BEFORE THE WASHINGTON UTILITIES AND TRANSPORTATION COMMISSION

IN THE MATTER OF THE REVIEW OF UNBUNDLED LOOP AND SWITCHING RATES; THE DEAVERAGED ZONE STRUCTURE; AND UNBUNDLED NETWORK ELEMENTS, TRANSPORT, AND TERMINATION	))))))	**DOCKET NO. UT-023003**

DIRECT TESTIMONY

OF

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ON BEHALF OF

QWEST CORPORATION

JUNE 26, 2003

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EXECUTIVE SUMMARY

My name is Richard J. "Dick" Buckley and I am employed by Qwest Corporation as a Director in Policy and Law. In my testimony, I describe the LoopMod Version 3, the Loop Module of Qwest's Integrated Cost Model (ICM). The purpose of LoopMod is to produce the investment for a subscriber loop and drop wire that can be used as a basis for developing costs for pricing decisions.

LoopMod is specifically designed to comply with the FCC's requirement of pricing based on total element long-run incremental cost (TELRIC). It develops investment by calculating what it would cost an efficient carrier to replace and operate the loop network today using currently available, forward-looking and efficient technology. Consistent with TELRIC, LoopMod uses the basic geographical design of the existing network and outside plant technology that meets industry-accepted network guidelines. The model is open and user-friendly, meaning it allows the user the ability to access and change numerous key inputs. The user has the ability, through the Excel auditing functions, to track the model's use of variables and formulas. The model has been modified to use customer location and clustering information available from the FCC Synthesis Model. There have been numerous other modifications to the manner in which the model calculates distribution and feeder investments. In addition, high capacity circuits that would utilize common facilities or structures are now included in the network calculations. This allows the model to reflect the economies associated with an integrated network. Qwest has also updated LoopMod to include current prices, changes in technology, recent line count data, and other information.

The network-related principles that the model follows are:

1. The model assumes the use of efficient, forward-looking technology that is currently commercially available.
2. Demand and sizing are based on the current total quantity of loops in service. The total network approach provides economies that would not exist in a model that reflects only near-term demand and construction.
3. Consistent with the TELRIC goal of estimating the costs of building a replacement network, the methods LoopMod uses to place outside plant are selected based on conditions in the existing environments, with buildings, roads, and other structures assumed to remain in place.
4. In accordance with the FCC's pricing rules, plant utilization levels are based on best case, reasonable (if not overly optimistic) projections of the actual use of plant.

Based on these criteria, the model uses copper cables in certain areas because that design is the least-cost technology for building basic voice grade circuits. The model also utilizes integrated TR-303 Digital Loop Carrier where that technology is appropriate. Cables and systems are sized to accommodate the universe of demand (total potential loops), and there is recognition that to install cables, a new entrant or an incumbent local exchange carrier (ILEC) rebuilding the network will require several different types of placing methods.

Using these guidelines, the model complies with appropriate standards for engineering design and service quality and produces a level of investment that is appropriate for use in estimating the costs that should underlie the pricing of the unbundled loop. Therefore, LoopMod follows TELRIC principles and produces reliable results that should be relied upon for setting prices in Washington.

I. INTRODUCTION

Q. PLEASE STATE YOUR NAME AND BUSINESS ADDRESS.

A. My name is Richard J. "Dick" Buckley. I am employed by Qwest Corporation as a Director in Policy and Law. My business address is 1801 California St., Room 2040, Denver, Colorado.

Q. PLEASE DESCRIBE YOUR EDUCATION BACKGROUND AND EMPLOYMENT EXPERIENCE.

A. In 1978, I received a B.A. in Business Administration with an emphasis in Finance from the University of Northern Colorado. I joined Qwest (Mountain Bell) in 1980 as a Cost Analyst in the area of data and supplemental terminal products. In 1983, I assumed responsibility for non-recurring costing and for implementing the dual element non-recurring cost structure. In 1986, I moved into cost analysis of the local loop and assisted in the development of Qwest loop program, LoopMod. My present responsibilities include local loop cost modeling and analysis, as well as providing subject matter expert support on local loop costing in regulatory proceedings.

Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY?

A. The purpose of my testimony is to describe LoopMod Version 3, the loop module of Qwest's Integrated Cost model (ICM) and explain the modifications and updates to LoopMod that are included in the Version 3 release. I also discuss the support and reasons for the input assumptions in LoopMod.

II. GENERAL

Q. PLEASE PROVIDE A GENERAL DESCRIPTION OF VERSION 3 OF LOOPMOD.

A. LoopMod is an investment development model designed by Qwest. The purpose of LoopMod is to produce the average investment for a local loop that can be used to develop cost-based loop rates. The local loop is the telephone line or transmission facility that runs from the local telephone company central office to the end user's premise. The loop can be made up of copper cables or fiber cables and electronic equipment or a combination of all three technologies. The model is specifically designed to comply with the FCC's requirement of pricing based on total element long-run incremental cost (TELRIC). It develops investment by calculating what it would cost to replace and operate the loop network today using currently available, forward-looking, efficient technology. Consistent with TELRIC, LoopMod uses the basic geographical design of the existing network and outside plant technology that meets industry-accepted network guidelines. The model is open and user-friendly, meaning it allows the user the ability to access and change numerous key inputs.

Q. PLEASE PROVIDE A SUMMARY OF THE CHANGES THAT HAVE BEEN INCORPORATED IN THIS VERSION OF LOOPMOD.

A. The model has undergone extensive changes, both with regard to the source of customer location data and to the manner in which the investments are calculated. The model now uses publicly available customer location data and disaggregates inputs to a density zone level. The following is a summary of the primary modifications:

- Distribution cluster input data is derived from the FCC Synthesis Model (SM) customer location information.
- Distribution plant is developed using a backbone and branch design that develops unique cable lengths and equipment sizes for each cluster.
- Variables such as sharing, placement costs and plant mix can be input at the density zone level. This provides a greater level of disaggregation and more consistency when comparing multiple models.
- Underground and aerial structure is developed within the model based on user adjustable inputs for conduit, splicing chamber and pole investments.
- Very high density clusters are modeled as large buildings rather than using the standard multi-location backbone and branches distribution design.
- Very low density clusters, with few customer locations, are connected to their nearest neighbor cluster via fiber and served with a small DLC remote terminal.
- Additional size increments of Digital Loop Carrier (DLC) systems have been added to recognize the economies available in larger systems.
- DLC channel unit costs now reflect unique data for POTS, Coin, ISDN, and DS1 channel units.
- High capacity circuits have been included in the demand data so that the model can share structure and common network components between DS0 unbundled loops and high capacity loops.

The changes discussed above result in a model that meets the following network-related criteria:

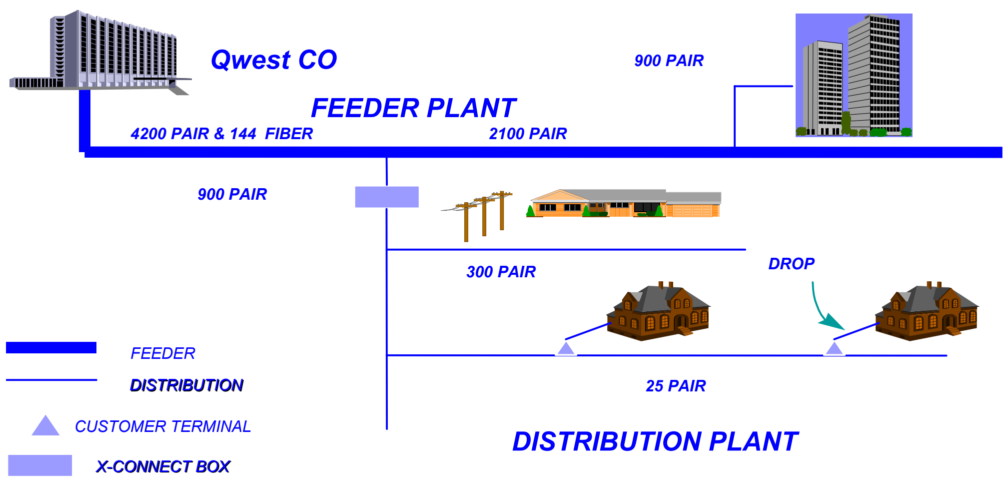
1. The model assumes the use of efficient, forward-looking technology that is currently commercially available.
2. Demand and sizing are based on the current total quantity of loops in service. The total network approach provides economies that would not exist in a model that reflects only near-term demand and construction.
3. Consistent with the TELRIC goal of estimating the costs of building a replacement network, the methods LoopMod uses to place outside plant are selected based on conditions in the existing environments, with buildings, roads, and other structures assumed to remain in place.
4. In accordance with the FCC's pricing rules, plant utilization levels are based on best case, reasonable (often overly optimistic) projections of the actual use of plant.

Q. PLEASE EXPLAIN FURTHER HOW LOOPMOD CALCULATES INVESTMENT.

A. LoopMod calculates the investments for loops and drop wires based on standard engineering loop designs, vendor prices and vendor placement cost estimates. These investments include the costs associated with the materials, construction, and engineering that are required to build loop plant from the central office to a local end user. The investment amounts that the model uses are based on data specific to Washington. For example, the quantity of lines in service, the prices charged by contractors for outside plant construction activities, and the customer location data are unique to Washington. LoopMod develops feeder investments by determining what technology and network component capacity is required to serve the distance and demand associated with each cluster of customer locations. The model develops the distribution investments by determining the amount of cable, pedestals, drops and interfaces that are necessary to serve the number of locations and the area contained in each cluster. After LoopMod calculates the investment, the Integrated Cost Model (ICM) converts the results to monthly costs that can be used to set cost-based rates for the unbundled loop.

Q. HOW DOES LOOPMOD SEGMENT THE DESIGN OF THE LOOP NETWORK?

A. Loop design is divided into two sections: feeder plant and distribution plant. As shown in the diagram below, feeder is the main facility leaving the central office. Feeder is typically a large copper cable or a fiber facility. If the facility is fiber, it is used to connect electronics at the central office with electronics at a location on the feeder route. Feeder cables are often placed within conduit and are designed to be reinforced periodically. Distribution plant consists of smaller cables that connect to the feeder plant at a Serving Area Interface (SAI) or cross-connect box.



As the name implies, these cables distribute pairs from the feeder plant to the customer locations. In a majority of cases, distribution cables are buried in the ground through one of several methods that can be used to bury cable. A small percentage of distribution cables are placed through the use of aerial plant, although the use of aerial plant has generally been declining in recent years. In addition to the SAI and the cables, distribution plant includes pedestals or customer terminals, drop or service wires, and network interface devices (NIDs). The terminals serve as a connection point between the distribution cables and the drop wire. The drop wire is the piece of distribution plant that runs directly to a customer's premises. The NID provides the connection between the drop and the inside wiring at a customer's premises.

Q. WHAT ARE SOME OF THE KEY ASSUMPTIONS RELATING TO LOOPMOD'S NETWORK DESIGN?

A. The two key cost drivers in the network design that LoopMod uses to develop Washington-specific loop plant investment are the same cost drivers in a real world network: (1) distance, and (2) population density. Feeder investments are affected directly by the distance from a serving central office (CO) to an end user. Longer distances require the placement of more feeder plant than shorter distances. Population density affects the type of outside plant and placement methods that can be used and also influences the selection of the distribution facilities. Higher density provides for greater economies of scale. For example, in feeder, higher density allows for the use of larger cables, while in distribution, higher density results in shorter cabling. Distance and density would be the primary cost drivers for a carrier building a replacement network, which is why LoopMod's emphasis on these factors in developing investment is appropriate and consistent with TELRIC.

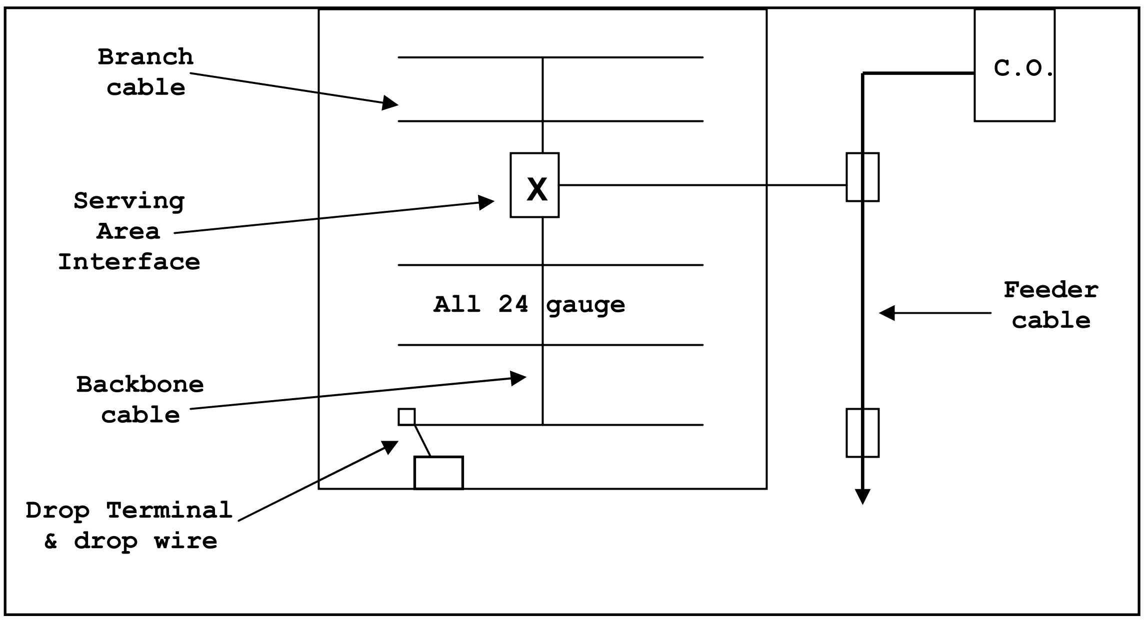
Q. HOW DOES LOOPMOD DETERMINE AN APPROPRIATE FEEDER DESIGN?

A. The model employs a mix of copper and fiber facilities based on user-selected breakpoints. The breakpoints determine the distances at which the model transitions between technologies. Each route in each wire center is analyzed to determine the amount of demand and the distance of demand from the serving central office. This route-specific information is used in conjunction with the breakpoint between copper and fiber to size the required electronics and cable facility. User adjustable inputs determine the amount of outside plant that will be placed in underground conduit systems, on poles or buried in trenches. Underground conduit systems are the preferred method of placing feeder cable in higher density areas because they allow easier access for reinforcements. The model allows the user to differentiate the costs for underground and buried trench work for each density zone. Feeder that is buried in urban areas typically is placed in the model through the use of the trenching methods that are appropriate for more densely populated areas (*e.g.*, cut and restore), while the model uses a greater degree of lower cost plowing techniques to place buried feeder in the lower density zones. In locations where digital loop carrier is utilized the model will select the system size that contains sufficient capacity to that demand. The model uses a user adjustable sizing factor to determine the quantity of channel units to install in each DLC remote terminal.

Q. HOW DOES THE MODEL DETERMINE DISTRIBUTION INVESTMENTS?

A. LoopMod now uses the branch and backbone approach to developing distribution plant distances and cable sizes. The backbone cables are the main cables out of the SAI. Branch cables extend, in a perpendicular fashion, from the backbone cables to distribute facilities to the individual customer locations. Based on the area of the cluster and the number of customer locations, the model builds an appropriate number of branch cables to serve those locations. The model sizes the branch and backbone cables using a user adjustable distribution cable sizing factor. The default input is 50 percent, which provides for at least two pairs per customer location. In addition, the backbone cable investment is adjusted through the use of a taper factor. The taper factor reflects the reduction of required pairs as branches splice into the backbone cable. The model also includes a Serving Area Interface (SAI), drop pedestals, drop wires and Network Interface Devices (NIDs). The SAI is sized to accommodate the amount of demand that exists within each individual cluster. Drop terminals are placed along distribution branch cables and connect the distribution cable pairs to the drop wires. The drops are terminated on modular NIDs at the customer premise. The illustration below shows the basic layout of the distribution facilities.

Distribution Area Network Components



Q. WHAT ARE THE KEY INPUTS ASSOCIATED WITH THE MODEL?

A. There are numerous inputs that have an impact on the final investment developed by LoopMod, but three of the key cost drivers are:

- Plant mix;
- Cable placing activities; and
- Structure sharing percentages.

These inputs are discussed in detail later in my testimony. Because these inputs are interrelated, it is essential to have consistency in the assumptions underlying each input. For instance, the model inputs cannot be based on the assumption that multiple telecommunication companies are sharing the cost of distribution trench while also assuming that the components in the distribution plant (which will be duplicated by each of the companies) have high utilizations. In addition, the assumptions must reflect the reality of the costs a carrier would face if it were replacing the Washington telephone network in the world as it exists today - with buildings, houses, roads, and other structures still in place. In its First Report and Order, the FCC made it clear that a goal of TELRIC is to develop prices that replicate the prices that would exist in a competitive environment.[1] In a real-world competitive market, a carrier would have to build a network by navigating the natural and man-made obstacles that are in the environment.

Q. HAS QWEST ATTEMPTED TO VALIDATE THE COST ESTIMATES THAT LOOPMOD PRODUCES?

A. Yes. The LoopMod results have been compared to a restatement of the HM 5.0a model. The objective of the comparison is to determine if the two models produce similar results when they are run using similar inputs. The comparative investments are summarized below:

	Investment
LoopMod - Loop only	$911
HM 5.0a with modified inputs - Loop only	$881

This data provides evidence that the Qwest loop model is processing data in a logical and mechanically correct manner. The comparison shows that with similar inputs the two models produce similar results. Further, it provides evidence that selecting reasonable

[1] *See Implementation of the Local Competition Provisions in the Telecommunications Act of 1996*, First Report and Order, 11 FCC Rcd 15499, 15846, ¶679 (1996).

inputs (not simply choosing a model) is absolutely essential to developing reasonable estimates of the average investment for a local loop.

III. CUSTOMER LOCATION INFORMATION

Q. WHAT IS THE SOURCE OF THE CUSTOMER LOCATION DATA USED IN LOOPMOD?

A. LoopMod uses the customer location data and clustering module that is currently utilized by the FCC's Synthesis Model (SM). The customer location information was originally developed in 1997. The line count data was updated to reflect the actual Qwest Washington lines in service for year-end 2002.

Q. PLEASE EXPLAIN HOW THE CUSTOMER LOCATION DATA WAS CONVERTED TO CLUSTERS?

A. The method used to develop the clusters used in LoopMod was the SM's "divisive" clustering algorithm. This approach starts with a single large cluster and splits that cluster into successively smaller clusters. Clusters geographic sizes are limited by a maximum distribution length parameter. The default for the data used in this run of LoopMod was 18,000 feet. The smaller clusters are evaluated on the relative distance of customer locations from the weighted centroid of the old and new clusters. After the clusters are established, customer locations may be reassigned to adjacent clusters if the location is closer to that cluster's center.

IV. PLANT MIX

Q. WHAT IS MEANT BY PLANT MIX?

A. Plant mix is the relative percentages of the various facility supporting structures. The supporting structures are poles, anchors, and guys for aerial cable, trench for direct buried cable, and conduit systems for underground cable. Conduit systems include the trench, the ducts, and the splicing chambers. Each structure has its own unique costs and appropriate application. Conduit systems originating from Qwest central offices are typically used in areas where there will be multiple telecommunications cables and where access to those cables will be necessary in the future. Areas with high density, such as urban centers or the neighborhoods surrounding wire centers, are likely to have conduit systems rather than directly buried cables. Directly buried cables will be used in areas where it is likely that there will not be a need for reinforcement. Examples of this are lower density feeder routes and distribution areas. Poles (aerial cable) were used throughout the network in the past, but are being used much less frequently today. As I observed earlier, while aerial plant has a lower first cost for placement, it is subject to a higher percentage of maintenance problems due to its exposure to weather, rodents, and vandalism. Also, municipalities and homeowner groups are encouraging, and often requiring, the use of buried plant for aesthetic reasons.

Q. WHAT MIX IS UTILIZED IN THE QWEST LOOP STUDIES?

A. The LoopMod inputs designate the percentage of plant mix by density zone for underground, buried and aerial. The default inputs develop structure distance that result in 73.6% buried, 15.1% underground, and 11.3% aerial.

Q. WHAT SUPPORT DOES QWEST HAVE FOR THE DEFAULT AERIAL PERCENTAGE?

A. The aerial percentage is based on a Qwest-wide summary of cable sheath miles in service. The data is separated by type of placement (aerial, building, underground, buried and submarine) and by fiber versus copper. Data from a December 2002 report shows that aerial comprises 11.5 percent of the company-wide total sheath miles for aerial and buried cable. The comparable number for December 1996 was 14.5 percent, thus demonstrating that the use of aerial facilities is decreasing. For Washington, the December 2002 data shows that aerial cable represented 18.04 percent of total cable sheath miles. While the change from 1996 to 2002 is not a dramatic shift, it demonstrates that the percentage of aerial cable is generally decreasing and that it is highly unlikely that a network rebuild would result in an increase in aerial plant.

V. PLACEMENT COSTS

Q. WHAT ARE CABLE PLACEMENT COSTS?

A. Cable placement costs are the costs of placing cable in the ground or on poles. These costs, along with the costs of splicing and other labor-related activities, are the single largest component of outside plant costs. On average, more than 60% of Qwest's total investment in buried cable is related to the cost of placing the cable.

Q. WHAT TYPES OF WORK ACTIVITIES ARE INVOLVED IN CABLE PLACEMENT?

A. Consistent with efficient engineering practices, LoopMod includes four basic methods for placing buried cable: trenching, plowing, boring, and cut & restore. The trenching method involves digging a trench, placing the cable directly into the trench and back-filling the trench. The plowing method places cable by directly plowing it into the ground without digging a trench. Boring involves the use of equipment that literally bores through the ground and pulls the cable back through the opening in situations where, for example, cable must pass underneath a road, a sidewalk or a yard. The advantage of directional boring is that it avoids the costs and disruption that arise from tearing up roads, sidewalks, yards, and other structures. Cut & restore involves placing cable by trenching in areas such as roads, yards, and other structures that will require extra activities on both the excavation of the trench and restoration of the area after cable placement. For instance, cut & restore asphalt requires cutting and removing the existing asphalt prior to trenching and replacing the asphalt after the cable is placed.

In addition, LoopMod includes subcategories that further differentiate these activities. For trenching, LoopMod identifies different costs for trench & backfill, rocky trench and hand dig. For plowing, LoopMod includes different costs for standard plowing, rocky plowing and plowing with hydro/broadcast seed restoration. The cut & restore category has different costs for concrete, asphalt, and sod.

Q. WHAT DETERMINES WHICH TYPE OF PLACEMENT ACTIVITY WILL BE USED WHEN BUILDING OUTSIDE PLANT FACILITIES?

A. The primary determinant is typically density. For instance, if buried cable is placed in a low-density area, along a county road with few obstacles, it is likely that the construction crew can plow the cable. In a new subdivision, before curbs, gutters and landscaping are placed, trenching machines can be used for standard trench and backfill placement. When the density increases, indicating a more developed serving area, placement activities such as boring would be required to avoid damaging streets, sidewalks and landscaping. If boring is not used, then cut & restore techniques must be used to repair areas disturbed during the trench work.

Q. WHAT MODIFICATIONS DOES LOOPMOD INCLUDE RELATING TO BURIED CABLE PLACEMENT ACTIVITIES AND COSTS?

A. LoopMod V3 contains a major structural change relating to the placement of buried cable. Rather than urban feeder, rural feeder, and the five density groups, the program now utilizes the same density zones used in other industry loop cost models. There are nine density zones which range from 0 to 5 lines per square mile up to greater than 10,000 lines per square mile. Input data for placement methods and the weighted average placement costs are adjustable at the density zone level. The activity costs contained in the program are taken from the current network contracts with vendors who perform placement of buried plant in Washington. The placement activity percentages are based on data gathered through discussions with Qwest outside plant engineers, an interview with cable television employees, articles from industry trade magazines, and CLEC responses to data requests. While it is difficult to establish exactly what mix of placement methods would be used in a TELRIC replacement network, the above data sources provide a starting point based on real world experiences. The LoopMod inputs reflect the percentages of trenching, plowing, boring, cut & restore asphalt, etc. that are reasonable for each of the density zones. The default values in LoopMod Version 3 are attached as Exhibit RJB-2 to my testimony.

Q. DID QWEST MAKE CERTAIN ASSUMPTIONS WHEN IT DERIVED THE PLACEMENT COSTS USED IN THE LOOPMOD MODEL?

A. Yes, Qwest assumed that the model should reflect the cost of:

1. extending service to all of its current Washington customers; and
2. using the type of cable placing techniques that an outside plant engineer would use to build a real world replacement network in Washington.

As the first assumption suggests, the model is designed to determine the forward-looking costs of all loops, not just those placed in any given year.

Q. HOW DO THESE ASSUMPTIONS AFFECT CABLE PLACEMENT COSTS?

A. In developing the forward-looking cost of a telecommunications network designed to serve all customers, the model must recognize the world as it currently exists. The model includes all the current lines in service so as to recognize the economies of scale that would be achieved by a single service provider. Consistent with TELRIC, the model also uses the most current proven technologies and includes the efficiencies those technologies provide. The model also recognizes the methods required to place the new technologies and the need to size facilities in a way that makes economic sense. With respect to cable placement, most of the houses in Qwest's Washington service territory are in neighborhoods that are already developed and that have streets, driveways, fences, sprinkler systems, and landscaping. A carrier building a new network to serve these households would need to negotiate around, through, or under these obstacles to place its cable facilities. This would require the use of special construction techniques, such as cut & restore asphalt or concrete, boring, cut & restore sod, and hand trenching. These techniques increase the cost of placing the cable. The Qwest TELRIC model was designed to reflect these realities of placing cable in developed neighborhoods. On the other hand, the model also includes the use of low cost placement, such as cable plowing, where the density allows the use of those methods. The plowing method of cable placement is used for 48.3% of the buried cable distance (which accounts for 35.6% of the overall cable distance).[2]

Q. WOULD A FORWARD-LOOKING MODEL PRODUCE COSTS THAT ARE GREATER THAN THE HISTORICAL COSTS?

A. That would be unlikely, though it is possible. In this case, LoopMod produces significantly lower outside plant investments than exist in the embedded network. That is because the forward-looking cost of building facilities often includes economies that were not available when a carrier originally built a network. For example, in a forward-looking network, the feeder routes are designed to meet the total current demand, plus a reasonable amount of growth. In contrast, from a historical perspective, feeder was placed to meet demand for up to five years, after which it had to be reinforced. A

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[2] Overall distance includes aerial, buried and underground.

forward-looking model, such as LoopMod, won't include these reinforcement costs, because the feeder can be sized to meet all current demand, plus reasonable growth. Similarly, the outside plant network design in the model reflects the optimal use of the latest electronic circuit equipment. This equipment often is less expensive than equipment that Qwest used in the past and has greater capabilities than some of the equipment currently in use in the Qwest network.

Despite these potential cost reductions, the forward-looking costs of a network contain some costs higher than historical costs, because labor is generally more expensive today than it was historically, as reflected on the company's books. Moreover, copper cable prices are commodity-driven rather than technology driven. In other words, cable prices are more likely to change based on the commodity cost of copper rather than on technological changes in the cable itself. This is in contrast to the cost decreases or feature enhancements that technological innovations have brought to the computer (or network switching) industry. LoopMod attempts to reflect both the economies and diseconomies that would occur if the network were rebuilt. Inconsistent treatment of these various economies and diseconomies would lead to erroneous results.

Q. WHICH LOOPMOD VARIABLES REFLECT THE DIFFERING IMPACTS OF THE ASSUMPTIONS IN A TELRIC MODELED NETWORK VERSUS AN EMBEDDED NETWORK?

A. The impacts of those assumptions are reflected primarily through the treatment of four variables:

1. Loop lengths;
2. Feeder design;
3. Technology; and
4. Placement costs.

The purpose underlying a cost model will determine how it treats these variables. The variables will differ between a model used for an embedded analysis of the network and one that is used to determine the costs for a replacement network. For example, if a model is used to estimate the cost of adding new lines to the network, the loop lengths will be longer than those of the existing lines since growth typically occurs on the undeveloped outskirts of the service area. Most of the areas in close proximity to the central offices have been developed. Similarly, feeder routes are frequently reinforced as new lines are added to the network. A model designed to estimate the cost of adding new customers to the network would reflect the economies of building primarily in the undeveloped areas, but would also include the higher costs associated with longer loops and feeder cables sized to serve only the new lines.

Conversely, a model designed to estimate the total cost of rebuilding the network, such as a TELRIC model, would have different characteristics. LoopMod contains the economies of the latest proven technologies and cables sized to serve the total demand. It also includes the universe of loop lengths, not just those being placed for the lines being added to the network. To maintain consistency of assumptions, though, LoopMod recognizes that placement costs will be different in mature, developed areas than in new growth areas. The four variables must be treated in an internally consistent manner in order for a cost model to produce meaningful results. For example, one cannot assume the cost to install plant in a new, undeveloped area while including the loop lengths for the existing customers in fully developed areas.

Q. HOW DOES FEEDER DESIGN DIFFER BETWEEN A GROWTH NETWORK AND A COST MODEL THAT ASSUMES A TOTAL REBUILD OF THE NETWORK?

A. As a network grows, feeder routes are frequently reinforced to meet the increasing demand. These reinforcements are designed to allow for approximately two to three years of additional growth. A new network would be built to account for all lines at once. Feeder routes could be designed and constructed once, eliminating the periodic reinforcement costs that have occurred in the existing network. Building one feeder system to serve all customers optimizes the economies of scale that can be achieved, reducing the cost per customer. LoopMod includes these economies in the feeder cable designs.

Q. HOW WOULD PLACEMENT COSTS VARY BETWEEN NEW CONSTRUCTION IN AN EXISTING NETWORK AND A COMPLETE REPLACEMENT OF THE NETWORK?

A. New “growth” distribution areas typically occur in undeveloped areas. In these areas, there are no roads, no sprinkler systems, no sidewalks, no landscaping, no fences, and typically no yards. As a result, placement of plant in these areas is less costly, and there is more opportunity to share structures. In existing developed areas, all these obstacles must be negotiated around or under or replaced when the construction is completed. Obviously, this significantly increases the costs of placing cable. LoopMod includes a percentage of aerial plant that is based on the amount of aerial plant that exists in the Qwest network today. The use of this amount of aerial plant is a conservative cost assumption since, as a percentage of total cable sheath mileage, the use of aerial plant is declining each year. This decline is due to both aesthetic concerns and the higher maintenance costs associated with aerial plant. Because aerial plant is more exposed to the elements than other types of plant, it is much more susceptible to damage and wear and tear and therefore requires greater maintenance expenses. If these higher maintenance expenses are properly accounted for in a cost model, they often result in aerial plant not being a least-cost approach, since the maintenance costs can outweigh the comparatively lower initial placement costs for this type of plant.

Q. WOULD A LARGE PERCENTAGE OF THE NETWORK REPLACEMENT CONSTRUCTION OCCUR IN NEW OR UNDEVELOPED AREAS?

A. The majority of the distribution construction would occur in mature, developed areas if the network were, as the TELRIC methodology assumes, completely replaced. However, the LoopMod default values conservatively reflect the amount of placing cost that LoopMod eliminates under the assumption that placement would occur in undeveloped or growth areas. This assumes that developers or other utilities will pay 20% of all placing costs for buried plant. Feeder plant placement would also be more likely to occur in developed areas in a network replacement. The percentage of lines that would be placed in undeveloped areas is dependent on the planning period and the growth rate assumed in the study and must be consistent with the other design assumptions.

Q. WHY ARE THE DIFFERENCES IN THE CHARACTERISTICS OF NEW LOOP CONSTRUCTION AND A REBUILD OF THE TOTAL NETWORK CRITICAL IN DETERMINING REASONABLE COSTS?

A. It is the interplay between all of these variables that determines the reasonableness of the cost estimates. If the assumptions are consistently applied, the resulting cost estimates will be reasonable. The loop lengths and feeder design assumptions in a cost model should reflect a rebuild of a total network to serve all Qwest customers in Washington. The cable placement costs must be consistent with these loop lengths and feeder design assumptions. In other words, if a study includes all of the customers with the associated shorter average loop lengths and the economies of larger cable sizes, then the study must include costs of placing plant in areas with streets, houses and landscaping. If the inputs are not consistent, the result will not comply with the requirements of TELRIC.

Q. HOW DOES LOOPMOD ACCOUNT FOR OBSTACLES ENCOUNTERED WHEN BUILDING FACILITIES IN DEVELOPED AREAS?

A. Qwest uses a combination of placement techniques to model the cost of building networks in developed areas. The ICM interface allows the user to vary these combinations as density changes. In rural areas, where less costly placement techniques such as plowing are often employed, the model allows the use of these methods.

Q. WHY IS PLOWING CABLE A LESS COSTLY PLACEMENT TECHNIQUE THAN OTHER PLACEMENT METHODS?

A. Plowing is less labor-intensive than normal trenching, since the plow opens the trench, lays the cable, and backfills the trench in one operation. Plowing is used where there are long cable runs without significant obstacles.

Q. HOW DOES LOOPMOD CALCULATE PLACEMENT COSTS IN DEVELOPED URBAN AREAS?

A. In higher-density urban areas, LoopMod assumes the use of placing techniques such as cut & restore sod, cut & restore concrete, cut & restore asphalt, boring, and hand digging. These activities reflect the placement difficulties that exist in mature neighborhoods. The levels of the activities were derived through interviews with field engineers and confirmed through an analysis of Qwest's experience in the Omaha Broadband Trial as well as upgrade projects conducted by CLECs and cable television operators. The technical trial in Omaha involved placement of a distribution network in mature neighborhoods. This provided real-world experience relating to what methods of placement activities would be required for an ILEC to replace plant or a new entrant to build facilities in developed areas. In Omaha, the construction crews were forced to use directional boring to place over 65 percent of the new facilities in order to circumvent obstacles in mature areas. As the Omaha experience demonstrated, directional boring is appropriate when the cost of restoration, coupled with customer dissatisfaction due to property damage, outweighs the additional cost of using this placement technique. Qwest is not alone in employing this technique. Boring is a common method of placing cable in urban areas to avoid the high cost of restoration and the disruption that goes with it.

Q. HAS QWEST GATHERED ANY OTHER INFORMATION THAT SUPPORTS THE ASSUMPTIONS REGARDING USE OF BORING TO PLACE CABLE IN DEVELOPED URBAN AREAS?

A. Yes. First, an article in the April 15, 1995 issue of America's Network (a periodical written for engineers and managers responsible for design, deployment, operation and maintenance of public network elements) estimated that in 1994, 25 percent of underground utility placement was done via trenchless methods (i.e., boring). In addition, the article cited an AT&T project in Atlanta, Georgia in which Southern Boring, an AT&T subcontractor, placed 30,000 feet of underground cable using directional boring. The boring method was utilized because it avoided the "disruption and mess excavation would have caused." In discussing the Qwest (then U S WEST) Omaha broadband project, the article further stated that "directional boring may not completely replace other methods. Trenchers and vibratory plows also played a part in the Omaha project and will continue to do most of the work in ***unimproved areas free of utilities*** and where surface disturbance isn't a factor." (emphasis added) Second, representatives of Qwest conducted an interview of representatives of a cable television company in Bismarck, North Dakota. Their experience in conducting a rebuild of the outside plant provided insight and support for the mix of placement activities currently used in LoopMod. In the Bismarck rebuild, approximately 50 percent of the 220 miles of buried plant was placed using boring techniques. A copy of the article and notes from the interview are provided as Exhibit RJB-3 and Exhibit RJB-4. Third, over the last year and a half, I visited several sites where contractors for AT&T Broadband (now Comcast) were upgrading and replacing cable plant. This work involved extensive use of hand-dig, missile, and directional boring techniques. In another example of the techniques that would be used in a replacement network, Qwest was required to place plant in two sub-divisions in Arizona after the homes were built and landscaping was in. This was due to problems the developer experienced with the facilities-based CLEC who had initially built the distribution plant. The placement of Qwest's facilities required the use of directional boring, hand-dig, and cut & restore sod. Directional boring allowed the construction crews to avoid damaging the existing power, CATV and telephony plant. Trenching and plowing would have entailed a far greater risk to that plant. An article in a recent construction trade magazine[3] highlighted an Iowa firm that had completed projects for AT&T, McLeod, Qwest (then U S WEST), and other independent telecommunications companies. The article stated that 60 percent of the underground work was done using horizontal directional drilling. Finally, an article entitled "Copper Cable a Major Player in Telecommunications" in the January 2001 issue of Utility Products Showcase[4] stated that horizontal directional drilling plays a big role in telecommunications construction. The CEO of the North Carolina telecommunications construction firm highlighted in the

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[3] Gaylord Construction Inc at http://www.ditchwitch.com/dwcom/OnTheJob/JobDetailNoNav/187

[4] *See* http://www.utilityproducts.com/Articles/jan01art.html

article said that when placing facilities within cities, 50 percent or more of the work is done by directional drilling.

Q. WHY SHOULD THIS COMMISSION ACCEPT THE PLACEMENT COSTS CONTAINED IN THE QWEST TELRIC MODEL?

A. The Commission should accept LoopMod's placement costs and selection of placement methods because:

- They are based on the costs that an efficient carrier would incur to place facilities; and
- They are consistent with the other assumptions used in the model.

Q. WOULD IT BE APPROPRIATE FOR THE COMMISSION TO USE A MODEL THAT REFLECTS ONLY THE CHARACTERISTICS OF NEW LOOPS AND DOES NOT RECOGNIZE THE HIGHER PLACEMENT COSTS ASSOCIATED WITH LAYING CABLE IN DEVELOPED NEIGHBORHOODS?

A. No. That approach would violate TELRIC principles, because it would address only the costs of new customers, not the costs for serving existing demand. In addition, a growth model that develops only the costs of adding lines to the existing network should generally produce higher loop costs than a total network or TELRIC model. The economies in a TELRIC model that are realized by serving the entire universe of loop customers do not exist for a growth model that focuses on a much smaller group of customers. It is clear that the costs calculated by a growth-only model do not represent the TELRIC costs for unbundled loops.

VI. STRUCTURE SHARING

Q. WHAT IS MEANT BY THE TERM "SHARING" IN THE OUTSIDE PLANT ENVIRONMENT?

A. Sharing in this context refers to the sharing of cable placement costs among multiple utility companies. Structure includes poles for aerial cable, conduit systems for underground cable, and trench for buried cable. For instance, in Washington, Qwest owns poles on which the power company attaches some of its cables. In addition, Qwest attaches its cables to poles owned by the power company. Pole sharing agreements like these allow each company to avoid a portion of the costs of building pole structures and thereby reduce costs (not to mention avoiding the aesthetic and governmental problems with attempting to build duplicate pole lines). In new subdivisions, where several facilities (cable television, telephone and power) are able to be placed at the same time, there are times when it is possible to coordinate trenching activities and the placement of facilities among the different utility companies. Sharing is a viable tool in the limited circumstances where multiple providers are placing outside plant at the same time in the same area or where, in the case of poles, the existing structure is accessible at any time.

Q. IS STRUCTURE SHARING ALWAYS AN AVAILABLE OPTION?

A. No. For sharing to be feasible in placing buried cable, multiple providers must be able to access a certain area at approximately the same time. In the TELRIC studies, the vast majority of the network is in areas that already have power and cable television. For those areas, a rebuild of the network will not involve sharing among multiple facility providers, since the other providers already have their facilities in place. The rebuilds in Omaha and Bismarck, mentioned earlier, yielded minimal trench sharing opportunities. In addition, there are certain placement techniques, such as plowing and boring, for which the simultaneous placement of multiple cables is not technically feasible or practical. While it is possible to plow in multiple cables at the same time this is usually done in long-haul applications with like facilities, not in distribution areas with telephone, coax, and power. The different facilities have varying slack requirements, which would make the use of a plow inefficient. Even pole lines have separation and clearance requirements that may preclude attachment to an existing structure.

Q. WHAT ASSUMPTIONS DID QWEST UTILIZE IN LOOPMOD RELATING TO SHARING THE COSTS OF PLACING FACILITIES?

A. The ICM interface provides access to the structure sharing assumptions used in LoopMod. This option gives the user the ability to specify the percentage sharing for aerial, underground, and buried. This information is further disaggregated to allow the user to specify a unique percentage for distribution versus feeder for each density zone classification. The user can also adjust the amount of structure sharing for buried drops in each density zone.

Q. PLEASE SUMMARIZE THE SHARING INPUTS RECOMMENDED BY QWEST.

A. Qwest assumes that 80 percent of the buried placement costs, 95 percent of the underground placement costs, and 50 percent of the aerial placement costs will be incurred by the incumbent telephone company. The costs that the telephone company does not bear because of the use of these percentages are assumed to be borne by other utility companies, such as power or cable television providers. The inputs that Qwest recommends assume that the opportunity to share will occur primarily in new developments where a developer will provide the trench at no cost to the company. In older, existing neighborhoods or areas where there is no developer, the company will bear the cost of trenching, and there will be little opportunity to share.

Q. IS IT APPROPRIATE TO ASSUME QWEST WOULD ALWAYS SHARE WITH OTHER TELECOMMUNICATIONS PROVIDERS?

A. No. Making an assumption of widespread structure sharing with other telecommunications providers is inconsistent with the other study assumptions and with TELRIC. It is doubtful that any one company or any combination of companies will build a second ubiquitous telecommunications network. In fact, in many areas, it is doubtful that anyone will even build a land-based network. Despite this fact, AT&T has asked commissions in other jurisdictions to adopt a scenario in which, on average, three companies, including other telecommunications companies, would share the costs of placing the total network. AT&T's assumption is utterly unrealistic and is not supported by real world experiences. In argument before the Utah Commission on October 22, 2002, counsel for AT&T Broadband confirmed that in upgrade situations "AT&T Broadband . . . doesn't have an opportunity to share our facilities."[5] Thus, unless the plant placement activity is taking place in a new development it is highly unlikely that

[5] Transcript, Hearing on Motions, October 22, 2002 (Docket No. 01-049-85), at 23.

there will be a significant amount of structure sharing. Sharing with other telecommunications companies is at odds with the economies assumed in a TELRIC single provider network. There is certainly no evidence of that level of sharing in any real world application.

Q. TO WHAT EXTENT HAS QWEST ACTUALLY BEEN ABLE TO SHARE THE COSTS OF PLACING BURIED CABLE?

A. Based on data from Qwest's buried placement records, for the years 2000 and 2001, Qwest has been able to share trench for approximately 20.2% (16.4% in Washington) of the buried sheath footage placed. If one makes the incredibly over-optimistic assumption that there will be three utilities in the joint trench[6] (with one third of the cost assigned to Qwest) the LoopMod input based on the Washington numbers would be 10.9% (1 -((1-.164)+(.164/3))). This compares to the 20% being utilized as the recommended input in the ICM. Qwest's actual experience reflects realistic sharing opportunities only in growth environments with new developments and, therefore, overstates the amount of sharing that reasonably can be expected in a TELRIC replacement rebuild of the entire network. The standard input of 20 percent used in LoopMod is a liberal estimate of the buried plant structure sharing that would occur in building a replacement network. In the HAI Inputs Portfolio discussion of sharing, the developers cite the "accelerated facilities based entry by CLECs"[7] as a justification for concluding that significant sharing would

[6] Sharing situations may also involve only one other utility, in which case Qwest's share would be one-half, rather than only one-third.

[7] HM5.2a_HIP.DOC, page 166

take place with other CLECs. If the advent of additional facilities-based providers is interpreted as an opportunity to share trench for the placement of distribution plant (though there is no real world evidence to support it), then there needs to be a corresponding recognition of the adverse impact on the utilization of Qwest distribution facilities. Standard distribution design will dictate that Qwest will build plant to every home in a serving area. If a CLEC is willing to share a trench in a sub-division, it is obviously going to do so on the expectation of selling its services to a significant percentage of the potential customers in that subdivision. That, in turn, necessarily will reduce the use of Qwest distribution plant in the same subdivision. Thus, if Qwest builds the same level of plant, it will realize a much higher percentage of unused lines (thus decreasing the fill factor).

VII. FILL FACTORS

Q. PLEASE BRIEFLY EXPLAIN WHAT FILL FACTORS ARE.

A. Fill factors, or utilization factors, are simply a relationship between the capacity of plant that will be provided or constructed and the amount of that plant that will be used. The feeder cable fill inputs to LoopMod are a maximum desired utilization at the point in time when the cable is placed. The cable or equipment selected will have the additional capacity associated with the fill or sizing factor as well as the additional capacity from selecting discrete cable and equipment sizes. For example, a location that has demand for 60 working pairs would select a 100 pair cable based on the following calculation: demand (60 lines) divided by sizing factor (80 percent) equals 75 pair requirement. The next larger cable to meet a 75 pair requirement is a 100 pair facility. The effective fill would actually be 60 percent (60 working lines divided by 100 available pairs). The methodology is the same with Digital Loop Carrier (DLC) equipment. The default sizing factor for both cable and DLC systems is 80 percent. The line cards for the DLC systems are sized using a 90 percent factor, as they can be more readily reinforced than cables and DLC systems.

Q. ARE DISTRIBUTION FILL FACTORS USED IN THE LOOPMOD PROGRAM?

A. LoopMod use cable sizing factors to select the branch and backbone distribution cables. The Qwest studies assume a certain network design of two pairs for each living unit. The distribution cable is sized to reflect this assumption. The sizing factor default input is 50 percent. This provides each location enough capacity to accommodate both primary and additional line demand.

Q. WOULD CHANGES IN THE SIZING FACTOR SIGNIFICANTLY CHANGE THE COSTS PRODUCED BY THE MODEL?

A. No. Since the factor is only used to size cable, only the cost of the cable itself is affected. A 100 pair cable is not twice as expensive as a 50 pair cable. A 100 pair cable costs $1.26 per foot, only $0.37 more than the $0.89 cost of a 50 pair cable. Thus, increases in cable size do not have a one-for-one impact on the costs produced by a model.

Q. WHAT IS THE AVERAGE NUMBER OF ACCESS LINES IN USE PER RESIDENCE CURRENTLY IN WASHINGTON?

A. According to data from the Qwest Integrated Forecasting Tool (IFT), as of December 2002, there were 1.178 working lines per residence. The additional 0.178 lines per location are the result of situations where customers require a second, third or even fourth line. Thus, a multi-pair design allows the company to respond to demand for additional pairs, regardless of where the demand exists in a neighborhood, with a minimum of additional investment and without disruptive reinforcements. In addition to being economically efficient, building distribution plant in this fashion is consistent with the Qwest and the Washington Commission's goal to minimize held orders.

VIII. NETWORK COMPONENTS

Q. WHAT OTHER ITEMS ARE INCLUDED AS INPUTS TO THE LOOPMOD PROGRAM.

A. In addition to inputs for plant mix, placement cost, sharing percentages and fill factors, the model also requires costs for all of the equipment that is required to build the local loop. This includes copper and fiber cabling, digital loop carrier systems, SAIs, building terminals, drop terminals, drop wires, and NIDs.

Q. HOW DOES LOOPMOD DEVELOP COSTS FOR THESE INPUTS?

A. The costs for the equipment inputs are derived from network databases that contain the vendor contract prices for each of the equipment items as well as the associated engineering and installation costs required to place that equipment into service. These costs reflect what Qwest is actually paying to purchase and install this equipment in Washington today.

IX. CONCLUSION

Q. PLEASE SUMMARIZE YOUR TESTIMONY.

A. The loop module of the ICM program presented in this docket utilizes efficient network designs and data inputs based upon currently available technology. The data inputs reflect what Qwest pays vendors for network components and outside plant construction. The program provides the user the ability to adjust a wide variety of model variables. The model's underlying structure is based on valid engineering guidelines. The model develops a realistic estimate of the investment for an unbundled loop. It does this in a consistent fashion, recognizing the economies of forward-looking technologies and feeder cable sizing used in serving the universe of existing customer locations, while also including the placing costs that would be incurred in a rebuild of the existing network or would be faced by a new entrant. The model assumptions comply with the TELRIC guidelines concerning technology, access line demand and utilization levels. These inputs and assumptions are discussed in detail in Exhibit RJB-2 attached to this testimony.

Q. DOES THIS CONCLUDE YOUR TESTIMONY?

A. Yes it does.