# Direct Testimony
# of
# Dennis Pappas

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BEFORE THE
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| IN THE MATTER OF DETERMINING PRICES | ) | |
| FOR UNBUNDLED NETWORK ELEMENTS | ) | TC01-098 |
| (UNEs) IN QWEST CORPORATION'S | ) | |
| STATEMENT OF GENERALLY AVAILABLE | ) | |
| TERMS (SGAT) | ) | |

# DIRECT TESTIMONY

OF

DENNIS PAPPAS

QWEST CORPORATION

OCT 15, 2002

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## I. IDENTIFICATION OF WITNESS

**Q. PLEASE STATE YOUR NAME, EMPLOYER AND BUSINESS ADDRESS.**

A. My name is Dennis Pappas. I am employed by Qwest Corporation as a Director in the Technical-Regulatory Group of the Local Network Organization. My business address is 700 W. Mineral Avenue, Room MNH19.15, Littleton, Colorado 80120.

**Q. PLEASE DESCRIBE YOUR WORK EXPERIENCE, TECHNICAL TRAINING, AND PRESENT RESPONSIBILITIES.**

A. I have worked in the telecommunications industry for 24 years. Between 1996 and 2001, I was directly associated with Interconnection and Wholesale Product Marketing. My first responsibilities in this area were as State Interconnection Manager for Colorado and Wyoming, a position that involved project management of all collocation activity. I later became a team leader for the Unbundled Loop and Collocation product teams. Subsequently, I became the Director of the Wholesale Product Marketing team. During that time I led several groups in developing new products and processes for provisioning interconnection products and services for competitive local exchange carriers ("CLECs"). Subsequent to that assignment, I was the General Manager for Qwest Wholesale Emerging Diversified Markets and had responsibility for approximately 75 CLEC accounts. In late 2000, I left Qwest to accept a position as Vice President of Services at TESS Communications, a facilities-based CLEC in Colorado and Arizona that provided a suite of services, including telecommunications, data, long distance and cable TV, to approximately 1,200 end users. In early 2001, I assumed the role of President of TESS with responsibility for the day-to-day operations of the company. I left TESS in that same year and returned to Qwest, where I again worked on the unbundled loop product team and began participating as a witness in a number of section 271 workshops. In December 2001, I accepted my current role as Director in the Technical Regulatory Group, Local Network Organization.

Prior to the years working in the area of interconnection, I held multiple titles and positions requiring expertise in network operations, including, for example, Staff Manager and Regional Service Manager in the Local Networks Organization. In the 14 years prior to those assignments, I worked in Network as an Installation and Maintenance Technician (I&M Technician) and Outside Plant Technician. As an Outside Plant Technician, I was responsible for placing network facilities throughout Northern Colorado utilizing all of the placement methods incorporated into Qwest's unbundled loop cost model, LoopMod. I have placed both aerial and buried plant made up of both fiber and copper-based facilities utilizing all placement methods – underground placement, trenching, plowing, and aerial placement. I have extensive experience placing facilities in new developments as well as replacing different parts of the network on a rehab basis. I estimate that during my years as an I&M technician, I installed approximately 12,000 service orders for end users and was dispatched on an additional 8,000 repair reports. I have also repaired numerous damaged and cut cables and have had extensive field experience involving cable maintenance. I performed many of these tasks as recently as 1998. I have my bachelor's degree in Business Administration and a Masters in Telecommunications from the University of Denver.

## II. OVERVIEW OF TESTIMONY

**Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY?**

A. The purpose of my testimony is to support the engineering inputs and network architecture assumptions that were used in developing the charges for certain Qwest products and services.

**Q. PLEASE PROVIDE AN OVERVIEW OF YOUR TESTIMONY**

A. My testimony focuses on several network-related issues, including collocation and associated elements, the assumptions relating to the engineering inputs made in the LoopMod portion of Qwest's Integrated Cost Model ("ICM"), average drop lengths, loop conditioning, loop extension technology, loop provisioning options and subloops.

In Section III of my testimony I describe the different types of collocation offered by Qwest. I cover the technical requirements relating to the basic network elements that are essential in facilitating a CLEC collocation within

Qwest premises. This portion of my testimony is meant to describe collocation at a high level of understanding, dealing with the major elements which are common to all collocation types and is not meant to align with each individual component of collocation as represented in Qwest's cost model.

Section IV of my Direct Testimony addresses the engineering assumptions presented in LoopMod. That testimony demonstrates that the network-related inputs in LoopMod are reasonable and are based upon forward-looking engineering practices. As I discuss in that testimony, it is important to recognize that the LoopMod engineering assumptions are interdependent. By that, I mean if one engineering assumption/input is modified, other related and/or dependent engineering assumptions/input must be analyzed to determine if they too are affected by the modification. This insures consistency in network design and architecture. LoopMod permits this process of easily modifying inputs and assumptions to ensure consistency in network principles and the design of a real-world network that uses efficient, currently available technologies and engineering practices. It is important to emphasize that these network and engineering assumptions are for use in a TELRIC-based cost model, which assumes that Qwest would be constructing a new replacement network, as opposed to a growth model. This replacement network would be built in areas with existing structures – both above and below ground – in place and consideration must be given, therefore, to how the presence of these structures affects engineering assumptions and inputs. My testimony relating to LoopMod also addresses critical inputs and assumptions relating to the design of feeder and distribution plant. They are:

(1) The extent to which an efficient carrier is able to share the costs of placing cable structure with other utility companies, often referred to as structure sharing.

(2) Cable placement methods used to construct a replacement network, specifically, underground buried and aerial placement methods.

(3) The fill factors or utilization levels that are assumed to exist in the network.

(4) The assumptions behind the planning engineering and design of a distribution network.

Section V briefly describes the average drop distances produced and proposed by Qwest's ICM.

Section VI discusses loop conditioning, along with a brief description of the bulk de-loading project concluded by Qwest in 2001.

Section VII of my testimony discusses the issue of Extension Technology and defines the limited circumstances under which charges for this technology apply.

Section VIII describes and defines the five different loop provisioning options that Qwest offers to CLECs, explaining the different activities that Qwest must perform for each of these options.

Section IX of my Direct Testimony describes access to the subloop particularly in a multi-tenant or multi-dwelling environment.

## III. COLLOCATION

### A. DESCRIPTION

**Q. PLEASE DESCRIBE QWEST'S COLLOCATION OFFERINGS.**

A. Collocation is an arrangement under which Qwest provides space in its premises for the placement of CLEC equipment to be used for the purpose of interconnection or access to unbundled network elements (UNEs) and ancillary services. Collocation includes the leasing to CLECs of the physical space within Qwest premises, and the resources necessary for the operation and use of the collocated equipment within that space. These resources include power, HVAC (heating, ventilation and air conditioning), and cabling, as needed, within the Qwest premises. There are currently multiple types of collocation available: Virtual Collocation, Caged Physical Collocation, Cageless Physical Collocation, Shared Caged Physical Collocation, Interconnection Distribution Frame (ICDF) Collocation, Adjacent Collocation, Common Area Splitter Collocation, Remote Collocation, Facility Connected Collocation and Field Connection Point/Cross Connection Collocation. In addition, other non-standard types of collocation may be requested through the bona fide request ("BFR") process.

Q. **PLEASE EXPAND ON THE DIFFERENT TYPES OF COLLOCATION OFFERED BY QWEST.**

A. The following is a brief description of the ten different types of collocation as offered by Qwest:

- **Virtual Collocation** – In a virtual collocation arrangement, Qwest requires the CLEC to purchase and deliver to Qwest equipment to be collocated in the Qwest premises. Qwest will install, repair and maintain the CLEC-owned equipment in Qwest owned central office bay equipment. The CLEC does not have physical access to its "virtually" collocated equipment.
- **Caged Physical Collocation** – Under a caged physical arrangement, a CLEC leases caged floor space for the placement of its equipment within a Qwest premises. The CLEC is responsible for the procurement, installation, and on-going maintenance of its equipment as well as the cross connections required within the cage.
- **Cageless Physical Collocation** – This arrangement allows for the lease of a non-caged area within a Qwest premise by the CLEC. Space is made available in single frame bay increments using industry standard bay

configurations where a CLEC can place and maintain its own equipment. The CLEC is responsible for the procurement, installation and on-going maintenance of its equipment as well as the cross connections required within its leased collocation space.

- **Shared Caged Physical Collocation** – This type of shared collocation allows for two or more CLECs to share or sublease a single collocation enclosure. Under shared physical collocation, one CLEC obtains caged physical collocation from Qwest and another CLEC may share use of that space. The CLEC(s) are responsible for the procurement, installation and on-going maintenance of their equipment as well as the cross connections required within the leased collocation space, just as they would be in a standard caged physical collocation arrangement.
- **Interconnection Distribution Frame (ICDF) Collocation** – Under ICDF collocation, a CLEC need not collocate equipment in a Qwest wire center to obtain access to UNEs and ancillary services. Via the ICDF, access to UNEs and ancillary services is provided via tie cables to various points within the Qwest wire center (e.g., MDF, COSMIC[1] or DSX, etc.). The ICDF may be (and usually is) shared by multiple providers.
- **Adjacent Collocation** – In instances where space is exhausted in a particular Qwest premises making physical collocation impossible, Qwest, to the extent it is technically feasible, makes available space in adjacent structures. These structures can include controlled environmental vaults,

controlled environmental huts or other similar structures. In addition, Qwest will permit CLECs to construct or otherwise procure an adjacent structure on property owned leased or otherwise controlled by Qwest (subject to applicable OSHA, EPA, federal, state and local safety and maintenance requirements and Qwest design and space planning for the site). In every other respect, an adjacent collocation will be handled as a caged physical collocation with Qwest responsible for providing power and other physical collocation services. The CLEC is responsible for the procurement, installation and on-going maintenance of its equipment as well as the cross connections required within the leased collocation space.

- **Common Area Splitter Collocation** - If a CLEC is engaged in line sharing and elects to have POTS splitters (splitters) installed in a common area within a Qwest wire center via standard collocation arrangements, a CLEC can either purchase the splitters or have Qwest purchase them. If the CLEC requests that Qwest procure the splitters on the CLEC's behalf, Qwest recovers the cost for the splitters from the CLEC. The splitters must meet the requirements for central office equipment collocation set by the FCC. The CLEC will be responsible for installing and maintaining the splitters in its collocation areas within Qwest wire centers.
- **Remote Collocation** – A remote collocation arrangement allows a CLEC to collocate equipment in or adjacent to a Qwest remote location subject to technical feasibility. Such remote locations include controlled

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[1] COSMIC is a trademark of LUCENT Technologies

environmental vaults, controlled environmental huts, cabinets, pedestals and other remote terminals. Responsibility for installed equipment mirrors cageless collocation requirements with each party responsible for the procurement, installation and maintenance of its own equipment.

- **Facility Connected Collocation -** This type of collocation allows a CLEC to access Unbundled Elements, Ancillary Services and Finished Services within a Qwest central office via an entrance facility without collocating physical equipment in the central office. FC Collocation takes place on a termination block or termination panel within the designated wire center and is engineered by Qwest. Terminations can include but are not limited to copper or fiber cable at this demarcation point in order to access UNEs, Ancillary Services or Finished Services within a Qwest central office.

- **Field Connection Point (FCP)/Cross Connection** – This type of Collocation establishes a demarcation point outside of the Qwest central office in order for a CLEC's facilities to interconnect with Qwest facilities. The FCP is located in the Feeder Distribution Interface (FDI) / Serving Area Interface (SAI) or other accessible terminals such as controlled environmental vault or controlled environmental huts. The FCP provides a point of interconnection away from the Qwest central office and will provide access to the sub loop elements currently offered by Qwest. In all cases, collocation is for placement of equipment necessary for interconnection and for access to UNEs and ancillary services.

**Q. IS ONE TYPE OF COLLOCATION PREFERRED BY QWEST?**

A. No, Qwest supports all types of collocation equally. The choice of type of collocation is driven primarily by the CLEC's business strategy. Secondarily, however, there may be instances where the physical characteristics of a given location may make it impossible for Qwest to satisfy a CLEC request for a specific type of collocation. For example, space at a given wire center may not be sufficient to permit caged physical collocation as requested by a CLEC. Given such a physical constraint, Qwest then makes available adjacent, cageless physical or virtual collocation as an alternative.

## B. COLLOCATION ELEMENTS

**Q. WHAT ARE THE NETWORK ELEMENTS ASSOCIATED WITH COLLOCATION?**

A. Speaking at a macro-level, the basic elements for all types of collocation are essentially the same. They are space, facility access to the collocation space, security, terminations, and power and grounding. In the instance of caged physical collocations, including shared physical collocation, the enclosure represents an additional element.

**Q. PLEASE EXPLAIN HOW SPACE CAN BE SEEN AS A COLLOCATION ELEMENT.**

A. Floor space within a Qwest central office is a valuable commodity not only as real estate, but also as an important element of collocation. As an element of collocation, the space within a central office that is not being utilized by Qwest is made available for use by CLECs for placement of their telecommunications equipment. This vacant space is "pre-conditioned" for use with telecommunications equipment. In addition to the actual physical square footage, it carries with it environmental components such as heating, ventilation and air conditioning (HVAC), access to power, cabling infrastructure and enhanced floor load capacity. When dealing with virtual collocation, ICDF collocation and remote collocation space is measured in terms of spare capacity on existing Qwest equipment bays, frames or shelves within a Qwest location.

**Q. HOW ARE CLECs NOTIFIED OF AVAILABLE SPACE WITHIN ANY GIVEN QWEST WIRE CENTER?**

A. The CLECs have two reports available when inquiring into space availability from Qwest. The first report is the Space Denial Report that reflects a list of locations where CLEC requests for space have been denied. The second report is the Space Exhaust Report that will inform the CLEC of those offices where Qwest is currently out of space. Both of these sites can be accessed at website http://www.qwest.com/wholesale/notices/collo/spaceAvail.html

As of September 20, 2002 Qwest did not have any locations within the 14-state region where space continues to be denied.

**Q. PLEASE DESCRIBE FACILITY ACCESS AS A COLLOCATION ELEMENT.**

A. A CLEC must have a method by which to connect its transmission facilities to its collocation within a Qwest central office. For virtual and physical collocations, a CLEC may choose from four options to obtain facilities access to its collocation. They are: 1) fiber entrance facilities, 2) purchase of private line or access services, 3) UNEs and 4) microwave entrance facilities. Other entrance facility technologies may be requested through the BFR (bona fide request) process.

**Q. PLEASE DESCRIBE COLLOCATION ENTRANCE FACILITIES.**

A. Qwest offers the following three fiber collocation entrance facilities options:

- **Standard Fiber Entrance Facility** - A standard entrance facility provides fiber connectivity between a CLECs fiber facilities as delivered to the collocation point of interconnection and the CLECs collocation space. A CLEC will deliver its fiber facilities to the collocation point of interconnection (C-POI) where Qwest will assist in the placement of the CLEC's cable into the C-POI and perform all splicing to the Qwest provided fiber entrance facility cable. This fiber entrance facility cable is taken into the central office where it is terminated onto a Fiber

Distribution Panel (FDP). A fiber interconnection cable is placed from the FDP to the collocation space where it is handed off to the CLEC.

- **Cross-Connect Fiber Entrance Facility** – The cross-connect fiber entrance facility provides connectivity between a CLEC's fiber facilities as delivered to a C-POI and multiple locations within a Qwest central office. A CLEC will deliver its fiber facilities to the C-POI where Qwest will assist in the placement of the CLEC's cable into the C-POI and perform all splicing to the Qwest provided cross-connect fiber entrance facility cable. This entrance facility fiber cable is then taken into the central office where it is terminated onto the first of two FDPs. A second FDP is connected, via fiber interconnection cables, to multiple locations within the central office and/or various types of equipment within the same central office. Cross-connections between the two FDPs are made with fiber interconnection cables, thus allowing access to multiple locations and types of equipment. This option provides flexibility in distributing fibers and readily supports applications where CLECs would require access to multiple points within one central office. A good example of this would be CLECs with multiple collocation spaces within a single central office.

- **Express Fiber Entrance Facility** – Qwest will place a CLEC-provided fiber cable from the C-POI directly to the CLEC's collocation space. This option is only available with a physical collocation. At the C-POI, Qwest will accept the CLEC fiber cable and continue placement of the cable through the central office to the CLEC collocation space where it is handed back to the CLEC. This is an uninterrupted path with no splices or cross-connections. It is important to note that this option does not provide for any test access by Qwest and, as such, the CLEC is fully responsible for the cable. In addition, this alternative is available only in wire centers with sufficient duct and inner-duct capacity.

**Q. PLEASE DESCRIBE WHY SECURITY IS CONSIDERED A PHYSICAL COLLOCATION ELEMENT.**

A. Historically, Qwest had restricted central office access to employees and authorized contractors in order to protect the network and to ensure service quality. With the implementation of physical collocation and the CLEC's need to access their collocated equipment within Qwest's central office s on a 24x7 basis, access is granted to CLEC employees and contractors as well. Qwest central office technicians and CLEC technicians are provided like access privileges within each central office. As such, Qwest has deployed electronic card readers at central office entrances that, when activated by a technician's ID badge, will unlock the doors allowing entry and track technician traffic into and out of an office. Qualified CLEC employees requiring access to the central office shall go through a security check before being issued ID badges. This security check is part of the physical collocation request process. The security check generally takes between three and ten days. Ms. Million's security costs are based on these activities.

**Q. PLEASE DESCRIBE TERMINATIONS AS AN ELEMENT OF COLLOCATION.**

A. CLECs may purchase terminations for the purpose of accessing unbundled network elements. These terminations may be requested in shared access and direct connection configurations.

In a shared access configuration, various frame types are designated as demarcation points within a central office with potentially multiple service providers appearing on the designated frame. This element includes Qwest-provided termination blocks and the associated installation labor between the CLEC's collocated equipment and the designated frame or cross-connect device.

In a direct connection configuration, a CLEC can obtain an uninterrupted, single provider path between its collocation and an existing frame or cross-connect device. This connection is designed from the collocation space to the same frame that Qwest uses to connect to that specific service. Ms. Million's testimony provides the costs of implementing both on a frame and as direct connections.

In shared access configurations, terminations are available in DS0, DS1, DS3 and OCn levels. In direct connection configurations, terminations are also available in DS0, DS1, DS3 and OCn levels, with DS0 level terminations offered per 100 pair block or individual termination. Each termination consists of the cable placement, a cable block and the cable block placement.

**Q. WHAT IS DC POWER?**

A. Most telecommunications equipment is powered by DC power. There are two types of power: alternating current (AC) and direct current (DC). AC is the power form used to operate most household appliances and other common equipment. It is the form of power that is produced by power plants. Its name derives from the fact that the electrons that transmit the current alternate directions in the transport medium. Electrons flow in a single direction in a DC power circuit. Most electronic circuit equipment requires the use of DC power. In most instances, as with computers, the equipment includes a small rectifier to convert the AC power from the outlet to the DC power used by the equipment. In a standard telecommunications central office this conversion is done by the power plant, eliminating the need to have the converters (i.e. rectifiers) on each piece of electronics used to provide telecommunications services.

**Q. PLEASE DESCRIBE HOW DC POWER IS SUPPLIED TO TELECOMMUNICATIONS EQUIPMENT IN THE CENTRAL OFFICE**

A. As I stated previously, it is AC power that the power company provides to the central office. This power is converted to DC power in the central office power plant. This DC Power plant consists of:

1. Redundant rectifiers to convert the AC power to DC power;
2. Parallel strings of batteries to provide backup power when the power to the building is out;
3. Power distribution bays or Fuse/Breaker Boards (PBDs) that connect the power plant to the cables that distribute power throughout the central office;
4. A backup generator to supply power during extended power outages; and
5. The cables that connect all the components of the power plant.

The power plant converts AC to DC power, provides backup power during periods of power outages, and provides a connection point (i.e. PBDs) for the large cables that distribute power throughout the office.

**Q. DO ALL THE POWER CABLES TO ALL EQUIPMENT COME DIRECTLY FROM THE MAIN POWER BOARDS (PBDs).**

A. No. The main power board is used primarily to connect the larger power cables that transfer power throughout the office. In most cases, power cables in excess of 60 Amps. These cables can be used to supply power to large power-hungry equipment or to secondary distribution power panels known as Battery Distribution Fuse Boards (BDFBs). The power board has the capability to handle some smaller cables but these fuse spots are primarily for smaller equipment located adjacent to the power board. The BDFBs can accommodate fuses for the smaller cables, which are used to power most of the telecommunications equipment spread throughout the office or in most CLEC collocation areas. This is an arrangement very similar to the distribution of AC power in any large building. In the AC world, power enters the building and routes through main switchgear (large breakers, analogous to the PBDs of the DC world), and is distributed on large cables to "sub-panels" (analogous to BDFBs) that have many smaller circuit breakers.

**Q. WHY WOULD A COMPANY USE A BDFB AND NOT JUST RUN ALL CABLES TO THE MAIN POWER BOARDS?**

A. The decision to run the power cables from a BDFB is strictly a matter of economics. A BDFB is used when its cost is less than the additional cost associated with running multiple cables to the power board. A BDFB allows a company to run a single large power cable to an area in the office where it is then split into the smaller cables required to power most equipment bays. There are two primary advantages to supplying power to a portion of the office through one large cable:

1. The power loss is minimized through the use of a larger cable; and
2. It is cheaper to buy and place one large cable than it is to buy and place multiple smaller cables.

A power loss occurs when power is transported across any distance. The amount of the power loss is a product of the resistance in the transport medium, the distance being traversed and the size of the power load being transported. Larger diameter cables (i.e. cables used for larger loads or longer distances) offer less resistance than small cables. The larger the number of amps being transported over a cable, the less the proportionate level of power loss. Using a BDFB to serve a remote portion of the office allows a company to use a larger power cable with larger loads reducing the level of power loss for the distance from the BDFB to the power board.

**Q. PLEASE EXPLAIN POWER AS AN ELEMENT OF COLLOCATION.**

A. Qwest provides AC and DC power during the build phase of a CLEC's collocation. DC power is delivered from Qwest DC power plant either from the main power board or through a Battery Distribution Fuse Board ("BDFB"). The concept of DC power is simple; however, the multiple elements required to deliver DC power to a CLEC piece of equipment makes it complex in the context of collocation.

Among the elements that deliver DC power is a "Miscellaneous Fuse and Alarm panel," located at the top of the equipment bay, which supplies power to the equipment in the bay. Next, a power cable connects the Miscellaneous Fuse and Alarm panel to the BDFB. The size of this cable is dependent on the distance from the main power board. The BDFB is designed to distribute between 200 amps and 600 amps of DC power in smaller increments to the Miscellaneous Fuse and Alarm panels or individual pieces of equipment. The collocated equipment is located relatively close to the BDFB that serves it.

BDFBs are centralized secondary DC distribution panels that distribute the power capacity from the larger power cables that feed them. The size of the power feeder cables is a function of the current drain and the distance to the BDFB from the main DC power feed. Power is provided via a pair of cables consisting of a feed (or negative side) and a grounded return (or positive side). Industry standard requires that power be redundant; therefore, there is another set of cables that also go to the BDFB from the Main Power Distribution Bays. The power feeder cables to the BDFB are normally 750 kcmil cables (that is, thousand circular mills). The 750 kcmil cable is a stranded insulated copper cable that is approximately 1.25 inches in diameter. The number of these 750 kcmil cables required to provide a feed to a single BDFB is dependent on the distance from the main power board. The 750 kcmil cable weighs twelve pounds per foot and is extremely stiff and resistant to manipulation. This power cable must be in a "power only" cable rack. Power cable racks are between 6 inches and 24 inches wide and are located in the overhead area of the central office running above the telecommunications equipment. The combined weight of the power cable and the cable rack needed to serve a BDFB may be between 60 and 100 pounds per foot. While this is a significant weight, it may not be critical in a single story building where the ceiling/roof only has to support itself. However, such weight can be a critical issue in a multi-story building where the ceiling of one story is the floor of the story above it, and must now support the equipment on the upper story as well as the power and communication cable racking of the lower story.

The Power Distribution Bays are fed by both batteries and rectifiers. Rectifiers convert Alternating Current (AC) power to DC power. The rectifiers are connected to both the commercial AC power and a generator along with the battery strings. There is a transfer switch that is activated when AC power fails. This switch isolates the buildings so the engine can start and assume the power load.

The size of power cable required is dependent on the distance power must be transported and the permissible drop in voltage. DC power suffers significant voltage losses in transmission over distance. This is countered by increasing the size of the cables transporting the power. Ms. Million's studies incorporate the costs for providing all of these power elements.

**Q. HOW IS REDUNTANT POWER PROVIDED TO THE DC POWER PLANT?**

A. Redundant power is provided through the use of battery strings and a backup generator to supply power during extended power outages. If an outage were to occur for an extended period of time, the generator would be used to provide DC voltage to central office equipment and restore the batteries to an acceptable charge.

**Q. WHY DOES QWEST PREFER TO PROVISION POWER TO A COLLOCATION SPACE INSTEAD OF ALLOWING CLECs TO PROVIDE THEIR OWN POWER?**

A. Both AC and DC power sources within a Qwest central office are designed to accommodate the load within that particular office. Most telecommunications equipment is designed to operate on DC, as opposed to AC, which is typical for most other applications. AC is available to power the supporting ancillary equipment within a given office as necessary.

As noted above, the existing Qwest telecommunications network functions with the aid of a battery backup system. Operational central office batteries weigh around 450 pounds each plus the framework, grounding and power leads that transport the DC power to the equipment. A standard battery cell produces 2 volts. Most telecommunications equipment requires –48 volts to function thus require a large number of batteries. These batteries, which are numerous in a typical central office, are connected in arrays called "strings" with 24 cells per string. The number of strings is determined by the amount of power required to maintain the office for either a four or eight-hour time frame. The time frame is dependent upon whether a generator is available at that office or not. A four-hour backup is provided when a generator is available and an eight-hour back up is provided when a generator is not available. Qwest feels this is the most efficient power architecture in either a single carrier environment or multi-carrier environment. To allow each carrier to supply its own power source would result in redundant installations and inefficient use of central office space. It is more efficient to minimize the number of battery strings in an office and maintain a single engine driven generator and automatic transfer switch to back up and maintain a charge on the batteries than to have multiple batteries and engines to support an office.

**Q. PLEASE DESCRIBE GROUNDING AS AN ELEMENT OF COLLOCATION.**

A. Qwest will provide a DC ground back to the central office Ground Bar (COGB). The CLECs are required to attach to this ground for personnel safety, and to protect both the CLEC's and Qwest's equipment. The hazards from improper grounding are electrical shock, Electro Static Discharge (ESD) and electrical noise. Electrical shock can be harmful to personnel and, even at very low levels, will damage or destroy electronic equipment.

A good central office ground and proper bonding and grounding of metallic structures keeps potential ESD differences at safe levels under normal conditions. Grounding and bonding insures a path of high current capacity and low impedance to carry fault current and provides a path for ESD, to keep ESD from damaging sensitive electronic equipment. If every piece of equipment is properly grounded to the central office ground bar(s), the potential for voltage on the bays is minimized, thus ensuring a safe work environment for Qwest employees and the employees of every collocating CLEC.

**Q. PLEASE DESCRIBE THE ENCLOSURE AS A PHYSICAL COLLOCATION ELEMENT.**

A. A caged physical collocation space within the Qwest central office may be enclosed by a welded steel (chain link) cage which is constructed for the protection of CLEC equipment installations within. While the welded cage is the standard design, there are other options available, such as fire rated hard walls. However, other options require an evaluation and would be constructed on an individual case basis (any construction within a central office requires measures be taken to protect the electronic equipment from dust containment for example). The enclosure will encompass the square footage the CLEC requested and is 10 feet tall. The exact location of the cage within the Qwest central office is determined by Qwest's Common

Systems Planners based on the availability of space with that given central office at the time the application was submitted.

### C. SUMMARY OF TESTIMONY ON COLLOCATION

**Q. WILL YOU PLEASE SUMMARIZE YOUR TESTIMONY ON COLLOCATION?**

A. Qwest collocation architectures provide each CLEC with workable and reasonable methods of accomplishing interconnection with the Qwest network and/or gaining access to UNEs purchased from Qwest. These architectures comport with the requirement that Qwest provides each CLEC access to UNEs in a nondiscriminatory manner. In addition, based on my review of the collocation cost study and my background in implementing collocation, the assumptions and elements used in the cost study are consistent with and reflect the real world deployment of collocation architectures by Qwest as discussed in my testimony.

**Q. HAS QWEST FACILITATED REQUESTS FOR COLLOCATION IN SOUTH DAKOTA?**

A. To date, CLECs have a total of 15 collocations within Qwest's 42 central offices. By establishing collocation in roughly 36% of Qwest offices, CLECs now has access to approximately 51% of the loops in the state today.

## III. ENGINEERING ASSUMPTIONS REGARDING THE LOOP MODULE AND THE INTEGRATED COST MODEL

### A. STRUCTURE SHARING

**Q. PLEASE DESCRIBE WHAT IS MEANT BY THE TERM "STRUCTURE SHARING."**

A. Simply put, structure sharing is the placement or attachment of facilities by multiple companies in the same trench or on the same terrestrial structure. Structure sharing is the process of multiple utility companies constructing facilities at the same time, in the same areas, utilizing the same trench or, in some instances, using the same pole attachments. Structure sharing thus refers to the extent to which Qwest is able to: 1) share physical structure with other utility companies, and 2) share portions of the costs of placing its cable structures with other utility companies.

New developments go through several phases. From an infrastructure standpoint one of the first is placement of what are commonly referred to as "wet facilities" – water and gas. Then curb and gutter are placed followed by "dry utilities" such as electricity, cable TV and telecommunications. For example, an electrical utility may open a trench in a new development to place its facilities and offer other utilities, typically cable television and telephone, the opportunity to use that same trench to place their facilities.

As part of a structure sharing arrangement in these new developments, the utility companies may be able to share a common trench thus reducing the cost of digging and back-filling the trench. But it is only the cost of the trench that is shared. Each utility is still fully responsible for the costs of the facilities it places in a shared trench.

**Q. WHERE IS STRUCTURE SHARING LIKELY TO OCCUR?**

A. New developments present the greatest opportunities for structure sharing. In this regard, however, it is important to emphasize that as a TELRIC-based cost model, LoopMod assumes that a carrier is building an entire replacement network, including areas where the telecommunications network already exists. As a result, the vast majority of construction of a TELRIC replacement network will occur in developed areas, not in new developments. This fact distinguishes a TELRIC replacement model from a cost model that develops costs only for new lines and growth. Accordingly, the opportunities to share in building a replacement network are limited. In addition, there are other practical considerations that limit the ability to share, including, for example, the timing of placing facilities. Utility companies often place their facilities at different times based on different business needs and cannot afford to delay placing facilities until other utilities are ready to do so. In addition, the networks of different utility companies, particularly feeder networks, often follow different routes and have different footprints. This significantly limits sharing possibilities in these feeder routes. Further, some utilities now insist on front lot placement, which may not conform to the manner in which the telecommunications company plant has been designed.

**Q. WHEN STRUCTURE SHARING IS FEASIBLE, WHAT OTHER FACTORS COULD AFFECT FACILITY PLACEMENT?**

A. The ability to structure share is dependent on several factors. Foremost among these factors is the type of plant being placed (aerial, buried or underground), the area in which the plant is being placed, the method of placement being used, and the timing of the placements. Another critical component is the coordination of the placement of these facilities. In new developments, utility companies are given notice of a trench being open and are typically offered only a narrow window within which to order materials, receive and place the facilities. If this window is missed, the utility company becomes responsible for opening a trench on its own and placing its facilities.

Unfortunately, there are limited opportunities for Qwest to share the costs of placing buried cable and even fewer to share the cost of placing underground cable (cable placed underground enclosed within a conduit system). Greater opportunities exist to share the costs of placing aerial facilities. Qwest has many joint use agreements with other utility companies relating to this type of facility. LoopMod properly reflects these different degrees of cost sharing opportunities for the different types of plant placements. The following sections go into more detail about the opportunities for structure sharing in the buried, aerial and underground environments.

Q. **WHAT FACTORS DETERMINE THE VIABILITY OF STRUCTURE SHARING FOR BURIED FACILITIES?**

A. The ability to structure share with buried facilities is dependent on the area in which the plant is being placed, the method of placement being used and the timing of the placements. In addition, the coordination of the joint effort is critical to a company's ability to share when an opportunity is proposed.

Q. **YOU HAVE REFERENCED THE TERM "REPLACEMENT NETWORK" SEVERAL TIMES IN YOUR TESTIMONY - WHY IS THE ISSUE SO IMPORTANT?**

A. As stated earlier, the assumptions contained in LoopMod are based on a replacement network. As such, the assumption is that facility placement will occur in established, fully developed areas, not in new developments. During the construction of this replacement network, structure sharing will be limited by the fact that other utility companies already have their facilities in place when Qwest begins placing its facilities. In addition, because of differing timelines, fiscal constraints, and consumer requirements, utility companies usually have different construction schedules that significantly limit sharing opportunities. In an area that is already developed, a carrier usually does not have the luxury of waiting for an open trench or for someone else to help bear a portion of the cost. Waiting can lead to held orders, which any telephone company must strive to avoid.

**Q. HAVE YOU PERSONALLY EXPERIENCED OR SEEN THIS TYPE OF REPLACEMENT NETWORK ACTIVITY BEING CONDUCTED?**

A. Yes, I have. While working at TESS Communications, I had the opportunity to observe an overbuild of TESS' network by Qwest in two developments, Rancho El Mirage and Desert Sunset, in the Phoenix market. Existing facilities resided in the easement at the front of the lots and included telecommunications, cable television and electric. Qwest had to place its cable, pedestals and buried service wires within the same easement. In observing the work, it did not appear that another utility was going into the open trench with Qwest, so structure sharing was not occurring. In addition, along several of the routes where TESS was constructing capacity and passing existing developments and business areas, there was no opportunity for sharing.

## B. CABLE PLACING ACTIVITIES AND THEIR RELATIONSHIP TO STRUCTURE SHARING

**Q. PLEASE DESCRIBE THE CABLE PLACEMENT ACTIVITIES ASSUMED IN LOOPMOD.**

A. The ICM LoopMod specifically identifies the various construction activities that will be required, by density group as described in Mr. Buckley's testimony, to rebuild a network. For example, the default placement inputs for density groups 3 (single-family sub-divisions) in LoopMod are:

- trench and backfill - 30%
- cut and restore concrete - 5%
- hand dig trench - 5%
- directional bore cable - 45%
- cut and restore asphalt - 10%
- cut and restore sod - 5%

Since construction will be required in areas that are already developed, Qwest would be required to perform cut and restoration activities in existing landscaping in order to restore it to its original form. Directional boring methods of construction will also have to be utilized. As briefly noted in prior testimony, the use of directional boring, while costly, avoids the costs that are associated with digging up roads, sidewalks, yards, and similar structures and restoring them to their original form.

**Q. IN YOUR EXPERIENCE, WOULD THE PERCENTAGES NOTED ABOVE BE REALISTIC WHEN BUILDING A REPLACEMENT NETWORK?**

A. The above noted percentages would certainly reflect what would occur in a "real world" scenario. Since the network would have to be built "around" all existing structures, it would only make sense that the percentage of directional boring and cutting and restoring asphalt would be higher than if these same facilities were being placed in a new development where obstacles were minimal.

**Q. WHY IS IT IMPORTANT TO UNDERSTAND THE INTER-DEPENDENCE OF THESE VARIOUS CONSTRUCTION METHODS?**

A. When engineering a network as complex as that of Qwest, it is critical to understand that decisions made in the design and engineering of that network cannot be made in a vacuum. Each engineering decision carries with it an impact on the existing network. As such, when using LoopMod, if one input is modified and other inter-dependent inputs are not also analyzed for possible modification, the results will not accurately represent the construction activity that is required. For example, if the amount of directional boring used in developed neighborhoods is reduced, the frequency of other placing methods would have to be correspondingly increased. With a reduction in directional boring, it is possible and indeed likely that another more difficult and costly method of placement would be required to account for the restoration activities and costs that directional boring avoids. If adjustments to certain inputs are not made to reflect these alternative placement methods, the cost estimates in a TELRIC model will not cover the costs an efficient carrier will actually incur to construct a network.

### 1. BURIED ENVIRONMENT

**Q. ARE THERE MULTIPLE METHODS FOR PLACING BURIED FACILITIES?**

A. Yes. There are two methods for burying cable facilities, buried and direct buried. Buried cable is cable that is placed directly into the ground without using conduit or inner-duct. Traditionally, this is done by digging a trench, placing cable within that trench, and then back-filling the trench.

Direct buried cable is buried cable that is placed directly into the ground through the use of a specific piece of mechanical equipment, a vibratory plow or cable plow, that literally pushes the cable into the ground eliminating the need for a trench. This method of placing buried cable is often used in areas where ground and soil conditions are relatively soft and the access to the proposed placement route will facilitate the use of such equipment.

The direct buried method of placing cable is cost-efficient, since it avoids the costs that are associated with digging and back-filling trenches. When the direct buried method of placement is used, however, cost sharing is not a viable option since only one facility is usually placed by a single entity. It is important to note that even without the ability to take advantage of the cost benefits offered by structure sharing, this method of placement is considered cost-efficient because the significant costs associated with trenching are avoided. While it may be practical for companies to place multiple interoffice or long haul facilities from a single plow, I have never observed two utility companies simultaneously placing feeder or distribution facilities through the use of plowing and directly burying cable within a development.

As stated earlier, the only realistic opportunities for placing buried cable in shared trenches occur when building the distribution network in new developments where construction is underway and timing permits it. In addition, as growth increases, technology evolves and construction methods improve, it will be even less likely that utility companies will deploy facilities at the same time. The recent upgrade of many cable TV networks is a perfect example of this because the projects were done in already built up areas and on unique facilities with little structure sharing opportunities with the possible exception of some limited aerial plant. A proper cost sharing assumption for buried cable should take into consideration the use of the direct buried method and the lack of cost sharing opportunities that are available with this method.

**Q. WHAT CABLE PLACEMENT METHOD WAS UTILIZED IN THE OVERBUILD EXPERIENCE YOU NOTED ABOVE?**

A. Qwest and TESS placed their cables into a trench where it was practical to trench. However, there was a substantial portion of the job conducted by crews that involved directional boring. Directional boring is a practice utilized when placing facilities to avoid disrupting both natural and man-made obstacles. In areas with these types of obstacles, directional boring often is more cost efficient than having to pot hole and hand dig multiple locations or replace/repair, portions, if not all, of the disturbed area and obstacles, such as roads, driveways, sidewalks, lawns, and gardens. In the overbuild, even some of the drops had to be placed via directional boring due to obstacles such as driveways, sidewalks and landscaping.

**Q. WHAT AMOUNT OF COST SHARING DOES LOOPMOD ASSUME FOR THE PLACEMENT OF BURIED CABLE?**

A. Qwest's LoopMod input relating to cost sharing assumes that a telephone company, on average, will bear 80 percent of the costs of placing buried cable, while other utility companies or developers will bear the remaining 20 percent.

Q. **ARE THESE ASSUMPTIONS IN LINE WITH QWEST'S REAL WORLD EXPERIENCES WHEN PLACING BURIED FACILITIES?**

A. Recent experience in the field confirms the reasonableness of Qwest's assumption that the telephone company will pay, on average, 80 percent of the costs of placing buried cables. As discussed above, in developed areas, it is very rare that another utility company will be placing buried facilities at the same time as Qwest. As a result, structure sharing is rarely an option in these areas and, thus, the telephone company typically pays 100 percent of the cost for placing buried cables in these areas.

Q. **IN THE ACTIVITY YOU HAVE EXPEREINCED AND WITNESSED, DOES 80% ACCURATELY REPRESENT THE AMOUNT OF PLACEMENT COST THAT QWEST IS RESPONSIBLE FOR?**

A. For new cable placement in a replacement scenario, 80% would accurately depicts the amount of time Qwest and TESS had to place facilities into the route without having the ability to share cost with another company. When considering plant rehabilitation, which I have personally conducted on several occasions, there was never another party in which the cost of placement was shared.

**Q. WHAT WOULD THE RAMIFICATIONS BE IF THE SHARING ASSUMPTION IN LOOPMOD FOR BURIED CABLE WERE INCREASED?**

A. First, I do not believe it would be consistent with real-world experience or with a TELRIC-based replacement network cost model to assume that a telephone company would pay less than 80 percent of the costs of placing buried cable. But, hypothetically, if Qwest were indeed paying less than 80 percent of the costs, one would have to assume, to be consistent, that Qwest would be at the mercy of the construction schedules and fiscal requirements of other utilities. This would include delays due to scheduling and the potential of having equipment and personnel sitting idle while waiting for each party's work to be completed. In this hypothetical situation, any savings realized through sharing would be jeopardized by the cost of idle time.

This approach and the delays associated with it will increase the potential for facilities not being in place at the time of demand. In addition to the timing issue, there is a resource issue. Qwest construction forces are currently scheduled based on planned deployments of facilities, which is efficient and cost effective. With construction schedules dependent on other companies, it would be difficult at best, to maintain those efficiencies.

## 2. AERIAL ENVIRONMENT

**Q. ARE AERIAL FACILITIES AS PREVALENT IN QWEST'S NETWORK AS BURIED FACILITIES?**

A. No. In South Dakota, aerial cable accounts for 4.26% of the total cable sheath miles located throughout the state. It is also standard engineering practice that, on a going forward basis, buried facilities will be used whenever possible to replace existing aerial plant. In fact, many local municipalities now prohibit the placement of aerial facilities. In those areas where aerial facilities exist, additions or changes to the facilities must be placed below ground. Mr. Buckley provides additional information in his testimony relating to the reasons for the decreasing use of aerial plant. In my experience, an efficient carrier rebuilding a network today would use minimal amounts of aerial plant and certainly would not use more than the percentage of this plant that Qwest has in place in South Dakota today.

**Q. DOES AERIAL PLANT PROVIDE THE SAME QUALITY OF SERVICE AS BURIED AND UNDERGROUND PLANT?**

A. No. Aerial plant is prone to service interruptions caused by its higher degree of exposure to the elements. Examples of these circumstances are wind, rain, lightning, squirrels, bullet and pellet damage, and auto accidents. While damage by humans and wildlife is common, weather remains the most significant cause of service degradation and interruption. Not only is localized weather damage possible because of storms, but entire spans of aerial line may also topple during ice storms, blizzards, or high winds. In rural areas, miles of aerial cabling may collapse when weighted down with ice or snow. In addition, electrical lines damaged by harsh weather can damage telephone lines that share common poles. Weather damage is less likely to occur with buried or underground plant because these cables are not exposed to the elements. In addition, as mentioned, many communities are opposed to the use of aerial plant because of aesthetic concerns.

**Q. WHAT IS THE PROPER AMOUNT OF COST SHARING FOR AERIAL FACILITIES?**

A. An efficient carrier would incur approximately 50% of the total cost required to place aerial facilities, which is consistent with Qwest's experience. In other words, it is realistic to assume that Qwest will be able to share about 50% of the costs associated with pole structures used to place aerial cable and other aerial facilities. This engineering assumption is reflected in LoopMod.

### 3. UNDERGROUND ENVIRONMENT

**Q. WHAT ARE THE OPPORTUNITIES FOR STRUCTURE SHARING IN AN UNDERGROUND ENVIRONMENT?**

A. The opportunities to share the costs of placing underground cable structure are quite limited. It is infrequent that another telecommunications service provider would want to share the cost of constructing a conduit system specifically designed to facilitate the needs of the network when that telecommunications provider can lease available duct space at a fraction of the construction cost. Normally, Qwest assumes all of the responsibility of engineering, constructing, maintaining and repairing its conduit structures.

In addition, the sharing of underground infrastructure between telephone and power facilities is seldom done. AT&T's own Outside Plant Engineering Handbook states "Joint trenching with power facilities should be employed only for distribution cables and service wires, not for feeder or trunk cables." AT&T's own policy thus leaves little, if any, opportunity for telephone and power companies to utilize each other's conduit. Complicating the issue, high voltage associated with power lines poses a potential safety hazard to Qwest's technicians who are generally trained to work on low DC voltage circuits. In my many years of outside experience, I have never seen electrical facilities residing in the same conduit system with Qwest facilities.

**Q. WHAT IS THE AMOUNT OF STRUCTURE SHARING IN AN UNDERGROUND ENVIRONMENT THAT IS REFLECTED IN LOOPMOD?**

A. LoopMod properly reflects that cost sharing for conduit structures occurs no more than five percent of the time. This input represents the small amount of conduit that is shared today and is likely to be shared in the future with other utility companies.

### C. FILL FACTORS

**Q. HOW ARE FILL FACTORS USED IN ENGINEERING A TELECOMMUNICATIONS NETWORK?**

A. Fill factors, also referred to as utilization, are used in the planning, engineering and construction of any telecommunications network. By measuring the utilization levels of its feeder facilities and monitoring the timeframe at which those levels are expected to reach predetermined thresholds, an efficient carrier can anticipate the need for and timing of augments to its network. Fill factors are also used as indicators as to the efficient use of the existing network. The testimony of Mr. Buckley provides detail as to LoopMod's treatment of fill rates.

**Q. PLEASE EXPLAIN WHY THE ENGINEERING ASSUMPTIONS MADE FOR THE FEEDER PORTION OF THE NETWORK DO NOT APPLY TO THE DISTRIBUTION FACILITIES.**

A. Distribution facilities are the connections between Qwest's feeder network and customer locations. The criteria used to plan, engineer, and build distribution facilities are quite different from those used for the feeder network. While the feeder network is sized to meet current demand plus reasonable projections of growth in a wire center, distribution facilities are built to satisfy pair per site criteria using actual developer sub-plats and/or municipal zoning. For example, distribution facilities to a residential development of 50 single family units, in Density Group 3[2], would be sized to allow for three (3) pairs per residence or a total of one hundred fifty pairs. Thus, fill factors are not used in the design of distribution networks. In addition, the cable placements in the distribution network tend to be of a much smaller size (25 and 50 pair cables) and are often buried. Qwest's distribution network includes the terminal and drop (buried or aerial service wire) to the customer.

## V. QWEST'S DROP STUDY

**Q. DOES QWEST'S CURRENT ICM PROPOSE AN AVERAGE FOOTAGE OF DROPS IN THE STATE OF SOUTH DAKOTA?**

A. Yes it does. The average drop length proposed in the ICM is approximately 130'. When looking at the individual Density Groups (DG), they break down as follows:

| | |
|---|---|
| DG-3 | 70' |
| DG-4 | 200' |
| DG-5 | 300' |

2 Density Group designations were developed for the original USW/Qwest Loop Models and were used to

**Q. IN YOUR INVESTIGATION INTO THIS MATTER, DO THESE AVARAGE FOOTAGES ACCURATELY REFLECT DROP LENGTHS IN SOUTH DAKOTA?**

A. In those areas I was able to tour on my last trip in South Dakota, the average drop lengths appeared to be realistic and in line with those noted in the cost model.

**Q. IN SOUTH DAKOTA, DOES QWEST USUALLY PLACE MULTIPLE DROPS TO END-USERS IN MULTI TENANT DWELLING UNITS?**

A. Not usually. In most instances, the builder runs all of the inside wiring to one single location on the outside of the building. At that point, Qwest provides connectivity to the Qwest network by running a single black sheath cable to a wall terminal to feed all units.

**Q. WHAT SHOULD BE CONCLUDED FROM YOUR TESTIMONY?**

A. I conclude that the drop lengths identified in Qwest's cost model are an accurate reflection of South Dakota drop lengths.

## VI. LOOP CONDITIONING OR UNLOADING

differentiate the demographics and saturation of given serving areas. For example Density Group 3 is a typical urban residential area.

**Q. CLECs HAVE CONTENDED IN OTHER PROCEEDINGS THAT WHEN QWEST UNLOADS LOAD COILS AND BRIDGED TAPS FROM LOOPS, ONLY QWEST BENEFITS AND CLECs THEREFORE SHOULD NOT HAVE TO PAY FOR THIS ACTIVITY. IS THIS CONTENTION CORRECT?**

A. No. CLECs obtain a significant benefit when Qwest unloads a loop that a CLEC customer will use. After a loop is unloaded, a CLEC customer can use it for data-related services. The conditioning or unloading charge that Qwest assesses is to compensate Qwest for the costs it incurs to dispatch a technician into the field to perform the multiple tasks required to unload a loop.

**Q. HAS QWEST UNDERTAKEN A BULK DELOADING PROJECT IN THE STATE OF SOUTH DAKOTA?**

A. Qwest has performed bulk deloading in South Dakota in three central offices: Rapid City, Sioux Falls, and Sioux Fall SW. During this Qwest-initiated activity, roughly 7,900 loops were unloaded. The CLECs in South Dakota benefit directly from the Qwest initiative activity insofar as having more than 10% of the loaded loops now freed up and available to advanced services to their end users. Qwest has not assessed a charge for the unloading associated with this initiative. However, there are still loops that CLECs will order that Qwest will have to unload at the CLECs' requests.

**Q. IF A CLEC REQUESTS AN UNLOADED LOOP AND QWEST HAS TO DISPATCH TO PERFORM LOOP CONDITIONING, WILL QWEST BILL THE CLEC FOR THE LOOP CONDITIONING?**

A. Yes. It is my understanding that decisions by both the FCC and the section 271 multi-state facilitator establish that Qwest should be permitted to recover the cost associated with loop conditioning - even on loops less than 18,000 feet. Paragraph193 in the FCC's UNE Remand Order states: "Nevertheless, the devices (load coils) are sometimes present on such loops, and the incumbent LEC may incur costs in removing them. Thus, under our rules, the incumbent should be able to charge for conditioning such loops." Accordingly, Qwest intends to continue billing CLECs when loop conditioning is required for loops CLECs—otherwise Qwest would be denied the opportunity to recover the costs of this activity.

**Q. IF THE CLEC WERE TO SUBMIT AN ORDER FOR AN UNLOADED LOOP AND THE LOOP WAS ALREADY UNLOADED AS PART OF QWEST'S BULK DELOAD PROJECT, WOULD THE CLEC BE CHARGED FOR LOOP CONDITIONING?**

A. No. The CLEC is only charged for removal of load coils when Qwest must dispatch to remove the loads. If the pair was unloaded as part of the Qwest bulk de-load initiative, there would be no additional charge to the CLEC for the work done in the past.

## VII. LOOP EXTENSION TECHNOLOGY

**Q. WHAT IS LOOP EXTENSION TECHNOLOGY?**

A. Extension technology or "regeneration" is the placement of either central office equipment, remotely located regeneration equipment, and/or other types of equipment that restore a digital signal to meet the technical parameters of a specifically requested loop. Signals may require restoration because they may be distorted during transmission over long distances. This type of technology commonly augments the voltage of the transmission so that subscribers located long distances from the serving equipment receive requested services at acceptable levels. As the name suggests, the technology "extends" the reach of a digital signal. Loop extension technology is commonly referred to as "regeneration".

**Q. DOES QWEST ASSESS A CHARGE WHEN EXTENSION TECHNOLOGY IS REQUIRED TO MEET THE STATED TECHNICAL PARAMETERS OF THE LOOP?**

A. No. When Qwest's programmable provisioning systems determine, based upon the existing American National Standards Institute (ANSI) parameters, that extension technology is required for the loop to meet technical standards, then equipment will be placed at no additional cost to the CLEC.

Q. **IN WHAT SCENARIOS WOULD A CLEC BE BILLED FOR EXTENSION TECHNOLOGY?**

A. A CLEC would be billed when the loop it has requested does not require extension technology based on the applicable ANSI standard as analyzed by the Qwest programmable provisioning systems, yet the CLEC requires that Qwest place such a device. In this instance, the CLEC would pay a monthly recurring charge based on the end user's zone rate.

## VIII. LOOP PROVISIONING OPTIONS

Q. **DOES QWEST OFFER A VARIETY OF PROVISIONING OPTIONS TO CLECs IN THE STATE OF SOUTH DAKOTA?**

A. Yes. Qwest offers five different provisioning options: Basic Installation, Basic with Performance Testing, Basic with Cooperative Testing, Coordinated without Cooperative Testing and Coordinated with Cooperative Testing. The following table illustrates the differences between each of the options. These options build upon each other and require subsequent additional work steps and time in order to deliver an unbundled loop to meet the CLEC specific requests.

# Installation Option Comparison

| | Basic Installation Option | Coordinated without Cooperative Testing Option | Basic with Performance Testing Option | Basic with Cooperative Testing Option | Coordinated with Cooperative Testing Option |
|---|---|---|---|---|---|
| **Work Groups** | | | | | |
| Central office | X | X | X | X | X |
| I&M Tech | X* | X | X* | X | X |
| RCMAC | X | X | X | X | X |
| QCCC | X | X | X | X | X |
| **Work Steps** | | | | | |
| Conduct Performance Testing | X | X | X | X | X |
| Clear with CLEC | X | X | X | X | X |
| Relay Performance Results to the CLEC | | | X | X | X |
| Contact CLEC at Coordinate Time | | X | | | X |
| Contact CLEC to perform Cooperative testing | | | | X | X |
| Email Test within 48 hours on Email form | | | X | X | X |

* Depends on new or existing loop

**Q. PLEASE EXPLAIN THE BASIC INSTALLATION FOR AN UNBUNDLED LOOP.**

A. There are two methods for providing basic installation of an unbundled loop. The two methods are dependent on whether the circuit is an existing or new circuit. If the circuit is existing, the central office Technician ("COT") is required to (1) perform a "lift and lay" procedure, (2) clear the order with the QCCC, and (3), finally clear the order with the CLEC. The "lift and lay" procedure entails the physical moving of a jumper from the Qwest central office network equipment to the CLEC's demarcation point within the Qwest central office. With this work complete, the end-user is connected to the CLEC's network. Upon completion of this step, the COT contacts Qwest's CLEC Coordination Center (QCCC) and closes the service order with the Center personnel. Qwest notifies the CLEC that the provisioning is complete on the unbundled loop service order. For these installations Qwest performs no testing other than identifying the phone number associated with the line. When installing a new loop, work from both the COT and an Installation/Maintenance ("I&M") Technician may be required. The COT performs the "lift and lay," and the I&M Technician may need to place cross-connects at the cross-connect box. The I&M Technician may also have to connect the buried service wire ("BSW") to the distribution pair at the pedestal feeding the home. In addition, the same technician may have to add capacity to the existing network interface device (NID) to allow termination of the new loop. At this point, the technician will conduct performance testing to ensure continuity to the end user's NID.

**Q. HOW DOES THE BASIC INSTALLATION WITH PERFORMANCE TESTING DIFFER FROM THE BASIC INSTALLATION OPTION?**

A. The basic installation with performance testing option involves the same work steps as for basic installation of a new or existing customer; however, the performance testing data is forwarded to the CLEC via the Implementor/Tester in the QCCC. For each of these installations, regardless whether it is a new or existing line, the CLEC receives the performance test. The relaying of this testing data, either verbally or via email, within 48 hours of completion, requires additional customer contact with the CLEC and hence, additional work steps. This also allows the CLEC to assess the quality of the line and determine whether the line meets the CLEC's anticipated needs.

**Q. HOW DOES THE BASIC INSTALLATION WITH COOPERATIVE TESTING DIFFER FROM THE BASIC INSTALLATION OPTION?**

A. Again, the work efforts described in the basic option are followed but in this instance, Qwest works with the CLEC, through the Implementor/Tester in the QCCC to perform cooperative testing. This testing could include, but is not limited to, a Qwest technician at either the central office or in the field, placing tone on the line or placing a short across the circuit at the CLEC's request. These steps allow the CLEC to conduct testing from different locations within its circuit and for the CLEC to validate that the loop it is accepting meets the technical parameters of the service it intends to provide to the end user. Once again, these additional work steps are over and above those involved in the basic installation option. Thus, with the cooperative testing option, Qwest must call the CLEC to arrange the testing and perform the cooperative testing before closing the service order. This option allows the CLEC to test the entire circuit from end to end, including its own equipment. Without a Qwest technician at the end user's premises, the CLEC would need to dispatch its own technician to conduct this type of testing. This option also allows the CLEC to resolve any issues with a loop in conjunctions with Qwest and save on the time and trouble of future diagnosis and repair.

**Q. HOW DOES THE COORDINATED INSTALLATION WITHOUT COOPERATIVE TESTING DIFFER FROM THE BASIC INSTALLATION OPTION?**

A. This option is a "lift and lay" procedure that offers CLECs the ability to coordinate the conversion activity. At the CLEC designated "appointment time", the Qwest Implementor/Tester contacts the CLEC to determine if the CLEC is ready for Qwest to proceed with the conversion or installation. If the CLEC is ready, Qwest performs the "lift and lay" and advises the CLEC when the "lift and lay" procedure is complete. This coordination takes place in the QCCC, a center specifically designed to handle all unbundled loop requests, from the CLEC. This option is different from "with" cooperative testing in that the CLEC chooses not to have Qwest perform a cooperative test prior to closing the order. Qwest delivers the loop to the CLEC at a designated time, which allows the CLEC to minimize and manage line outage with its end user.

**Q. HOW DOES THE COORDINATED INSTALLATION WITH COOPERATIVE TESTING DIFFER FROM THE BASIC INSTALLATION OPTION?**

A. This option not only gives the CLEC the ability to designate a specific time for Qwest to perform its work but also gives the CLEC the latitude to perform "cooperative" testing with Qwest once the unbundled loop has been installed. Cooperative testing allows the CLEC to conduct testing from a remote location without having to dispatch one of its own technicians. The purpose of the test is to validate that the loop and now the CLEC's network elements are meeting the technical parameters of the service it intends to provide to its end user. This level of coordination and cooperative testing involves multiple work steps and, therefore, more time and labor than is required for a basic installation.

**Q. PLEASE SUMMARIZE THE DIFFERENCES BETWEEN BASIC INSTALLATION AND BASIC WITH COOPERATIVE TESTING.**

A. There are two methods for providing unbundled loop orders utilizing the basic installation option. Each method depends on whether the circuit is an existing or new circuit. On an existing loop, the central office Technician ("COT") is required to perform a "lift and lay" procedure by removing an existing jumper(s) from Qwest's central office network and then extending, usually by running an new jumper, to the CLEC point of interconnection within the central office. The central office technician will perform an Automatic Number Identification Test (ANI Test) on the existing number, prior to performing the lift and lay work, to ensure correct assignments.

In the case of a new loop, two technicians may be required to effectively install the loop. The COT places a jumper between the Cable Facility Assignments (CFA) provided to Qwest by the CLEC and the unbundled network element at the Qwest distribution frame. Concurrently, a Field Technician may be dispatched to the field to place cross connects at the FDI and terminal, if required, and then terminate the end user's drop to a NID. Performance testing is conducted in either case to ensure that the loop that was just installed meets the technical parameters of the loop ordered. The technician(s) contact the Customer Communications Technician – Implementor (CCT-I) in the QCCC who records the results captured in the performance testing and logs those results as benchmarks for future testing purposes. Following those steps, the CLEC is notified that the job is complete and ready for service.

If the CLEC requests Qwest to perform a basic installation with cooperative testing, the initial steps are relatively the same for either new or existing unbundled loops meaning that the COT, and many times the Field Technician, follow the same work steps to install the service order. The differences, and added work steps, begin once the CCT-I contacts the CLEC to begin the cooperative testing. If the request were for an existing loop, the COT remains on the line with the CCT-I and is available to work "cooperatively" with the CLEC to test and provide central office test assist to the CLEC tester. If the unbundled loop request was for a new loop and the related work warranted an additional dispatch to the field to perform any of the work steps noted above, the Field Technician would stay on the line with the CCT-I to work cooperatively with the CLEC. Qwest will work with the CLEC tester and provide assistance as requested including, but not limited to applying a short, a ground and tone to the circuit or placing a test set at the DMARC thus allowing the CLEC tester to perform a loop back test. In addition, the Qwest technician will also relay pertinent terminal information to the CLEC denoting terminal location and binding post information.

**Q. THERE HAS BEEN CONFUSION EXPRESSED IN OTHER PROCEEDINGS ABOUT THE DIFFERENCES BETWEEN PERFORMANCE TESTING AND COOPERATIVE TESTING. CAN YOU EXPLAIN THE DIFFERENCES?**

A. Simply put, cooperative testing is not conducted until Qwest has successfully completed the performance testing. Qwest conducts performance tests in order to identify and correct any issues prior to notifying the CLEC that the loop, and the Qwest technician, is ready for the cooperative tests. The sole purpose of performance testing is to make sure that the loop tests in accordance with the technical parameters set forth for the loop being installed. This battery of tests assists the Qwest technician in not only determining if the circuit meets certain documented performance levels, but also gives the Qwest technician insight into the loop's physical characteristics, which will enable trouble resolution if warranted. All of this work is completed prior to Qwest contacting the CLEC to conduct cooperative testing.

**Q. YOU MENTION PERFORMANCE TESTING – WHAT EXACTLY IS PERFORMANCE TESTING?**

A. Performance testing is a battery of tests that is administered by Qwest technicians and occurs when a circuit is turned up prior to requesting the CLEC to accept the circuit. In the unbundled world, this testing is conducted on variety of the loops offered by Qwest. The battery of tests include:

**2-Wire and 4-Wire Analog Loops**

No Opens, Grounds, Shorts, or Foreign Volts

Insertion Loss = 0 to -8.5 dB at 1004 Hz

Automatic Number Identification (ANI) when dial-tone is present

**2-Wire and 4-Wire Non-Loaded Loops (xDSL or Advanced Digital Transport – Spectrum Management Compatible)**

No Load Coils, Opens, Grounds, Shorts, or Foreign Volts

Insertion Loss = 0 to -8.5 dB at 1004 Hz – Long loops maybe acceptable. When greater than 8.5 dB verify Actual Measured Loss is reasonable match to Engineered Measured Loss.

Automatic Number Identification (ANI) when dial-tone is present

**Basic Rate ISDN and xDSL-I Capable Loops**

No Load Coils, Opens, Grounds, Shorts, or Foreign Volts

Insertion Loss = 40 dB at 40 kHz or 15 Minute Bit Error Ratio Test (BERT), 1 minute All 0's, No Errors

Automatic Number Identification (ANI) when dial-tone is present

**DS1 Capable Loop**

Digital Continuity Testing

**DS3 Capable Loops**

Digital Continuity Testing

**ADSL Compatible Loops**

No Load Coils, Opens, Grounds, Shorts, or Foreign Volts

Insertion Loss = 0 to -8.5 dB at 1004 Hz – Long loops maybe acceptable. When greater than –8.5 dB verify Actual Measured Loss is reasonable match to Engineered Measured Loss.

Automatic Number Identification (ANI) when dial-tone is present.

**Q. WHAT PURPOSE DOES THE PERFORMANCE TESTING SERVE WHEN ATTEMPTING TO INSTALL AN UNBUNDLED LOOP?**

A. In general, performance testing allows Qwest to either identify issues associated with a loop prior to the cooperative testing with a CLEC, or verify that the loop being installed is suited for the services the CLEC intends to place on the physical media.

**Q. DO YOU HAVE ANY PERSONAL EXPERIENCE WITH TESTING LOOPS IN THIS MANNER?**

A. I have tested thousands of circuits in this manner during my years as an Installation and Maintenance technician.

**Q. WHAT BENEFITS DOES A CLEC RECEIVE FROM COOPERATIVE TESTING?**

A. Cooperative testing allows the CLEC to test the entire circuit – a circuit with not only the Qwest facility but also the CLEC's equipment, including wiring and collocation equipment the CLEC has installed, plus connectivity back to the CLEC's switch location. By choosing cooperative testing, a CLEC is able to avoid perhaps multiple field dispatches. Without cooperative testing, the CLEC would be faced with having to dispatch to the end users locations or wait for their end user to install some form of CPE and then test to that equipment assuming it was installed correctly. On those occasions where Qwest has a technician at either the end user's premises or in the Qwest central office, the CLEC avoids a field dispatch.

## IX. SUBLOOP

### A. DESCRIPTION OF SUBLOOP

**Q. WHAT IS A SUBLOOP?**

A. A Subloop is defined as any portion of a loop that a CLEC may have access to, when technically feasible, at accessible terminals throughout Qwest's outside plant network, including inside wire. An accessible terminal is any point on a loop where technicians can access the wire or fiber within the cable without removing a splice case to reach the wire or fiber within. Such points may include, but are not limited to, the pole, pedestal, network interface device, minimum point of entry, single point of Interconnection, main distribution frame, remote terminal, Feeder Distribution Interface (FDI), or Serving Area Interface (SAI).

**Q. WHAT SUB LOOP TYPES DOES QWEST CURRENTLY OFFER TO CLECs?**

A. Qwest currently offers four different types of subloops: (1) DS-1 Capable Feeder loop, (2) 2 or 4 Wire Unbundled Distribution loop, (3) 2 or 4 Wire Non-Loaded Unbundled Distribution loop, and (4) Shared Distribution loop. Other sub loop types can be requested through the Special Request Process (SRP).

**Q. HAVE CLECs IN SOUTH DÂKOTA SUBMITTED ANY REQUESTS TO QWEST FOR THESE SUBLOOP ELEMENTS?**

A. As of the end of June 2002, Qwest had only provisioned 78 subloops for CLECs within the 14 State Region. None of the subloops were provisioned in South Dakota.

**Q. WHAT IS MEANT BY "INSIDE WIRE"?**

A. Inside wire is the simple wire, complex wire or intra-building cabling within a residential or business structure or building including those with multiple tenants or dwellings. This cable or wiring may be owned by either the structure/building owners or by Qwest.

## B. MTE/MDU ACCESS

**Q. HOW WOULD A CLEC GAIN ACCESS TO INSIDE WIRE AS PART OF THE SUBLOOP?**

A. Qwest offers CLECs access to multi-tenant environments (MTE), sometimes referred to as multi-dwelling units (MDU), through the procedures set forth in Qwest's MTE Terminal Access Policy. The type of MTE terminal access that Qwest provides is dependent on the option that the building owner has selected through Qwest's Cable Wire Service Termination Policy ("CWSTP").

**Q. WHAT IS THE CABLE WIRE SERVICE TERMINATION POLICY?**

A. Qwest's CWSTP sets forth the guidelines for the installation of telecommunications facilities and services that Qwest offers regarding MTE/MDU access. Under the CWSTP, there are four service options that are available to property owners for providing access to terminals in MTEs/MDUs.

**Q. PLEASE DESCRIBE THE FOUR SERVICE OPTIONS.**

A. The four options that are available pursuant to the CWSTP are described below. The availability of direct access to an MTE terminal depends upon the type of terminal and the CWSTP option that is selected.

**CWSTP Option 1**

MTE Terminals identified as Option 1 are the equivalent of an MTE network interface device ("NID"). An MTE NID is defined as a terminal that is simultaneously the Minimum Point of Entry ("MPOE") and the demarcation point where Qwest ownership and control ends and the property owner's ownership and control begins. MTE NID access may be obtained at the protector field as well as at the customer's inside wire appearance.

**CWSTP Option 2**

Option 2 sets the demarcation point at the floor level in a multi-story building. Qwest owns and maintains riser cable from the floor level back to the central office. The same architecture could apply at trailer parks, marinas and other similar MTEs. Option 2 typically provides a readily accessible cross connect field for direct MTE terminal access at the MPOE. Qwest, in most cases, has inventories of the Qwest-owned inside wire extending beyond the MTE terminal to the network demarcation point NID. Option 2 MTE terminal access may be obtained at the MPOE protector field or at the floor level NID.

**CWSTP Option 3**

In option 3, the demarcation point is located either in a suite or an apartment unit. Qwest owns and maintains all wire and equipment from the suite or unit back to the central office. Option 3 MTE terminals typically consist of terminals at the MPOE that are hard-wired and contain no readily accessible cross-connect field. The exception is large buildings and high rise buildings. Prior to direct CLEC access, Qwest-owned and controlled inside wire for Option 3 MTE terminals was not always inventoried in provisioning and maintenance databases. Option 3 MTE terminal access may be obtained at the MPOE protector field as well as at the customer cross-connect of Qwest's owned and controlled inside wire.

**CWSTP Option 4**

Option 4 provides a MPOE for campus environments. These terminals are placed near the property line of a campus environment and are detached from MTE buildings usually resting on a separate pad on provided rights of way. Access to Option 4 terminals is provided through Field Connection Point ("FCP") and collocation processes.

**Q. FOR PURPOSES OF THIS DISCUSSION, WHAT IS THE DEFINITION OF A DEMARCATION POINT?**

A. The Demarcation Point is properly defined for purposes of this discussion as the point where Qwest-owned or controlled facilities cease, and CLEC, end user, owner or landlord ownership of facilities begins. The FCC defines the NID network element as "any means of interconnection of end-user customer premises wiring to the incumbent LEC's distribution plant, such as a cross connect device used for that purpose."[3] In the UNE Remand Order the FCC clarified that when a CLEC receives an unbundled NID from Qwest, it includes "all the features, functions, and capabilities of the facilities used to connect the loop distribution plant to the customer premises wiring, regardless of the particular design of the NID mechanism."[4]

**Q. HOW DOES THE INTRABUILDING CABLE LOOP PRODUCT RELATE TO MTE/MDU ACCESS AND THE CWSTP?**

A. As previously stated, simple or complex inside wire or intra-building cable is either owned by the property owner or Qwest as part of its outside plant network. If the inside wire is under the control of the property owner and a CLEC wishes access, arrangements must be made between the property owner and the CLEC. The Intra-building Cable Loop Product gives CLECs

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3 47 C.F.R. § 51.319 (b).
4 UNE Remand Order ¶ 233.

access to the inside cable and wiring that is Qwest owned and would be applicable under Option 1 and Option 2 of the CWSTP.

**Q. PLEASE SUMMARIZE YOUR TESTIMONY ON SUBLOOP ACCESS.**

A. Qwest offers CLECs access to multi-tenant environments (MTE), sometimes referred to as multi-dwelling units (MDU), through the procedures set forth in Qwest's MTE Terminal Access Policy. The type of MTE terminal access that Qwest provides is dependent on the option that the building owner has selected through Qwest's Cable Wire Service Termination Policy ("CWSTP"). These policies allow for CLEC access to the subloop under varying field architectures and in an equitable and non-discriminatory manner.

## X. CONCLUSION

**Q. DOES THIS CONCLUDE YOUR TESTIMONY?**

A. Yes.

## CERTIFICATE OF SERVICE

I HEREBY CERTIFY that on this 14th day of October, 2002, the foregoing **Direct Testimony of Dennis Pappas** was filed and served upon the following parties as follows:

| | |
|---|---|
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