BEFORE THE

WASHINGTON UTILITIES AND TRANSPORTATION COMMISSION

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

PHASE B DIRECT TESTIMONY OF

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ON BEHALF OF

VERIZON NORTHWEST, INC.

Formerly Known as GTE Northwest Incorporated

SUBJECT: COSTS SUPPORTING MRCS

AUGUST 4, 2000

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I. INTRODUCTION

I. Q. PLEASE STATE YOUR NAME AND BUSINESS ADDRESS.

A. My name is Kevin C. Collins. My business address is 711 Van Ness, Suite 300, San Francisco, CA 94102.

I. Q. BY WHOM ARE YOU EMPLOYED, AND IN WHAT CAPACITY?

A. I am employed by Verizon as Staff Manager - Economic Issues. I am responsible for supporting incremental cost models and their application in the pricing of network services for the former GTE Telephone Operating Companies.

I. Q. PLEASE DESCRIBE YOUR EDUCATIONAL BACKGROUND AND BUSINESS EXPERIENCE.

A. I received a Bachelor of Science in Economics from California State Polytechnic University Pomona and a Masters of Science in Economics from the University of North Texas. I have also completed one year of the Ph.D. program in economics at the University of Washington.

I began working for GTE in 1986 as a Rates and Tariffs Administrator responsible for the costing and pricing of local services for GTE in Washington, Oregon, Idaho, and Montana. In 1991, I accepted the position of Staff Administrator - Toll Pricing, where I was responsible for the costing and pricing of all usage-based services for GTE's operating areas in the Northwest, California, and Hawaii. In 1993, I assumed the position of Staff Administrator - Access Pricing, where I was responsible for the development of switched access service discount plans and the costing and pricing of all ancillary services (e.g., billing and collection, directory assistance, operator services, etc.) in twenty-eight states. In 1994, I accepted the position of Section Manager - New Services Pricing, where I was responsible for the costing and pricing of all new and non-traditional services in twenty-eight states. In 1996, I assumed the position of Section Manager - Cost Models and Methods, where I was responsible for the completion of cost studies for network services in all GTE operating areas. I assumed my present position at the end of 1996.

A. ON WHOSE BEHALF ARE YOU PRESENTING TESTIMONY IN THIS PROCEEDING?

A. I am presenting testimony on behalf of Verizon Northwest Inc., which was formerly known as GTE Northwest Incorporated. The company recently changed its name after the closure of the merger between its parent company, GTE Corporation, and Bell Atlantic Corporation. The merged company is named Verizon Communications.

A. IN YOUR TESTIMONY HOW DO YOU USE THE TERMS "VERIZON NW" AND "GTE"?

A. My fellow witnesses and I use "Verizon NW" to refer to Verizon Northwest, Inc., the company that is a party to this proceeding and on whose behalf we are testifying. I use "GTE" to refer to the former GTE companies, which are now part of the Verizon Communications companies along with the former Bell Atlantic companies. This will make clear that we are talking about cost studies and inputs that have been developed by and for the GTE telephone operating companies and about those companies' networks, operations, practices and procedures.

A. **Q. HAVE YOU TESTIFIED BEFORE THIS COMMISSION?**

A. Yes. I testified in Docket No. UT-980311 (a) (Universal Service Cost Proceeding).

A. **Q. HAVE YOU PREVIOUSLY TESTIFIED BEFORE ANY OTHER REGULATORY BODIES?**

A. Yes. I have testified in support of the Company's cost studies submitted in California, Oregon, Texas, Ohio, Indiana, Pennsylvania, Wisconsin, Nevada, New Mexico, and Illinois.

A. WHAT IS THE PURPOSE OF YOUR TESTIMONY?

A. The basic purpose of my testimony is to present costs in support of Verizon NW's proposed recurring rates. In Section II of my testimony I describe and sponsor the GTE Integrated Cost Model Version 4.1b (ICM). ICM is a long-run incremental cost model that estimates the forward-looking costs of provisioning both retail services and unbundled network elements ("UNEs") out of Verizon NW's Washington network. In this proceeding, ICM is used to provide costs for rates that were not adopted in Docket No. UT-960369, et al. The ICM costs presented in this proceeding are listed in Tab 5 of the ICM cost study and documentation binders or the report may be viewed and/or printed from the ICM "REPORTS" "OUTPUT" "Unbundled Network Elements" after accessing "Disk1" on the CD ROM and installing ICM. ICM was also used to develop subloop element cost fractions, which were applied to GTE's approved loop costs to satisfy the subloop unbundling requirement. These factors were developed by using the relative level of investment for feeder and distribution out of ICM. This resulted in cost element factors of 30% feeder and 70% distribution for a 2-wire loop and 38% feeder and 62% distribution for a 4-wire loop. Issues relating to the development of expenses are covered in the testimony of Verizon NW Witness Joseph Abs.

Part III of my testimony covers other issues related to the FCC's UNE remand order. Two special cost studies are described in this section, which use inputs primarily from ICM but are conducted separately. Issues covered in this section include xDSL capable loops, dark fiber, high capacity loops, Competitive Local Exchange Carrier (CLEC) dedicated transport, Enhanced Extended Links (“EELs”), and inside wire (“intra-building riser cable”).

Q. WHAT STUDIES AND SUPPORTING DOCUMENTATION ARE YOU SPONSORING?

A. My testimony proposes costs developed by the Company's Integrated Cost Model in accordance with the Commission's First Supplemental Order. However, as explained by Verizon NW Witness Dennis Trimble, certain assumptions incorporated into the current version of ICM need to be evaluated in light of the U.S. Court of Appeals for the Eighth Circuit's decision in *Iowa Utilities Bd., et al. v. FCC and United States of America, No. 96-3321* (and consolidated cases) (8th Cir. July 18, 2000). However, in the event that the Commission denies Verizon NW's Motion to Stay Proceeding and decides to go forward despite the uncertainty of the appropriate cost methodology, the Company offers costs produced by ICM. Verizon NW reserves its right to propose new rates after the legal issue of the appropriate cost model methodology is resolved at the federal level.

I am sponsoring the following items:

1) Study Overview (Tab 1) or on the CD ROM in the folder \READ FIRST\Overview.pdf;

2) ICM Documentation including:

   a) "ICM Model Methodology" - (Books I through VII of VII for Conceptual Framework, Loop, Switching, Interoffice Transport, SS7, Expense and Mapping/Report Modules) (Tab 2);

   b) "ICM User Guide" (Tab 3);

   c) "System Manual Database Tables (Book I of II) and System Manual Codes (Book II of II)" (Tab 4);

3) "Summary of Costs" (Tab 5); and

4) GTE's Total Element Long Run Incremental Cost ("TELRIC") study (Tabs 6 through 23).

The major components of the network modeled by ICM are represented by the diagram in ICM Model Methodology - Conceptual Framework, Book I of VII, page 4 (Tab 2). ICM's modeling process (flowchart) is represented on page 3 of ICM Model Methodology - Conceptual Framework Book I of VII (Tab 2).

The CD ROM included with the filing contains ICM and all of the files and input data needed to replicate the study results. Copies of the CD and paper documentation that support the model assumptions and the development of company-specific input values have been provided to parties who have signed the protective order. While the model documentation (Tabs 2 through 4) is not confidential, it is also provided on the CD in electronic format for the parties' benefit. The electronic version of the model documentation noted above can be found on the filed CD ROM in the file folder "Supporting Documentation \ ICM Manuals \ WashingtonDoc4.1b".

II. MODELING LONG RUN FORWARD-LOOKING COSTS

A.MODEL CHOICE

Q. WHAT COST MODEL SHOULD THE COMMISSION SELECT IN THIS PROCEEDING TO ESTIMATE THE LONG RUN FORWARD-LOOKING COSTS OF VERIZON NW'S WASHINGTON NETWORK?

A. Verizon NW's long run forward-looking costs are best estimated by its company-specific cost model, ICM. There are two main reasons for this. First, the objective of the Commission in this proceeding should be to estimate the forward-looking costs of provisioning telecommunications services out of each company's own network. Second, only the ICM model reflects GTE's operating practices and characteristics, and only ICM is based on GTE's costs for material and labor. In addition to these two main reasons, ICM possesses several characteristics, as explained below, that will facilitate the Commission's determination of Verizon NW's forward-looking costs in Washington.

Q. WHY SHOULD THIS COMMISSION SEEK TO ESTIMATE THE

FORWARD-LOOKING COSTS OF PROVISIONING TELECOMMUNICATIONS SERVICES OUT OF EACH COMPANY'S OWN NETWORK?

A. The TELRIC studies filed in this docket will assist in the development of the rates for UNEs to be provided out of a specific company's network. In order to help achieve this policy objective, the cost studies must produce accurate estimates of the forward-looking, economic costs *each company expects to incur* in provisioning UNEs and telecommunications services. Because each company can only provision UNEs out of its own network, it necessarily follows that the cost estimates relied on by this Commission must reflect forward-looking costs specific to each company's network.

Q. WHY IS IT IMPORTANT THAT A COST MODEL REFLECT GTE'S ENGINEERING PRACTICES AND OPERATING CHARACTERISTICS, AND BE BASED ON GTE'S COSTS FOR MATERIAL AND LABOR?

A. Unless a cost model reflects GTE's engineering practices and operating characteristics, it cannot produce realistic estimates of Verizon NW's forward-looking costs. As I explain below, ICM reflects a long run forward-looking loop network designed according to the Company's engineering practices and guidelines, along with switches using Verizon NW's forward-looking technology and engineered to the service characteristics of GTE's system. In particular, the switching costs produced by ICM are based on the host/remote relationships and technology mix found in Verizon NW's network, and on the switch prices that Verizon NW is able to obtain today and for the foreseeable future. In addition, costs are based on input prices for material and labor that GTE is able to obtain. The material cost inputs to ICM are based on actual contracts with vendors, and the labor costs are based on GTE's experience of what labor activities actually cost in Washington.

Q. ARE THERE ANY OTHER RELIABLE ALTERNATIVES TO ICM THAT PRODUCE ACCURATE ESTIMATES OF VERIZON NW'S LONG RUN FORWARD-LOOKING COSTS?

A. There are no reliable alternatives to ICM for estimating Verizon NW's long run forward-looking costs. While a number of proxy models have been developed to estimate long run forward-looking costs, the results produced by proxy models can never, except by mere coincidence, accurately estimate Verizon NW's or any other company's long run, forward-looking costs.

Q. WHY ARE PROXY MODELS INCAPABLE OF ACCURATELY ESTIMATING THE LONG RUN FORWARD-LOOKING COSTS FOR ANY PARTICULAR COMPANY?

A. A proxy model is an off-the-shelf, one-size-fits-all model that is typically populated with a default set of national or statewide inputs. The only "company-specific" information generally used within a proxy model is existing central office locations, line counts, geographic terrain characteristics, and selected ARMIS information. A proxy model is designed to produce costs by wire center, irrespective of who the incumbent carrier is. Consequently, a proxy model does not reflect differences in engineering practices or operating characteristics of the carriers operating within a state. For example, the proxy models that I am familiar with restrict the user to a fixed set of technology choices in terms of size and vendor for Digital Loop Carriers ("DLCs"). At least in the case of Verizon NW, the models' results are not as representative of Verizon NW's forward-looking costs as are the cost estimates produced by ICM, which fully reflects GTE's technology choices.

Additionally, a proxy model is generally populated with a default set of national and statewide inputs that ostensibly can be applied to most LECs in the country. While it is technically possible to replace these inputs with values specific to a given company, in practice this is difficult, if not impossible to accomplish. The reasons for this include the sheer number of the inputs and the uncertainty as to what is done with them by the proxy model. Also, the data required to populate the inputs may not be available, either due to limitations of a company's information systems, or due to the fact that no basis for the inputs exist in reality. A prime example of this latter situation is the placement factors for soil types utilized by the HAI Model. These factors were "made up" by Dean Fassett at John Donovan's request, and have never been updated. (Messrs. Donovan and Fassett are two of the HAI Model's early developers.) Even if these factors had a substantive foundation, there is no reason to believe that contractors in different parts of the country would experience the same, or even similar, cost differences under each set of soil conditions. By comparison, ICM's placement costs are based on actual contracts between GTE and vendors that operate in, and are familiar with, Verizon NW's Washington service territory.

Q. WHAT ARE THE FEATURES OF ICM THAT WILL FACILITATE THE COMMISSION'S DETERMINATION OF VERIZON NW'S LONG RUN FORWARD-LOOKING COSTS IN WASHINGTON?

A. ICM provides the advantages of testability, flexibility, complete openness to inspection, and internal integration. ICM allows the user to easily see and vary inputs, and evaluate the impact on intermediate and final output, thereby affording tremendous testing capability. Without this capability, the user is left with gaps in knowledge about a model's operation and performance. ICM is flexible in that it can be used for various purposes, such as the estimation of universal service costs, UNE costs, and the determination of costs for retail services. Another dimension of flexibility that ICM offers is that it is capable of easily accommodating a change in the definition of a service. ICM is completely open to inspection, including the model code and all preprocessing functions. This attribute allows a user to understand precisely how the model is operating. Finally, ICM is integrated, combining all network components into one model that operates on a consistent set of inputs.

Q. PLEASE EXPAND ON ICM 'S TESTING CAPABILITY.

A. ICM was developed with the premise that the more ways in which a model can be tested, the easier it is for reviewers to gain confidence in it. The six primary features that enable the user to test ICM are:

<u>Sensitivity Analysis Capabilities</u> - ICM offers two avenues for the user to conduct sensitivity analyses. First, a menu-driven "user option" function allows the user to change model assumptions such as administrative fill, sharing percentages, pole spacing, etc. Second, a table reader function allows the user to view and revise all other model inputs, which include material costs, plant mixes, rate of return, depreciation lives, etc. The ability to change ICM's inputs and assumptions enables the user to easily test the sensitivity of its outputs to specific input changes.

<u>Intermediate Outputs</u> – The ability to change inputs and observe the impact on final output provides the user with a solid tool for evaluating the operation of a cost model. ICM expands dramatically upon this capability by offering the user a large set of intermediate outputs. These outputs are generated

and saved to a series of output files that can be viewed via the table viewer. Intermediate outputs are available for items such as size, length, and type of facilities placed at the demand cluster level. (As explained below, a demand cluster is an area within the wire center that is served directly by the switch or by a DLC.) Investment results are available at the wire center level for items such as poles, conduit, aerial copper distribution cable, etc.

Integrated Table Query Function – Much of the intermediate output produced by ICM is offered to the user on a detailed basis. For example, the total amount of 25-pair buried copper distribution plant placed can be viewed at the cluster level. In some instances, the user may wish to view intermediate output on a slightly more aggregated basis. For this purpose, ICM features a database query function as part of its table viewer. The user may define search parameters and query the desired intermediate output table to view a customized level of intermediate output detail.

Database Export Function – ICM offers the user the capability to export database files and table viewer query results in a comma-delimited format for use by an analytical software program (e.g., a spreadsheet program) of the user's choice. The user may view and export any ICM database files (e.g., input tables, raw input data, and intermediate output tables) to perform tests on ICM's performance as a whole and/or to evaluate the operation of specific functions within the model. The Export Function makes it possible to extract these outputs into such off-the-shelf tools as

Microsoft Access or Excel.

<u>Visual Interface Output</u> – ICM offers the user the ability to view a graphical representation of the modeled network designed to serve the demand in a particular wire center. The user can view, by CLLI code, maps depicting items such as the distribution of demand density, DLC placement, feeder network design, and demand clustering results. This function can be used in conjunction with sensitivity analyses to see how the network placement may vary due to input and/or assumption changes.

<u>Numerical Output Integrated With Visual Interface</u> – Accompanying the Visual Interface is an option to see detailed intermediate output results that correspond to the wire center serving area map being viewed on the screen. For example, the user may simply click on a particular demand cluster depicted on the visual interface to examine details about the type and amount of distribution plant placed by ICM in that particular distribution area (e.g., type of plant, size, length, number of units, etc.).

Q. WHAT DO YOU MEAN WHEN YOU SAY THAT ICM IS FLEXIBLE?

A. ICM produces both TSLRIC and TELRIC estimates, meaning it can be used for the purposes of establishing universal service costs, UNE costs and to assist in retail rate rebalancing. In addition, ICM provides the necessary cost information to identify the implicit support contained in current prices for toll, vertical services, switched access, and other non-supported services.

Finally, the Mapping/Report Module of ICM allows the user to define new elements or services by assembling the desired type and number of basic network functions. Thus, ICM can respond to new requirements for element or service costs.

A. IS ICM OPEN TO INSPECTION?

A. Yes. All of ICM's processes and inputs are well defined and documented. The programming code of ICM is readily available for review. Output from the model, including intermediate output, can be reviewed at nearly any level of detail desired, and all supporting information is available for review. However, for obvious reasons, a company's costs and customer or market information, including vendors' proprietary information, must be maintained as confidential. Consequently, Verizon NW makes all of this supporting information available once the necessary confidentiality agreements and/or protective orders have been executed. This information will allow thorough review so that interested parties can confirm that the proposed inputs reflects the source data.

Q. WHAT ADVANTAGE DOES ICM OFFER BY BEING INTEGRATED?

A. ICM is integrated in that it combines all network components -- the loop, switching, transport, and signaling -- into one model. ICM was developed from its inception in its present modular format. This modular approach provides a consistency within the model with respect to inputs, programming logic, and assumptions. This not only makes the model easier to use but, more important, it makes the cost studies internally consistent. Because a common set of inputs and modeling assumptions is used, the results are consistent across the various network components and uses for which ICM is employed, whether this is USF, UNE, or rate rebalancing. ICM can be used to support regulatory proceedings dealing with both retail and wholesale telecommunication services. The advantage is that this enables this Commission to consistently identify costs for Verizon NW for both universal service funding and UNE proceedings, as well as for the rate rebalancing proceeding eventually required to make all implicit subsidies explicit.

B. *<u>OVERVIEW OF ICM</u>*

Q. WHAT IS THE PURPOSE OF ICM?

A. The purpose of ICM is to calculate the TELRICs of individual UNEs and the TSLRICs of retail services. As explained below, ICM does this by designing the network all at once, using currently available, forward-looking technology and the prices for labor, material and equipment that Verizon NW is actually able to obtain. In keeping with the FCC's First Report and Order, the modeled network is based on Verizon NW's existing wire center locations. The network is modeled so that it is capable of serving one hundred percent of current demand, and its components include all the network elements Verizon NW is required to unbundle (e.g., loops, switches, transport). As noted earlier in my testimony, the ICM documentation provides a diagram illustrating the main components of the modeled network. (See "Tab 2 - Conceptual Framework, Book I of VII, page 4" or the file folder "Supporting Documentation \ ICM Manuals \ WashingtonDoc4.1b \ Model Methodology \ Conceptualframework4.1bfiling" on the CD ROM).

Q. PLEASE DESCRIBE ICM.

A. ICM is comprised of six modules: Loop, Switch, Interoffice Transport, Signaling System 7 ("SS7"), Expense, and Mapping/Reporting. These six modules design and cost the forward-looking network as if it is built all at once using all new plant and technology. The designed network reflects the economies of scope and scale of all services across Verizon NW's entire Washington network. ICM can be used for both retail services, such as residence and business services, and for wholesale services such as UNEs and switched and special access.

As noted in Section I of my testimony, ICM's overall modeling process is depicted in "Tab 2 - Conceptual Framework, Book I of VII, page 3" or the file folder "Supporting Documentation \ ICM Manuals \ WashingtonDoc4.1b \ Model Methodology \ Conceptualframework4.1bfiling" on the CD ROM.

As shown in this diagram, the modeling process begins with commercially available and internal Company data that are used by the first five of ICM's modules to model a forward-looking network and develop investments and expenses for the network components. The Mapping/Report Module is then used to combine the network component investments and costs into basic network functions ("BNFs"), UNEs, and services. All of the modules are consistent, and utilize the same set of inputs. If, for example, inputs related to line counts are changed, then all six modules of ICM will be updated when the model is run.

Q. BRIEFLY DESCRIBE THE SIX MODULES OF ICM.

A. ICM's Loop Module estimates the investments needed to construct the loop -- that portion of the local exchange telephone network that extends from the Main Distribution Frame in the wire center to the Network Interface Device at the end user's location. These investments include items such as telephone poles, manholes, copper and fiber optic cables, and conduit. ICM builds the loop from existing wire center locations to customer locations determined through the use of detailed census information, actual line counts, tariffed exchange boundaries, road length data, and specialized algorithms. ICM places DLC systems to ensure that maximum copper loop length limits are not exceeded and do not impede the provision of advanced services.

The Switch Module calculates the investment needed to provide the circuit connections for completing telephone calls. The switch module designs a network based on Verizon NW's existing wire center locations, host/remote relationships, and the digital switch types that Verizon NW deploys in its network. Costs are based on the current prices Verizon NW pays for initial switch placements and expansions.

The Interoffice Transport Module designs the facilities needed to carry traffic among Verizon NW offices and between Verizon NW 's network and the rest of the public switched network. These facilities consist of specialized transmission equipment within wire centers and outside plant facilities that carry communication signals between hosts, remotes, and tandem offices. ICM models the investments associated with these facilities using the most efficient fiber optic equipment and technologies.

The SS7 Module calculates the investments needed for a stand-alone signaling network. This signaling network, via connections at end office and tandem switches, governs the operation of the switched telephone network by setting up calls and ensuring efficient utilization of facilities.

The output of the four modules described above represents the investment needed to build a modern, efficient telephone network. The Expense Module determines the factors and ratios used to calculate the costs of operating this network. Non-recurring costs of establishing or terminating service and common costs are <u>not</u> included in the development of expenses. In addition, the Expense Module calculates the capital cost ratios (depreciation, return on investment, and taxes) associated with the network investments.

The Mapping/Report Module applies the factors and ratios developed in the Expense Module to the investments generated by the other four modules. This module also aggregates the costs of Basic Network Functions (BNFs – e.g., network access channels, line terminations, call setup and minutes of use) to TSLRICs of services and TELRICs of unbundled network elements and develops detailed output reports. BNF reports are also generated, which include a cost for every network function. Output reports can be aggregated at the wire center level, groups of wire centers, or at statewide weighted average totals.

Each of the six modules of ICM is described more fully in the "ICM Model Methodology, Books I through VII" contained in Tab 2 and on the CD ROM in file folder "Supporting Documentation \ ICM Manuals \ WashingtonDoc4.1b \ Model Methodology".

Q. HOW DOES ICM CALCULATE THE TELRIC OF A UNE?

A. The first four ICM modules identify the forward-looking investments associated with the various network elements, and the Expense Module calculates the factors needed to convert these investments into monthly recurring costs. These monthly recurring costs fall into two broad categories, capital costs and operating expenses. The capital costs include: (1) both a return of and a return on the investment; (2) property taxes associated with the investment; and (3) income taxes associated with the return component of capital costs. The operating expenses consist of the costs of maintaining and operating the network, including the costs of general support assets such as motor vehicles and general-purpose computers. Also included are the expenses of any marketing, billing and collection activities associated with a given UNE. The Mapping/Report Module calculates the capital costs and operating expenses, using the factors produced by the Expense Module and the investments identified by the other four modules. The Mapping/Report Module also maps the costs of the network components into UNEs, and produces reports showing the recurring costs of each UNE.

For example, the investments associated with an unbundled loop are modeled by the Loop Module and include both (1) the material costs of loop facilities, such as the feeder cable, distribution cable, and drop wire; and (2) the cost of installing these facilities, such as trenching and labor costs. After the Mapping/Report Module calculates the capital costs and the operating expenses of each network component and maps these recurring costs to UNEs, it reports these costs in seven categories. Here is an illustrative example of one of the ICM's UNE Reports for a two-wire loop:

Network Element	Investment	Deprec. & Return	Composite Inc. Tax	Property Tax	Maint. & Support	Marketing	B/C & Directory	TELRIC
2-wire	1531.23	204.11	33.26	14.08	62.33	5.74	0.00	26.63

Q. PLEASE EXPLAIN THE COSTS SHOWN IN EACH COLUMN.

A. The Investment column shows the total investment associated with the two-wire loop, which includes the material cost of the loop facilities, as well as the cost of installing the facilities. In the above example, the total investment cost of the loop equals $1,531.23.

The Depreciation and Return column shows the annual capital charge necessary to recover the total loop investment. This charge includes both a return of the total investment (the annual depreciation cost) and a return on the total investment (the rate of return). As illustrated in our example, if the owners of the network receive $204.11 (after taxes and other operating expenses) each year over the estimated life of the loop, they will recover the total long-run investment cost of the loop -- $1,531.23 – plus a reasonable return. The Depreciation and Return charge will, of course, vary depending on the depreciation lives and cost of capital inputs that are used in the model. Longer depreciation lives or a lower cost of capital will produce a lower annual charge associated with the loop investment, and *vice versa*.

The Composite Income Tax and Property Tax columns reflect the annual state and federal income taxes, and the property taxes, associated with the loop.

The Maintenance and Support column reflects the annual maintenance expenses, such as the costs of maintaining and repairing poles, conduits, and other outside plant required for loops. Additionally, this column reflects the costs associated general support assets unless the user has opted to exclude them. The next two columns show the annual operating expenses associated with marketing activities, billing and collection activities, and directory-related costs, if any. All of these capital costs and operating expenses are calculated using ICM's Expense Module.

The last column shows the monthly TELRIC of the loop, which is simply the sum of all the annual costs divided by 12:

Depreciation and Return	$204.11
Composite Income Tax	33.26
Property Tax	14.08
Maintenance and Support	62.33
Marketing	5.74
Total	$319.52 / 12 = $26.63

Q. CAN ICM CALCULATE COSTS ON A DEAVERAGED BASIS?

A. Yes, ICM calculates and reports costs at the wire center level, which can be extracted to an external analysis tool, such as a spreadsheet program, and combined into any combination the user believes is correct. ICM also aggregates and reports the wire center costs as a statewide average.

C. *UNDERLYING ASSUMPTIONS AND INPUTS*

Q. WHAT ARE THE MAJOR ASSUMPTIONS AND INPUTS UNDERLYING ICM?

A. The major assumptions and inputs underlying ICM are that:

(1) The network is modeled as if it is built all at once, using all new plant and technology; customer locations below the wire center level can be approximated by the amount of road feet in a relatively small area;

(2) The modeled network is designed to meet the transmission parameters required for voice grade services as well as services requiring transmission speeds up to 6 mbps, and is also based on the forward-looking technology mix that Verizon NW expects to employ in its network;

(3) The study should be based on forward-looking capital costs;

(4) The study reflects structure mix and sharing parameters based on Verizon NW ’s actual operating experience;

(5) The costs are based on the input prices for material, equipment and labor that Verizon NW expects to pay;

(1) The study sizes cable based on GTE’s engineering guidelines; and

(2) The costs exclude common costs and the non-recurring costs of initiating and terminating service.

Q. DOES THE ASSUMPTION THAT THE NETWORK IS BUILT ALL AT ONCE WITH ALL

NEW PLANT AND TECHNOLOGY REFLECT VERIZON NW'S EXISTING NETWORK OR HOW NETWORKS ARE BUILT IN THE REAL WORLD?

A. No. Obviously, Verizon NW's network and any real-world network evolve through time and reflect a mix of technologies, some of which are no longer considered forward-looking. Neither Verizon NW nor any other business immediately replaces its plant or technology whenever a new product or technology enters the market. For example, American Airlines does not retire its fleet and replace it whenever a new plane is introduced. Likewise, accounting firms do not throw away all their desktop computers every six months just because a more efficient computer becomes available. Additionally, ICM builds the network to serve one hundred percent of the market; this implies that no other company will install facilities, which is contrary to fact. While the results of such a model can be useful, they only serve as a lower bound on the actual forward-looking incremental costs of provisioning UNEs to new entrants.

Q. WHY SHOULD THE RESULTS OF A COST MODEL THAT ASSUMES THE NETWORK IS BUILT ALL AT ONCE USING ALL NEW PLANT AND TECHNOLOGY BE VIEWED AS A LOWER BOUND OF THE ACTUAL FORWARD-LOOKING INCREMENTAL COSTS OF PROVISIONING UNES?

A. There are a number of reasons. First, such a model assumes economies of scope and scale that do not exist in the real world. For example, suppose that along a particular route, ICM places a 400-pair cable. In the real network, the required capacity may be provisioned with a 300-pair cable, followed by a 100-pair cable, because of the way that demand is realized through time. Comparing the modeled network with the real-world network leads to several other examples:

(1) In the modeled network, pole lines are assumed to run down only one side of the street, whereas in the real network clearance considerations may require poles on both sides;

(2) In the modeled network, pair-gain devices are often assumed to be located in the center of a carrier serving area, while in the real network, they may be located elsewhere due to topographical and right-of-way constraints, or due to the development of demand through time;

(3) In the modeled network, one pedestal may be provisioned for every four drops, when in the real network some pedestals will serve fewer drops simply because there isn't always an even number of customer locations on a street; and

(4) In the modeled network, distribution plant may be built only to serve existing customers, whereas in the real network plant is built to serve both vacant and planned structures.

Second, the assumptions underlying many long-run economic cost models do not reflect the constraints that an Incumbent Local Exchange Carrier ("ILEC") will face. In particular, long-run economic cost models do not account for the costs of transitioning the existing network to the network contemplated by the model. For example, in Verizon NW's network, many end users are served by integrated pair-gain devices, via a trunk-side connection to the switch, because this has been the most economical way of providing service to these end users. If such an end user decides to leave Verizon NW in favor of a CLEC, and if the CLEC only orders an unbundled loop in order to provide service to that end user, then Verizon NW must terminate that end user's loop at the mainframe in order to hand it off to the CLEC. A cost model that assumes all new plant and technology does not capture these real-life transition costs.

Because such a model assumes economies of scope and scale that will not be realized, and because many real-world constraints are ignored, the model results will underestimate the actual forward-looking costs of provisioning UNEs. Hence, the long-run costs produced by such a model are a lower bound.

Q. PLEASE EXPLAIN HOW ICM MODELS CUSTOMER LOCATIONS USING ROAD FEET DATA.

A. The basic unit of analysis in the Loop Module is the Demand Unit, which is a grid that is 1/200th by 1/200th of a degree in size. For Bothell, for example, this equates to 1,823 feet long by 1,225 feet wide, or about 0.08 square miles. Utilizing line count estimates by census block from PNR Associates, Stopwatch Maps assigns customer lines to each Demand Unit on the basis of each grid's share of road feet in the wire center. The Demand Units are assigned to each wire center based on Verizon NW's tariffed exchange boundaries and the resulting totals for each wire center are trued up to Verizon NW's actual line counts by wire center. The road feet measure in ICM is taken from the US Census Bureau's TIGER files, and corresponds to the types of roads along which residential or business development would normally occur, and from which customers would have access to their premises. The measure excludes interstate highways, limited access roads, bridges, tunnels, access ramps, alleys, driveways and motorcycle trails. The sum of the lines assigned to the individual Demand Units in a wire center equals the total actual line count for the wire center. ICM uses this same road feet measure to constrain the structure length placed within a wire center

Q. HOW DOES ICM REFLECT THE FORWARD-LOOKING TECHNOLOGY MIX THAT VERIZON NW EXPECTS TO EMPLOY IN ITS NETWORK?

A. ICM assumes that the existing wire center locations and host/remote relationships remain unchanged. ICM models switching costs based on the switches that it purchases from its three primary vendors – Lucent's 5ESS, Nortel's DMS-10 and DMS-100, and AGCS's GTD-5. Besides assuming the host/remote relationships are unchanged, ICM models the host and remotes in a consistent fashion – that is, if the host is a DMS-100, then any remote switches are DMS-100 remote units. Additionally, the DLCs used by ICM reflect the line sizes and vendor choices actually used by Verizon NW in making additions to its real-world network. ICM's transport network is based on existing tandem locations, with offices clustered together on SONET rings based on their distance from the tandems. In instances where only two nodes are involved, such as a host/remote link or tandem serving a single Verizon NW switch, ICM models a point-to-point connection. The SS7 network modeled by ICM is based on the actual locations of the Service Control Points and Signal Transfer Points within the GTE nationwide SS7 network.

Q. WHY IS IT APPROPRIATE FOR VERIZON NW'S COST STUDIES TO BE BASED ON FORWARD-LOOKING CAPITAL COSTS?

A. Capital costs are the costs associated with the capital used by the firm. These costs include both a *return on* and a *return of* the invested capital. The *return on* component of capital costs is called the cost of capital or the cost of money. The providers of Verizon NW's capital do so on the basis of their required expected, or *ex ante*, rate of return. This required rate of return is largely determined by the risk associated with investing in a local telecommunications carrier. This risk has increased because of several factors: the prospect of increased competition and the attendant loss of market share; the uncertainty surrounding the prices to be charged for resale services and for unbundled network elements; the magnitude of implementation costs and the question of how or whether they will be recovered; the loss of geographical diversification of regulatory risk due to the simultaneity of arbitration proceedings among the states; and the possibility that prudently made historical investments will not be recoverable. Unless Verizon NW's TELRIC estimates are based on a risk-adjusted, forward-looking cost of capital, they will not reflect the costs Verizon NW expects to incur. Verizon NW advocates using a cost of capital of 12.737 percent in estimating its TELRICs.

The *return of* component of capital costs is called depreciation. This component reflects the using up of the service potential of an asset. It accounts for the change in the market value of an asset due not only to its utilization in providing a service, but to other factors as well. For example, the loss in the market value of a machine may be due to wear and tear resulting from the provision of the service or element, or it may simply be due to obsolescence resulting from changing demand conditions or technology. While obsolescence may not physically destroy an asset, it nonetheless reduces its economic or market value. Depreciation lives that account for such a loss in the value of an asset are called economic lives. Use of longer lives, or lower rates, will understate the true economic cost of the service under study. Therefore, economic depreciation more accurately reflects the cost of providing an unbundled network element.

Q DID VERIZON NW USE ITS FORWARD LOOKING CAPITAL COSTS IN THE COST STUDIES FILED IN THIS PROCEEDING?

A. No. In the run of ICM being filed with my testimony, inputs for the *return on* and *return of* capital are those used by this commission in Docket No, UT-960369, et al. However, the Commission has recently reset Verizon NW's depreciation rates in Docket No. UT-992009, so before the Commission sets rates in this proceeding, the costs need to be adjusted for that change.

Q. WHY IS IT APPROPRIATE FOR VERIZON NW'S COST STUDY TO REFLECT STRUCTURE MIX AND SHARING PARAMETERS BASED ON THE COMPANY'S ACTUAL OPERATING ENVIRONMENT?

A. Unless these parameters are based on Verizon NW's actual operating environment, then the resulting cost estimates will not reflect the forward-looking costs Verizon NW expects to incur. With respect to structure sharing in particular, parties in other proceedings have attempted to justify levels of sharing that substantially exceed actual experience based on the conclusory statement that opportunities for sharing will be greater in the future. Such proposals conveniently overlook the fact that Verizon NW's network is in place today. They assume that Verizon NW (or other utilities) would have the foresight to install poles and conduit systems that were large enough to accommodate these greatly expanded levels of sharing. With respect to buried cable, these parties apparently believe that Verizon NW will dig up its existing cable in order to immediately rebury it in a shared trench. Even if one takes the position that it is the costs of some hypothetical new entrant that is going to rebuild the entire network that should be modeled, greatly increased levels of sharing still cannot be supported. Even under this hypothesis, the required coincidence of wants in space and time among the sharing utilities must be assumed as well. However, there is no hypothetical new entrant that will completely rebuild the electric power and cable TV networks in Verizon NW's serving areas. Like Verizon NW, their networks are already in place along with sharing arrangements that made sense at the time.

Q. WHY IS IT APPROPRIATE FOR VERIZON NW'S COST STUDIES TO BE BASED ON THE INPUT PRICES FOR MATERIAL, EQUIPMENT AND LABOR THAT VERIZON NW EXPECTS TO PAY?

A. It is appropriate because, unless the input prices correspond to what Verizon NW expects to pay, there is no reasonable expectation that the resulting cost estimates will reflect the costs Verizon NW expects to incur in provisioning telecommunication services and UNEs. In particular, the labor costs must reflect the wage rates Verizon NW pays in Washington, and any sales taxes or shipping costs included in the costs of material and equipment must reflect whatever Verizon NW pays. Also, the discount factor used to estimate switching costs must reflect a blend of that realized for modernization purchases and for growth purchases.

Q. WHAT IS THE SOURCE OF ICM'S INPUTS FOR MATERIAL, EQUIPMENT AND LABOR?

A. The material prices used in ICM reflect Verizon NW's current experience. GTE purchases materials and equipment on a nationwide basis to capture the economies of scale associated with buying in quantity. The material prices for switches are based on contracts with switch vendors and include loadings for vendor and Company engineering and installation costs, supply expense, and costs of acceptance testing. Additionally, loading factors are applied to the material costs to reflect the cost of power and test equipment. The material prices are used as inputs to SCIS (Switching Cost Information System), which is used to produce the required investments for ports, call origination and termination, usage and switch features. SCIS is a product of Telcordia Technologies and is used to assign the costs of switch components on the basis of how the component is engineered. ICM uses the output from SCIS to determine the costs of the Nortel and Lucent switches. Another program, CostMod, is used to determine the costs of the GTD-5. Both of these programs base the costs on the usage characteristics of each switch in Verizon NW's Washington network. The inputs for the switching module can be found in Tab 11. To access these inputs electronically, open "Disk1" on the CD ROM and install ICM. The switch investment inputs are contained in the WASWINVW.DB table found in the ICM\database folder.

Material prices for such items as poles, manholes, fiber and copper cables, drop wires, NIDs, DLCs, terminals and pedestals are taken from the GTE Advanced Material System ("GTEAMS"). GTEAMS is an information management system used by the Company in the normal course of business to perform planning, inventory accounting, and material purchasing management functions. The inputs for material costs in ICM include loadings for freight, sales tax, engineering, minor materials and supply expense, and can be found in Tab 9. Placement costs for these items are based on vendor contracts specific to the state of Washington; the inputs are found in Tab 10. The material and placement cost inputs are also on the ICM CD in the WAMATL.DB and WALABR.DB tables, respectively. After accessing "Disk1" on the CD ROM and installing ICM, these files can be found in the ICM\database folder.

Q. HOW DOES ICM SIZE CABLE CONSISTENT WITH GTE'S ENGINEERING GUIDELINES?

A. ICM sizes feeder and distribution plant based on the ratio of installed to working lines. For feeder, this ratio is based on the ratio of forecasted lines at the midpoint of a four-year planning horizon to the current number of lines in the network, and reflects the engineering practice of designing feeder plant with the expectation that it will require reinforcement. Unlike feeder plant, distribution plant is not designed with the expectation that it will require reinforcement, and it is instead built to serve ultimate demand. For distribution, the ratio of installed to working lines is based on an assumption of 2.34 lines per lot. Within the ICM documentation, these ratios are also referred to as the engineering factors for feeder and distribution, respectively. The ratios are user-adjustable inputs and the details of their calculation are found in Tab 21. The distribution calculation is supported on WADFACTOR, page 1 of 1 and the feeder support can be found at WAEFACTOR, page 1 of 1. The electronic files can be found on the CD ROM under \SUPPORTING DOCUMENTATION \ RUNTIME OPTIONS \ DISTRIBUTION \ WADFACTOR.PDF AND SUPPORTING DOCUMENTATION \ RUNTIME OPTIONS \ DISTRIBUTION \ WAEFACTOR.PDF. These values are input under the Outside Plant tab of ICM's Runtime Options user interface.

III. OTHER UNE REMAND ISSUES

(7) **Q. WHAT IS VERIZON NW'S PROPOSAL FOR DARK FIBER?**

A. Verizon NW proposes to utilize the same components - costs for fiber transport and for loops served, in part, over facilities - found in ICM for its dark fiber study. Therefore, the same inputs for fiber material, trenching, plowing, poles, conduit, etc. are used to generate dark fiber costs for the purposes of this proceeding. The dark fiber study is found in Tab 22 or on the CD ROM at \SUPPORTING DOCUMENTATION \ OUTBOARD COST STUDIES \ DARK FIBER. The file name for the dark fiber study is DKFIBR.PDF.

As detailed on page 2 of the study, dark fiber costs are identified with two different applications, loop and transport. The loop application includes both the cost of the fiber itself along with fiber distribution panel ("FDP") costs on each end. In addition, these costs are split between feeder and distribution plant. In contrast, the transport application identifies the fiber and FDP costs separately. That is, there is a termination piece (FDP) and a distance-sensitive piece (fiber cost per mile). Identification of the distance-sensitive piece of transport separately essentially provides geographic cost detail down to the route level. That is, for any particular transport route, the cost will be a function of the specific route distance.

Q. HOW WAS THE DARK FIBER STUDY PERFORMED?

A. The dark fiber study is based on the cost of a 24-fiber cable, using the average length of a business loop modeled by ICM. The material and placement costs, depreciation and return factors, and the other expense factors used are the same as are used by ICM. The outside plant ("OSP") percentages correspond to the overall percentages for aerial, buried and underground placement modeled by ICM for Washington.

Q. IS VERIZON NW PRESENTING ANY OTHER SPECIAL STUDIES?

A. Yes. Verizon NW is presenting a special study of high-capacity facilities, which is not included in ICM. These facilities include DS-3 loops, CLEC dedicated transport, and CLEC dedicated transport for EELs. The results of this study are located in Tab 22 and on the CD ROM in SUPPORTING DOCUMENTATION \ OUTBOARD COST STUDIES \ HiCap_SpACC.

Q. HOW WAS THE STUDY OF HIGH-CAPACITY FACILITIES PERFORMED?

A. The study of high-capacity facilities was performed much in the same way as the dark fiber study. First, raw material costs are combined with the associated costs for engineering, installation, and minor materials to provide a total installed investment amount. Annual operating expense factors from ICM (e.g. capital recovery, taxes, maintenance, etc.) are then applied to the total installed investment to yield an annual cost, which is then divided by 12 to obtain the monthly cost.

A. WHAT COST BASIS DOES VERIZON NW PROPOSE FOR INTRA-BUILDING RISER CABLE?

A. Verizon NW proposes to treat requests for intra-building riser cable on a BFR basis. Identifying a typical cost for intra-building riser cable is not practical in this case for two reasons. First, there is no typical configuration. These requests will likely vary significantly from one application to the next. For example, one request might be for a large multi-building campus environment while another may be a simple riser cable application in a small business building. Second, the incidence of these requests is expected to be very rare, which is akin to having a very small sample size in a statistical experiment, i.e. not conducive to achieving statistically valid results. Therefore, the identification of costs specific to each particular request (BFR basis) is practical, due to the low expected number of requests, and gives a more accurate reflection of the true underlying costs.

Q. DOES THIS CONCLUDE YOUR PHASE B DIRECT TESTIMONY?

A. Yes, it does.