the number of copper and fiber cables that are to be placed in that segment, and also includes the ducts needed for other users in a sharing scenario. One 4-inch duct is required for each copper cable placed. Fiber cables are placed in subducts inside of 4-inch ducts. Verizon NW assumed that up to three subducts could be placed in each 4-inch duct. For example, a route segment that contained 7 fiber cables would require a minimum of 3 ducts: 7 divided by 3 equals 2 1/3, which is rounded up to 3. Efficient engineering practices call for the placement of additional ducts whenever installing conduit, because (1) the incremental costs of installing additional ducts at the time of initial placement are relatively low, (2) it is very costly to open a new trench to install additional ducts at a later time, and (3) municipalities discourage repeated excavations of public streets and rights of way. Accordingly, when conduit is first installed, it is far more efficient and appropriate to install sufficient duct capacity to accommodate the growth needs for the life of the plant than it is to subsequently re-dig trenches to install additional duct capacity along the same route. To account for this, VzLoop divides the required number of ducts by Verizon NW's duct sizing factor of 0.5 and selects the smallest standard duct formation[31/] that provides the resulting number of ducts.

VzLoop models the costs of trenching with a 30-inch cover (*i.e.*, 30 inches from the surface to the top of the conduit system). The number of ducts modeled

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[31/] The standard duct formation sizes are 1, 2, 4, 6, 9, 12, 15, 18, 21, 24, 27, 30, 33, 36, 39, 42, 45 and 48.

determines the placement method and depth necessary to maintain the 30-inch cover.

Q. HOW DOES VZLOOP MODEL THE SHARING OF CONDUIT SYSTEMS WITH OTHER UTILITIES?

A. VzLoop models the sharing of conduit systems based on the inputs for the percent of conduit systems shared with other users and the number of additional ducts to be added for other users in a sharing scenario. VzLoop calculates the cost of two systems – one shared and one nonshared – for the entire length of each underground cable span. The size of the shared system includes the number of ducts required by Verizon NW plus the additional ducts specified by the user input. The proportion of the shared system investment assigned to Verizon NW equals total modeled ducts minus the shared ducts, divided by the total modeled ducts. The size of the nonshared system reflects just the number of ducts required by Verizon NW. VzLoop then calculates the weighted average of (a) the portion of the shared system investment assigned to Verizon NW, and (b) the total cost of the nonshared system. Verizon NW uses the percent of conduit that is shared in the existing network to determine the proper weighting for this average.

Q. HOW DID VERIZON NW SELECT THE INPUTS FOR CONDUIT SHARING?

A. In Verizon NW's experience, opportunities to share conduit with other carriers or utilities have been very rare. Because the ability to share conduit costs is largely beyond Verizon NW's control, there is no reason to believe that these opportunities would increase in a forward-looking network. If anything, because most carriers and utilities already have installed their facilities in Washington, sharing opportunities would be more limited for a reconstructed network than they have been for Verizon NW over time. Accordingly, Verizon NW has conservatively assumed that 9.22% of all conduit systems are shared, based on the percentage of shared conduit in the existing network. Based on Verizon NW's experience, Verizon NW further assumed that a shared conduit system would have one additional duct to accommodate the additional user(s).

Q. DOES VZLOOP MODEL THE SHARING OF FIBER SHEATHS AND THE CORRESPONDING SUPPORT STRUCTURE BETWEEN THE LOCAL EXCHANGE AND IOF NETWORKS?

A. Yes. As explained above, VzLoop models the sharing of fiber sheaths and the corresponding support structure between local loops, interoffice ("IOF") transport and high capacity facilities, by placing 12 fibers for each DLC modeled in the local loop network. VzLoop assigns only one-half of the total fiber investment (including the fiber sheath, the poles, conduit systems and placement costs) to the local loop network. As explained in more detail in Part VII below, VzLoop also calculates the average installed investment per strand-foot (taking into account the costs of fiber cable, as well poles and conduit systems). This average investment per strand-foot for all of the cable and structure components is then used to determine fiber and structure costs for interoffice transport and high capacity facilities. In this way, VzCost captures the economies of providing local loops, IOF transport, and high capacity loops using shared facilities.

G. Subloops

Q. WHAT ARE SUBLOOPS?

A. Verizon NW offers three types of subloops: the feeder subloop, the distribution subloop, and the drop subloop. The distribution subloop is also known as the Unbundled Subloop Arrangement ("USLA"),[32] and it provides a CLEC with access to Verizon NW's metallic distribution pairs/facilities from Verizon NW's SAI to the NID or Rate Demarcation Point at the end user location.[33] USLA is offered as either a two-wire or four-wire transmission channel and can be used by the CLEC to provide new service to an end user. The new service may include either reactivation of service to an end user's location (*e.g.*, re-use old drop cable and NID) or the establishment of original service (*e.g.*, provide a new drop cable and NID) to the end user's location, where distribution facilities exist. There are distribution pairs currently in the network that provide Verizon NW's retail service that can be converted to USLA.

The feeder subloop is also known as the Unbundled Feeder Sub Element ("UFSE").[34] This element consists of a 2-wire, 4-wire, or DS1 transmission path over a feeder facility from Verizon NW's central office to the SAI, using either copper cable or fiber-fed DLC. Verizon NW also offers a DS3 feeder subloop consisting of a DS3 transmission path from Verizon NW's central office to the RT location. DS3 subloops are provided over fiber facilities only.

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[32] "USLA" is Verizon's product name for the distribution subloop.

[33] When a CLEC orders USLA, Verizon NW places a cable connecting its SAI to the CLEC's equivalent of the SAI, called the TOPIC.

[34] "UFSE" is Verizon's product name for the feeder subloop.

The drop subloop is also known as the Unbundled Drop Sub-Element. This element consists of a 2-wire or 4-wire transmission path from a NID on the customer premises to the distribution terminal.

Q. HOW DOES VERIZON NW MODEL THE RECURRING, FORWARD-LOOKING COSTS OF PROVIDING SUBLOOPS?

A. Verizon NW models the forward-looking investment for distribution subloops by subtracting the BC investments for feeder components (*e.g.*, copper feeder cable, fiber feeder cable, DLC electronics, etc.) from the corresponding total loop investment. For example, to calculate the forward-looking investment for a 2-wire distribution subloop, Verizon NW subtracts the feeder BC investments from the total investment for a 2-wire loop.

Likewise, Verizon NW models the forward-looking investment for feeder subloops by subtracting the BCs for distribution components (*e.g.*, copper distribution cable, drop cable, NID, etc.) from the corresponding total loop investment. For example, to calculate the forward-looking investment for a DS1 feeder subloop, Verizon NW subtracts the distribution BC investments from the total investment for a DS1 loop. After determining the investments for each type of subloop, Verizon NW applies the appropriate cost factors in the same manner as for loops to produce recurring monthly subloop costs.

VzCost models the investment for unbundled drops by adding the BC investment for the drop cable to the corresponding BC investment for the distribution terminal.[35/] After determining the investments for each type of drop, VzCost applies the appropriate cost factors in the same manner as for loops to produce recurring monthly drop subloop costs.

H. xDSL-Compatible Loops

Q. WHAT TYPES OF XDSL-COMPATIBLE LOOPS DOES VERIZON NW OFFER?

A. Verizon NW offers a 2-wire xDSL-compatible loop and a 4-wire HDSL-compatible loop.

Q. HOW DID VERIZON NW CALCULATE ITS PROPOSED RATES FOR THESE XDSL-COMPATIBLE LOOPS?

A. Verizon NW proposes the same recurring costs for these UNEs as it does for ordinary 2-wire and 4-wire unbundled loops.

Q. DOES VERIZON NW PROPOSE RATES FOR THE SALE OF INSTALLED LINE SPLITTERS, WHERE A CLEC WISHES TO CONVERT A LINE SHARING TO A LINE SPLITTING ARRANGEMENT?

A. No. No other party has raised any objection to the proposal of Verizon NW to delete this item.

I. Dark Fiber

Q. PLEASE DESCRIBE THE DARK FIBER UNE.

A. Unbundled dark fiber consists of spare, unlit, continuous fiber optic strands that are located within an existing, in-place fiber optic cable sheath owned by Verizon

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[35/] The BC investment for 2-wire drop cable represents the weighted average of the per-unit investment for aerial and buried 2-wire drops. Likewise, the BC investment for 4-wire drop cable represents weighted average of the per-unit investment for aerial and buried 4-wire drops.

NW and terminated on an accessible terminal at each end. Dark fiber strands have not been activated, or lit, through connection to enhancing electronics/photonics. The unbundled dark fiber network element consists of two fiber strands, or one pair. A strand is not considered continuous if splicing is required to provide fiber continuity between locations. Verizon NW has developed recurring and non-recurring costs for interoffice ("IOF") dark fiber and loop dark fiber.

Q. WHAT KINDS OF DARK FIBER MAY A CLEC ORDER?

A. A CLEC can order three types of dark fiber: IOF dark fiber, loop dark fiber, and dark fiber subloop. Unbundled IOF dark fiber originates between either (a) accessible terminals in two Verizon NW central offices that can be cross-connected to a CLEC's collocation arrangement located in that same Verizon NW central office, or (b) an accessible terminal in a Verizon NW central office and a CLEC central office (Channel Termination). For dark fiber terminating at the CLEC's central office point of presence ("CO/POP"), a dispatch out is required to install the jumper to the demarcation point and to perform a continuity test.

An unbundled loop dark fiber network element originates between Verizon NW's accessible terminal, such as the fiber distribution frame, or its functional equivalent, located within a Verizon NW wire center that can be cross connected to a CLEC's collocation arrangement located in that same Verizon NW central office, and terminates at Verizon NW's hard termination point in the main telecommunications room at an end-user premises within that serving wire center

("SWC"). A dispatch out is required in order to place the fiber jumpers to the CLEC's demarcation point located in the main telecommunications room or Verizon NW designated location and to perform a continuity test.

For dark fiber subloop three arrangements are available: (a) accessible terminals between the central office and a remote terminal, (b) accessible terminals between the remote terminal and an end user, or (c) accessible terminals between two remote terminals.

These unbundled dark fiber arrangements are offered on a route-direct basis. With each of the arrangements described above, once Verizon NW installs the jumpers at both ends of the fiber, each fiber strand is tested to ensure continuity.[36]

Q. PLEASE DEFINE THE DARK FIBER RECURRING RATE ELEMENTS.

A. Recurring Dark Fiber Loop Charge: There are three recurring rate elements that recover the costs related to dark fiber between a Verizon NW central office and a CLEC central office. The SWC charge recovers the capital cost, installation and maintenance of the accessible terminal at the Verizon SWC. The Loop Mileage Charge recovers the capital cost, installation, and the maintenance cost of the fiber cable and supporting structures, from the Verizon NW SWC to the customer premises and is charged on a per quarter mile basis. The total mileage is determined by calculating the mileage between the two locations using vertical and horizontal coordinates. The Loop Fixed Charge recovers the capital cost,

[36] The non-recurring costs associated with each of the Dark Fiber elements will be addressed in Verizon NW's non-recurring filing, currently scheduled to be filed in August.

installation and maintenance of Verizon NW's equipment at the customer premises (accessible terminal).

<u>IOF Dark Fiber (between Verizon central offices)</u>: There are three recurring rate elements that recover the cost of dark fiber when ordered between Verizon NW central offices. The Serving Wire Center charge recovers the capital cost, installation and maintenance of the accessible terminal at each Verizon NW SWC. The IOF Mileage Charge recovers the capital cost, installation, and the maintenance cost of the fiber cable and supporting structures between Verizon NW Central Offices on a per mile basis. The total mileage is determined by calculating the mileage between the local serving office of Circuit 1 and the local serving office of Circuit 2 using vertical and horizontal coordinates. Finally, the Intermediate office charge recovers the capital cost, installation, and maintenance of the accessible terminals in the Intermediate Office.

<u>Dark Fiber Channel Termination Charge (between a Verizon NW central office and a CLEC central office)</u>: There are four recurring rate elements that recover the cost of IOF dark fiber when ordered between a Verizon NW central office and a CLEC central office. The Serving Wire Center charge recovers the capital cost, installation and maintenance of the accessible terminal at the Verizon NW SWC. The IOF Channel Termination Mileage charge recovers the capital cost, installation, and the maintenance cost of the fiber cable and supporting structures from the Verizon NW SWC to the CLEC CO/POP on a per quarter mile basis. The total mileage is determined by calculating the mileage between the two locations using vertical and horizontal coordinates. The IOF

Channel Termination Fixed Charge recovers the capital cost, installation and maintenance of Verizon NW equipment at the CLEC CO/POP. The Intermediate office charge recovers the capital cost, installation, and maintenance of the accessible terminals in the Intermediate Office.

Dark Fiber Subloop Elements

Feeder CO to Remote Terminal (RT) Charge (between a Verizon NW central office and a remote terminal): There are three recurring rate elements that recover the cost of IOF dark fiber when ordered between a Verizon NW central office and a remote terminal.

The Serving Wire Center charge recovers the capital cost, installation and maintenance of the accessible terminal at the Verizon NW SWC. The Subloop Feeder Mileage charge recovers the capital cost, installation, and the maintenance cost of the fiber cable and supporting structures from the Verizon NW central office to the remote terminal on per quarter mile basis. The total mileage is determined by calculating the mileage between the two locations using vertical and horizontal coordinates. The Subloop Feeder charge per pair recovers the capital cost, installation, and the maintenance cost of the FDF at the remote terminal.

Distribution RT to End User Charge (between a Verizon NW RT and an end user): There are three recurring rate elements that recover the cost for IOF dark fiber when ordered between a Verizon NW RT and an CLEC end user. The Subloop Distribution Mileage charge recovers the capital cost, installation, and the maintenance cost of the fiber cable and supporting structures from the

Verizon NW RT to the end user on per quarter mile basis. The total mileage is determined by calculating the mileage between the two locations using vertical and horizontal coordinates. The Subloop Distribution Charge per Pair recovers the capital cost, installation, and the maintenance cost of the FDF at the remote terminal. The Loop Charge per Pair recovers the capital cost, installation, and the maintenance cost of the FDF at the end user location.

<u>RT to RT Charge (between two Verizon NW RTs)</u>: There are three recurring rate elements that recover the cost between two Verizon NW RTs. The Subloop Transport Mileage charge recovers the capital cost, installation, and the maintenance cost of the fiber cable and supporting structures between two Verizon NW RTs. The total mileage is determined by calculating the mileage between the two locations using vertical and horizontal coordinates. The Subloop Transport Charge per Pair per RT recovers the capital cost, installation, and the maintenance cost of the FDF at the remote terminal. The Intermediate Office Charge per intermediate office recovers the capital cost, installation, and the maintenance cost of FDF at the central office that is intermediate to the two remote terminals.

Q. PLEASE EXPLAIN HOW THE DARK FIBER COSTS WERE DEVELOPED.

A. There are two basic investment components utilized in the development of Dark Fiber costs. The first is the Fiber Distribution Frame ("FDF") investment which is developed using four different sizes of FDFs. The individual FDF investments are divided by their fiber termination capacity. These termination unit investments are then weighted to yield an average price per FDF termination with a utilization factor applied. The VzLoop Cost Manual describes the development of these costs in more detail.

Verizon NW also develops a total weighted outside plant investment per fiber strand foot, which is an output of the Loop Model, for aerial, buried and underground fiber cable. Verizon NW applies utilization factors and the associated structure investments for poles and conduit, as explained in the IOF section above.

The Dark Fiber mileage components use the outside plant investment per fiber strand foot multiplied by two to generate a per pair investment. The per pair facility investment is used in all Dark Fiber configurations. The outside plant investment per pair per fiber foot is multiplied by the number of feet in a mile to generate a per mile investment. The per mile facility investment can be divided to produce any fractional length defined by rate elements. The mileage costs are adjusted by a route to air ratio to convert route miles to air miles since all mileage rates are billed based on air miles.

Fixed elements (for example, Serving Wire Center, Intermediate Office Termination, IOF Channel Termination Fixed Loop Charge/Pair etc.) are calculated using the investment for four CO FDF Terminations (2 in and 2 out for a fiber pair) or four Customer Location FDF Terminations as discussed above. Intermediate Office Charge investment consists of eight CO FDF terminations (2 in 2 out for a fiber pair). The current study assumes the fiber pair terminates at a SWC, is cross connected on the office side of the FDF and exits the office towards another location.

For each investment component, Verizon NW developed BCs, as described earlier in the testimony. The BCs were then mapped through a VzCost - Cost Study Template, where annual cost factors are applied to develop annual and monthly costs.

J. Deaveraged Zone Rate Structure

Q. DOES VERIZON NW PROPOSE DEAVERAGED LOOP RATES?

A. Yes. Verizon NW's deaveraging proposal is addressed in the testimony of Terry R. Dye.

V. LOCAL SWITCHING

A. Element Description

Q. WHAT DOES THIS SECTION OF THE TESTIMONY ADDRESS?

A. This section addresses switch technology and the basic cost methodology that Verizon NW used to calculate switching costs in its recurring cost studies. Below, Verizon NW describes the switching technology assumed in Verizon NW's studies, the functions of the various pieces of the switching network, the costing tools that were utilized, and then the cost methodology.

Q. WHAT FUNCTION IS PERFORMED BY A SWITCH?

A. The purpose of a switch is to establish a transmission connection between two end users. When a customer places a call, the switch establishes a transmission path between the originating end user (calling party) and the terminating end user (called party). Switches also permit telephone companies to offer services such as call waiting and call-forwarding, which are referred to generally as "switch features." The switching network works in conjunction with the signaling network, which we address in more detail separately in this testimony.

Q. WHAT IS THE FCC'S DEFINITION OF THE LOCAL CIRCUIT SWITCHING NETWORK ELEMENT?

A. FCC Rule 47 C.F.R. §51.319(c)(1) defines local circuit switching capability as:

> (i) Line-side facilities, which include, but are not limited to, the connection between a loop termination at a main distribution frame and a switch line card;
>
> (ii) Trunk-side facilities, which include, but are not limited to, the connection between trunk termination at a trunk-side cross-connect panel and a switch trunk card; and
>
> (iii) All features, functions and capabilities of the switch, which include, but are not limited to:
>
> (A) The basic switching function of connecting lines to lines, lines to trunks, trunks to lines, and trunks to trunks, as well as the same basic capabilities made available to the incumbent LEC's customers, such as a telephone number, white page listing and dial tone; and
>
> (B) All other features that the switch is capable of providing, including but not limited to, customer calling, customer local area signaling service features, and Centrex, as well as any technically feasible customized routing functions provided by the switch.

Q. WILL THE FCC'S *TRIENNIAL REVIEW ORDER* IMPACT UNBUNDLED LOCAL SWITCHING?

A. Yes. The FCC's adoption of the *Triennial Review Order* significantly narrowed the circumstances under which incumbent carriers are obligated to provide unbundled local switching. Although the extent to which Verizon NW will be required to provide unbundled switching in the future is uncertain, Verizon NW is proposing rates for all switching UNEs that are under consideration in this proceeding,[37/] subject to later amendment.

Q. DO VERIZON NW'S SWITCHING STUDIES COMPLY WITH PREVIOUS ORDERS BY THIS COMMISSION?

A. Yes, Verizon NW has tailored its switching cost studies to comply with this Commission's prior orders. As the Commission ordered in its 13th Supplemental Order in Docket UT-003013, Verizon NW's switching cost studies utilize Washington-specific data to the extent possible. For example, the mix of switch technology is based on Verizon NW's expected network configuration over the near future. In addition, Verizon NW has submitted proposed costs for the 911 database and advanced intelligent network ("AIN") service creation, in accordance with the Commission's 32nd Supplemental Order in Docket UT-003013.

Q. WHAT LOCAL SWITCHING RATE ELEMENTS ARE INCLUDED IN VERIZON NW'S COST STUDY ?

A. The Local Switching elements addressed in Verizon NW's cost study consist of the following components:

(1) Line ports (POTS/PBX/CENTREX);

(2) Local Switch Usage (terminating and originating, including end office trunks); and

(3) Reciprocal Compensation Usage (terminating).

37/ Although Verizon NW is not proposing rates for certain switching UNEs that this Commission recently set rates for, Verizon NW's existing UNE tariff provides rates for all switching UNEs.

Q. PLEASE BRIEFLY DESCRIBE THESE ELEMENTS AND THE FUNCTIONS THEY PROVIDE.

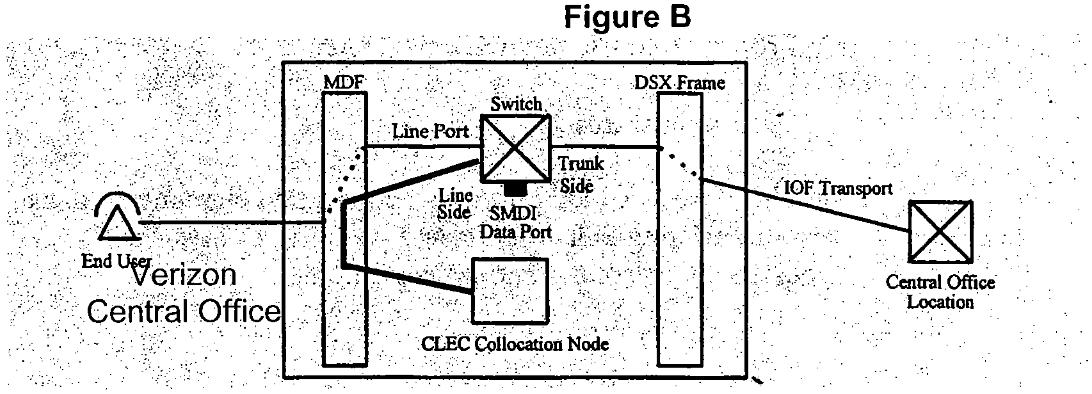
A. Line ports connect an end user's line into the switch. The costs for line ports are recovered on a monthly, flat-rate basis. As such, Verizon NW allocates to the line port only those resources whose costs do not vary based on usage.

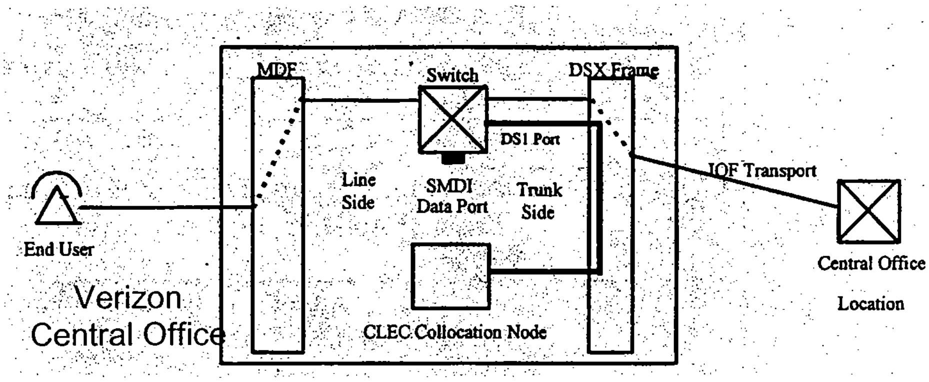
Trunk ports connect the switch to the trunking network. Verizon NW's cost studies recover trunk port costs in the local switching usage UNEs. The local switching usage element accounts for resources that are used to process calls through the switch, other than line and trunk ports. The local switching usage UNE (which includes trunk port costs) is recovered on a minute-of-use ("MOU") basis, as these costs vary based on the amount of traffic that travels through a switch.

For an explanation of the reciprocal compensation element, *see* Section V.D.5 of this testimony.

The diagrams below simplistically show the line and trunk port components:

Figure B





Q. WHAT IS A SWITCH FEATURE?

A. A switch feature is a service provided by the switch in addition to its normal function of establishing transmission paths. Call waiting and three-way calling are examples of switch features. Switch features can be customized for each customer and are operated by the computing domain of the switch.

Q. DO VERIZON NW'S PROPOSALS CONFORM TO THE REQUIREMENT OF THE EIGHTH SUPPLEMENTAL ORDER IN DOCKET UT-960369, UT-960370, AND UT-960371 TO AVOID SEPARATE CHARGES FOR VERTICAL FEATURES IN THE ABSENCE OF COMPELLING REASONS?

A. Yes. Verizon NW's switching studies avoid charging separate rates for features that can be provisioned through the switch processor and that do not require any specific, unique hardware. Costs for these features are included in the Local Switching Usage element. Verizon NW proposes separate rates only for additional features that necessitate additional hardware for which vendors charge Verizon NW separately.

Q. HOW CAN A CARRIER PURCHASE A FEATURE THAT REQUIRES SPECIFIC, UNIQUE HARDWARE THAT IS NOT INCLUDED IN THE LOCAL SWITCHING USAGE ELEMENT?

A. The most commonly used features that have specific, unique hardware requirements can be purchased from Verizon NW as "port additives." The port additive cost studies identify the monthly costs associated with each feature included in the studies.

Q. WHAT RATE WOULD VERIZON NW CHARGE IF A CARRIER WISHED TO PURCHASE A FEATURE THAT IS NEITHER INCLUDED IN LOCAL SWITCHING USAGE NOR OFFERED AS A PORT ADDITIVE?

A. The vast majority of the commonly used features are included in Local Switching Usage, or are available as port additives. In the event that a carrier wishes to purchase a feature not included in Verizon NW's cost studies, Verizon NW would price the particular features requested by the carrier on an individual case basis upon receipt of a bona fide request ("BFR").

B. Technology Assumptions

Q. WHAT ASSUMPTIONS ABOUT SWITCHING FACILITIES DID VERIZON NW USE TO MAKE ITS SWITCHING COST STUDY FORWARD-LOOKING?

A. Verizon NW examined its current switching equipment and facilities and constructed a forward-looking end office switch for use in its cost studies based on current growth and deployment trends and plans. Verizon NW made the following technological assumptions:

(1) All digital switching;

(2) An access line split of 36.7% GTD5 (AGCS switch type), 42% 5ESS (Lucent switch type); and 21.3% DMS-100 (Nortel switch type);

(3) 37% of the lines provisioned using integrated digital loop carrier ("IDLC") GR-303 peripherals and 63% on analog line ports [copper cable pairs and universal digital loop carrier ("UDLC")]; and

(4) Line concentration of 4:1 at the remote terminal of GR-303 DLC.

Q. WHAT IS THE REASON FOR THE MIX OF THE THREE SWITCH VENDOR TECHNOLOGIES?

A. Verizon NW currently uses three suppliers to ensure strategic diversity in the sources of digital switches. This diversity is critical to a functioning, low-cost network. Verizon NW deploys different types of switches for functional reasons, such as the type of traffic that will travel over a particular switch and the geographical location a switch will serve. Furthermore, Verizon NW is able to incur lower costs overall by using three different vendors, as they must compete with each other for Verizon NW's business and offer lower prices. Verizon NW anticipates continuing this strategic mix of 5ESS, DMS-100, and GTD5 technologies in the current planning year. Therefore, this mix is appropriate to assume in a forward-looking study.

Q. WHAT IS THE BASIS FOR VERIZON NW'S ASSUMPTIONS OF 37% GR-303 AND 63% ANALOG PERIPHERALS?

A. This percent mix of analog lines (including copper pairs and UDLC) and digital GR-303 lines is based on Verizon NW's projected mix of line port purchases for Washington in the current planning year. Because many of Verizon NW's customers are served via copper loops or UDLC and will continue to be served on these facilities for the foreseeable future, Verizon NW must assume a correspondingly high percentage of analog line peripherals. At the same time, Verizon NW has assumed a generous and aggressively forward-looking percentage of IDLC, all provisioned on GR-303.

Q. HOW DO THESE ASSUMPTIONS AFFECT SWITCHING COSTS?

A. These assumptions affect the type and mix of line ports included in the Local Switching cost studies. Copper and UDLC loops are integrated into the switch using a basic analog peripheral that has a one-to-one assignment between the switch and the loop. Fiber loops can allow for more efficient connections between the loop and switch, or the remote terminal and the switch, by being integrated into the switch using DLC technology. GR-303 technology has the added advantage of allowing line concentration, which allows a carrier to reduce the total number of DS1 facilities between the remote terminal and the digital switch by assigning transmission paths as calls are made rather than dedicating a channel to each line.

Q. WHAT LINE CONCENTRATION RATIO DOES VERIZON NW ASSUME AND HOW DOES THIS AFFECT SWITCHING COSTS?

A. Verizon assumes a 4:1 line concentration ratio for GR-303 loops. This assumption affects the number of GR-303 ports included in the Local Switching cost studies. This is a conservative assumption designed to minimize costs while ensuring reliable service to end users.

Verizon NW's assumption of a 4:1 line concentration is aggressively forward-looking and more efficient than Verizon NW has actually been able to achieve in its network to date. Verizon NW determined, based on the judgment and experience of its network engineers, that as many as one-fourth of its customers served by a GR-303 remote terminal could be expected to use their phones simultaneously. Thus, the maximum line concentration that would be appropriate in the forward-looking network is 4:1, and anything higher likely would leave at least some customers without the ability to complete calls at some times.

Q. WHAT LOCATIONS ARE ASSUMED FOR SWITCHES IN VERIZON NW'S STUDY?

A. Consistent with the TELRIC methodology, the study assumes current host wire center locations. Only those remote switches that have been determined by Verizon NW as having "survivability" in the actual network have been identified as remote switches in the forward-looking switching investment. Those remote switches whose primary function is to serve as a pair-gain device have been identified as part of the forward-looking loop investment.

C. Costing Approach

1. Methodology

Q. HAVE THE LOCAL SWITCHING UNE COSTS BEEN DEVELOPED USING THE SAME METHODOLOGY THAT WAS PREVIOUSLY USED?

A. No. Previously, UNE switching costs were determined by using a "unit investment" approach. The current studies develop the costs using the "total investment" approach described in the Cost Manual.

Q. HOW IS THIS NEW METHOD DIFFERENT?

A. The "unit investment" method disaggregates the total cost of the switch into the costs for switch resources on a per unit basis (*e.g.*, Getting Started Cost per millisecond, Cost per Line Centum Call Seconds ("CCS") and the like) and then identifies the types and quantities of resources required for each element (or feature). The next step is to assemble all of the piece parts to calculate costs corresponding to the various rate elements, *e.g.*, cost per call setup and per minute for a POTS call as well as the costs associated with all of the features in a switch that are available to the CLECs. This method is complicated and resource intensive, requiring that the cost of each and every individual feature be calculated. It is the method used when calculating retail price floors.

The total investment cost methodology starts with the total switch costs (excluding any service specific feature-related hardware) and simply takes all of the costs that are not recovered through other elements (*i.e.*, line ports) and divides that by the annual originating plus terminating minutes of use. The annual minutes of use are calculated by the division of the originating plus terminating busy hour season originating and terminating CCS per line by the busy hour to annual ratio (BHAR). This method eliminates the need for the disaggregation and reaggregation associated with the unit investment methodology.

Q. DOES THE TOTAL INVESTMENT COST APPROACH ENSURE THAT THERE IS NO DOUBLE COUNTING?

A. Yes. This approach starts with the total investment for the switch. The investments being recovered from other elements (*i.e.*, line ports) are subtracted out and the remainder is divided by the annual minutes of use (MOU). This ensures that all of the Local Switching UNE investments (*i.e.*, those not associated with line ports) in the switch are recovered only once. In the case of switch features, only the feature specific hardware that is not elsewhere accounted for in the model is included in the port additive costs so that, again, no double counting can occur.

2. Material Investments

Q. HOW WERE MATERIAL INVESTMENTS DEVELOPED FOR THE SWITCHING STUDY?

A. The material investments for the 5ESS and DMS-100 switches were developed using the Switching System Cost Information System ("SCIS") model developed by Bellcore (now known as Telcordia) and Verizon's COSTMOD program for the GTD5 switching system. SCIS is a computer system that is comprised of two modules: SCIS/Model Office ("SCIS/MO") and SCIS/Intelligent Network ("SCIS/IN"). SCIS/MO develops switching investments and the processor-related investments associated with features that do not require any specific, unique hardware. As explained more fully below, SCIS/MO allows the user to construct a customized "model office" based on that user's variables that produce both total and unit switch investments. SCIS/IN, using the unit investments generated by SCIS/MO, develops incremental investments associated with vertical switch features. A more detailed explanation of SCIS in general can be found in the Cost Manual.

The Cost Modeling System ("COSTMOD") is a PC-based software program developed by Verizon that estimates material investments for GTD-5 EAX host switches and remote switching units. The investment estimates are based on inputs such as the number of access lines and trunks served as well as inputs on traffic characteristics such as busy hour originating and terminating ("O+T") CCS per line and busy hour O+T CCS per trunk. The investment calculated by COSTMOD is based upon investment tables that reflect the vendor price list.

COSTMOD is composed of two cost modules: GTD-5 EAX Switching Cost Module and the Vertical Services Application or Features Cost Module. The GTD5 EAX Switching Cost Module enables the user to develop switch unit investments for major categories based upon individual switch inputs and defaults. The unit investment of the major GTD-5 switch hardware and software components is determined based upon the switch architecture and the network functional elements of the switch.

Q. IS THE SCIS MODEL GENERALLY ACCEPTED BY THE TELECOMMUNICATIONS INDUSTRY?

A. Yes. National Economic Research Associates ("NERA") published a paper in which it concluded that the economic principles used in Telcordia's models, such as SCIS, "are consistent with the rules and principles used by regulators to determine the costs associated with network elements and interconnection."[38/] SCIS and other Telcordia models using similar principles have been used in cost studies filed with this Commission, the FCC, and other state commissions throughout the country.

Q. HOW DID VERIZON NW UTILIZE SCIS IN ITS STUDY?

A. Verizon NW used SCIS/MO, which lets the user construct a model office that is representative of a typical office in the network. Verizon NW determined inputs, such as the number of access lines, the type of line peripherals, busy hour CCS per line, and the like, based on current trends adjusted to be forward-looking. After these data are input into SCIS/MO, the program determines the investment costs for that model office.

To "build" the model offices, Verizon's engineering organization first determined existing relevant office parameters for the current Washington switching network. The Verizon Service Cost organization assigned each of the 32 host switches and 66 remote switches to one of the SCIS representative model offices using the following criteria:

1) Type of Switch (GTD5, 5ESS, DMS-100)
2) Host or Remote Switch
3) Number of lines per switch
4) Busy Hour CCS per Line

After each switch was assigned to one of the representative model offices, the total and unit investment results from SCIS/MO were used as the basis for

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38/ *An Economic Evaluation of Network Cost Models*, National Economic Research Associates, August 7, 2000.

the forward looking investment for that switch. For example, a 5ESS switch whose line size falls between 7,501 and 15,000 will have different investment inputs than a larger 5ESS switch whose line size falls between 25,001 and 40,000 lines. The individual total and unit SCIS/MO investment results were weighted by the number of host and remote switches that fall in each category of representative model offices. A similar process was conducted for the GTD5 switches, 5ESS, and DMS-200 tandem switches. For the tandem model, the current Washington tandem switches were assigned to one of the representative model offices based on the number of trunks in a given switch.

D. Cost Inputs

Q. WHAT ARE THE KEY SWITCH COST DRIVERS THAT YOU MODELED?

A. There are several key cost drivers that impact the total investment (as modeled in SCIS and COSTMOD) in an individual central office switch as well as the accompanying unit investments. They are as follows:

- Getting Started Costs (*i.e.*, switch processor, common equipment, spares, breakage)
- Line Termination (physical line ports)
- Line CCS
- Trunk CCS

Q. WHAT CENTRAL OFFICE DESIGN INPUTS WERE USED TO CREATE THE REPRESENTATIVE MODEL OFFICES?

A. Verizon NW reviewed the key engineering inputs that will impact the switch investments. They are as follows:

- Total Lines per Central Office

- Line Port Technology Mix (Universal/Analog, GR303 IDLC)
- Average Busy Hour CCS per Line
- Average Busy Hour Call Attempts per Line
- Total Trunks per Central Office
- Trunk Port Technology Mix (DS1, STS-1)
- Average Busy Hour CCS per Trunk

Q. HOW DID YOU VARY THESE CENTRAL OFFICE ENGINEERING INPUTS TO CREATE THE REPRESENTATIVE MODEL OFFICES?

A. By varying the inputs listed above, Verizon NW created a series of model office runs that captured the impact of changes to the inputs on the total investment outputs. For example, Verizon NW ran the SCIS Model Office for six line sizes for host switches. In addition, Verizon NW varied the busy hour CCS per line, the busy hour calls per line, and the number of trunks per office.

Q. HOW DO THE LINE PORT TERMINATION INVESTMENTS VARY FOR EACH REPRESENTATIVE MODEL OFFICE?

A. As with GSC, the physical line port termination costs vary by the line port technology. Separate representative model offices were therefore constructed for each of the three line port technologies (Analog, TR-08 IDLC, and GR-303 IDLC).

Q. HOW DO THE LINE CCS INVESTMENTS VARY FOR EACH REPRESENTATIVE MODEL OFFICE?

A. The investment per Line CCS is dependent on the amount of traffic, measured in CCS, per line and the accompanying line concentration ratio ("LCR," essentially, the ratio of lines to ports) for a given central office. In the SCIS model, the investment per line CCS is a capacity cost that captures that investment associated with a given line unit/module engineered for a given busy hour CCS per line divided by the capacity (objective) CCS per line. Therefore, all central offices (for a given line port technology) with the same line concentration ratio will have the same investment per line CCS.

Q. HOW DO THE TRUNK CCS INVESTMENTS VARY FOR EACH REPRESENTATIVE MODEL OFFICE?

A. End office trunk investments can be recovered in one of two ways: (a) an investment per trunk CCS is converted to a cost per minute of use, or (b) a dedicated trunk port is recovered as a monthly cost per port. In Washington, the end office trunk investment is recovered in the local switching usage rate. In general, the key cost drivers are the actual busy hour outgoing plus incoming (O+I) CCS per trunk and the trunk port technology (DS1 versus STS1/DS3).

Q. HOW DID VERIZON NW USE THE REPRESENTATIVE MODEL OFFICE TO CALCULATE THE TOTAL SWITCHING INVESTMENT IN WASHINGTON?

A. As discussed previously, each host and remote switching wire center in Washington was assigned to one of the representative model office constructs based on its central office design characteristics (*i.e.*, lines per office, busy hour CCS per line). In essence, a profile was created that assigns and tallies the number of host and remote switches to each of the model office configurations. Next, the Washington-specific forward-looking parameters were applied to weight the various outputs from the representative models for the following; (1) percent mix of analog (including UDLC and copper) and GR-303 IDLC lines, (2) percent mix of DS1 versus STS-1 trunk peripherals (5ESS only). The total investments were calculated by summing the total investment per switch for each of the representative model offices based on the number of Washington switches that fell into each of the categories (*e.g.*, 5ESS switch between 25,001 and 40,000 lines whose BH CCS per line is greater than 3.4 CCS). The final step was a calibration that adjusts the total lines and trunks produced by the model (either up or down) to match the actual Washington line and trunk counts received from Verizon NW's engineering group.

A similar process is used to develop the weighted unit investment outputs (*e.g.*, investment per line port).

Q. WHAT VERSION OF SCIS WAS USED FOR VERIZON NW'S STUDY?

A. SCIS/MO Version 2.8 was used for the Washington switching cost studies.

Q. HOW ARE VENDOR PRICES FOR SWITCHING EQUIPMENT REFLECTED IN SCIS?

A. Vendor list prices are built into each version of SCIS. The vendor discounts, which are applied to the material investments, are inputs supplied by the user.

Q. ARE VERIZON NW'S ESTIMATES OF VENDOR-DISCOUNTED MATERIAL INVESTMENTS CONSERVATIVE?

A. Yes. Over time, Verizon continues to upgrade the different components of Verizon NW's digital switches. Regulatory mandates and vendor enhancements continually require network additions and modifications. The forward-looking material investments presented here do not capture future switch-related costs Verizon will have to incur to meet such regulatory requirements.

1. Switch Discount

a) Appropriate Switch Discount for TELRIC Switching Studies

Q. WHAT SWITCH DISCOUNTS DID VERIZON NW USE IN ITS COST STUDIES?

A. Verizon NW used the switch discount that it will actually receive when deploying switching equipment in the foreseeable future.

Q. WHY IS THE ACTUAL DISCOUNT VERIZON NW WILL RECEIVE IN THE FORESEEABLE FUTURE APPROPRIATE FOR TELRIC STUDIES?

A. As Dr. Shelanski explains, the actual discount that Verizon NW will receive when purchasing the latest available digital switching technology in the future is appropriate for determining TELRIC switching costs because it is the most accurate indicator of forward-looking costs. The forward-looking switching technology — the basis of the switching costs presented here — will be deployed by Verizon NW incrementally, at the discount rates Verizon actually receives. This construct *does not* represent the mixture of switching equipment components Verizon has currently deployed in its network. Rather, it represents the mixture of switching equipment components Verizon is purchasing incrementally to upgrade and expand its switching network, on a forward-looking basis.

Q. HAVE THE FCC AND ANY OTHER STATE COMMISSIONS ACCEPTED THE USE OF ACTUAL SWITCH DISCOUNTS AS THE APPROPRIATE ASSUMPTION FOR CALCULATING SWITCHING RATES?

A. Yes. In its SBC Kansas/Oklahoma 271 Order, the FCC agreed with the state commission's conclusion that the appropriate discount rates for switches were the actual discounts that SBC received. The ALJ determined, and the FCC agreed, that predictions based on information other than the current contracts would be inherently inaccurate.[39]

b) Switch Discounts in the Vendor Contracts

Q. PLEASE DESCRIBE THE SWITCHING VENDORS' DISCOUNT STRUCTURE IN THE CURRENTLY EFFECTIVE CONTRACTS FOR 5ESS AND DMS-100 SWITCHING EQUIPMENT.

A. The contracts that Verizon has with its switch vendors are very complex and have various discount levels for different types of equipment. For example, there are different levels of growth discounts on peripherals that provide GR-303 interfaces, versus peripherals that provide analog interfaces. It is important to note that for both Nortel and Lucent contracts, there is no longer one single discount specified that is applicable for new (or replacement) switches and another single discount specified for all types of growth equipment. Both vendors offer many different types of discounts, which depend on both the types and volumes of equipment purchased. Furthermore, new switches are almost always purchased through the competitive bidding process, which allows vendors to submit bids that are not based on Verizon's existing contracts.

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[39] *See* Memorandum Opinion and Order, *Joint Application by SBC Communications, Inc., Southwestern Bell Telephone Co., and Southwestern Bell Communications Services, Inc. d/b/a Southwestern Bell Long Distance for Provision of In-Region, InterLATA Services in Kansas and Oklahoma,* CC Docket No. 00-217, FCC 01-29, ¶ 77 (rel. Jan. 22, 2001).

c) Methodology for Determining Appropriate Discount

Q. PLEASE DESCRIBE VERIZON NW'S METHODOLOGY FOR DETERMINING THE SWITCH DISCOUNT THAT VERIZON WILL ACTUALLY RECEIVE WHEN DEPLOYING SWITCHING EQUIPMENT.

A. Verizon NW examined the overall discount that Verizon actually received for its most recent purchases of switching equipment under the current contracts. As discussed above, Verizon NW's methodology is appropriate because:

(1) It is the overall discount Verizon actually receives (and will continue to receive) when purchasing switching equipment;

(2) It is based on the mix of equipment that Verizon is actually deploying in its network, including all types of switching equipment such as processors, trunks, lines, and peripherals;

(3) It captures all "credits" offered within the contracts;

(4) It is based on the actual material prices Verizon paid for switching equipment, not on an interpretation of Verizon's complex contracts or a hypothetical model; and

(5) It is based exclusively on vendor-supplied data concerning their list prices and discount prices of switching equipment (hardware) sold to Verizon.

Q. PLEASE DESCRIBE HOW THIS WAS ACCOMPLISHED.

A. Verizon asked each of its switching vendors to provide a detailed list of all switching equipment (hardware) purchases Verizon made during past years (either 2000 or 2001, depending on which was the latest available information), and to include actual quantities, list prices, and prices Verizon paid for the equipment. From this information, Verizon calculated an overall effective discount it actually received during the timeframe the purchases were made, by comparing the total list price of all purchases made versus the actual total price paid.

Q. PLEASE DESCRIBE HOW VERIZON CALCULATED THE LUCENT SWITCH DISCOUNT.

A. Lucent provided Verizon with its equipment purchases for the entire year 2000 for Verizon East (formerly Bell Atlantic) states.[40/] The list included both the retail price and the discount price. The overall effective discount Verizon received during this timeframe was calculated by summarizing these purchases. This is the discount Verizon NW used in the switching cost study.

Q. DO YOU BELIEVE THE LUCENT 2000 PURCHASE DATA REPRESENTS THE TYPES OF EQUIPMENT PURCHASES VERIZON WILL BE MAKING FROM LUCENT IN THE FUTURE?

A. Yes. As explained above, the data includes the types of switching equipment purchases, typical of what Verizon purchases in any given year. For example, this data includes new switch additions, growth, upgrades, and regulatory and manufacturer mandated equipment modifications. This mix is not expected to change materially in the foreseeable future.

Q. PLEASE DESCRIBE HOW VERIZON CALCULATED THE NORTEL SWITCH DISCOUNT.

A. Nortel provided Verizon with its equipment purchases for the entire year 2001 for all Verizon states. As with the Lucent discount, the overall effective discount Verizon received during that year was calculated by summarizing those

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40/ Excluding 10% of the lowest dollar value orders.

purchases. This discount represents an appropriate estimate of the forward-looking discount Verizon will actually incur under the latest contracts with Nortel. This is the discount Verizon NW used in the switching cost study.

Q. ARE THE FORWARD-LOOKING DISCOUNTS APPROPRIATE TO USE FOR BOTH END-OFFICE AND TANDEM SWITCHES?

A. Yes. These discounts are appropriate to use in calculating costs of both types of switches because both types of switches were included in the purchase data used to calculate the discount.

Q. PLEASE DESCRIBE HOW VERIZON NW DETERMINED THE FORWARD-LOOKING AG COMMUNICATION SYSTEMS ("AGCS") DISCOUNT FOR THE GTD5 SWITCH.

A. The material prices reflected in the COSTMOD investment represent Verizon's contract prices for GTD5 switching equipment. Unlike the SCIS/MO model where a separate vendor discount is applied to a list price, the COSTMOD model does not require the use of a vendor discount since it captures the Verizon contract prices for GTD5 switching equipment.

2. Utilization

Q. HOW IS UTILIZATION ACCOUNTED FOR IN THE SWITCHING COST STUDIES?

A. As in other cost studies, Verizon NW applied a utilization factor to each type of equipment investment (digital line ports and analog line ports). Utilization was not applied against usage (per minute of use) investment.

Q. HOW WAS THE FORWARD-LOOKING UTILIZATION FOR DIGITAL LINE PORTS DETERMINED?

A. The digital line port utilization factor for the switch digital line ports is **[VERIZON NW PROPRIETARY BEGINS]** XXXX **[VERIZON NW PROPRIETARY ENDS]**. In general, the utilization rate of lines at the DLC remote terminal is higher than the utilization of switch digital line ports (used with IDLC). This is so because capacity is needed at the switch and at the DLC remote terminal to provide dial tone using switch digital line ports. Switching capacity is installed first, ahead of DLC remote terminal capacity. Therefore, in actual practice, utilization of switch digital line ports is lower than utilization of lines at the DLC remote terminal.

Q. HOW WAS THE FORWARD-LOOKING UTILIZATION FOR ANALOG LINE PORTS DETERMINED?

A. The utilization of analog lines is set at **[VERIZON NW PROPRIETARY BEGINS]** XXXX **[VERIZON NW PROPRIETARY ENDS]** which is Verizon NW's current operating utilization.

Q. DOES THE SCIS MODEL ALLOW FOR ADMINISTRATIVE SPARE IN ITS COST CALCULATION?

A. Yes. SCIS allows for administrative spare for trunks and lines. Verizon NW explains the concept of administration spare in the loop section above. Verizon NW used the following administrative spare capacity fills: **[VERIZON NW PROPRIETARY BEGINS]** XXXX **[VERIZON NW PROPRIETARY ENDS]** for digital line ports and **[VERIZON NW PROPRIETARY BEGINS]** XXXX **[VERIZON NW PROPRIETARY ENDS]** for analog line ports.

3. Switch Ports

Q. HOW DID VERIZON NW CALCULATE LINE PORT MATERIAL INVESTMENTS?

A. Unit material investments for the line ports components were obtained directly from the SCIS and COSTMOD model office outputs, then adjusted as described above.

4. Usage

Q. HOW DID VERIZON NW CALCULATE THE LOCAL SWITCH USAGE MATERIAL INVESTMENTS?

A. Verizon subtracted the total material investment for the line port components from the SCIS and COSTMOD model office outputs from the total investment to arrive at a total switch usage investment. This usage investment represents all switch investment, without line port investments, and includes processor-based features.

Q. HOW DID VERIZON NW CONVERT THE MATERIAL INVESTMENT ASSOCIATED WITH USAGE TO MOU INCREMENTS?

A. Verizon NW divided the usage investment by the busy hour total switch MOU capacity to arrive at a busy hour MOU investment for usage.

Q. PLEASE EXPLAIN HOW THE TOTAL BUSY HOUR SWITCH LINE AND TRUNK MOU CAPACITY WAS DETERMINED.

A. SCIS develops an average busy hour CCS per line, per switch technology. Multiplying this CCS per line times the number of lines in each switch technology yields the total busy hour CCS per switch technology. The sum of the total busy hour CCS for all three switch technologies (GTD5, 5ESS, and DMS-100) yields the total busy hour CCS for the switch network. The total switch busy hour CCS is then converted to total switch busy hour MOU capacity by multiplying it by 100, then dividing by 60. A similar calculation is prepared for the conversion of the total end office trunk busy hour investment into a busy hour per MOU investment included in the local switching usage UNE.

Q. HOW WAS THE TOTAL INVESTMENT PER BUSY HOUR MOU CONVERTED TO A COST PER ALL HOURS OF THE DAY ("AHD")[41/] MOU?

A. The total investment per busy hour MOU was converted to a total cost per busy hour MOU by the application of annual cost factors and investment related loadings as described in other parts of this panel testimony. This total was converted to an AHD MOU cost by the application of the busy hour to AHD conversion factor.

Q. WHAT IS THE AHD CONVERSION FACTOR?

A. The AHD or the Busy Hour to Day Ratio ("BHDR") converts the usage calling per minute of use investment in the average busy season busy hour to an investment per minute of use for any minute of use during the day. This ratio represents the proportion of the busy day's traffic that is accounted for by the busy hour. Because the hour in question is, by definition, the busiest of the day, that ratio will fall somewhere above 0.042, or 1/24.

Q. HOW WAS THE BHDR CALCULATED FOR WASHINGTON?

41/ "All Hours of the Day" means averaged over all time-of-day periods.

A. For Washington, the starting point for the BHDR was the latest Verizon Washington dial equipment minutes (DEMS) available (2000). DEMS represent the annual usage minutes of the Verizon Washington switching network. From the DEMS, Verizon NW determined the average *annual* conversation minutes per access line. Verizon NW compared this value to Verizon NW's switching study's busy hour capacity minutes per access line to determine the busy hour to day ratio for Washington. It was determined to be 0.06011, meaning that the traffic in the busy hour represents about 6% of all traffic in the day.

Q. IS THE BHDR FORWARD-LOOKING?

A. Yes. Verizon NW took additional steps to ensure that the BHDR is forward-looking with respect to changes occurring in the switching network. Verizon NW conducted a separate analysis to estimate the impact of removing data-related minutes of use that in the future will move to a non-switched broadband service such as DSL and cable modems. Many of the additional lines used by customers today are being utilized for dial-up Internet access and the removal of these long holding time calls will impact the busy hour to day ratio. Using data from Washington, Verizon NW estimated that the impact of the removal of the minutes of use related to additional lines would increase the Busy Hour to Day Ratio by approximately 6%. This forward-looking adjustment yields a BHDR of 6.37% (6% times 1.06).

Q. WHAT IS THE BUSY HOUR TO ANNUAL RATIO?

A. The Busy Hour to Annual Ratio ("BHAR") represents the relationship between traffic in the busy hour of one business day in the busy season to the total traffic in the year. In order to develop the BHAR for Washington, the BHDR (6.37%) is divided by the effective calendar days of 272 which yields the BHAR of 0.000234.

Q. WHAT IS MEANT BY THE "EFFECTIVE CALENDAR DAYS"?

A. The Effective Calendar Days input converts the investment per minute of use for any minute occurring during the day (as calculated by the BHDR above) to the investment per minute of any minute on the network during any given day of the year. Verizon NW estimated the number of effective calendar days using a formula that assumes that the average BS/BH (busy season/busy hour) exhibits demand of 4 CCS per line, and a demand of 3 CCS per line in the rest of the year (non-busy season). It is also assumed that the weekend and holiday CCS per line demand is eighty percent of the non-busy season demand or 2.4 CCS per line. Since the busy season is three months or approximately 25% of the weekdays, the total is 63 days. The total average CCS demand per line for the office is: (63 x 4 CCS) + (188 x 3 CCS) + (114 x 2.4 CCS) for a total of 1,090 CCS. Dividing the total CCS of 1,090 by the 4 CCS per line, the BS/BH demand yields an effective number of calendar days of 272.

Q. ARE THE LOCAL SWITCHING USAGE ORIGINATING AND TERMINATING MOU COSTS THAT VERIZON NW IS PROPOSING APPLICABLE TO BOTH INTRA- AND INTER-SWITCH CALLS?

A. Yes. The entire capacity of MOU (originating minutes *plus* terminating minutes) was used to develop the per-MOU costs of Local Switch Usage. The costs associated with a terminating MOU is the same cost for a terminating MOU for any call type (intra-switch or inter-switch). Likewise, the cost associated with an originating MOU is the same cost for originating MOU for any type of call (intra-switch or inter-switch). In addition, the SS7 "call set up" cost component is weighted by the percent of interoffice calling and assigned to the local switching originating MOU.

Q. IS VERIZON NW PROPOSING TO CHARGE THE ORIGINATING USAGE RATE FOR ALL ORIGINATING MINUTES, AND THE TERMINATING USAGE RATE FOR ALL TERMINATING MINUTES?

A. Yes. Verizon NW separated its total switching usage costs into originating and terminating costs.

Q. PLEASE EXPLAIN NON-CONVERSATION TIME ("NCT") AND HOW IT RELATES TO USAGE COSTS.

A. Conversation time is the actual time (in MOU) that switch resources are being used during the conversation part of each call. NCT time represents the time that switch resources are being used other than during the actual conversation time. For example, NCT includes the time required for dialing the call, ringing, and call set-up. It also includes the time associated with calls that are not completed (that is, the called party does not answer or the line is busy). Since non-conversation times are not measured by the switch's billing recordings, and thus cannot be billed, Verizon must include an NCT additive ("NCTA") in the conversation minutes ("MOUs") to account for this time. The ratio of (conversation minutes plus NCT) to (conversation minutes) is multiplied by the cost per MOU to recover the costs associated with non-conversation time.

Based on a non-completed call ratio of 16% for Washington, the NCTA factor is calculated as 1.07.

Q. PLEASE EXPLAIN RIGHT-TO-USE ("RTU") FEES.

A. RTU fees are the software costs associated with the vendor's software. Because digital switches are processor controlled, extensive software is required.

Q. HOW WERE RTU FEES INCLUDED IN UNE SWITCHING COST STUDIES?

A. Verizon NW developed an RTU expense factor, which was applied to all UNE switching investments (line ports, local switching, and service specific feature hardware).

5. Reciprocal Compensation Usage (Terminating)

Q. PLEASE EXPLAIN WHY VERIZON NW IS FILING A SEPARATE USAGE (TERMINATING) COST FOR RECIPROCAL COMPENSATION.

A. Section 251(b)(5) of the Act states that all LECs have "[t]he duty to establish reciprocal compensation arrangements for the transport and termination of telecommunications." Reciprocal compensation arrangements include the mutual and reciprocal recovery of costs through cash payments or other non-cash transactions such as bill-and-keep arrangements. Additionally, incumbent local exchange carriers are obligated to provide interconnection "on rates, terms, and conditions that are just, reasonable, and nondiscriminatory."[42/] In § 252(d)(2)(A), the Act specifies that a state commission can not consider the terms and conditions to be just and reasonable unless,

(i) such terms and conditions provide for the mutual and reciprocal

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42/ Telecommunications Act of 1996, 47 U.S.C. § 251(c)(2)(D).

> recovery by each carrier of costs associated with the transport and termination on each carrier's network facilities of calls that originate on the network facilities of the other carrier; and
>
> (ii) such terms and conditions determine such costs on the basis of a reasonable approximation of the *additional costs* of terminating such calls. (emphasis added)

Verizon NW has therefore appropriately filed costs associated with the *additional costs* of terminating such calls.

Q. PLEASE EXPLAIN HOW THE RECIPROCAL COMPENSATION USAGE COST WAS DEVELOPED.

A. Verizon NW determined the costs associated with basic usage (no features) as previously described for Local Switch usage, but excluded the getting started[43/] investments identified by SCIS and COSTMOD.

Q. IS VERIZON NW PROPOSING A TWO-TIERED RECIPROCAL COMPENSATION RATE?

A. Yes. In its 32nd Supplemental Order, the Commission directed parties to produce evidence in this proceeding regarding the appropriate two-tiered rate structure for reciprocal compensation. The reciprocal compensation rates Verizon NW is proposing recognize this mandate as well as the fact that some CLECs hand off traffic in Verizon NW end offices but that others, for efficiency

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[43/] "Getting started" investments represent the investments associated with switch processor and memory, test equipment, maintenance equipment, office spares, and other miscellaneous equipment and are not impacted by the additional reciprocal compensation usage.

reasons, hand off traffic in Verizon NW tandem switch offices. Verizon NW is proposing a "Meet Point A" arrangement for CLECs handing off traffic at a Verizon NW end office switch. Verizon is also proposing a "Meet Point B" arrangement for CLECs handing off traffic at Verizon NW tandem switch offices.

6. Port Additives

Q. HOW WERE THE INVESTMENTS ASSOCIATED WITH THE "PORT ADDITIVES" DEVELOPED?

A. As previously described, port additives are optional switch features that require specific, unique hardware. Verizon NW determined the incremental hardware investments associated with these port additives by running each feature through SCIS/IN and COSTMOD. SCIS/IN is the module of SCIS that calculates incremental investments associated with specific features of the switch. A more detailed discussion of SCIS/IN can be found in the Cost Manual.

Q. HOW WERE THE MATERIAL INVESTMENTS DESCRIBED ABOVE CONVERTED TO MONTHLY COSTS?

A. The material investments were converted to total in-place investments by the use of loading factors for EF&I and power. The resultant investments are converted to monthly costs with the application of annual capital and expense factors, as described in other parts of this panel testimony.

E. Tandem Switching

1. Element Description

Q. WHAT IS THE TANDEM SWITCHING ELEMENT?

A. Tandem Switching is defined in FCC Rule 47 C.F.R. 51.319(c)(2), Local Tandem Switching Capability. The Tandem Switching capability network element is defined as:

> (i) Trunk-connect facilities, which include, but are not limited to, the connection between trunk termination at a cross connect panel and switch trunk card;
>
> (ii) The basic switch trunk function of connecting trunks to trunks; and
>
> (iii) The functions that are centralized in tandem switches (as distinguished from separate end office switches), including but not limited, to call recording, the routing of calls to operator services, and signaling conversion features.

Q. PLEASE DEFINE THE TANDEM SWITCHING ELEMENT USED IN VERIZON NW'S FORWARD-LOOKING INCREMENTAL COST STUDY.

A. The Tandem Switching element used in Verizon NW's cost study recovers the total tandem switch investment (both trunk ports (digital) and usage).

2. Technology Assumptions

Q. PLEASE DESCRIBE THE FORWARD-LOOKING TANDEM SWITCH TECHNOLOGY ASSUMPTIONS.

A. The forward-looking tandem switch construct is based on Lucent's 5ESS technology, the most up-to-date technology available, placed at current tandem locations.

Q. HOW DID VERIZON NW DETERMINE THE FORWARD-LOOKING CONSTRUCT?

A. Verizon NW developed the forward-looking tandem construct by reviewing the engineering trunk and traffic data for the two 5ESS tandems currently residing in the Verizon NW network. As described above for the end office switches, Verizon NW's engineers provided existing tandem office parameters which were then used to "bucket" each of the current Washington tandem switches to one of the representative tandem model offices. SCIS then calculated, by switch technology type, the unit and total switch material investments for these technologies.

3. General Costing Approach

Q. PLEASE DESCRIBE THE COST METHODOLOGY USED IN DEVELOPING THE TANDEM SWITCHING ELEMENT.

A. The cost methodology used in developing the tandem switching costs is consistent with the cost methodology described above for local switching.

Q. HOW WERE THE MATERIAL INVESTMENTS FOR THE TANDEM SWITCH DEVELOPED?

A. The material investments for the tandem switch were developed using SCIS, in the same manner described for local switching. However, the feature module of SCIS (SCIS/IN) was not required because trunk features are provided solely by the switch processor and associated RTU software.

Q. PLEASE EXPLAIN HOW RTU WAS INCLUDED IN TANDEM SWITCHING?

A. RTU was included in all UNE tandem switching costs (*i.e.*, trunk ports and tandem switching) in the same manner as previously described for local switching.

F. Packet Switching

Q. IS VERIZON NW PROPOSING UNBUNDLED PACKET SWITCHING RATES?

A. No, Verizon NW is not proposing rates for unbundled packet switching. Although the Commission determined in its 32nd Supplemental Order in Docket No. UT-003013 that it would consider evidence regarding the costs associated with unbundled packet switching,[44/] the FCC has since clarified that incumbent carriers are no longer required to offer unbundled packet switching under *any* circumstances.

Q. WHAT HAS THE FCC DETERMINED SINCE THIS COMMISSION'S LAST ORDER REGARDING PACKET SWITCHING?

A. In the press release adopting the *Triennial Review Order*, the FCC eliminated the limited circumstances under which an incumbent could be required to unbundle packet switching facilities. The FCC found that: "Incumbent LECs are not required to unbundle packet switching, including routers and DSLAMS, as a stand-alone network element. The order eliminates the current limited requirement for unbundling of packet switching."[45/] While the order accompanying adoption of that rule has not yet been issued by the FCC, it is clear from this language that the FCC has made an affirmative finding *not* to require unbundled packet switching. Although this Commission required Verizon NW to submit proposed costs for unbundled packet switching to address the possibility that Verizon NW could deploy these facilities and, at that point, *might* satisfy the conditions previously set forth by the FCC under which packet

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44/ *See* 32nd Supplemental Order ¶ 438.

45/ *See* Attachment to Triennial Review Press Release, available at http://hraunfoss.fcc.gov/edocs_public/attachmatch/DOC-231344A2.pdf (rel. Feb. 20, 2003).

switching could be required to be unbundled,[46/] any ambiguity about the potential for the need for unbundled packet switching no longer exists.

Although the FCC's press release is unambiguous in abolishing the possibility that an incumbent could be required to offer unbundled packet switching, Verizon NW is prepared to propose rates for unbundled packet switching if it is legally required to do so due to subsequent action by the FCC.

VI. CALL-RELATED DATABASES

Q. WHAT COSTS IS VERIZON NW PROPOSING FOR CALL-RELATED DATABASES?

A. Consistent with this Commission's 32nd Supplemental Order, Verizon NW is proposing costs for the E-911 and advanced intelligent network ("AIN") databases.[47/]

A. E-911

Q. HOW DID VERIZON NW MODEL COSTS FOR E-911 SERVICES?

A. Verizon NW modeled costs for the service it provides between its proprietary database management system and the non-regulated Public Safety Answering Point ("PSAP") Automatic Location Identification ("ALI") controller services. Together, these services constitute the Enhanced 9-1-1 system. The service provided by Verizon NW is the Distribution Machine for the Address Routing and Control System ("DMARCS") ALI Gateway.

Q. WHAT IS THE FUNCTION OF THE DMARCS ALI GATEWAY?

46/ *See* 32nd Supplemental Order ¶ 437.

47/ *See id.* ¶ 440.

A. DMARCS provides a secure buffer to which customers with non-Verizon PSAP ALI controllers may dial into and download the ALI, including daily updates for their system. The ALI is available in National Emergency Number Association (NENA) standard format.

Q. WHAT DOES THE DMARCS ALI GATEWAY SYSTEM CONSIST OF?

A. The DMARCS ALI Gateway service has the following three components:

(1) Security systems for E-911 customers that have their own ALI computers.

(2) Communications software, modem, and telephone access from the customer's ALI computer to the public switched network. These components are provided by the customer in order to download ALI records.

(3) DMARCS hardware, software, and technical support at Verizon's National Support Center in San Angelo, Texas. This secure buffer holds ALI databases for each DMARCS customer and has modems connected to the public switched network. DMARCS customers call the DMARCS system via modem to download their ALI records. The National Support Center provides guidance and assistance via a toll-free number to DMARCS customers with activities related to connecting to the DMARCS system and retrieving their data. The software for the DMARCS service was developed and is maintained by the National Support Group programmers specifically for this service.

Q. WHAT IS THE DMARCS ALI GATEWAY SERVICE PROCESS?

A. E-911 service districts use DMARCS daily to download ALI updates. Local DMARCS Administrators use ALI computer communications software and modems to dial into Verizon's DMARCS system.

Q. WHY WAS DMARCS ALI GATEWAY ESTABLISHED?

A. Verizon is obligated under the requirements of the Electronic Communications Privacy Act of 1986, 18 U.S.C. § 2703, to take prudent action to protect the privacy expectations of its subscribers. In addition, Verizon's normal business practice is to protect its customer lists from unauthorized resale and protect its internal databases from hacking. When Verizon or another regulated telecommunications service provider provides the ALI controller services to a PSAP, those requirements are met by the direct control that Verizon or other regulated provider retains over the ALI software and therefore over the ALI database.

However, when a non-regulated provider of customer premises equipment (CPE) provides the PSAP ALI controller equipment, DMARCS is required as a replacement step in the ALI provisioning process to protect Verizon and its subscribers. In downloading ALI to an on-premises database system, DMARCS replaces direct dialing to Verizon's Database Management System with direct dialing to a protected database system.

Q. DESCRIBE THE METHODOLOGY USED TO DETERMINE THE COSTS ASSOCIATED WITH PROVIDING DMARCS ALI GATEWAY SERVICE.

A. Verizon NW input investments for the hardware and associated vendor software by account, expense for in-house developed software, and demand into VzCost tables. Within the basic components (BCs), Verizon NW divided total investments and expenses by forecasted demand for customers. Within the cost study Verizon NW converted the investments and expenses to annual and monthly costs and added component costs to produce the monthly cost for the service.

B. AIN Service Management System (AIN Service Creation costs)

Q. WHAT AIN SERVICE CREATION COST STUDIES ARE PRESENTED HERE?

A. In compliance with the Commission's 32nd Supplemental Order, Verizon NW has presented cost studies for AIN Service Creation Usage, Certification and Testing, Help Desk, Subscription Charge, Database Queries, Utilization Element, Service Modification, Switched Announcement, and Service Creation Access Ports.

Q. PLEASE DESCRIBE THE AIN SERVICE CREATION MODEL UNDERLYING VERIZON NW'S COST STUDY.

A. Verizon NW's study is based on the assumption that carriers will access the Service Creation Environment (SCE) through the same platform, ISCP SPACE™, that Verizon itself uses.

Q. PLEASE DESCRIBE THE ADVANCED INTELLIGENT NETWORK (AIN).

A. AIN is a service platform that utilizes the SS7 signaling network. It consists of a database that can intelligently route calls or provide other intelligent functionalities. This database is known as an ISCP. The mechanism to query the ISCP is known as an AIN trigger and occurs in an end office. End offices that have the ability to trigger are called Service Switching Points (SSP).

VII. INTEROFFICE TRANSPORT AND DS3 HIGH CAPACITY LOOPS

Q. WHAT WILL THIS SECTION OF THE TESTIMONY ADDRESS?

A. This section of the testimony will address the recurring costs associated with providing interoffice transport and DS3 high capacity loops. Specifically, it will address the differences between dedicated and common interoffice transport; the calculation of recurring costs associated with different types of dedicated transport facilities; the calculation of recurring costs associated with providing common transport; and the calculation of recurring costs associated with DS3 high-capacity loops.

Q. WHAT IS INTEROFFICE TRANSPORT?

A. Interoffice transport refers to the transport facilities that connect Verizon NW central offices to each other. There are two types of interoffice transport: dedicated transport and common transport. Dedicated transport allows CLECs to connect CLEC collocation facilities at the DS1 and DS3 signaling rates over a circuit that is dedicated to the CLEC. Common transport is provided to CLECs using shared circuits to route calls to and from UNE-Platform customers. Common transport is necessary to deliver calls placed to or from UNE-Platform lines and for which the CLEC has not ordered customized routing with a dedicated trunking arrangement.[48/]

48/ For example, a CLEC might order customized routing so that directory assistance calls from its UNE-Platform customers are delivered to the CLEC's operator services center over dedicated facilities instead of shared facilities.

Q. WHAT ARE DS3 HIGH CAPACITY LOOPS?

A. DS3 high capacity loops connect an end user to a Verizon NW central office.

A. Overview of Network Architecture

Q. PLEASE DESCRIBE THE FACILITIES TYPICALLY USED TO PROVIDE INTEROFFICE TRANSPORT AND DS3 HIGH CAPACITY LOOPS.

A. Synchronous Optical Network ("SONET") facilities are the most common type of facility used to provide interoffice transport and DS3 high capacity loops in modern telecommunications networks. SONET equipment transmits signals as light impulses over fiber optic cables. The simplest SONET architecture is a point-to-point facility that connects only two locations. Figure C below is a simple diagram of a point-to-point SONET facility.

Figure C
Point-to-Point SONET Facility

SONET facilities also can be configured to create a continuous loop, called a SONET ring, that connects two or more locations (called "nodes"). Figure D below is a simple diagram of a four-node SONET ring.

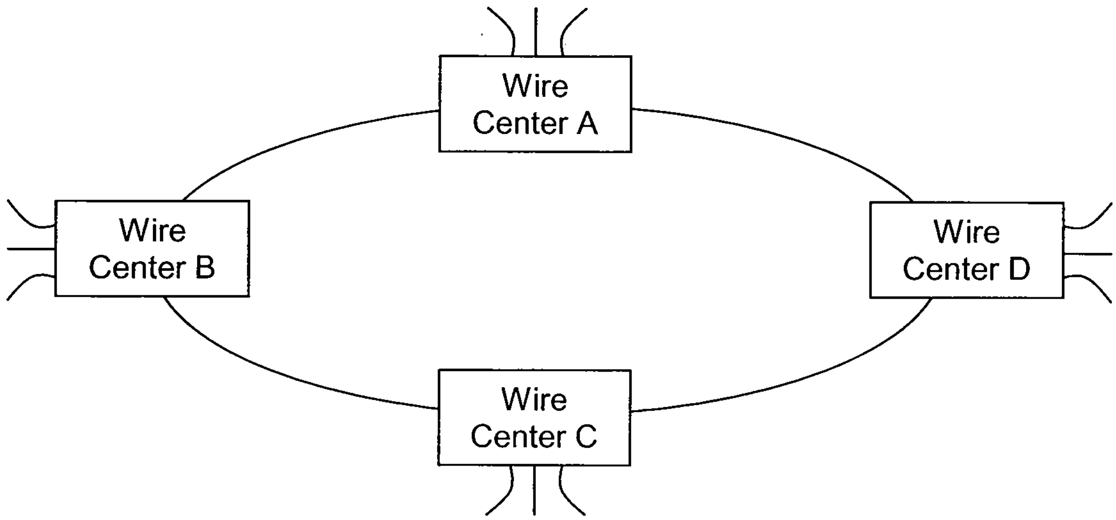

Figure D
SONET Ring with Four Nodes

At each end of a point-to-point SONET system, or at each node on a SONET ring, the fiber is connected to a piece of equipment called an add-drop multiplexer ("ADM"). ADMs provide three principal functions. First, ADMs provide the optical transmission and termination equipment that facilitate high-speed transmissions along the fiber between the connected wire centers. Second, ADMs provide lower-speed electrical or optical interfaces that allow standard transport channels (*e.g.*, DS3) to enter or exit the SONET ring at each serving wire center. Third, ADMs provide multiplexing and demultiplexing functions that allow these standard channels to be combined (multiplexed) or separated (demultiplexed) for efficient transmission on the SONET ring.

Because certain types of SONET rings (called "bi-directional line switched rings" ("BLSRs")) are designed with sufficient reserved capacity on the transmission paths that connect all of the nodes on the ring, these rings are capable of quickly and automatically restoring all of the service on the ring if any one of the fiber segments on the ring is broken (*e.g.*, due to a break in the fiber cable between any two of the nodes) by simply reversing the transmission path around the ring to avoid the broken segment. In the example shown in Figure D above, if the fiber connection between Wire Center A and Wire Center B were broken, the ADMs at Wire Centers A and B would immediately reroute their transmissions around the other side of the ring — *i.e.*, through Wire Centers C and D — to allow service between A and B to continue with minimal interruption until the fiber connection between A and B can be restored. A more detailed description of SONET ring fault protection is provided in the IOF Cost Manual, Exhibit RP-8.

Other types of transport facilities include asynchronous transport over fiber, radio, or copper. These transmission technologies were developed before SONET transmission and are no longer widely available. Thus, SONET technology is considered the most efficient, currently-available technology for providing transport and high capacity services.

B. Interoffice Transport

Q. PLEASE DESCRIBE THE INTEROFFICE TRANSPORT ELEMENT.

A. The Interoffice Transport ("IOF")[49/] element is defined by the FCC in 47 C.F.R. § 51.319(d) as follows:

> Interoffice transmission facilities. An incumbent LEC shall provide nondiscriminatory access, in accordance with § 51.311 and section 251(c)(3) of the Act, to interoffice transmission facilities on an unbundled basis to any

[49/] The abbreviation "IOF" comes from the term "Interoffice Facilities."

> requesting telecommunications carrier for the provision of a telecommunications service. . . .
>
> (1) Interoffice transmission facility network elements include:
>
> (i) Dedicated transport, defined as incumbent LEC transmission facilities, including all technically feasible capacity-related services including, but not limited to, DS1, DS3 and OCn levels, dedicated to a particular customer or carrier, that provide telecommunications between wire centers owned by incumbent LECs or requesting telecommunications carriers, or between switches owned by incumbent LECs or requesting telecommunications carriers;
>
> (ii) Dark fiber transport, defined as incumbent LEC optical transmission facilities without attached multiplexing, aggregation or other electronics;
>
> (iii) Shared transport, defined as transmission facilities shared by more than one carrier, including the incumbent LEC, between end office switches, between end office switches and tandem switches, and between tandem switches, in the incumbent LEC network.

Q. PLEASE DEFINE THE DEDICATED INTEROFFICE TRANSPORT ELEMENT USED IN VERIZON NW'S FORWARD-LOOKING INCREMENTAL COST STUDY.

A. The Dedicated Transport element is defined as an IOF transmission facility that is dedicated to a particular customer. Dedicated Transport is offered between Verizon NW-owned wire centers at the DS1 and DS3 signaling levels. Dedicated DS3 transport consists of a two-point digital channel that provides for simultaneous two-way transmission of digital electrical signals at a transmission rate of 44.736 Mbps. Dedicated DS3 transport provides for the equivalent of 28 DS1 channels or 672 analog voice grade channels.

Q. DEFINE THE COMMON INTEROFFICE TRANSPORT ELEMENT USED IN VERIZON NW'S FORWARD-LOOKING INCREMENTAL COST STUDY.

A. The Common Transport element is defined as IOF transmission facilities, specifically interoffice trunking, shared by Verizon NW and other carriers using Verizon NW's existing switch routing. It is purchased on a per-minute-of-use basis when CLECs utilize the UNE-Platform without customized routing in their network. Common IOF transport is offered between Verizon NW-owned switches, and it contains components that are priced on a fixed and per-air-mile basis.

a) Costing Methodology

Q. PLEASE DESCRIBE VERIZON NW'S APPROACH TO MODELING THE FORWARD-LOOKING INVESTMENT FOR IOF TRANSPORT.

A. Verizon NW uses a capacity costing approach to modeling the forward-looking costs of providing IOF transport. This approach differs from the ground-up approach used in the loop cost studies. Under a capacity costing approach, a cost model identifies the costs per unit of capacity of typical network configurations used to provide service rather than trying to determine the total cost of the network used to provide those services. The cost per unit of capacity is then divided by a utilization factor to take into account the cost of spare capacity on the network.

This capacity costing approach is far more practical for modeling IOF transport costs than the ground-up approach used in the loop cost studies for at least two reasons. First, the interoffice transport network is inherently complex (far more so than the loop network) because of the need to provide a very large number of connections among the approximately one hundred wire centers in Washington. Detailed data about the specific transport services provided through these many connections is not readily available in a practicably usable form, making it difficult or impossible to model a complete IOF network capable of serving all of the demand in Washington. Second, even if it were possible to model such a network at any one point in time, such a model would not account for the frequent changes made to the transport network to accommodate the highly volatile transport demand. Because a capacity costing approach does not rely on the ability to model the entire network accurately, it is not affected by such factors and thus can produce more reliable estimates of forward-looking costs.

Q. PLEASE DESCRIBE THE FORWARD-LOOKING TRANSPORT ARCHITECTURE USED IN VERIZON NW'S COST MODEL.

A. Verizon NW's transport cost model starts with the assumption that the forward-looking network would use bi-directional line switched SONET rings to provide IOF transport between Verizon NW wire centers. This assumption is consistent with the FCC's TELRIC methodology because, as noted above, SONET equipment is the most efficient technology currently available for providing high capacity transport between Verizon NW wire centers.[50/] Verizon NW's cost model then determines the forward-looking costs of providing IOF transport based on the weighted average cost of providing transport on a variety of different, forward-looking, SONET ring designs.

50/ *See Local Competition Order* ¶ 685.

Q. PLEASE DESCRIBE THE VARIATIONS IN FORWARD-LOOKING SONET RING DESIGNS.

A. The variations in ring designs fall into four categories: variations in equipment used to provide the different transport services (*e.g.*, DS1 and DS3), variations in the size (*i.e.*, number of nodes) of the SONET ring, variations in complexity of the equipment used at wire centers with different demand characteristics, and variations in the equipment vendors. Equipment configurations vary depending on the capacity of the transport service, because the capacity of the service being provided determines, among other things, the extent to which multiplexing and demultiplexing is required when a circuit enters and exits the ring.

For each different transport service, Verizon NW models a set of SONET ring designs for each ring size from 2-10 nodes. Determining the number of nodes to place on a SONET ring involves certain trade-offs. Increasing the number of nodes on a SONET ring increases the probability that a particular transport circuit can be created between two requested wire centers without having to use more than one ring. However, larger rings require greater (and more costly) planning and administration to achieve efficient fill, because the available capacity on a ring is limited by the peak load between any two adjacent nodes on the ring. Conversely, decreasing the number of nodes on a SONET ring decreases the probability that a particular transport circuit can be provided between the two requested wire centers without having to use more than one ring. For example, if a network uses only two-node rings, it would be necessary to build many overlaying rings to connect offices in various two-node patterns. In turn, many DS3s would have to travel across two or more two-node rings to connect the particular points required by customers. Because ring interconnection increases costs in a SONET network, reducing ring interconnection requirements generally helps reduce overall transport costs. Thus, engineers typically design SONET rings of various sizes to account for varying demand characteristics across the network. Verizon NW's IOF transport cost studies use a weighted average of different ring sizes to account for the variation that would exist in a forward-looking network.

For each ring size, Verizon NW models a set of different designs suited to four different levels of wire center complexity.[51/] These designs correspond to standard designs that Verizon NW's engineers use for the newest SONET ring installations. The variations among these designs account for, among other things, the levels of automation appropriate for different wire center demand levels. For example, the dense urban wire center designs typically include digital cross-connect systems ("DCS"), which allow for more efficient management of circuits in busy wire centers.

Finally, Verizon NW's cost model includes equivalent sets of designs for both equipment vendors (Nortel and Fujitsu) that Verizon NW uses for its IOF network. The costs of these designs are weighted according to the mix of each vendor's equipment used in the existing Verizon NW network to produce a

[51/] The four wire center complexity levels are: rural, suburban, urban, and dense urban. In some cases, Verizon NW's model uses a weighted average of several designs for each level of wire center complexity.

weighted average cost among the two vendors. The forward-looking SONET ring designs are described in more detail in the IOF Cost Manual.

Q. HOW WERE THE DIFFERENT RING DESIGNS WEIGHTED IN VERIZON NW'S COST STUDIES?

A. The ring designs in Verizon NW's IOF cost studies were weighted to reflect the forward-looking mix of SONET rings for Verizon NW. Among the different ring sizes, Verizon NW weighted the designs according to the current mix of sizes of OC48 SONET rings in Verizon NW's network. Among the different wire center complexity levels, Verizon NW weighted the ring designs according to the percentage of IOF circuits currently provided at wire centers having each level of complexity.

Q. HOW DOES VERIZON NW'S COST MODEL DEVELOP THE COSTS FOR EACH SONET RING CONFIGURATION?

A. The IOF cost model starts with contract prices and vendor information for the equipment components of each circuit design. Material prices are compiled into typical equipment configurations for each ring size, service (*i.e.*, DS1 and DS3), central office complexity level, and equipment vendor (*i.e.*, Nortel and Fujitsu), as explained above and in the IOF Cost Manual. The investments for each configuration are then calculated on a per-DS0 basis.

The remaining steps are conducted within the VzCost system. Material investments are input into the "Loading Run" module of VzCost, where investment loading factors are applied as described in Part X.A below to account for the costs of engineering, furnishing and installing the equipment, as well as installing the power equipment necessary to provide electrical power to the circuit equipment. Finally, Verizon NW applies the annual cost factors described in Part X.B below to each loaded investment account in the typical circuit design to derive the annual costs, which are then divided by twelve to derive monthly costs.

Q. WHAT IS THE BASIS FOR THE EQUIPMENT MATERIAL AND INSTALLATION COSTS USED IN THE IOF TRANSPORT STUDIES?

A. Material prices for electronics equipment reflect the latest negotiated contract prices Verizon NW has with the manufacturers of the circuit equipment. The circuit equipment investment loading factors reflect Verizon's recent experience installing such equipment and are explained in more detail in Part X.A below.

Q. HOW ARE THE FIBER CABLE AND STRUCTURE INVESTMENTS DEVELOPED FOR THE IOF STUDY?

A. To calculate investments for interoffice fiber cable and structure, VzCost begins with the fiber investments modeled by VzLoop using the methodology described in Part IV above. For each structure type, VzCost starts with the total fiber cable and associated structure investment modeled by VzLoop and then divides by the total installed feet of fiber strands modeled for that structure type, producing the average fiber and structure investment per strand-foot for that structure type. VzCost then calculates the weighted average investment per strand-foot according to the total mix of aerial, buried, and underground fiber cable modeled by VzLoop. These calculations are described in more detail in the IOF Cost Manual and can be viewed online in VzCost in the BC run named

"IOF_OSP_V3." The formula for these calculations is named "OSP_IOF_FAC_WGTD_AVG."

Q. DOES THE IOF COST MODEL TAKE INTO ACCOUNT SHARING OF SUPPORT STRUCTURE BETWEEN LOOP FACILITIES AND IOF FACILITIES?

A. Yes. As explained in Part IV above, VzLoop models 12 fiber strands per RT in the loop cost studies, but assigns only half of the fiber cable and structure investment to the cost of the loop. Thus, the fiber cable sizes modeled by VzLoop reflect the economies associated with sharing structures between feeder and IOF cables. Because the IOF cost studies use a capacity costing approach instead of a ground-up approach, Verizon NW does not merely assign the remaining half of the fiber cable and structure investment to the IOF cost study. Rather, Verizon NW takes the average fiber investment per strand per foot from the forward-looking fiber investment modeled by VzLoop and applies that average investment in the IOF cost study to determine the forward-looking fiber and associated structure investment for IOF.

Q. HOW DOES VERIZON NW ACCOUNT FOR THE COST OF TRANSPORT CIRCUITS THAT TRAVEL ACROSS MULTIPLE SONET RINGS?

A. As explained above, each SONET ring connects a discrete number of wire centers (nodes). If a service requires transport between two wire centers that are not connected on the same SONET ring, the circuit must be provisioned across multiple SONET rings that can be connected at intermediate wire centers to create a circuit between the desired wire centers. To do this, Verizon NW must use intermediate channel termination ("ICT") equipment at each intermediate wire center to connect the circuit from the ADM on one ring to the ADM on another ring.

To account for these costs, Verizon NW models several different configurations of ICT equipment for each transport service. These configurations are described in more detail in the IOF Cost Manual.[52/] VzCost calculates a weighted average of these different configurations and then applies an ICT factor of 0.75 to account for the average number of ICTs per circuit that would be used in the forward-looking network. In a real-world network, a number of interoffice transport circuits would cross two or more rings because of the limited number of wire centers (typically fewer than 6) that are connected by any one SONET ring compared to the total number of wire centers in the Washington network (99). The 0.75 ICT factor is conservative, because it assumes that a significant number of circuits can be served on just a single ring. For example, if 25% of the circuits required one ring interconnection, and another 25% required two ring interconnections (at twice the cost of a single ring interconnection), the 0.75 ICT would mean that the remaining 50% of the circuits could be completed using a single ring.[53/]

b) Digital Cross-Connect Systems

Q. WHAT ARE DIGITAL CROSS-CONNECT SYSTEMS ("DCS")?

52/ *See* IOF Cost Manual.

53/ If 25% of circuits require one ICT, and 25% of circuits require two ICTs, and all other circuits required no ICTs, the average number of ICTs per circuit would be 0.25 + (2 x 0.25) = 0.75.

A. DCS are software-driven electronics that provide advanced circuit aggregation and management functions, such as multiplexing and rearrangement, within the transport network. For example, certain types of DCS provide an efficient mechanism to interconnect lower-capacity circuits such as DS0s and DS1s with and among high capacity SONET transport systems, which transmit signals at a DS3 or higher signal level. DCS are particularly efficient for use in wire centers with high levels of demand or demand that changes frequently. DCS also provide fault isolation and testing capabilities.

There are three primary types of DCS equipment categorized by the core functionality they provide. Narrowband DCS (NDCS) has the ability to multiplex and cross-connect DS0 circuits onto one or more DS1 channels. Wideband DCS (WDCS) has the ability to multiplex and cross-connect DS1 circuits onto one or more DS3 circuits. Because the WDCS can connect a DS1 port to a DS1 channel within a DS3 port, the WDCS can provide a DS1-to-DS3 multiplexing function. This function is necessary for DS1 transport because, as noted above, SONET ADMs transmit signals between wire centers at DS3 and higher signaling levels. NDCS and WDCS are usually deployed at large central offices and primarily support circuits that terminate in that office. Broadband DCS (BDCS) has the ability to cross connect DS3 channels using optical interfaces from one high capacity system to another. BDCS are usually deployed at large transport hub offices and primarily support interconnections among very high capacity backbone transport systems. Because all DCS systems can be controlled by centrally-located network management systems, they allow technicians to connect and rearrange circuits (for both service provisioning and restoration) without having to travel to each wire center.

Q. WHAT TYPES OF DCS ARE INCLUDED IN VERIZON NW'S IOF TRANSPORT COST STUDIES?

A. Verizon NW has included WDCS and BDCS in some, but not all, of the ring configurations included in its cost studies. As explained in more detail in Verizon NW's IOF Cost Manual, WDCS and BDCS are included in the ring configurations corresponding to high-traffic wire centers where the alternatives to DCS — manual cross-connection and standalone multiplexers — would not allow Verizon NW to provide the service quality and reliability expected of it.

Q. CAN SOME DCS PROVIDE OPTIONAL FUNCTIONALITY IN ADDITION TO THE FUNCTIONALITY DESCRIBED ABOVE?

A. Yes. With the installation of additional operating systems, certain DCS equipment can perform optional functions such as those offered in Verizon's Enterprise Network Reconfiguration Service. Because those optional functions are not part of the IOF transport UNE, Verizon NW has not included in its IOF transport rates the additional costs of the operating systems that would be required to provide the optional functionality.

c) Utilization

Q. HOW IS UTILIZATION ACCOUNTED FOR IN THE IOF TRANSPORT STUDY?

A. Interoffice transport circuits typically must pass through one or more levels of multiplexing to be carried on the high capacity transport network. As is the case with all network capacity, the multiplexing equipment, including DCS, cannot be operated at 100% of capacity. Consequently, a reasonable utilization level must be estimated for these elements. Interoffice facility growth, churn, equipment breakage, and administrative spare must all be reflected in the utilization level. Based on these factors, Verizon NW estimated that the forward-looking utilization level would be 75%.

Verizon NW also accounts for spare capacity when calculating the per-strand-foot investment by applying two utilization factors. The first utilization factor accounts for the fact that available fiber strands are never 100% utilized. Because Verizon NW has no reason to believe that fiber strand utilization would increase in a forward-looking network, Verizon NW has applied a **[VERIZON NW PROPRIETARY BEGIN]** XXXX **[VERIZON NW PROPRIETARY END]** utilization factor that is based on Verizon NW's current fiber utilization rate. The second utilization factor accounts for the fact that, on any ring with a given circuit capacity (*e.g.*, 48 DS3s on an OC48 ring), not all of the circuit capacity will be used at any given time. For this second utilization factor, Verizon NW used the same 75% value that was applied to account for utilization of circuit electronics. Applying these two utilization factors allows Verizon NW to recover all of the forward-looking fiber investment attributable to IOF transport facilities, including fiber investment associated with reasonable levels of spare capacity, through the rates for the working circuits on a SONET ring.

The application of these utilization factors is discussed in more detail in the IOF Cost Manual.

C. Development of IOF UNE Rates

1. Dedicated Transport

Q. HOW DOES VERIZON NW RECOVER THE COSTS OF THE DEDICATED INTEROFFICE TRANSPORT UNE?

A. Verizon NW recovers monthly costs on a "fixed" basis and a "per mile" basis for each signaling level facility. In general, the fixed costs are those costs associated with equipment installed at the originating and terminating Verizon NW wire centers, which include electronic equipment such as SONET ADMs, DCS, and fiber terminations. The per-mile costs are generally associated with network components whose costs are driven by the length of the transport circuit. Such components include interoffice fiber cables, support structure, and any necessary intermediate channel termination electronics at intermediate Verizon NW serving wire centers for circuits that must traverse more than one SONET ring.

Q. HOW DOES VERIZON NW CALCULATE THE FIXED (NON-MILEAGE-SENSITIVE) COSTS OF PROVIDING INTEROFFICE TRANSPORT?

A. As explained above, Verizon NW applies equipment prices from its vendor contracts to each of the modeled equipment configurations to produce per-unit material investments. Verizon NW then applies investment loading factors to the equipment prices to account for associated installation, engineering, and power costs.[54/] This results in total installed unit investment.

54/ The investment loadings are discussed in more detail in Part X.A below.

Q. HOW DOES VERIZON NW CALCULATE THE MILEAGE-SENSITIVE COSTS OF PROVIDING INTEROFFICE TRANSPORT?

A. VzCost calculates mileage-sensitive costs in five steps. First, VzCost calculates the average fiber cost per SONET ring (on a per-DS0 basis) using the per-strand-foot investment developed by VzLoop, the average length of a SONET ring in Verizon NW's network, and the total circuit capacity of each SONET ring design. Second, Verizon NW multiplies this average cost by 1.75 (one plus the 0.75 ICT occurrence factor) to take into account the use of fiber on multiple rings for circuits that traverse more than one ring. Third, VzCost calculates the weighted average cost of ICT electronics per circuit using the different ring designs and the 0.75 ICT factor, as explained above and in the IOF Cost Manual.[55/] Fourth, Verizon NW applies the appropriate ACFs to these costs to produce annual costs and then divides by 12 to produce recurring monthly costs. Finally, Verizon NW adds these costs together and divides by the average billed miles per circuit in Washington to produce the average, monthly, mileage-sensitive costs on a per-mile basis.

2. Common Transport

Q. HOW WERE THE COSTS DEVELOPED FOR THE COMMON IOF TRANSPORT ELEMENT?

A. To determine the costs of common transport, the IOF cost model includes in its SONET ring designs a set of message trunking designs that are used to provide common transport. As explained in more detail in the IOF Cost Manual, these

55/ *See* IOF Cost Manual.

message trunking designs are similar to the SONET ring designs for DS1 services, with one notable difference: the message trunking designs account for the fact that some common transport circuits connect to switches using a DS3 or STS-1 interface instead of a DS1 interface.[56/]

Q. HOW DOES VERIZON NW DEVELOP RATES FOR THE COMMON TRANSPORT UNE?

A. Verizon NW recovers common transport UNE costs through a fixed per-minute rate, and a mileage-sensitive per-minute rate. The fixed per-minute rate recovers the non-mileage-sensitive costs of providing transport components such as SONET add/drop multiplexers, cross-connect systems, and cross-connect bays. VzCost calculates these costs by dividing (a) the weighted average of the modeled SONET ring designs (expressed on a per-DS0 basis)[57/] by (b) the average number of minutes of use per trunk.

The mileage-sensitive per-minute rate recovers the mileage-sensitive costs of providing common transport, including the costs of fiber cable, support structures, and ICT equipment. VzCost calculates these costs by dividing (a) the weighted average mileage-sensitive costs calculated for the message trunking SONET ring designs (expressed on a per-DS0 basis) by (b) the average number of minutes of use per trunk. This produces the mileage-sensitive per-minute rate for common transport.

56/ *See* IOF Cost Manual.

57/ The IOF investments are converted to costs per DS0 by dividing the DS1 investments by 24, and the DS3 and STS-1 investments by 672.

D. DS3 High Capacity Loops

Q. WHAT TECHNICAL ASSUMPTIONS DID VERIZON NW MAKE ABOUT DS3 HIGH CAPACITY LOOPS FOR ITS COST STUDY?

A. Verizon NW's costing approach for DS3 high capacity loops is similar to the approach used in the IOF transport cost studies, with a few differences. As with the IOF transport cost studies, Verizon NW's cost study for DS3 high capacity loops assumes the use of several designs of SONET transport equipment, the most efficient technology currently available for providing these services. Also, as with the IOF transport studies, Verizon NW's cost study uses a weighted average of several SONET ring designs corresponding to the different wire center complexity levels, with the weighting determined by the relative mix of wire centers in Washington. However, the SONET ring designs used to calculate DS3 high capacity loop costs are limited to 2 nodes.[58/] This is different from Verizon NW's IOF transport studies (which model SONET ring designs containing as many as 6 or more nodes), because DS3 high capacity loops typically are provided on SONET facilities that are dedicated to a particular customer or customer location. In addition, unlike the IOF transport cost studies which are based on SONET ring designs using only OC48 rings, Verizon NW's DS3 high capacity loop study includes designs with different SONET ring speeds (*e.g.*, OC3, OC12, OC48). The varying ring speed designs allow Verizon NW's cost study to account for an appropriate mix of facilities dedicated to a particular

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58/ A dedicated facility dedicated to a particular customer location would have only two nodes: one at the Verizon NW wire center, and one at the customer location.

customer (which are more likely to be tailored to the service requested by the individual customer) and facilities shared by more than one customer (which are likely to have a much higher capacity than any individual service provided over the facility). The weighting of designs with different ring speeds is based on the relative mix of SONET rings with those speeds in Verizon NW's network.

The different SONET ring designs used in the DS3 high capacity loop study is described in more detail in the IOF Cost Manual.

Q. DOES VERIZON NW ACCOUNT FOR ANY NETWORK RESOURCE SHARING BETWEEN DS3 HIGH CAPACITY LOOPS AND THE GENERAL LOCAL ACCESS INFRASTRUCTURE?

A. As noted above, because of the unique nature of DS3 high capacity loops, and the types of customers they serve, the transport facilities used to provide this service are generally separate from the more general local access infrastructure and often separate from the SONET rings used in Verizon NW's interoffice transport network. The opportunity for network resource sharing typically is limited to sharing of the fiber cable and support structure used for loop feeder facilities. This sharing is accomplished by using the same large fiber cable to provide fibers for both loop feeder facilities and DS3 high capacity loops on some portion of the route between the Verizon NW end office and the end user customer. The DS3 high capacity loop study reflects these sharing opportunities in the same manner as described above for the IOF transport cost studies.

Q. WHAT CHARGES DOES VERIZON NW PROPOSE FOR DS3 HIGH CAPACITY LOOPS?

A. Verizon NW proposes a fixed monthly charge to recover its forward-looking costs associated with providing DS3 and high capacity loops.

VIII. DAILY RECORD USAGE FILE

Q. PLEASE EXPLAIN THE DAILY RECORD USAGE FILE ("DRUF") SERVICE.

A. This service provides resellers and UNE purchasers with IntraLATA local and toll call usage record details of their end users. DRUF consists of the processing and transmission of those call record details.

Q. HOW WERE THE PROCESSING AND TRANSMISSION COSTS FOR DRUF DEVELOPED?

A. Costs were developed for Record Processing, Data Transmission, and Tape or Cartridge. The costs include the computer processing usage time, computer termination maintenance, salary and wages of personnel handling the data transmission functions, software maintenance and disk maintenance.

IX. ELEMENT COMBINATIONS

Q. DOES VERIZON NW PROVIDE ELEMENTS IN COMBINED FORM?

A. Yes. Verizon NW provides UNE combinations for any elements that Verizon currently combines in its network, as required by 47 C.F.R. § 51.315. Examples of UNE combinations include the UNE-Platform and expanded extended loop.

Q. WHAT IS THE UNE-PLATFORM?

A. The UNE-Platform consists of all of the individual network elements used by Verizon NW to provide service to a particular subscriber. For example, the UNE-Platform might consist of local loop, switching, and transport elements for certain subscribers, but the UNE-Platform might include only local loop and switching elements for other subscribers.

Q. WHAT IS AN EXPANDED EXTENDED LOOP (EEL)?

A. An EEL is a combination of a loop and interoffice transport facilities, together with multiplexing where required. In some cases, multiple loops are multiplexed for the interoffice transport portion of an EEL.

Q. HOW DOES VERIZON NW DETERMINE THE RECURRING CHARGE FOR AN ELEMENT COMBINATION?

A. As a general rule, the recurring charge for an element combination is simply the sum of the recurring charges for the constituent elements. Thus, the recurring charge for the UNE-Platform would equal the sum of the recurring charges for the elements used to serve that subscriber.

The one exception to the general rule is for EELs. For EELs, an additional charge applies for testing in response to trouble reports. If a customer served by an EEL arrangement reports a problem with service, resolving that problem requires determining whether the problem exists in the loop portion or the transport portion of the service (*i.e.*, "sectionalization"). This determination requires the use of testing equipment in the serving central office for the loop. Because a CLEC purchasing an EEL does not have any equipment installed in the serving central office for the loop, the CLEC cannot perform such testing itself. Thus, Verizon NW must perform subscriber trouble testing for EEL arrangements, and it is appropriate for Verizon NW to recover the relevant costs associated with EEL testing.

Q. HOW WAS THE TESTING CHARGE DETERMINED?

A. An EEL Testing expense factor has been developed that, when applied to the investment in the underlying loop component of the EEL arrangement, produces the forward-looking costs associated with subscriber trouble dispatch testing for the loop component.

Q. HOW WAS THE EEL TESTING FACTOR DEVELOPED?

A. The forward-looking costs associated with subscriber trouble dispatch testing for the loop component of an EEL arrangement consist of the expenses associated with subscriber trouble dispatch testing and the investment-related costs of testing equipment.

To determine the appropriate portion of testing equipment-related costs that should be allocated to outside plant-related subscriber trouble dispatching testing, Verizon NW used the ratio of (1) total outside plant trouble repair hours (2) all trouble repair hours. This ratio was applied to the total investment-related costs for testing equipment requiring a trouble dispatch to determine the level of investment-related costs attributable to outside plant-related subscriber trouble dispatch testing. These costs were then added to the outside plant-related subscriber trouble dispatch testing expenses and multiplied by common overhead and gross revenue loading factors to arrive at the total forward-looking estimate of outside plant-related subscriber trouble dispatch testing costs. Finally, this total, forward-looking cost estimate was used to develop a cost factor that, when applied to the cost of an investment in an outside plant facility, calculates the appropriate share of Verizon NW's total monthly outside plant-related subscriber trouble testing costs attributable to that investment.

Q. ARE TROUBLE DISPATCH SUBSCRIBER TESTING COSTS RECOVERED THROUGH THE LOOP UNE RATES CALCULATED IN THE LOOP COST STUDY?

A. No. Verizon's local loop studies exclude the costs associated with trouble dispatch loop testing. The exclusion of these expenses from the local loop study reflects the assumption that, in the forward-looking environment, the CLEC purchasing a loop (but not an EEL) will perform the subscriber trouble dispatch testing function. Thus, it is necessary to develop an additional charge for such testing in connection with the purchase of unbundled EELs because the CLEC must rely on Verizon NW to perform such testing for unbundled EELs.

Q. IS THE COST FACTOR FOR EEL TESTING APPLIED TO THE IOF ELEMENT OF THE EEL?

A. No. Unlike the case with unbundled loops, Verizon NW ordinarily would be responsible for trouble testing on unbundled IOF facilities. Accordingly, the costs associated with trouble testing on IOF facilities were already included in the Network ACF for those facilities and thus did not require application of an additional cost factor in connection with the EEL element.

X. FACTOR DEVELOPMENT AND APPLICATION

Q. WHAT WAS THE BASIC METHODOLOGY VERIZON NW USED TO DEVELOP RECURRING UNE COSTS USING FACTORS AND INVESTMENT LOADINGS?

A. The recurring UNE costs in Verizon NW's studies are based on the efficient costs that Verizon NW projects it will incur in connection with the investment in the facilities used to provide various unbundled elements (*e.g.*, loop, switching, transport, etc.) in a forward-looking network. Developing UNE costs involves two steps. The first requires identifying the investment for the facilities that support any particular element. The second step is to identify the expenses associated with that investment.

To derive the investment for a single unit of a network element, Verizon NW identifies the relevant per unit material investment, and to that apply investment loading factors that include the costs for the engineering, installation, and power equipment relating to the installed equipment. This produces the total cost installed ("TCI") for a unit of investment. To the TCI, a series of annual cost factors and loadings are applied to develop the operating expenses and capital costs associated with that investment. These include items such as the costs of operating and maintaining the network element, the related marketing costs associated with the network element, a share of common overheads, and the capital carrying costs associated with any support facility investments, such as land and buildings and furniture and office equipment.

The annual expense factors and loadings are calculated as 1) ratios of network expense to the underlying network investment; 2) ratios of marketing and common overhead expenses to total network expenses; or 3) ratios of revenue-driven expenses to gross revenues. The application of all these expense factors and loadings produces annual costs for each unbundled network element. Verizon NW then converts this annual recurring cost into a monthly or per-minute of use cost for each unbundled network element. In addition to this testimony, cost factor and loading development is explained in more detail in Exhibit RP-15.

Q. HOW DID VERIZON NW ENSURE THAT THE COSTS USED IN VERIZON NW'S FACTORS AND LOADINGS ARE FORWARD-LOOKING?

A. Verizon NW's studies reflect only those expenses that would be associated with a forward-looking, efficient network and, therefore, the expenses themselves are forward-looking and efficient. For example, no expenses are included for analog switches because this technology would not exist in a forward-looking network.

Second, in calculating the factors and loadings, Verizon NW used its most recent financial data available at the time the studies were calculated, and thus captured current, up-to-date expenses that are not expected to change significantly in the foreseeable future. Thus, Verizon NW's most recent expenses reflect the efficiencies and economies of scale Verizon NW reasonably expects to capture in the foreseeable future.

Third, to ensure that the expenses are forward-looking, Verizon NW adjusts for productivity and inflation in its studies through 2005. Fourth, to avoid any dispute and to ensure that any expenses are as forward-looking as possible, Verizon NW assumed the forward-looking expenses would be lower still: Verizon NW reduced its expenses to reflect savings from Verizon NW's mergers and increased efficiency in copper maintenance costs.

Q. IS VERIZON NW'S TREATMENT OF EXPENSES SIMILAR TO ITS TREATMENT OF EXPENSES IN UNE STUDIES THAT IT HAS PERFORMED IN OTHER STATES?

A. Generally speaking, yes. This study is based on relatively recent data that reflects, among other things, the growth in competition in Washington since the 1996 Act. The more current expenses used here reflect up-to-date costs. In other jurisdictions, Verizon companies did not make merger adjustments in its studies, but here, for the avoidance of dispute, Verizon NW does. In light of repeated CLEC arguments in other jurisdictions that Verizon costs fail to account for concrete savings expected as a result of the GTE merger with Bell Atlantic, Verizon NW has accounted for the expected savings from this merger and removed any merger-associated costs from expenses used in the studies.

Q. DOES VZCOST COMPLY WITH THE COMMISSION'S GUIDANCE ON COST MODELING?

A. Yes, it complies with the TELRIC costing principles. Consistent with the Eighth Supplemental Order in Docket Nos. UT-960369, UT-960370, and UT-960371, Verizon NW's expense factors and loadings reflect anticipated productivity gains and future investment levels, not simply embedded values. In addition, Verizon NW's expense factors and loadings attribute costs to the relevant UNEs to the extent that such costs can be identified as being incurred for specific UNEs. This ensures that cost causation is maximized and that common and shared costs are minimized. Moreover, because Verizon NW's studies include only those costs that relate to the efficient technologies that would be deployed in a forward-looking network, and because all the investments and expenses are normalized and adjusted, those studies are forward-looking.

A. Investment Loadings

Q. PLEASE EXPLAIN HOW YOU CALCULATED THE INVESTMENT IN VERIZON NW'S UNES.

A. As noted, the investment per network element used in Verizon NW's cost studies reflects several components, which include, but are not limited to, the price of the material investment, the cost to engineer and install the investment, and the cost of necessary support power equipment. The price of the material investment, as adjusted using investment loading factors, produce the TCI (Total Cost Installed). TCI is the relevant measure of investment, because the total dollars that Verizon NW invests in materials attain relevancy only as part of an installed element within the network.

To calculate TCI, Verizon NW starts with material-only investment for a network element and then applies investment loading factors to translate the material-only price into the TCI. There are two categories of investment loading factors. Specifically, Verizon NW has developed the Engineer, Furnish & Install ("EF&I") and the Power Loading Factors to establish the TCI for assets in digital switching, digital circuit, operator systems, and originating/terminating plant accounts. EF&I Loading Factors also are applied to the digital loop carrier equipment, but not to other loop and transport ("outside plant") investment; for such investment, the engineering and installation costs are built into the material costs of the respective outside plant investments. Power Loading Factors are not applied to outside plant accounts because power costs are not incurred in connection with those facilities.

1. Engineer, Furnish & Install Loading Factors

Q. WHAT ARE ENGINEER, FURNISH & INSTALL LOADING FACTORS?

A. The EF&I Loading Factors translate material-only investment into installed investment by accounting for costs such as vendor engineering, Verizon NW engineering, transportation, warehousing, vendor installation, Verizon NW installation (including acceptance testing or other plant labor), and interest during construction. The EF&I Loading Factors represent the relationship between these expenses and material-only investment for each plant account. The EF&I Loading Factors are applied to material-only investment to calculate the installed unit investment in each relevant account (step 1 in Chart A in Part X.D below).[59/]

Q. HOW ARE THE EF&I FACTORS DEVELOPED?

A. As noted above, EF&I Loading Factors are developed for digital switching, digital circuit, operator systems and originating/terminating equipment. The EF&I Loading Factors are developed using data contained within the company's Detailed Continuing Property Record ("DCPR") database (for former Bell Atlantic ("BA") jurisdictions) and the Central Office Equipment Property ("COEP") database (for former GTE jurisdictions). Data from the two most recent, complete calendar years are used to calculate the factors. To calculate the factor for each plant account, the total EF&I-related costs for equipment placed

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59/ All investment loadings and expense factors and loadings are applied as 1 plus the factor.

during this time period is divided by the value of the total material-only investment for the same equipment. Verizon system-wide data including all the former GTE and BA jurisdictions from the two-year period is used for each plant account in order to minimize anomalies that might be present in a specific market or in a specific year with respect to a particular type of equipment.

2. Power Loading Factor

Q. WHAT IS THE POWER LOADING FACTOR?

A. The Power Loading Factor represents the relationship between the investment in power equipment necessary to run installed central office equipment and facilities and the installed investment in the equipment itself. One factor is developed for investments in central office digital switch, digital circuit, and operator systems. Data representing the two most recent, complete calendar years available in the DCPR and the COEP databases are used to calculate the factor. As with the EF&I Loading Factors, the Power Loading Factor is also developed using system-wide (former GTE and former BA) data covering a two-year period in order to minimize anomalies that might be present in a specific market or in a specific year with respect to a particular type of equipment. Power investments associated with collocation are removed from the factor so that collocation-specific power costs are not included in the cost of other services.

To calculate the Power Loading Factor, the value of installed central office power equipment placed in the two most recently available calendar years is divided by the value of installed central office equipment placed in the same years. The resulting loading factor is applied to the total in-service, installed investment per unit to produce the total cost installed (step 2 in Chart A).

B. Annual Expense-Related Factors And Loadings

Q. AFTER TOTAL COST INSTALLED IS DETERMINED, WHAT IS THE NEXT STEP IN CALCULATING UNE COSTS?

A. Annual Cost Factors ("ACFs") and expense loadings are used to convert the TCI into recurring annual UNE costs. The ACFs and expense loadings are designed to account for the various wholesale-only expenses incurred by the company in operating and maintaining individual network elements. Retail-only expenses are removed and therefore not considered. The ACFs and expense loadings are developed as ratios that represent relationships between a subset of costs and (1) their associated plant account investments — expense-to-investment (E/I) ratios, (2) relevant expenses — expense-to-expense (E/E) ratios, or (3) associated revenues — expense-to-revenue (E/R) ratios.

Q. PLEASE EXPLAIN GENERALLY HOW THE ACFS AND LOADINGS ARE APPLIED TO CALCULATE ANNUAL RECURRING COSTS.

A. Verizon NW applies the ACFs in its studies to calculate the costs of depreciation, return on debt and equity, income tax, and property tax; the annual costs of operating and maintaining the network; and software licensing fees. Verizon NW applies expense loadings in its studies to calculate marketing expenses and common overhead expenses. Verizon NW applies revenue loadings to calculate costs such as regulatory assessment fees and uncollectible expenses. As explained in more detail below, some costs, such as the network costs, capital and tax costs, and software licensing fees can be readily attributed to particular assets, and are therefore represented as ratios, or factors, of those costs to the relevant plant investments. These factors are applied first to the TCI to arrive at the expenses associated with a unit of installed equipment (step 3 in chart A). Other expenses, such as marketing and common overhead, are not associated with a particular network asset and are represented as ratios, or loadings, of those expenses to total network expenses. These expense-to-expense loading factors are applied to the previously calculated network expenses (steps 4-6 in chart A). Finally, costs of uncollectibles and regulatory assessments are represented as a ratio of those expenses to gross revenues. The Gross Revenue Loading ratio is applied to the previously calculated total unit expenses (step 7 in chart A). Application of these cost factors and loadings produces costs that collectively constitute the total annual unit cost; this annual unit cost is divided by 12 to arrive at the monthly UNE cost, or by the average number of minutes of use to arrive at the cost per minute of use.

Q. HOW ARE THE PLANT ACCOUNT EXPENSES ATTRIBUTED TO PARTICULAR COST FACTORS?

A. Costs that are directly associated with a particular basic network component, because they are incurred in specific plant accounts, are directly attributed to the investments in those accounts. For example, expenses incurred in connection with switching maintenance, and recorded as such in Verizon NW's accounting records, would be directly attributed to the switching "cost pool." (Cost pools refer to the "pool" of costs associated with the equipment or facility that makes up a specific UNE.) Costs that are not specific to a single plant investment account are directed to multiple relevant network cost pools; for example, the expenses in Network Administration Expense Account 6532 are directed to various network cost pools, which include the cable, buried copper, and switching cost pools. The ratio of a network cost pool's expenses to its relevant investments produces an expense-to-investment factor.

Other expenses are captured by expense-to-expense loadings – the Marketing Loading and Other Marketing Support Loading. Expense-to-expense ratios are developed by dividing the relevant expenses by the total company expenses, less non-recurring, marketing, and common costs. The Common Overhead Loading Factor is a ratio of the general corporate operations and other common overhead expenses to total company expenses, less common overhead expenses. Finally, the calculations for the expense-to-revenue loading – the Gross Revenue Loading – identify the revenue-driven expenses and divide by the gross revenues that are associated with those expenses. This approach ensures that forward-looking cost calculations for each network element reflect cost-causative principles to the greatest extent possible and that non-account specific costs are reflected in the costs of the various network elements in reasonable proportions.

Q. WHAT ARE THE ACFS AND LOADINGS USED BY VERIZON NW IN THIS FILING?

A. They are:

1) Total Capital & Property Tax ACFs (E/I)

2) Network ACFs (E/I)

3) Right-To-Use ACFs (E/I)

4) Marketing Loading (E/E)

5) Other Marketing Support Loading (E/E)

6) Common Overhead Loading (E/E)

7) Gross Revenue Loading (E/R)

Q. IS THIS METHODOLOGY DIFFERENT THAN THAT USED BY VERIZON NW IN THE PAST?

A. In the last Washington UNE case, Verizon NW employed the Integrated Cost Model ("ICM"). VzCost utilizes a similar cost pool approach in the development of the expense factors.

One significant difference is that the ICM model used a Fixed Allocator, an expense-to-expense loading factor, to account for certain marketing, common, and revenue-driven costs. These type costs are now reflected in various subfactors, including the Marketing Loading, Other Marketing Support Loading, Common Overhead Loading, and the Gross Revenue Loading.

1. Capital and Property Tax Factors

Q. WHAT CAPITAL-RELATED EXPENSES DOES VERIZON NW INCLUDE IN ITS COSTS?

A. The capital-related expenses include the following components: depreciation, return on debt and equity, income tax, and property tax. These costs represent the depreciation expense on investment, the amount Verizon NW must provide investors and lenders as a return on capital (*i.e.*, the cost of capital), and the amount that Verizon NW must pay in federal, state and property taxes. Verizon

NW assumes straight-line depreciation using lives determined in accordance with Generally Accepted Accounting Principles ("GAAP"). A discussion of depreciation is included in the testimony of Mr. Sovereign. A discussion of the cost of capital is included in the testimony of Dr. Vander Weide. Since the amount returned to stockholders (return on equity) is taxable by Federal and State jurisdictions, a composite Income Tax Factor is applied against this amount. The capital cost calculation is done for each year of the asset life and the results are summed and annualized to become the depreciation, return, and income tax costs that determine the capital factors. The Corporate Tax Department provides Verizon NW with the applicable Property Tax Factor for each plant account.

The various capital-related expense factors are summed to become the Total Capital & Property Tax Factor for a particular plant account. This factor is applied to the investment in a particular account to yield the applicable capital cost for those investments on an annual basis.

2. Network Expense-to-Investment Factors

Q. PLEASE EXPLAIN HOW THE NETWORK FACTORS ARE DEVELOPED.

A. The Network Factors include the costs of network repairs, maintenance, testing, engineering, network administration, methods, and support. Network Factors are developed in VzCost using a cost pool methodology. To develop the Network Expense Factors, Verizon NW first considers annual expense and investment data, by account in its General Ledger, for the jurisdiction under study. Verizon NW adjusts the expenses for each network plant account in order to account for non-recurring costs, retail costs avoided, and normalizations as necessary to make them forward-looking (see *infra* Part X.C). The next step in Network Factor development is to map (attribute) the forward-looking expense and investment data to the network cost pools as described above. The factors are applied to TCI for the relevant plant to produce the recurring annual network costs that relate to these network elements.

3. Right-to-Use Expense-to-Investment Factors

Q. WHAT IS INCLUDED IN THE RIGHT-TO-USE COST FACTORS?

A. Right-to-Use ("RTU") fees are the software costs that equipment manufacturers charge Verizon NW for the operation of and feature functionality associated with their equipment. Based on American Institute of Certified Public Accountants' SOP 98-1, since January 1999, Verizon NW has capitalized *all* switch and other network-related software costs and books them to the Intangible Asset Account 2690. All the capitalized software costs are amortized over the life of such software. The only exception is for software costs that are incurred specifically to fix a problem in previously installed software; these software fixes are treated as expenses in the year incurred and are recovered in the Network Factors. The RTU Factors are designed to express relationships between amortized software costs and digital switching and digital circuit investments.

Q. HOW WERE THE RTU FACTORS DEVELOPED?

A. The RTU Factors are developed using data contained within the company's COEP database. Data from the two most recent, complete calendar years available in the COEP database are used to calculate the factors. Regional data covering all the former GTE jurisdictions is used for each plant account in order to minimize anomalies that might be present in a specific market or in a specific year with respect to a particular type of equipment.

The RTU Factors are the ratio of annual RTU software costs to total investment associated with either digital switching and operator system accounts (accounts 2212 and 2220), or digital circuit and other terminal equipment (accounts 2232 and 2362). The RTU factors are applied to appropriate investments in the Digital Switching and Operator Systems and the Digital Circuit and Other Terminal Equipment accounts. Collocation investments are removed from the factor's investment denominator since the RTU factors are not used in collocation studies.

4. Marketing and Other Marketing Support Loadings

Q. WHAT COSTS ARE INCLUDED IN THE MARKETING AND OTHER MARKETING SUPPORT LOADINGS?

A. The Marketing Expense-to-Expense Loading includes the cost of product management, sales, customer services, and product advertising associated with Verizon NW's wholesale services. The Other Marketing Support Expense-to-Expense Loading includes the costs of shared land and buildings, information management, furniture, office equipment, and other support equipment costs associated with product management, sales, customer services, and product advertising. As with the Network Factors, the expenses are adjusted to make them appropriate for use in a UNE study before they are used in the calculation of each loading.

5. Common Overhead Loading

Q. WHAT COSTS ARE INCLUDED IN THE COMMON OVERHEAD LOADING?

A. Pursuant to the Thirty-Second Supplemental Order in Docket UT-003013, Verizon NW has calculated a common cost factor to specifically account for, and appropriately allocate, common costs: the factor includes no direct costs. The Common Overhead ("COH") Loading is developed based on – and accounts for – the expenses incurred in connection with General and Administration ("G&A") functions, including executive, planning, general accounting and finance, external relations, human resources, legal, regulatory and any associated General Support Facility costs, as recorded in the General Ledger. As with other expenses in Verizon NW's studies, after starting with book costs, adjustments are made to normalize the data for using in a forward-looking study.

Q. HOW IS THE COMMON OVERHEAD LOADING CALCULATED?

A. The COH Loading is calculated in VzCost using the adjusted forward-looking expenses, as just described. These expenses are mapped to the common cost pool for use in developing the COH Loading. The COH Loading represents the ratio of common overhead expenses in the common cost pool to total company expenses less the common overhead expenses. Common overhead expenses are excluded from the denominator because the factor is not applied to common costs.

The COH Loading of 6.29% is applied to all recurring costs, including marketing costs, other marketing support costs, and to non-recurring costs. In this manner, the common overhead expenses are appropriately assigned to all categories of network, marketing and marketing support expenses, including non-recurring expenses. The COH Loading represents the correct relationship of common overhead expenses to total expenses for the network on a going forward basis, as required by the Thirty-Second Supplemental Order in Docket UT-003013.

6. Gross Revenue Loading

Q. HOW DID YOU DEVELOP THE GROSS REVENUE LOADING?

A. The Gross Revenue Loading ("GRL") is developed to account for the revenue-driven expenses associated with regulatory assessments and uncollectibles. These expenses are associated with the level of revenue that Verizon NW actually receives. The GRL is developed outside of VzCost and loaded into a data table for use in VzCost-generated cost studies. The regulatory assessment component is calculated by dividing regulatory commission assessments by total revenues. The uncollectibles component is calculated by dividing UNE uncollectibles by total UNE revenues in 2002. Verizon NW is applying an uncollectibles rate of 1.997%. The uncollectibles rate reflects the actual uncollectibles that Verizon NW has experienced in Washington in connection with the provisioning of UNEs and resale to CLECs. If turmoil in the telecommunications industry continues, the uncollectibles rate could increase substantially.

The 2002 uncollectibles data is used rather than the 2001 data that is used for expenses because revenue-related data is fully analyzed sooner than expense-related data. Thus, Verizon NW chose to use its most up-to-date 2002 revenue data even if it would not be able to use data from the same year for expenses.

All of the applicable Gross Revenue Loading components are applied, via a gross-up formula, to arrive at total unit costs. The GRL component expenses are summed together and are applied to total expenses as [GRL/(1 - GRL)].[60/] This ensures that the total cost is sufficient to recover the revenue-driven expenses.

C. Adjustments To Expense-Related Factors And Loadings

Q. WHAT DOES VERIZON NW DO TO ENSURE THAT THE EXPENSE DATA USED IN THE COST FACTORS AND LOADINGS ARE FORWARD-LOOKING?

A. As noted above, the expense-related factors were created using annual expenses and revenue data for the most recent years available. It is therefore up-to-date and reflects the significant efficiencies Verizon NW has achieved; this data is forward-looking on its face. Further, as explained above, to make the data even more forward-looking, Verizon NW has adjusted for merger-related savings and costs and the maintenance savings from replacement of old copper

[60/] Verizon NW uses a gross-up formula because uncollectibles and regulatory assessments are incurred on every dollar of revenue, even those additional dollars that are intended to cover the original amount of uncollectibles and regulatory assessments. For example, assuming a composite GRL of 10%, Verizon NW multiplies total expenses by 1 plus (.1/.9) or 1.11. If this was applied to a hypothetical $100 of costs, it would produce $111.11 in total revenues to be recovered. This would consist of the original $100 of costs; $100 x 10% GRL or $10 to recover the uncollectibles and regulatory assessment costs on the $100; and $10 x 10% or an additional $1.11 to recover the GRL on the additional uncollectibles and regulatory assessment requirement. Thus, the gross-up is necessary to ensure that Verizon NW recovers the full amount of the 10% GRL when it is applied to total expenses.

with new copper. Specifically, Verizon NW adjusts expense data to reflect the following:

Inflation and Productivity Adjustment: Verizon NW adjusts its 2001 base year operating expenses for both inflation and productivity. Operating expenses are adjusted to account for the productivity savings that Verizon NW plans to achieve with respect to labor savings. While, as noted above, Verizon NW also has based its cost studies on a forward-looking network using the most efficient currently available technologies, and the operating costs and other expenses are associated with that forward-looking efficient network construct, this specific productivity adjustment is an additional downward adjustment to expenses. The productivity increase that Verizon NW postulates is based on Bureau of Labor Statistics data for non-farm business output through 2005. The net result is that Verizon NW's TELRIC rate proposals reflect both this real-world expected productivity increase as well as the highly productive achievements incorporated into the TELRIC network. At the same time, since the prices are being adjusted forward to reflect savings over time, the studies reflect anticipated changes in inflation as well, based on Bureau of Labor Statistics data, through 2005.

Merger Savings Adjustments: the forward-looking savings Verizon NW expects due to the Bell Atlantic/GTE merger. Many of the savings from the 2000 merger between Bell Atlantic and GTE are already reflected in lower 2001 expenses, but any additional savings are deducted from the relevant expense accounts.

Merger Costs Adjustments: the one-time costs paid and booked in 2001 for the merger effort are deducted from the recurring expenses.

Copper Wire Maintenance Adjustments: newer copper should result in lower maintenance expenses than the copper that Verizon NW has installed in the past. Therefore, Verizon NW has included a 5% reduction in copper wire maintenance expenses in this study.

Q. HOW DOES VERIZON NW DEVELOP THE MERGER SAVINGS AND COST ADJUSTMENTS?

A. Verizon NW developed an estimate of total savings from the Bell Atlantic/GTE merger over the period from the mid-2000 ("merger date") to the end of 2002 for the purpose of reporting to the SEC. Since the General Ledger data for 2001 used in the cost studies reflects the merger savings only for 2000 and 2001, Verizon NW further reduced its expenses in the cost study by the amount of merger savings in the remaining year, 2002, which is estimated as $5,940,000. Verizon NW has reduced 2001 base year expenses by the projected 2002 merger savings amount. In addition, merger costs, because they will not be incurred in the future, are removed from Verizon NW's 2001 expenses. Verizon NW has removed over $9,185,800 in merger costs from its expenses.

Q. WHAT OTHER ADJUSTMENTS DOES VERIZON NW MAKE TO ITS EXPENSE FACTORS AND LOADINGS WHEN CALCULATING ITS COST FACTORS?

A. Verizon NW makes adjustments to the base year financial data in order to prevent double recovery of certain costs and to ensure that the expenses and investments are accurate and relevant for a UNE cost study. These adjustments are categorized as follows: (1) non-recurring expense adjustment; (2) avoidance of retail-related costs; (3) normalization; (4) product-specific adjustments; (5) other miscellaneous adjustments; and (6) forward-looking calibration ("FLC") adjustment. The first four of these adjustments are developed as a percentage of the base-year expense or investment account affected. The percentage is then entered into a data table in VzCost and applied to the base-year expense or investment account. The miscellaneous and FLC adjustments are explained separately below.

1. Non-Recurring Expense Adjustments

Q. WHY DID VERIZON NW REMOVE NON-RECURRING EXPENSES?

A. With the exception of the Common Overhead and the Gross Revenue Loadings, the expense-related factors and loadings are developed for use in studies of *recurring* costs. Because expense accounts used in the factors capture the cost of both recurring and non-recurring work, they need to be adjusted to remove the portion of costs associated with non-recurring service order work. These adjustments achieve the removal of expenses associated with *non-recurring* costs from the *recurring* expense factors. This ensures that non-recurring costs are not recovered in the recurring UNE rates.

The adjustment for non-recurring costs is developed using the calendar year 2001 non-recurring revenue as a surrogate for the non-recurring costs that are reflected in the total expense amounts. Since the non-recurring rates are designed to recover expenses, the elimination of the base period revenues ensures that non-recurring costs are not reflected in the recurring factors, thereby avoiding double recovery. If the Commission determines that Verizon NW's non-recurring costs are different from what Verizon NW proposes and adjusts its non-recurring rates, then the amount of non-recurring revenues removed from expenses should be adjusted accordingly.

2. Avoidance of Retail-Related Expenses

Q. WHAT RETAIL-RELATED EXPENSES DID VERIZON NW REMOVE?

A. Direct retail costs associated with providing service to retail customers are excluded from factors used in wholesale UNE studies. These costs are excluded by applying a retail avoided cost percentage, which Verizon NW determined on the basis of an examination of affected expense accounts. For each expense category, Verizon NW determines which, if any, particular expenses are avoided when providing service on a wholesale/resale basis rather than on a retail basis. The amount of expenses avoided is used to derive an avoided cost percentage. Verizon NW's retail avoided cost methodology is designed to conform with the Eighth Circuit's interpretation of retail costs that "will be avoided" in *Iowa Utilities Bd. v. FCC*, 219 F.3d 744, 755 (8th Cir. 2000).

3. Normalization Adjustments

Q. WHAT NORMALIZATION ADJUSTMENTS WERE APPLIED?

A. Normalization adjustments were applied to make the base-year expenses reflect the proper level of forward-looking UNE-related costs. Normalization adjustments are also made to investments to remove any anomalies that may have occurred in a given year in an investment account:

> Pension Adjustments: the net pension credits due to unrealized expected returns on pension plan assets are removed. These credits accrue to Verizon NW pension plan participants and not to Verizon NW itself, its shareholders, or its retail or wholesale customers.
>
> Pole and Conduit Revenue Adjustment: Verizon NW makes adjustments for the revenues received from other utilities for pole attachments and conduit rentals. The revenue offsets Verizon NW's cost for the portion of its pole and conduit that it rents out to other companies. Therefore, the pole and conduit expenses are reduced to account for these rent revenues.
>
> Expense Adjustments Related to Time & Material, Customer-Provided Equipment, and Premises Inside Wire: these expenses are removed from account 6362 (Other Terminal Expense). These expenses have no relationship to the investments in account 2362 (the factor denominator), which includes only company-owned equipment. Moreover, products associated with these activities have their own revenue streams (Time & Material Rates, Special Pricing Arrangements and Wire Maintenance Plans) that offset these expenses; therefore the costs of these products are not recovered through other products or UNEs.

Operator Services Systems Adjustment: The investment and expenses for operator services were normalized to produce a Verizon West regional operator services factor by multiplying the total amount of Verizon West operator services costs by the percentage of access lines in Verizon West that are attributable to Washington.

4. Product-Specific Expense Adjustments

Q. WHY DOES VERIZON NW MAKE PRODUCT-SPECIFIC ADJUSTMENTS TO COSTS?

A. In providing some products and services, Verizon NW is directly compensated because a specific tariff or contractual relationship exists separate from a UNE rate. These include services such as Collocation and Third Party Billing & Collecting Arrangements. To avoid double recovery of these expenses, Verizon NW removed the expenses associated with providing these products and services.

The amount of product-specific expenses to be removed from the expense accounts is calculated by surveying all product cost studies for expenses for which Verizon NW will be compensated outside the UNE rate. Then the relevant expense accounts are adjusted by applying a ratio of the appropriate product-specific costs to the affected expense accounts. This removes a portion of the expenses that can be attributed to product-specific costs. The net result is that Verizon NW removes any costs in the related expense accounts before developing the UNE factors to ensure there is no double recovery of those expenses.

5. Other Miscellaneous Adjustments

Q. WHAT ARE THE MISCELLANEOUS ADJUSTMENTS THAT VERIZON NW MADE?

A. Verizon NW excludes non-forward looking expenses and investments as one type of miscellaneous adjustment. The cost factor development methodology uses Account Eliminations (for expenses) and Technology Adjustments (for investments) to eliminate total expense or investment accounts because the technology is obsolete and/or non-applicable in a forward-looking cost study. For example, deployment of analog switching is not appropriate in modeling a forward-looking network; thus, this account is eliminated from expense factor development. It is eliminated in both the expense and investment assumptions.

Also, an adjustment is made for any expense or investment that is studied on an Activity-Based Costing ("ABC") basis and included in cost studies outside the standard expense factors and loadings process.[61/] For example, directory-listing costs are developed in Washington for each dial-tone line and loop based on an ABC study; therefore, Verizon NW ensures there is no double counting of directory expenses by removing the costs used in the directory study from the costs used in factor development.

6. Forward-Looking Calibration Adjustment

Q. WHAT IS THE FLC FACTOR AND WHY IS IT APPROPRIATE?

61/ Activity-Based Costing is a cost study method that determines cost by studying the component costs of the various activities included in a particular process.

A. The FLC factor is another adjustment Verizon NW makes in its cost factor development to ensure that the results are accurate and appropriate to a forward-looking cost study. The FLC factor calculates the ratio of forward-looking investments to booked network investments. The FLC is applied to the booked network investments prior to calculating the expense-to-investment ACFs. Without the FLC adjustment, forward-looking expenses would be divided by booked investments, which would produce an understatement of actual forward-looking expenses, as described below.

The FLC is necessary because Verizon NW uses forward-looking expenses – *not* embedded or current expenses – in its ACF calculations. It thus already has identified the expense adjustments that would be appropriate and likely in a forward-looking TELRIC network; where no adjustment is made to a current expense, this reflects the fact that the current expense is the best prediction of TELRIC-compliant, forward-looking expenses. Assume, for example, that Verizon NW has estimated that the appropriate forward-looking repair expense for a particular plant account amounts to $300 annually. If compared to a booked investment level of $1,000, this would produce an ACF of .3000. But if the forward-looking TELRIC investment in that plant is only $800, application of the .3000 ACF would produce repair expenses of only $240, as shown in Table A below.

TABLE A				
Application of a Forward-Looking Calibration (FLC) Factor				
(Example Demonstrating a Shortfall)				
Line	Item	Source	Amount	Comments
1	Forward-Looking Expense		$300	Estimate of True Forward-Looking Expense
2	Booked Investment		$1,000	Investment Denominator of ACF Ratio
3	Annual Cost Factor (ACF)	L1 / L2	.3000	Calculated ACF
4	Illustrative TELRIC Investment		$800	Forward-Looking Investment
5	Purported TELRIC Expense based on ACF	L4 x L3	$240	Pseudo "Forward-Looking" Expense
6	Shortfall	L1 – L5	$60	Unrecovered Additional True Forward-Looking Expense

As Table A shows, applying an ACF developed as the ratio of forward-looking expenses to booked investments to TELRIC-adjusted investment levels produces expenses that in this example are $60 lower than the forward-looking expenses Verizon NW already has calculated. But there is no reason, other than a mathematical one, for this lower expense level. The mere fact that plant might cost less in the future – *i.e.*, that the "TELRIC" investment might be 20% lower than today's investment figure – would not reduce the cost of repair by 20%. Indeed, the repair costs are more likely the same; it costs the same amount to fix a section of new copper cable, for example, whether or not the vendor discounts the price of the cable.

The FLC factor is therefore applied to correct for the expense under recovery in the example above. It adjusts the denominator of the ACF (*i.e.*, the booked investment levels) by an amount designed to offset, without overcompensating for, the magnitude of the expected TELRIC discount applied to Verizon NW's investment levels.

Q. HOW WAS THE FLC FACTOR DEVELOPED?

A. The FLC factor compares TELRIC investment levels to currently booked investment levels. Verizon NW calculates the FLC ratio by comparing the forward-looking TELRIC plant investments in Verizon NW's studies to the booked plant investment contained in Verizon NW's accounting records.

Verizon NW used 76% as the FLC based on study results of forward-looking plant investment in its network, as compared to booked plant investment. This may only be a placeholder, however. Once this Commission issues an order determining the TELRIC investment levels, Verizon NW will be able to recalculate, if necessary, the Washington-specific FLC. The New York, Massachusetts, and Pennsylvania Commissions, each of which approved the FLC, recognized that the FLC had to be recalculated at the end of the case to account for the Commissions' decisions concerning appropriate expense and investment inputs so that Verizon's compliance studies would produce the correct total expense amounts.

Q. PLEASE EXPLAIN THE EFFECTS OF APPLYING THE FLC FACTOR TO THE ACFS.

A. The FLC factor ensures that the expenses are not artificially reduced as a result of applying the non-adjusted ACFs to TELRIC plant investments. Table B below, which is an extension of Table A above, shows how the FLC factor makes this adjustment:

TABLE B				
Application of a Forward-Looking Calibration (FLC) Factor				
(Example Correcting for a Shortfall)				
Line	Item	Source	Amount	Comments
1	Forward-Looking Expense		$300	Estimate of True Forward-Looking Expense
2	Booked Investment		$1,000	Investment Denominator of ACF Ratio
3	Annual Cost Factor (ACF)	L1 / L2	.3000	Calculated ACF
4	Illustrative TELRIC Investment		$800	Forward-Looking Investment
5	Purported TELRIC Expense based on ACF	L4 x L3	$240	Pseudo "Forward-Looking" Expense
6	Shortfall	L1 – L5	$60	Unrecovered True Forward-Looking Expense
7	FLC Adjustment Factor	L4 / L2	.8000	Forward-Looking Calibration Factor
8	Adjusted ACF	L3 / L7	.375	Identifies Appropriate Amount of Expense
9	TELRIC Expense	L4 x L8	$300	Appropriate Level of Forward-Looking Expense
10	Shortfall	L1 – L9	$0	Shortfall Eliminated

Q. DOES THE FLC FACTOR APPLY TO ALL ACFS?

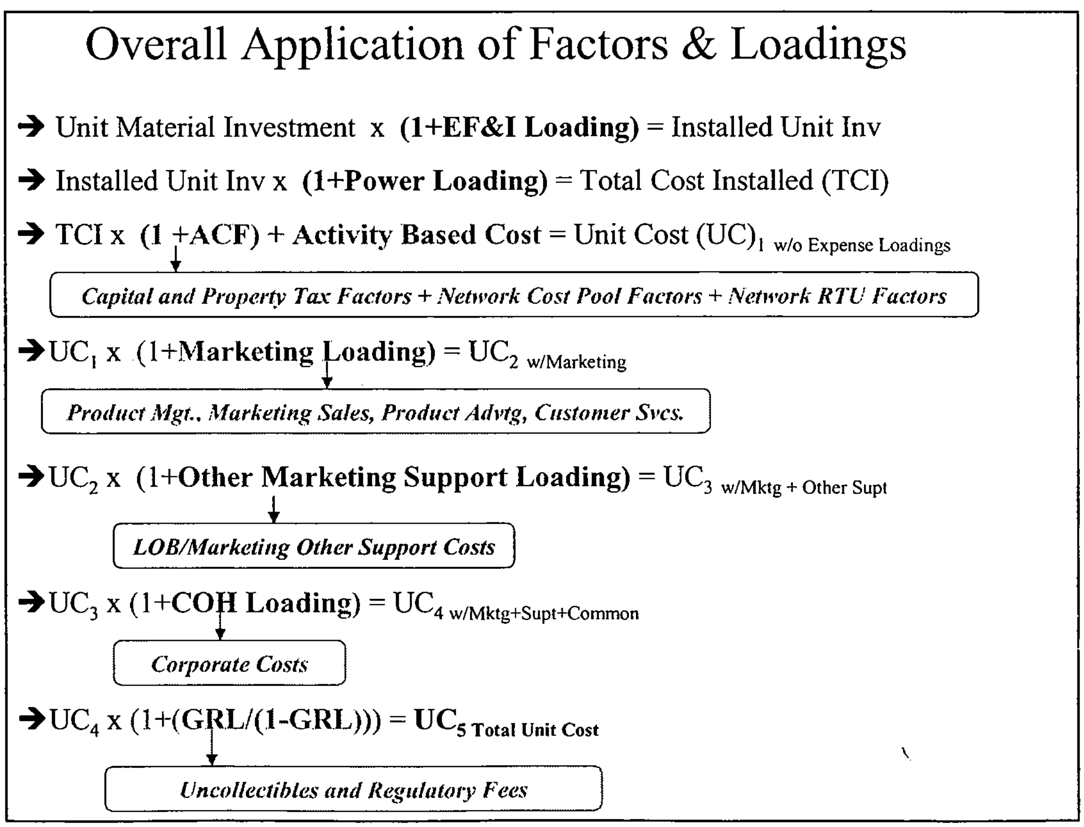
A. No. The FLC factor applies only to network expense-to-investment factors. A FLC is not applied to expense-to-expense loadings or the GRL because the FLC is an adjustment to network investments.

D. Overall Application Of Factors And Loadings

Q. CAN YOU SUMMARIZE THE OVERALL METHOD OF HOW FACTORS AND LOADINGS ARE APPLIED IN THE RECURRING COST STUDY?

A. Yes, the diagram below shows how the factors and loadings are applied in a recurring cost study. The study begins with unit material investment and, through the sequential application of the factors and loadings, the final output of the study is total unit cost. To express unit cost on a monthly basis, results are divided by 12.

CHART A



Q. DOES THIS CONCLUDE YOUR DIRECT TESTIMONY?

A. Yes.

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Exhibit No. ___ (RP-2)
Docket No. UT-023003

Verizon Northwest Inc. - Washington

WA.UT023003 Whsl Init.05062003

June 26, 2003

SUMMARY OF PROPOSED RATES

UNBUNDLED NETWORK ELEMENT/SERVICE	PROPOSED RATE
LOCAL LOOPS	
2 Wire Basic Unbundled Loop - Density Cell 1	$22.77
2 Wire Basic Unbundled Loop - Density Cell 2	$35.78
2 Wire Basic Unbundled Loop - Density Cell 3	$75.26
2 Wire Basic Unbundled Loop - Statewide Average	$30.07
2 Wire Digital-ISDN-BRI Loop - Density Cell 1	$28.87
2 Wire Digital-ISDN-BRI Loop - Density Cell 2	$47.38
2 Wire Digital-ISDN-BRI Loop - Density Cell 3	$125.39
2 Wire Digital-ISDN-BRI Loop - Statewide Average	$40.76
4 Wire - 4 Wire Customer Specified Signalling Loop - Density Cell 1	$55.89
4 Wire - 4 Wire Customer Specified Signalling Loop - Density Cell 2	$82.30
4 Wire - 4 Wire Customer Specified Signalling Loop - Density Cell 3	$163.03
4 Wire - 4 Wire Customer Specified Signalling Loop - Statewide Average	$70.74
Digital 4 Wire (56KD-64KD) Loop - Density Cell 1	$59.81
Digital 4 Wire (56KD-64KD) Loop - Density Cell 2	$86.22
Digital 4 Wire (56KD-64KD) Loop - Density Cell 3	$166.95
Digital 4 Wire (56KD-64KD) Loop - Statewide Average	$74.66
2 Wire Customer Specific Signalling Loop - Density Cell 1	$24.74
2 Wire Customer Specific Signalling Loop - Density Cell 2	$37.95
2 Wire Customer Specific Signalling Loop - Density Cell 3	$78.31
2 Wire Customer Specific Signalling Loop - Statewide Average	$32.17
DS1 Loop - Density Cell 1	$101.50
DS1 Loop - Density Cell 2	$154.07
DS1 Loop - Density Cell 3	$517.89

Exhibit No. ___ (RP-2)
Docket No. UT-023003

Verizon Northwest Inc. - Washington

WA.UT023003 Whsl Init.05062003

June 26, 2003

SUMMARY OF PROPOSED RATES

UNBUNDLED NETWORK ELEMENT/SERVICE	PROPOSED RATE
DS 1 Loop -Statewide Average	$131.80
DS-3 Loop - Statewide Average	$1,124.03
2 Wire xDSL Loop - Density Cell 1	$22.77
2 Wire xDSL Loop - Density Cell 2	$35.78
2 Wire xDSL Loop - Density Cell 3	$75.26
2 Wire xDSL Loop - Statewide Average	$30.07
4 Wire HDSL Loop - Density Cell 1	$55.89
4 Wire HDSL Loop - Density Cell 2	$82.30
4 Wire HDSL Loop - Density Cell 3	$163.03
4 Wire HDSL Loop - Statewide Average	$70.74
ISDN Loop Extender (Digital) - Statewide Average	$23.23
SUB-LOOPS	
Subloop Distribution - 2 Wire - Density Cell 1	$14.92
Subloop Distribution - 2 Wire - Density Cell 2	$24.11
Subloop Distribution - 2 Wire - Density Cell 3	$36.30
Subloop Distribution - 2 Wire - Statewide Average	$18.99
Subloop Distribution - 4 Wire - Density Cell 1	$29.82
Subloop Distribution - 4 Wire - Density Cell 2	$48.20
Subloop Distribution - 4 Wire - Density Cell 3	$72.57
Subloop Distribution - 4 Wire - Statewide Average	$37.95
Subloop Feeder Element - 2 Wire - Density Cell 1	$7.88
Subloop Feeder Element - 2 Wire - Density Cell 2	$11.69
Subloop Feeder Element - 2 Wire - Density Cell 3	$38.99
Subloop Feeder Element - 2 Wire - Statewide Average	$11.11
Subloop Feeder Element - 4 Wire - Density Cell 1	$26.10

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Verizon Northwest Inc. - Washington

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June 26, 2003

SUMMARY OF PROPOSED RATES

UNBUNDLED NETWORK ELEMENT/SERVICE	PROPOSED RATE
Subloop Feeder Element - 4 Wire - Density Cell 2	$34.13
Subloop Feeder Element - 4 Wire - Density Cell 3	$90.49
Subloop Feeder Element - 4 Wire - Statewide Average	$32.82
Subloop Feeder Element - DS1 - Density Cell 1	$82.43
Subloop Feeder Element - DS1 - Density Cell 2	$124.41
Subloop Feeder Element - DS1 - Density Cell 3	$473.84
Subloop Feeder Element - DS1 - Statewide Average	$109.15
Feeder Subloop Element - DS3 - Statewide Average	$951.23
Drop Sub-Element - 2 Wire - Density Cell 1	$3.82
Drop Sub-Element - 2 Wire - Density Cell 2	$6.37
Drop Sub-Element - 2 Wire - Density Cell 3	$7.78
Drop Sub-Element - 2 Wire - Statewide Average	$4.78
Drop Sub-Element - 4 Wire - Density Cell 1	$7.65
Drop Sub-Element - 4 Wire - Density Cell 2	$12.75
Drop Sub-Element - 4 Wire - Density Cell 3	$15.55
Drop Sub-Element - 4 Wire - Statewide Average	$9.57
NID / HOUSE &RISER	
NID to NID Connnection - 2 Wire (per NID)	$1.33
NID to NID Connection - 4 Wire (per NID)	$2.66
Standalone NID - DS1 (per NID)	$1.52
House and Riser Cable - Building Access (Per Pair, Per Month)	$1.04
House and Riser Cable - Floor Access (Per Pair, Per Month)	$1.04

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Verizon Northwest Inc. - Washington

WA.UT023003 Whsl Init.05062003

June 26, 2003

SUMMARY OF PROPOSED RATES

UNBUNDLED NETWORK ELEMENT/SERVICE	PROPOSED RATE
EEL IOF/TESTING	
2 Wire Analog Test Charge	$0.052733
2 Wire Digital Test Charge	$0.052733
4 Wire Analog Test Charge	$0.105466
DS1 (1.544 mbps) Test Charge	$0.093752
Digital 4 Wire (56 or 64 kbps) Test Charge	$0.105466
Voice Grade - Fixed incudes one end only	$23.81
Voice Grade - Per Mile	$0.200824
2 Wire ISDN - Fixed includes one end only	$22.74
2 Wire ISDN - Per Mile	$0.602473
LINE PORTS	
POTS / PBX / CTX Port - Per Month	$3.57
FEATURES	
Call Waiting Display Name & Number	$2.46
Three Way Calling	$1.10
Remote Call Forwarding	$1.50
Caller ID - Number Only (Calling Number Delivery)	$0.032952
Caller ID (Calling Number & Name Delivery)	$1.56

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Verizon Northwest Inc. - Washington

WA.UT023003 Whsl Init.05062003

June 26, 2003

SUMMARY OF PROPOSED RATES

UNBUNDLED NETWORK ELEMENT/SERVICE	PROPOSED RATE
Anonymous Call Block (Anonymous Call Rejection)	$0.585258
*69 (Automatic Recall)	$0.020565
Call Waiting	$0.000570
Busy Redial (Automatic Callback)	$0.017197
Station to Station Calling (CTX Intercom)	$3.04
CTX Announcement	$0.743904
Ctx Three Way Calling	$1.10
Ctx Automatic Recall (Return Call)	$0.020565
Ctx Distinctive Ringing	$0.023483
Ctx Loudspeaker Paging	$0.879450
Ctx Meet-Me Conference	$0.003456
Ctx Selective Call Acceptance	$0.063219
Ctx Select Call Forwarding (Ctx Selective Call Forwarding)	$0.031623
Ctx Selective Blocking (Ctx Selective Call Rejection)	$0.067767
Ctx Six Way Conference	$1.83
Ctx Station Message Detail Record (SMDR)	$0.024229

verizon

Exhibit No. ___ (RP-2)
Docket No. UT-023003

Verizon Northwest Inc. - Washington

WA.UT023003 Whsl Init.05062003

June 26, 2003

SUMMARY OF PROPOSED RATES

UNBUNDLED NETWORK ELEMENT/SERVICE	PROPOSED RATE
Automatic Callback (Ctx Repeat Call)	$0.017197
Ctx Call Transfer (Call Transfer - All Calls)	$0.437132
Ctx Call Waiting Terminating	$0.000285
Ctx Call Pick-Up Direct (Directed Call Pick-Up with Barge-In)	$0.031535
Ctx Executive Busy Override	$0.000879
ISDN Intercom	$72.96
ISDN Announcement	$0.212661
ISDN 3-Way Calling	$0.627410
ISDN 6-Way Conference	$1.16
ISDN Selective Call Rejection	$7.43
ISDN Call Transfer Individual - All Calls (Ftr. 578)	$0.149097
ISDN Calling Name & Number Delivery	$36.66
ISDN Call Pick Up	$0.000084
LOCAL END OFFICE SWITCHING	
Originating EO Local Switching - Per MOU	$0.004978
Terminating EO Local Switching - Per MOU	$0.004423
TANDEM SWITCHING	
Tandem Switching - Per MOU	$0.000890

SUMMARY OF PROPOSED RATES

UNBUNDLED NETWORK ELEMENT/SERVICE	PROPOSED RATE
COMMON TRANSPORT	
Common Transport - Per Mile	$0.000006
Common Transport - Per Termination	$0.000062
RECIPROCAL COMPENSATION	
Reciprocal Compensation - Meet Point A - Termination at End Office (Per MOU)	$0.003388
Reciprocal Compensation - Meet Point B - Termination at Tandem (Per MOU)	$0.004850
IOF/HICAP	
Interoffice Facilities (IOF) - DS0 Voice Grade - Per Mile	$0.200824
Interoffice Facilities (IOF) - DS0 Voice Grade Fixed includes one end	$23.81
Interoffice Facilities - (IOF) - DS-1 Per Mile	$4.82
Interoffice Facility (IOF) DS-1 Fixed includes one end	$29.56
Interoffice Facilities (IOF) - DS-3 Per Mile	$28.73
Interoffice Facilities (IOF) - DS-3 Voice Grade Fixed includes one end	$177.56
E911	
E911 Database - ALI Gateway, Per Month	$25.83
DARK FIBER	
Dark Fiber - IOF - Verizon CO to Verizon CO - Serving Wire Ctr Chrg/Pair/SWC	$10.57

Exhibit No. ___ (RP-2)
Docket No. UT-023003

Verizon Northwest Inc. - Washington

WA.UT023003 Whsl Init.05062003

June 26, 2003

SUMMARY OF PROPOSED RATES

UNBUNDLED NETWORK ELEMENT/SERVICE	PROPOSED RATE
Dark Fiber - IOF - Verizon CO to Verizon CO - Interoffice Mileage Per Pair Per Mile	$194.55
Dark Fiber - IOF - Verizon CO to Verizon CO - Intermediate Office Chrg/Intermediate Office	$21.14
Dark Fiber - IOF - Verizon CO to CLEC CO - Serving Wire Center Charge/Pair/SWC	$10.57
Dark Fiber - IOF - Verizon CO to CLEC CO - IOF Channel Termination Fixed Charge	$12.38
Dark Fiber - IOF - Verizon CO to CLEC CO - IOF Channel Termination Mileage per pair per 1/4 mile	$48.64
Dark Fiber - IOF - Verizon CO to Verizon CO - Intermediate Office charge per intermediate office	$21.14
Dark Fiber - Loop - Serving Wire Center Charge/Pair/SWC	$10.57
Dark Fiber - Loop Mileage Charge per pair per 1/4 mile	$48.64
Dark Fiber - Loop Charge/Pair	$12.38
Dark Fiber - Subloop Feeder CO to RT - Serving Wire Ctr Chrg/Pair/SWC	$10.57
Dark Fiber - Subloop Feeder CO to RT - Mileage Charge per pair per 1 mile	$48.64
Dark Fiber - Subloop Feeder CO to RT - Charge/Pair	$10.57
Dark Fiber - Subloop Distribution RT to EU - Mileage Charge/Pair/Quarter Mile	$48.64
Dark Fiber - Subloop Distribution RT to EU - Charge/Pair	$10.57

SUMMARY OF PROPOSED RATES

UNBUNDLED NETWORK ELEMENT/SERVICE	PROPOSED RATE
Dark Fiber - Subloop Distribution RT to EU - Loop Charge/Pair	$12.38
Dark Fiber - Subloop RT to RT - Mileage Charge/Pair/Quarter Mile	$48.64
Dark Fiber - Subloop RT to RT - Transport Charge/Pair/RT	$10.57
Dark Fiber - Subloop RT to RT - Intermediate Office Chrg/Intermediate Office	$21.14
DAILY USAGE FILE (DUF)	
Daily Usage File (DUF) - Per Record Recorded	$0.000706
Daily Usage File (DUF) - Per Record Transmitted	$0.000682
SMS (AIN SERVICE CREATION)	
SMS Pricing (AIN) - Service Creation Usage - Remote Access per 24 Hour Day	$4,428.20
SMS Pricing (AIN) - Service Creation Usage - On Premises per 24 Hour Day	$4,428.20
SMS Pricing (AIN) - Certication and Testing per hour	$114.04
SMS Pricing (AIN) - Help Desk Support per hour	$114.04
Subscription Charge per line/month/service	$1.28
SMS Pricing (AIN) - Database Query - Network Query	$0.000681
SMS Pricing (AIN) - Utilization Element Per ACU/Query	$0.000525

SUMMARY OF PROPOSED RATES

UNBUNDLED NETWORK ELEMENT/SERVICE	PROPOSED RATE
SMS Pricing (AIN) - Service Modification - DTMF Update Per Occurrence	$0.118773
Switched Based Announcement	$0.001621
SMS Pricing - (AIN) Service Creation Access Port Per Month Per Logo ID	$1,443.41

VZCost System Processing Flow Chart

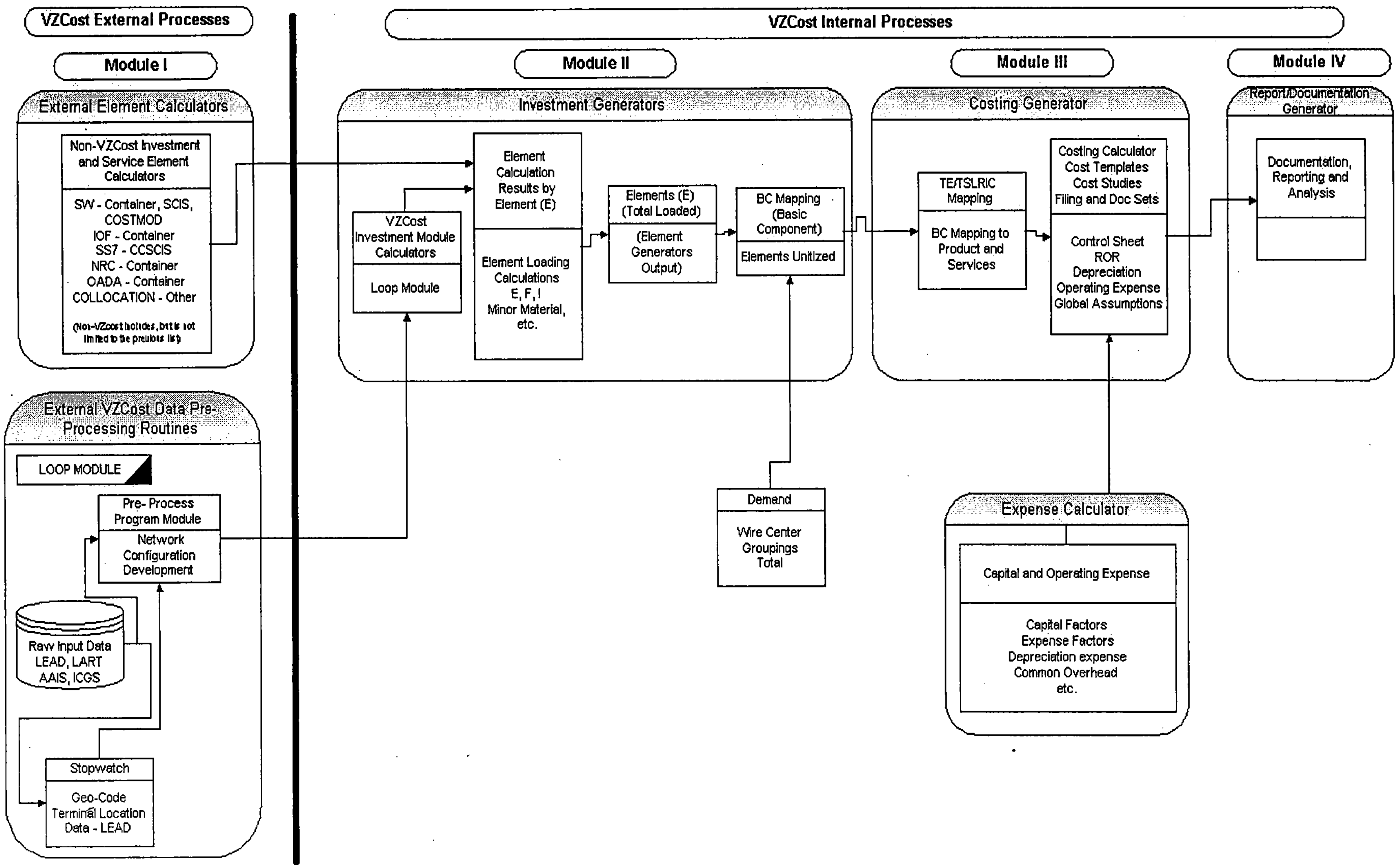
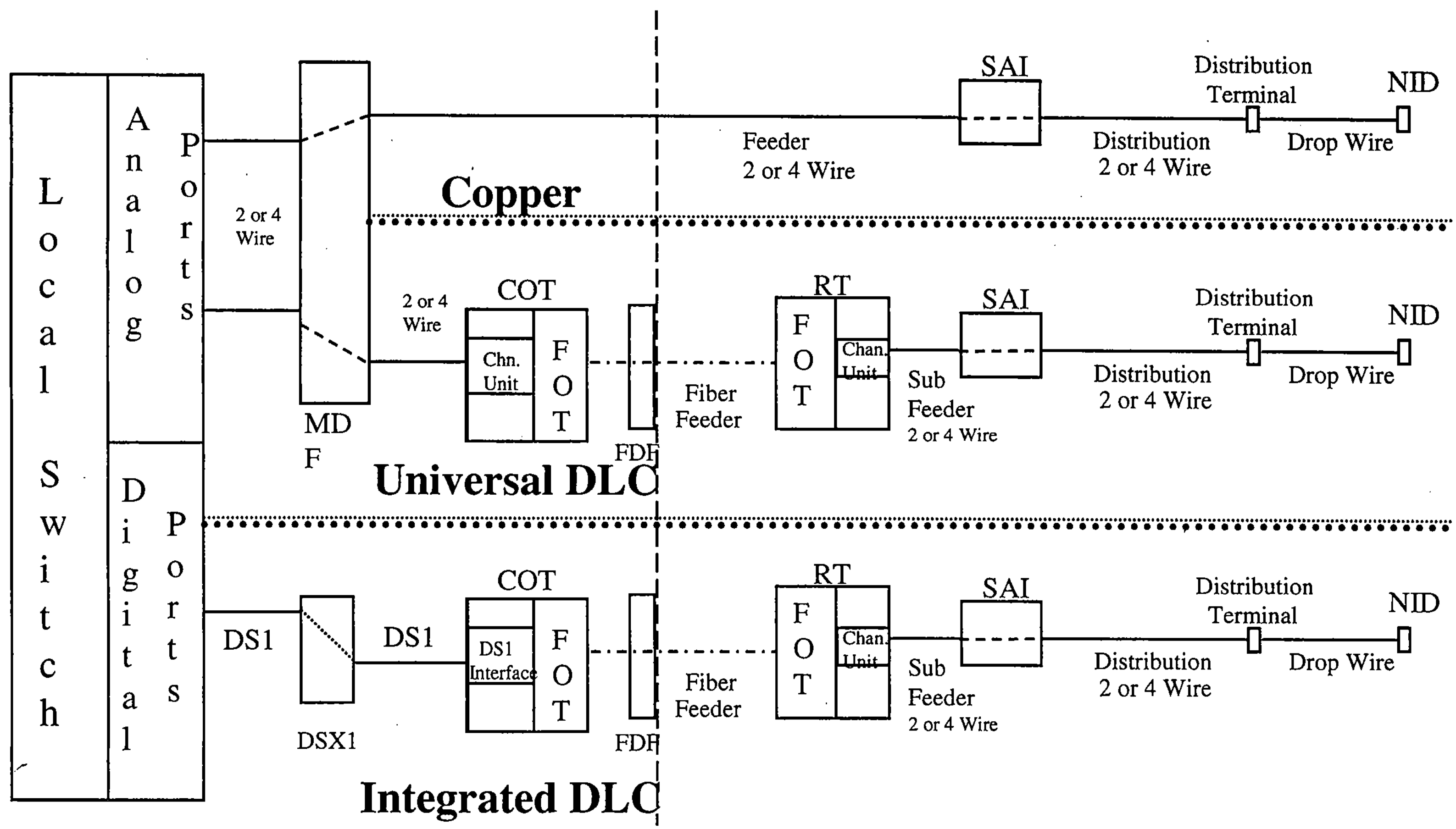


Exhibit No. ____ (RP-3)
Docket No. UT-023003

VzCost Manual Exhibits RP-4, RP-5, RP-6C, RP-7, RP-8, RP-9C, RP-10, RP-11, RP-12C, RP-13C, RP-14C, RP-15, RP-16, RP-17C, RP-18C, RP-19C, RP-20C, RP-21C, RP-22

AVAILABLE ON COMPACT DISC WITH THIS FILING

Loop Architecture Alternatives



Abbreviations:
FOT = fiber optic terminal FDF = fiber distribution frame DSX1 = digital cross-connect box