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IN THE MATTER OF INVESTIGATION INTO U S WEST COMMUNICATIONS, INC.'S COMPLIANCE WITH CERTAIN WHOLESALE PRICING REQUIREMENTS FOR UNBUNDLED NETWORK ELEMENTS AND RESALE DISCOUNTS.

Docket No. T-00000A-00-0194

Arizona Corporation Commission
DOCKETED

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NOTICE OF FILING DIRECT TESTIMONY

Please take notice that Cox Arizona Telcom, L.L.C., through the undersigned counsel, files the "public version" of the Direct Testimony of Dr. Francis R. Collins in the above-referenced docket, a copy of which is attached.

Dated: May 23, 2001.

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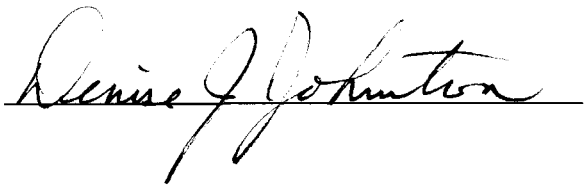

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IN THE MATTER OF INVESTIGATION INTO U S WEST COMMUNICATIONS, INC.'S COMPLIANCE WITH CERTAIN WHOLESALE PRICING REQUIREMENTS FOR UNBUNDLED NETWORK ELEMENTS AND RESALE DISCOUNTS.	**Docket No. T-00000A-00-0194**

DIRECT TESTIMONY OF

DR. FRANCIS R. COLLINS

ON BEHALF OF

COX ARIZONA TELCOM, L.L.C.

MAY 23, 2001

(PUBLIC VERSION)

INTRODUCTION OF WITNESS

Q. WHAT IS YOUR NAME AND BUSINESS ADDRESS?

A. My name is Francis R. Collins and my business address is PO Box 272, Newton, MA 02459.

Q. BY WHOM ARE YOU EMPLOYED AND IN WHAT POSITION?

A. I am employed by CCL Corporation, a company that provides public policy, technical, and economic counsel in the fields of telecommunications and cable television. I am the president of CCL Corporation.

Q. DR. COLLINS, ON WHOSE BEHALF ARE YOU APPEARING IN THIS PROCEEDING?

A. My testimony is presented on behalf of Cox Arizona Telcom, L.L.C. ("Cox"), which is a facilities-based provider of local telecommunications services in Arizona.

QUALIFICATIONS OF WITNESS

Q. WHAT IS YOUR BACKGROUND AND EXPERIENCE?

A. I have been employed in the telecommunications industry for the past thirty-nine (39) years. I began my professional career in telecommunications at Bell Telephone Laboratories where I worked for six (6) years designing and developing broadband telecommunication network technology. I have provided independent public policy, managerial, system design, technology application and economic counsel to various domestic and foreign clients.

My relevant experience includes appearances as an expert witness on a wide variety of telecommunications public policy, technical and economic matters before various regulatory agencies in the United States, as well as assistance to

clients in the development of telecommunications systems in ten (10) other countries. *Exhibit FRC-A* to this testimony contains additional information concerning my professional background and experience.

PURPOSE OF TESTIMONY

Q. DR. COLLINS, WHAT IS THE PURPOSE OF YOUR TESTIMONY?

A. The purpose of my testimony is to provide the Arizona Corporation Commission ("Commission" or "ACC") with the perspective of a facilities-based new market entrant on certain issues regarding Qwest's filings in this Docket and which significantly impact a facilities-based provider. These issues are delineated in the testimony summary that follows.

Cox's silence on other issues does not constitute agreement with other Qwest positions in this Docket.

SUMMARY OF TESTIMONY

Q. PLEASE SUMMARIZE YOUR TESTIMONY

A. My testimony points out that the Qwest Cost Study physically, economically, and technologically isolates tenants in business and residence multi-dwelling units (MDUs) to such a significant extent that those tenants will not be able to benefit from the competition in the provision of local exchange services intended by Congress with its passage of the Telecommunications Act of 1996 (the "1996 Act"). Having already established a blockade to the benefits of competition for MDUs while retaining market control, Qwest's proposals will put in motion a longer range strategy that could allow Qwest to maintain market dominance forever. This longer term strategy uses pricing artifacts – the "fill or utilization factor", the "sizing factor", and the "gradation of allowable cable sizes" – to recover total investment costs on essential technological elements necessary for

competition while Qwest remains the super-dominant service provider. Specifically, this strategy provides Qwest with a zero dollar investment cost basis for outside plant facilities going forward by loading all of the investment cost on a small part of the total capacity installed that has caused that cost. Qwest then can enjoy the balance of the capacity ("goods on the shelf") free of investment cost.

The testimony points out that the Qwest study appears to have several flaws that undermine its results. These flaws include such things as: (i) the depreciation and salvage value factors that have been used; (ii) the amount of overhead loading that has been applied; and (iii) the use of maintenance factors which are unreasonable. Cox has corrected these cost model input infirmities and has used its own cost model to present cost data that more reasonably represents the actual forward looking costs of the Qwest network loop and sub-loop elements.

Finally, this testimony points out to the Commission that the FCC has put to rest, subject to any appeal, the issue of intercarrier compensation for the termination of Internet Service Provider (ISP) traffic.

RECOMMENDATIONS TO THE COMMISSION

Q. DR. COLLINS, WHAT ARE YOUR RECOMMENDATIONS TO THE COMMISSION?

A. I recommend that the Commission adopt the MDU gateway depicted in *Exhibit FRC-D* where both the Minimum Point of Entry and the point of Demarcation meet FCC requirements, are located at the property line of campus properties and located inside single building units at the closest possible point to an accessible outside wall as is feasible. I further urge the Commission to allow property owners to purchase the telecommunication facilities on their property at net book value, just as the California Public Utilities Commission has done.

The notion of allowing Qwest to use its market dominance to recapture all of its outside plant investment over a significantly smaller number of units of capacity than have been installed (and which caused the investment costs), establishes barriers to market entry and threatens to force out new market entrants currently in business. I, therefore, urge the Commission to require Qwest to capture their investment costs over all but ten (10%) percent of the capacity installed that has caused that cost. The ten (10%) percent difference will provide a buffer for administrative and other costs of Qwest.

I recommend that the Commission require all carriers to settle their balance of payments caused by internet traffic within ninety (90) days and to establish an expedited process for settling disputes regarding these settlements which are brought to the Commission's attention.

I further recommend that the Commission require Qwest to re-run its cost studies using the Depreciation Schedules, Investment Based Factors and Maintenance Factors used as inputs to the Cox cost model for the determination of the 2-wire loop and sub-loop costs.

THE COX ISSUES

Q. DR. COLLINS, DOES COX HAVE A CONCERN ABOUT THE QWEST DEFINITION OF THE "SUB-LOOP"?

A. Cox wants to provide a competitive choice of local exchange service providers to tenants in residential MDU complexes and business entities in Multi-Tenant Environments (MTEs, both hereafter "Tenants"). In certain situations, where Qwest alleges ownership of telecommunications facilities on private property, Cox must have access to those Qwest facilities – the "last 300 feet" as it were – and that access should not be, physically, technically, or economically blocked by

Qwest. If it is blocked in any one or combination of these three ways, it will isolate the Tenants from Qwest's competitors, including Cox.

Cox's global position on this issue is that the campus and intra-building wire are not part of the distribution plant but are facilities on private property as noted by the FCC in a number of rulings going back to the late 1980's. Cox will address this issue in greater depth later in the testimony.

In its filings in this Docket, Qwest appears to attempt to set in place an unnecessary economic barrier to competitors. It does so through an inappropriate definition of what constitutes the Sub-Loop that the FCC has mandated that Incumbent Local Exchange Carriers (ILECs) provide to CLECs so that consumers will have a choice of service providers.

Although its definition of what constitutes a Sub-Loop is unclear, Qwest appears to have defined its position in the direct testimony of Maureen Arnold . [Ex. MA-1, p. 8] This Exhibit indicates that the Sub-Loop constitutes the Distribution Loop portion of the total loop. In examining the cost elements identified in the exhibit, only one element referred to Intra-building Cable, Cox's interest. Ms. Arnold indicated that Intra-building Cable was to be further discussed by Qwest witness Robert Kennedy. The investment for this Intra-building Cable (FRC 62C) was also presented in Qwest's tabulation entitled "Section A-Unbundled Loop Average Investment for 2-wire Distribution Cable," further solidifying Qwest's definition that the Intra-building Cable is included.

Mr. Kennedy addressed collocation and sub-loop issues in his testimony and addressed an "Intra-building Cable loop product." He did not address cable on the property outside the buildings of a multi-building complex, usually referred to as "campus wire." Mr. Kennedy points out that access to the Intra-building Cable Loop Product, consisting of riser cable or inside wire, is achieved at a cross-connect facility installed inside the building by the CLEC or building owner. Mr.

Kennedy further points out that Qwest (and not the CLEC) will provide the cross-connections to that inside wire. This adds customer premise visits and coordinated conversion charges to the CLEC's costs of offering competitive services to the Tenants. This reveals just one of a number of anti-competitive problems with Qwest's position on Sub-Loops. Examples of others are presented below.

Further, the direct testimony of Qwest witness Buckley (at p. 4) sets forth a diagram that describes what constitutes the "Distribution Sub-Loop." This diagram has been excerpted and included in this testimony as *Exhibit FRC-B* for ease of reference. Mr. Buckley's testimony points out that the Distribution Sub-Loop consists of:

> "In addition to the SAI and the cables, distribution plant includes pedestals or customer terminals, drop or service wires, and network interfaces."

There is no mention of cable or other non-network interface facilities on private property being included in the distribution facilities, and if Qwest now claims so, it is only because Qwest is subsuming the facilities on private property. These facilities on private property have been addressed separately from network facilities by the FCC since the late 1980's. The FCC's focus in those decisions is to provide as much control of telecommunications facilities on private property to the property owner.

The impact of Qwest's apparent descriptions of the Distribution Sub-Loop (which extends Qwest's network up to and into the building) and of the Intra-building Loop Product, is to isolate the campus wire and the Intra-building Cable from access by competitors. The only feasible manner of CLEC access is for the CLEC to physically extend its network onto the private property.

Property owners are loath to allow a multiplicity of CLECs to place cable across their property because of the esthetic problems it can create and disruption to the unencumbered use of the property during a multiplicity of construction

projects. The facilities that have been historically in place and which can provide this interconnection – the campus wire – appear to have been left out of Qwest's filing. In the event that Qwest asserts ownership of those facilities, it must provide access to them at just reasonable and in non-discriminatory terms, conditions and rates. Most facilities-based CLECs have facilities at an MDU property line but are isolated from the Qwest-defined interconnection point at the building(s). Therefore, the CLEC cannot take advantage of its facilities presence at the property line to offer competitive services to the Tenants.

In summary, Qwest apparently has provided either (i) access at the SAI to the *entire* Distribution Sub-Loop which may allow a CLEC to serve the customer but at significant cost (Qwest's current rate for that Distribution Sub-Loop in Zone One is $15.85 – an amount that is in excess of some CLEC's entire charge for dial tone and one that CLEC's cannot afford if they are going to be able to compete) or (ii) access to a cross-connect facility within a building to which Qwest will connect its building wire if the CLECs can bring their facilities to that point (which often is not allowed by the MDU owner).

Cox believes that if Qwest is successful in offering only these two alternatives, the Tenants of residential MDUs and commercial MTEs will not have access to the benefits of competition. These Tenants will have been competitively isolated either by (i) Qwest's insistence that the entire distribution facility must be used which would require a CLEC to pay for a significantly larger portion of the loop than it needs and which may require a CLEC to re-route its facilities; or (ii) the CLEC's need to access intra-building wire, which is either unlikely or very costly to gain. Because the cost of CLEC access would significantly exceed market retail rates, CLECs will not be able to provide competitively-priced service to those Tenants and would choose not to compete for those Tenants.

Q. DR. COLLINS, YOU INDICATED THAT THE FCC HAS ADDRESSED THE MDU/MTE ISSUE. WOULD YOU BE MORE SPECIFIC?

A. Under the Telecommunications Act of 1996, tenants in multi-tenant properties should be entitled access to competitive telecommunications carriers. This access to CLEC services can be significantly restricted, or even eliminated, by the manner in which the private property MDU/MTE has been "wired" for service.

The FCC, in Docket 88-57, provided the property owner with the choice of how the wiring for the private property should be installed and who should install it for those properties being built after June 8, 1990. That is, the ILEC had the duty to inform the property owner that the property owner could assume the responsibility for the wiring installation as long as that installation met certain standards. In the alternative, the property owner could request that the ILEC install the wiring but in accordance with any of several alternative architectures. Each of these architectures provide different levels of control, installation/ maintenance responsibilities and cost being left as the responsibility of the property owner

For properties that were developed prior to June 1990, the telecommunications wiring was either to have been installed in accordance with the ILEC's reasonable practices or should be brought up to that standard by the incumbent carrier. The determination of reasonable practices was to be made against the applicable legislative and regulatory standards.

The FCC did not intend (or authorize state regulatory bodies) to create two classes of property owners: those who could control the wiring on their premises by virtue of being "new" property owners and those who had no control by virtue of being "old" property owners. Therefore, the process established by the FCC at that time was designated to bring both of these groups of property owners into the same position.

The 1996 Act has significantly changed the standard by which the treatment of telephone wire and cable on private property should be treated. The Act promises the benefits of local exchange service competition to all customers. The Act's emphasis on a continuation of the provision of universal service, subsidized through a tax (surcharge) on telephone service, brings the competitive benefits to low income and rural subscribers. The Act did not intend – nor does it allow ILECs to create – a differentiation in access to competitive services between single family homes or single building businesses and residential or business subscribers in multi-tenant properties.

Q. DR. COLLINS, WHAT IS COX'S POSITION ON THIS ISSUE?

A. Cox's position on providing access by MDU tenants to competitive services is simple. Tenants must have access to competitive services and such access often requires a reconfiguration of the Minimum Point of Entry (MPOE) and the Demarcation point (Demarc) on that private property.

The MPOE and Demarc are defined by the FCC as the point at which the local exchange carrier's network ends and the property owner's telecommunications facilities start. The FCC opened the maintenance, repair and installation of the customer's telecommunications facilities to competition in 1990 and in doing so wanted the property owner to control as much of those facilities as possible so that competition would be enhanced. Therefore, the MPOE should be precisely what it indicates and, in light of the 1996 Act, should support its competitive neutrality provisions. This means that the MPOE should be as close to the point on the property where it is available to all competitors on an equal basis. The optimum location for the MPOE would be property specific but, in general, it should be at the edge of the property and, to comport with FCC regulations, should be within twelve (12) inches of that edge.

It has been Cox's experience that many, and in fact most, of the ILEC wire and cable installations on private property have been designed to move the MPOE and Demarc as close to the subscriber as possible. This strategy is then used to claim that the wire and cable on private property is an extension of the ILEC network and that the wire and cable is network wire. In view of the FCC's 1990 action, this position was, at that time and depending on state regulatory policy, only tenable for "old" property. It was not tenable for new property.

For new property, installing ILEC-owned wire and cable on private property was only possible with the willing and informed agreement by the property owner. And, as agreements with respect to real property must be in writing. Qwest should be able to produce a written agreement signed by the property owner for each instance it claims that the wire and cable on private property belongs to it. In the absence of that agreement, Qwest cannot now claim that the property owner was provided information that allowed it to make an informed judgment and that either (i) the property owner entered into an oral agreement or (ii) the property owner made no choice and Qwest made the choice for the property owner.

Absent a signed agreement that clearly demonstrates that the property owner was fully informed, the access point to competitors for the tenants of multi-tenant properties must now be located as close to the property boundary as possible. This location for the point of demarcation between the networks of competing carriers and the wire and cable on the private property is required so that the tenants can use the carrier of their choice.

For "old" property (built before June 1990), the installation must have been done in accordance with Qwest's reasonable and competitively neutral practices. "Reasonable" should be determined by the federal and state regulatory requirements in existence at the time of the construction. Today, in view of the 1996 Act

and the equitable treatment of all consumers, it is necessary to bring the wire and cable issue up to date. This means one point of interconnection, at the property line, between the wire and cable on private property and the carriers representing the tenant's choice for service. Existing wire and cable must be reconfigured so that the point of demarcation between the network wiring of any carrier and the wire and cable on the private property needed by Tenants to reach the networks of the competitive providers of service is located at the property edge.

Q. YOU INDICATED THAT QWEST HAD PROVIDED FOR ONLY ONE SCENARIO IN MDU/MTE ACCESS AT THE PROPERTY. WHAT ARE SOME OTHERS?

A. To understand the problem with Qwest's single scenario, we need to put things into perspective. If one considers *Exhibits FRC-C-1* to *C-4* and puts them into the context of *Exhibit FRC-B*, the picture becomes much clearer. Note that these depictions represent campus properties wherein Qwest has alleged ownership of the facilities on private property and present several alternative scenarios that may be present at an MDU/MTE. Yet, a different situation exists on other campus properties, where Qwest has not asserted ownership; that situation is one that comes closer to the Cox recommendation presented in *Exhibit FRC-D*. To put the attached exhibits in context, the cable connecting to the customer premises in *Exhibit FRC-B* (such as the 900 pair cable) is the same cable indicated at the top of each diagram in *Exhibits FRC-C-1* to *C-4* and is identified as coming from the Qwest network and connecting to Qwest's MPOE located on the campus property.

In *Exhibit FRC-C-1*, a campus property of three buildings is depicted. The Qwest MPOE has been initially located near the property edge or has been moved there at the owners request (both required by the FCC) while the Demarc has been left at each building. Access to the three buildings is provided on the property side of that MPOE through the use of campus wire and network interface facilities for

which, we will assume, Qwest has also asserted ownership. Note that although CLECs A and B have facilities at the property line and close to the MPOE, under Qwest's filing they would either have to reroute those facilities to the Qwest SAI which, in *Exhibit FRC-B*, is at the intersection of the Feeder Cable and the Distribution Cable or trench, plow, or place underground facilities which would cross the property to each building. Additionally, under the Qwest filing, the CLEC would have to hire Qwest to install a Field Connection Point or a cross-connect facility at significant cost in order to interconnect to the Intra-building Sub-Loop. These additive costs for using the Sub-Loop, as Qwest has configured it, makes it impossible to create a viable business case for a CLEC to serve such a property.

Exhibit FRC-C-2 depicts a campus property wherein there are two high rise buildings. Qwest has physically and economically isolated the Tenants in these buildings by its assertion of ownership of the MPOE, the Campus Wire, the Riser Cable in the buildings and the network interface (SNI) on each floor of the building. Although Qwest has not asserted ownership of the horizontal cabling on each floor (and it could be available for Tenants to access CLEC networks), it is not physically or economically possible because the campus wire and MPOE serve as a Qwest-controlled gateway.

Exhibit FRC-C-3 depicts another campus property wherein the Qwest MPOE has been located in each building. This scenario is quite common. The Tenants cannot obtain access to competitive services because of the Qwest gateway represented by the SNIs, Riser Cable, and MPOE. Therefore, the Tenants have been physically impaired from reaching competition. This physical impairment is compounded by the economic impairment involved in the CLECS moving its facilities to the SAI as noted above to provide service.

Exhibit FRC-C-4 represents another scenario wherein the Qwest SNIs have been located within each office or dwelling unit. This configuration, along with all the other Qwest competition gateway elements, make it even more difficult for Tenants to access competitive services because the CLECs have the additional burden of extending cable into each office or dwelling unit.

Exhibit FRC-D depicts an arrangement on private property that is competitively neutral. In this depiction, the property owner owns the telecommunication facilities on the property, the MPOE/Demarc is at the property line, and all Tenants have equal access to the carrier of their choice. The chosen carrier merely interconnects with the telephone pair(s) serving that customer at the MPOE. This is Cox's preferred treatment of the MDU/MTE to allow Tenants access to the benefits of competition. Cox notes that the FCC requires Qwest to rearrange the facilities to that indicated in *Exhibit FRC-D* and, after that rearrangement, the property owner can and should be able to purchase those facilities.

Q. IF QWEST ASSERTS OWNERSHIP OF THE FACILITIES NEEDED TO PROVIDE A LEVEL PLAYING FIELD FOR TENANT ACCESS TO COMPETITIVE SERVICES, BUT AGREES TO MEET ITS OBLIGATION UNDER THE 1996 ACT TO SELL THE FACILITIES TO THE PROPERTY OWNER, HOW SHOULD A BUY-OUT FIGURE BE DETERMINED?

A. The fairest way to determine the buy-out price is to price the facilities at net book value. That is original investment minus accumulative depreciation expense. The California Public Utilities Commission has recently ruled that this is the preferred method in:

> PUBLIC UTILITIES COMMISSION OF THE STATE OF CALIFORNIA, Telecommunications Division, Market Structure Branch, RESOLUTION T-16373, April 19, 2001.

Q. DR. COLLINS, IS THERE A COMPELLING REASON FOR QWEST RECONFIGURING ITS FACILITIES TO CORRESPOND TO YOUR *EXHIBIT FRC-D*?

A. Yes. The FCC has required that they do so upon request by the property owner or the agent of the property owner.

Q. IS THERE A COMPELLING REASON FOR QWEST TO SELL THE RECONFIGURED FACILITIES TO THE PROPERTY OWNER?

A. The Commission can require Qwest to convey the facilities at their fair value. If the fair value is paid, there is no "Taking" of the facilities and Qwest is made whole. As noted above, Cox believes that a fair value is placed on the facilities when Qwest is paid its current net book value for the facilities. If Qwest is paid more than net book value – such as if it were paid the replacement value – then they will have received super-normal profit for these facilities. Note that the depreciated portion of the facilities have already been paid by the rate-payers, and the property owner. In other instances, Qwest could have already charged the property owner for a portion of the installation and then incorporated the entire cost, including the portion that Qwest did not pay for, in the rate base.

THE "FREE GOODS" ON QWEST'S SHELF PROBLEM AND A SOLUTION

Q. YOU INDICATED IN THE SUMMARY OF YOUR TESTIMONY THAT THE COMMISSION SHOULD REVIEW THE "FILL FACTOR" PROBLEM OR, AS QWEST HAS DEFINED IT, THE "NUMBER OF PAIRS PER LIVING UNIT." WOULD YOU ELABORATE ON THIS PROBLEM AND PROVIDE YOUR RECOMMENDATION TO THE COMMISSION FOR ITS CONSIDERATION?

A. This issue is extremely important because it establishes Qwest's cost basis for the primary ingredient of local exchange service provision, the dial tone line. There is no difference of opinion between Qwest and Cox as to the definition of "Fill Factor" or as it is sometimes called the "Utilization Factor." The Fill Factor represents the forecast capacity to be in service over a period of time divided by the total capacity installed at each of those points in time. The difference of opinion arises due to the way the cost of that plant in service is developed when viewed against Qwest's monopoly (or market control) power.

There is another factor that must be taken into consideration in determining the cost of the dial tone line – the "Sizing Factor." The Sizing Factor provides a buffer for under-forecast errors and for dial tone service expansion during a period of time when additional capacity can be installed. There is no difference of opinion between Cox and Qwest on this issue.

In earlier decisions, the Commission has allowed Qwest to use, as a forecast capacity figure, three lines per living unit in Density Groups 3 and 4 and two lines per unit in Density Zones 1, 2 and 5. Insofar as Qwest's actual lines in service are closer to one line per living unit across its footprint in Arizona, Cox finds this level of installation exaggerated. This exaggeration is exacerbated when the demand computed using the three- and two-line allowance is again increased by the Sizing Factor and then again due to the increments in cable size provided in the Qwest cost model. This exaggerated growth in outside plant is harmful to competition as explained below. The Commission can remove this impediment to the start and growth of competition by merely requiring that each unit of capacity carry its own cost. Qwest's current cost methodology does not do so. Therein lies the difference of opinion between Qwest and Cox on this issue.

To highlight this difference of opinion, consider the following example. A location (in an area where Qwest has at least 90% market share) has a forecast

demand of 45 lines. Applying a Sizing Factor of 80% leads to a provisioning requirement of 45 lines of demand divided by 80% or 56 lines of capacity. This capacity must be provided from a cable that has at least 56 pairs in it. Although there are 75 pair cables available in the marketplace, it appears that Qwest's outside plant design cable increments jump from a 50 pair cable to a 100 pair cable, thereby providing an additional increase in capacity over and above the Sizing Factor. Cox and Qwest disagree on the cable size increments used in Qwest's design criteria.

Selecting the 100 pair cable (using Qwest's criteria) provides 100 pairs of capacity to serve 45 working pairs. Note Qwest's "Effective Fill" at this point is 45 lines of demand divided by 100 lines of capacity or 45%. At this point, to determine the cost per pair, Qwest takes the investment – for example, $900.00 – and divides it by the line equivalent of the Effective Fill ($900.00 divided by 45 lines) or $2.00 per line. The effect is to recapture 100% of the investment from the capacity forecast to be required from the market controlled base of subscribers when 45 lines of capacity are supplied. When those 45 lines are put into service ,the remaining 55 lines of capacity have a zero investment cost and it is this capacity that Qwest will use to offset inroads from competition.

In Cox's case (and that of other potential and active competitors), Cox must recapture 100% of its investment from 100% (or nearly 100%) of its installed capacity in order to keep the per line cost at levels that will allow it to compete in the marketplace.

The Commission must take note of this use of Qwest's monopoly power to increase the apparent per line cost artificially while Qwest still maintains market control. The Commission has aided, perhaps unintentionally, Qwest in this endeavor by sanctioning its three- and two-lines per site methodology. My recommendation to the Commission is to remove this block to competition by

requiring Qwest to recapture its investment from all (except a small provision for maintenance and administration of 10%) of the plant units represented by that investment. In this instance Qwest would have a per line investment cost of $900.00 divided by 90 pairs (100 pairs – 10%*100pairs = 90 pairs) or $1.00 per pair. In this manner each unit of installed capacity carries the cost generated by the installation of that unit of capacity.

INTERNET TRAFFIC

Q. DR. COLLINS, SEVERAL OF THE QWEST WITNESSES HAVE ADDRESSED COMPENSATION FOR INTERNET TRAFFIC. WHAT IS YOUR VIEW OF THAT TESTIMONY?

A. Qwest witnesses Brotherson, Taylor and Craig discuss compensation for internet traffic as Qwest views the issue. I believe that the level of mutual compensation appropriate for internet traffic on a going forward basis is no longer an issue because of FCC action. On April 19, 2001 the FCC (Docket Nos: CC 96-98, 99-68) adopted new rules for intercarrier compensation for traffic delivered to Internet Service Providers (ISPs). In essence, and subject to certain qualifying conditions, intercarrier compensation for ISP-bound traffic will be capped at the rate of $0.0015/minute of use (mou) for the first six months following the effective date of the order. The rate will be capped at $0.0010/mou for the next 18 months and beyond the two-year period the rate will be capped at $0.0007/mou.

Unless overturned on appeal, this decision by the FCC should put this issue to rest. However, I believe that the Commission could provide additional and needed assistance by ordering Qwest and other carriers to comply with the order and by providing an expedited protocol to hear and decide matters brought before them related to any attempt by any carrier to delay payment for internet bound traffic.

IMPORTANT COST DRIVERS AND THE PROBLEMS THEY INTRODUCE TO THE COST STUDY

Q. YOU INDICATED IN THE SUMMARY OF YOUR TESTIMONY THAT YOU WERE CONCERNED ABOUT CERTAIN INPUT FACTORS IN QWEST'S STUDY. WHICH OF THESE ARE YOU MOST CONCERNED ABOUT AND WHY?

A. In its model, Cox has adopted those input parameters recommended in the previous UNE pricing dockets before this Commission to the extent that the passage of time has not made them stale. Two of these – Depreciation and Cost of Capital – drive the cost model. As an example, Cox has accepted the Commission's recommendation as to the weighted cost of capital (WACC) of 10.37% (including the capital structure of 38.3% long term debt and 61.7% common equity) as being high but within a range of reasonableness. However, I believe that a more appropriate figure at this time would be the 7.09% cost of debt, 11.4% cost of equity, and a capital structure of 38.3% debt and 61.7% equity for a total WACC of 9.75% provided for in Decision 58927. Be that as it may, Cox has used the 10.37% in its TELRIC cost study.

Depreciation is another matter. There are two factors that must be considered under the heading depreciation. The service lifetime and the net salvage value. Cox believes that the best values to use are those approved by the FCC. The values used by Qwest in its studies are not clear. *Exhibit FRC-E-1* presents, in columns (1) and (2), the service life and net salvage value Qwest, at various points, indicates it has used in the cost study. However, in response to Staff Discovery DW-01-017, Qwest provided the service lives and net salvage value presented in columns (3) and (4). These two presentations are significantly different in plant elements that carry huge investments and using one schedule as opposed to the second will produce different results of significance. The impact of

the depreciation data provided by Qwest in response to Staff discovery results in the following reduced loop costs:

COMPARISON OF 2-WIRE LOOP COSTS
BASED ON QWEST'S TELRIC STUDY AND RESPONSE
TO STAFF DW-01-017
(Depreciation Effects Only)

	Zone 1	Zone 2	Zone 3
Qwest Study	$23.07	$28.64	$42.14
Qwest response to Staff Discovery	$21.46	$26.35	$38.46

Note that these reductions are driven by the difference in the conflicting Qwest data for service lives and net salvage value alone. Incorporating other needed modifications to the Qwest input data would drop these costs further.

Rather than making an attempt to repair Qwest's study, Cox, to provide an example, has undertaken its own TELRIC study and produced results for the two wire loop and distribution sub-loop. The Cox TELRIC cost model, discussed at greater length below, is based on a different approach than that of Qwest. For example, to account for depreciation, Cox has used the service lives and net salvage value presented in *Exhibit FRC-E-2*. The Qwest claimed input data are presented in columns (1) and (2) and the Cox/FCC approved service lives and net salvage value are presented in columns (3) and (4).

Qwest also has used maintenance factor inputs that are overstated and have led to exaggerated costs. Cox has accepted the Commission's recommendation as to maintenance and reduced the Qwest factors by 15%.

Further, Qwest has overstated its common and "other" assignable costs, which drive the costs upward. Cox has accepted the Commission's ruling in Decision No. 60635 (the previous UNE pricing decision) of a 15% mark-up to cover these costs. Again, these seemingly minor charges can have a significant effect on the outcome. For example, the effect of the common/unassigned cost modifications can be seen in the following tables:

COMPARISON OF 2-WIRE LOOP COSTS
BASED ON QWEST'S TELRIC STUDY AND THAT PER COMMISSION OPINION AND ORDER – DECISION 60635
(Common and Unassigned Costs Only)

	Zone 1	Zone 2	Zone 3
Qwest Study	$23.07	$28.64	$42.14
Commission Order	$17.35	$23.74	$39.26

COMPARISON OF 2-WIRE SUB-LOOP COSTS
BASED ON QWEST'S TELRIC STUDY AND THAT PER COMMISSION OPINION AND ORDER – DECISION 60635
(Common and Unassigned Costs Only)

	Zone 1	Zone 2	Zone 3
Qwest Study	$15.84	$21.57	$35.23
Commission Order	$13.20	$17.97	$29.36

These cost differences are significant and are due *only* to a correction of this *one* of a multitude of input factors for Qwest's study. The Commission should order Qwest to correct all of its unreasonable input data.

THE COX COST STUDY

Q. DR. COLLINS, WOULD YOU PRESENT THE RESULTS OF THE COX COST STUDY?

A. The results of the Cox TELRIC cost study for the two wire loop and distribution sub-loop are presented in *Exhibits FRC-F-1* and *F-2*. A summary of these results are presented in the following table.

COMPARISON OF 2-WIRE LOOP COSTS
BASED ON THE QWEST AND COX TELRIC STUDIES

	Zone 1	Zone 2	Zone 3
Qwest Study	$23.07	$28.64	$42.14
Cox Study	$11.26	$15.20	$25.49

COMPARISON OF 2-WIRE SUB-LOOP COSTS
BASED ON THE QWEST AND COX TELRIC STUDIES

	Zone 1	Zone 2	Zone 3
Qwest Study	$15.85	$21.57	$35.23
Cox Study	$8.09	$10.95	$17.84

These significant differences in cost result from a correction of the input data used and the use of a TELRIC cost model that more closely matches (i) the cash flow over the service lives of the plant elements (related to the service) to (ii) the cash flow required to service the debt and equity components of the cost of capital at the capital structure chosen.

Q. YOU NOTED PREVIOUSLY THAT YOU USED THE COMMISSION'S RECOMMENDED INPUT PARAMETERS WITH THE EXCEPTION OF

THOSE THAT WERE MADE STALE BECAUSE OF THE PASSAGE OF TIME. WOULD YOU ELABORATE FURTHER ON THE MOST IMPORTANT OF THESE FACTORS?

A. *Exhibit FRC-G* presents information that contrasts the Qwest and Cox Investment Based Factors (Annual Charge Factors) for various elements of plant. These Investment Based Factors provide the bridge between investment and the cash flow necessary to support that investment cost.

Exhibit FRC-H presents information which contrasts the Qwest and Cox Maintenance Factors. This input data is necessary in the TELRIC model's development of costs.

It was noted earlier in this testimony that a comparison between the Qwest and Cox Service Lives and Net Salvage Value is presented in *Exhibit FRC-E-2*.

Exhibit FRC-I presents an illustration of the computation of one of the Cox Investment Based Factors depicted in *Exhibit FRC-G* – that of FRC Account 45C for Buried Metallic Cable. This type of computation was run for each of the accounts presented in *Exhibit FRC-G*.

Q. WOULD YOU DESCRIBE *EXHIBIT FRC-I* IN GREATER DETAIL?

A. The model presented in *Exhibit FRC-I* computes, as an interim step, the Investment Based Factor for each of the Plant Accounts shown on *Exhibit FRC-H*. Because of the volume of data, I have not included similar tables for the other incremental plant investment categories but rather have presented one example of those calculations using plant account 45C.

The model uses the input data described throughout this testimony to determine the Investment Based Factor (IBF) needed to establish the annual cash flow required to service each of the incremental investments. This IBF must fulfill two primary objectives:

1. the sums of the present values of the net cash flows to debt and equity over the forward looking period of 23-years (the service life used for FRC 45C as shown in *Exhibit FRC-E-2*, column 3) must be equal to, respectively, the present values of the debt and equity that initially financed this incremental investment.

2. the "real price" charged each year in the forward looking period to recover all incremental costs must be the same for all of the cost objects of the same type produced during the forward looking period such that the corresponding "nominal" prices for the cost objects are sufficient to generate requisite net cash flows.

These two objectives fulfill fundamental requirements of the theory of competitive markets from both a supply-side and a demand-side view: (i) that investors must have an opportunity to realize their required rates of return and (ii) that all output produced bears the same real prices, so that no intergenerational or temporal price discrimination occurs among consuming entities throughout the forward-looking period. Qwest's approach fails to meet these fundamental market requirements. For example, Qwest's proposal violates the bar against cost/price discrimination in its computation of cost object unit prices using the "fill factor" or "site allowance" methodology discussed previously in this testimony.

Cox's methodology, on the other hand, meets these basic market objectives. For example, as indicated on *Exhibit FRC-I*, for each $1,000.00 of buried metallic cable investment the cash flow necessary to fund the expenses indicated as the column headings in *Exhibit FRC-I* must be generated. Column (11) demonstrates, for example, that the sum ($617.00) of the Present Value Equity Cash Flow over the 23-year forward-looking period (determined using the 12.40% equity cost as the discount rate) equals the sum of the present value of incremental equity investment; *i.e.*, the assumed $1,000 incremental investment at the beginning of 1999 times the equity ratio of 61.70% or $617.00. This means that the internal rate of return (IRR) earned by the incremental equity investment is precisely equal

to the equity cost of 12.40%. While not shown in *Exhibit FRC-I* but computed internally by the model, the same holds for incremental debt investment; i.e., the sum of the present value debt cash flows (determined using 7.09% as the discount rate) is equal to the initial total 1999 investment of $1,000 times the debt ratio of 38.30%. Debt payments include Debt Retirement (DR) in Column (7) and interest payments incorporated in Before Tax Cash Expenses in Column (2) of *Exhibit FRC-I.*

Nominal annual Required Cash Receipts, corresponding to the unbundled loop output produced per $1,000 of incremental investment that fulfill the two fundamental objective functions, are shown in Column (1) under the premises of expected debt return (7.09%) and equity return (12.40%) of investors, as well as an anticipated 4.2% annual inflation rate. Using a mid-year calculation convention, the "real" annual Required Cash Receipts per $1,000 of incremental investment over the forward-looking period is $162.57, whereas the corresponding "nominal" amount in 2001 is $180.18; *i.e.*, $162.57 $(1+4.2\%)^{2.5}$. Thus, the appropriate 2001 ACF is $180.18/$1,000 = 18.02% for Buried Metallic Cable. This percentage is shown in Column (2) of *Exhibit FRC-G.*

In this instance, the plant account (45C) has a twenty-three year service life as can be seen on *Exhibit FRC-E-2.* This period of time designates the rows of the cash flow matrix in *Exhibit FRC-I.* Note that in the current year, 2001, the required cash receipts must be $180.18. For the $1,000.00 investment, this represents an Investment Based Factor (IBF) of $180.18 divided by $1,000.00 or 18.02%. Referring to *Exhibit FRC-G* at the row entitled Buried Cable-Met, one notes that the Cox input figure for the IBF is 0.18018 or 18.02%.

The IBFs for all of the plant elements are determined in this manner and these factors, along with the other factors (depreciation, WACC, etc.) described above, are used to determine the 2-wire loop and distribution sub-loop costs as

presented in *Exhibits FRC-F-1* and *F-2*. The significant differences between the Cox and the Qwest cost determinations are cause for concern. The Commission should require Qwest to modify the input data to its study so that it matches the Cox factors for the 2-wire loop and distribution sub-loop. Because the same improper input factors were used to generate the other costs provided by the Qwest model, Cox believes that the rest of the costs developed by Qwest also are inaccurate.

CONCLUSION

Q. DOES THIS COMPLETE YOUR TESTIMONY?

A. Yes.

EXHIBIT FRC-A

CURRICULUM VITAE OF DR. COLLINS

PROFESSOR FRANCIS R. COLLINS

Dr. Collins is a senior member of the International Telecommunications Industry. He has made significant contributions to the science, engineering, business development and evolution of that industry. His professional science and engineering focus over the years has been the System Architecture, Design and Implementation of large scale public and private telecommunications and teleprocessing systems and networks. A few of the many possible examples are: the design and creation of the fundamental plan which included operations, finance, technology and training for the Public Switched Network in Saudi Arabia; a technical audit and re-engineering of the communications and telemetry systems serving the oil and gas fields in Algeria; the specification for operational and technology improvements in NIRT, the National Iranian Television Company; numbers of technical and economic audits of operating telephone companies in the United States; the technical audit and specification for quick fix technical improvements to the local exchange plant for CANTV, the telecommunications provider in Venezuela; the establishment of a strategy for and the technical evaluation of the proposals for the alternative telephone company in Australia; the establishment of competitive strategies for the National and International telephone companies in Australia; a technical, organizational and financial "due diligence" study including vendor recommendations for a 2,000,000 line switched telephone and broadband telecommunication project in Thailand; and from the commercial sector a few examples are: the design and architectural implementation of the Florists' Transworld Delivery (FTD) Mercury Network in North America; the design of corporate nationwide telecommunications and teleprocessing systems for a host of industrial clients and the provision of technical and economic counsel to telecommunications service providers.

While a teaching professor, a Dean of Engineering, and a Provost of the University at Boston University, Dr. Collins provided consulting services in: Public Policy; Business Analysis; Revenue Production Strategy Development; the application of Science and Engineering to the design and development of public switched networks; and Economic and Financial Counsel. This work has been done for the national and international telecommunications, cable television, and information technology community.

Dr. Collins' own applied research is in the design and implementation of unique communications, teleprocessing and information technology systems and the requisite requirements analysis and system design. In addition Dr. Collins has pursued an intellectually stimulating aspect of being a telecommunications scientist and professional engineer, that of addressing issues related to Public Switched Telecommunication System Design, Telecommunications Public Policy Development; Telephone Operating Revenue Requirements and Rate Design Issues for Developed and Developing Countries across the world. In addition he has addressed the technological, economic and public policy concerns and issues to be faced in the introduction of technology and competition into those public telecommunication and broadband networks. For the past few years, Dr. Collins' interests have centered on the introduction of deregulation and competition in the telecommunications industry in general and most recently the local exchange marketplace. He is currently viewed as one of the leading authorities in the implementation of the Telecommunication Act of 1996 and the application of the FCC's Rules and Orders in the support of that Act. He has formally addressed these issues in Arizona, California, Connecticut, Iowa, Louisiana, Michigan, Nebraska, Nevada, New Hampshire (Maine

and Vermont adopted the New Hampshire results), New York, Michigan, Ohio, Oklahoma, Pennsylvania, Rhode Island, and Virginia.

Recent specific areas of work have included:

- Providing economic and technical counsel to state governments and the representation of co-carriers in negotiations between ILECs and CLECs to arrive at co-carrier agreements which satisfy the 96 Telecommunications Act requirements;

- The determination of the approach for and subsequent review of Total-Element/Service-Long Run Incremental Cost Studies, the audit of investment levels, the determination and allocation of Joint and Common Cost, the determination or verification of investment loading factors, and the determination of the Cost-of-capital and Depreciation, for the establishment of cost elements (and subsequently rates) for unbundled local exchange networks;

- The provision of technical and economic counsel to and representation of parties in TS-LRIC cost methodology development workshops whose goals are to make recommendations to regulatory bodies;

- Member of the Connecticut Telcom Industry Operations Task Force which was established by the Connecticut Commission;

- Member of the State of Connecticut Technical and Economic Task force providing oversight to the implementation of Alternative Regulation for SNET;

- Technical Counsel to the Connecticut Carrier Change Process sub-committee established by the Connecticut Commission;

- Member of the California PUC E911 Task Force; Member of the California PUC LNP Task Force;

- Member of the FCC/NANC Task Force addressing Telephone Number Optimization Issues

- Member of INC (Industry Telephone Number Committee) a National Standards Setting Forum for Telephone Number Utilization established by the FCC.

- The provision of Technical and Economic Counsel to a California Industry Association regarding: NPA/NXX issues; New Regulatory Framework issues; Local Competition Rule issues; issues underlying Local Number Portability; the Provision of Emergency Services; Open Network and Network Architecture Issues, and the implications of the Telecommunications Act of 1996;

- Technical and Economic Audits for Operating Telephone Companies, focusing on the Construction Program, the resulting Capital Investment, and its effect on the Rate Base;

- The design of a multi-variable computer program for doing first cost and upgrade costs of CATV and Video Dial-tone Broadband Networks;

- The review and analysis of proposed Capital Programs and the proper allocation of costs to regulated and competitive services for local exchange operating telephone companies;

- The assessment of proposed Rate Design Structures and their relationship to the Capital Investment and the utility of that investment;

- The technical audit of portions of the CANTV Network in Venezuela with the recommendation for immediate and cost effect upgrading of that network through the evolutionary introduction of technology to the Capital Program;

- For the government of Australia, the evaluation of the optimum manner of introducing a significant advanced technology expansion to the existing network through the establishment of a "Second Carrier" for domestic local and long distance service;

- The managerial oversight of the design and implementation of a comprehensive training program in Saudi Arabia;

- The development of a major 124 hour technical training program in telecommunications and advanced broadband services for NYNEX. The program ran three years and over 1,200 staff members were trained.

- The technical and economic audit of a 2,000,000 line, 2.8 billion dollar expansion of the public network for video, data and voice services in the greater Bangkok, Thailand area for an investment banking firm's due diligence effort;

- The Creation of the Fundamental Plan for the terrestrial and satellite based Public Switched Network for Saudi Arabia for; Operations, Revenue Requirements, Tariff Structures, Organizational Structures and Technology Introduction;

- The Creation of the Specifications for the Loop, Switching and Trunking Equipment to Implement the Saudi Arabian Public Switched Network;

- The Architectural Oversight of the Implementation of the Public Switched Network in Saudi Arabia;

- The Analysis and Synthesis of an International Gateway Network using Space Satellite Links for Saudi Arabia;

- The Design of a National Video and Digital Data Network for National Iranian Television;

- The Analysis leading to recommendations for rectifying problems in the Telecommunications supporting the gas and oil fields in the Algerian Sahara;

- The design of a Space Satellite International Gateway Complex to support international communications to/from The Republic of Vietnam;

- The Planning and Design for a Voice and Data terrestrial and Satellite base Telecommunication System for the Provision of Educational and Medical Services to remote regions in the United States;

- The analysis required for the design and then the design, installation, staff training, and establishment of operational and cost control systems for nationwide voice, television and data networks for private industry and national governments. These include projections of needed telecommunications capacity and services based on Operational Research methods applied to the particular situation;

- The Architectural Design;, Public Policy Impact Analysis; and Financial Impact Assessment; System and Subsystem Specification; Integration, Test and Evaluation of Large Scale Teleprocessing systems;

- The specification of components for nationwide on-line, real time voice/data systems employing thousands of terminals;

- The architectural design and engineering specification for mobile telephone systems considering the cost performance aspects of standard vs. cellular configurations;

- The integration of cellular signaling and billing transmission protocols with Equal Access, Feature Group D formats;

- The evaluation of start-up companies and their products for investors or venture capital concerns;

Dr. Collins has had forty years of experience as a systems engineer, engineering manager, executive and senior consultant in the telecommunication, navigation and digital electronic fields. He is recognized as an international expert in telecommunications; science, technology, economics and public policy. As a member of technical, middle and top management levels, he has held marketing, profit, overhead, cost, planning, and administrative control positions for a number of top companies: Bell Telephone Laboratories, the MITRE Corporation, the Magnavox Company, Analytical Systems Corporation, Arthur D. Little, Inc., and Boston University.

His Executive Management positions have included:

- Executive Project Manager, the MITRE Corp.;
- Director, the Magnavox Communications Research Laboratories;
- Executive Vice President, The Analytical Systems and Engineering Corporation;
- Managing Project Director, Arthur D. Little Inc.;
- Dean of the College of Engineering, Boston University;
- Provost and Director of Sponsored Research, Boston University;
- President and CEO, CCL Corporation.

He is the author of over 100 technical papers and has processed patents in the design of telecommunications, information technology, and multi-media broadband networks and equipment. He currently is in the process of perfecting two patents related to the "convergence" of the cable and telephone industries. In addition, he has accomplished work and published confidential reports in the areas of requirement analysis and telecommunications system performance and design for the Army, Navy and Air Force. These systems, both satellite and terrestrial, typically employed advanced modulation techniques, equipment and systems to support generic mission profiles.

Dr. Collins was awarded the B.S.E.E. degree Cum Laude by Northeastern University and the M.S.E.E. degree with high honors as part of Bell Telephone Laboratories Educational Program. This certificate program involved additional higher education above the Masters degree level. These courses were taken at the Massachusetts Institute of Technology and in residence at the Laboratories. In that work his educational emphasis was on digital switching and network transmission systems. His doctorate (Ph.D. in Telecommunications) was awarded by the Union Graduate School. In 1996 Dr. Collins was appointed to the "International Academy" in the position of Academician (Professor Emeritus in the US) by the Faculty of the University of Moscow, St. Petersburg, Russia.

Dr. Collins has been a Professor of Engineering of the undergraduate and graduate school faculties of Northeastern University, Lowell University, and Boston University. His academic career includes the organization and presentation of courses in the areas of: digital computer/electronics; solid state circuit design; synthesis of linear passive bilateral networks; the theory of time varying fields; the theories of dynamic systems with applications of classical (transform calculus techniques) and modern (state space formulations) solutions; communications theory and the design of communications systems. He was a Professor of Engineering and a Dean of the College of Engineering, responsible for the Colleges Research Activity, at Boston University from 1976 to 1978 and Provost, a position similar to Executive Vice President, responsible for the research activity of the University with responsibility for The Office of Research Programs from 1978 to 1981. During his tenure at Boston University Dr. Collins was sought after for consulting services by national and international businesses, industries, and governments and provided these services to the extent allowed by his faculty affiliation.

From 1981 to the present he has been providing consulting services through CCL Corporation and additionally is "Of Counsel" to a number of other distinguished firms including Arthur D. Little, Cambridge Strategic Management Group, Exeter Associates, and J.W. Wilson Associates.

Dr. Collins is a registered Professional Engineer in the Commonwealth of Massachusetts; a member of both the Massachusetts and National Societies of Professional Engineers; a past Vice President and current Executive Board Member of the Massachusetts Chapter, a member of the Legislative and Government Affairs subcommittees of the National and Massachusetts Societies, a member of two national engineering honor societies, Eta Kappa Nu and Tau Beta Pi; a past member of the Institute of Electrical and Electronics Engineers; a member of the National Society of Engineering Educators; and a member of the National Association of Cable Television Engineers. He has served on numbers of National and International professional

advisory boards, panels, and North American Standards setting Organizations over the years and has served Internationally as a member of the International Telecommunications Union in Geneva, Switzerland. He is currently a member of a number of National Telecommunications Standards and Public Policy Setting Bodies operating under the auspices of the Federal Communications Commission.

EXHIBIT FRC-B

QWEST PICTORIAL DEPICTING QWEST'S OUTSIDE PLANT LAYOUT

EXHIBIT FRC-B

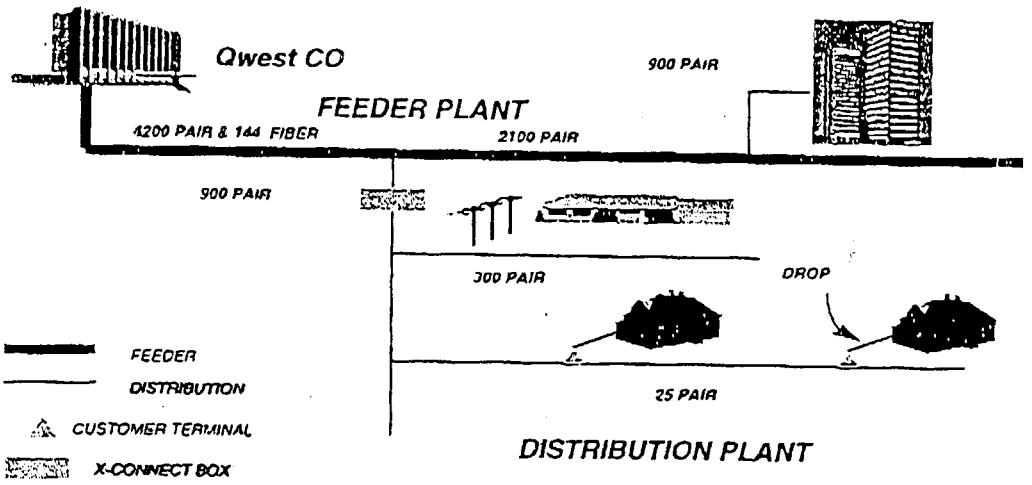
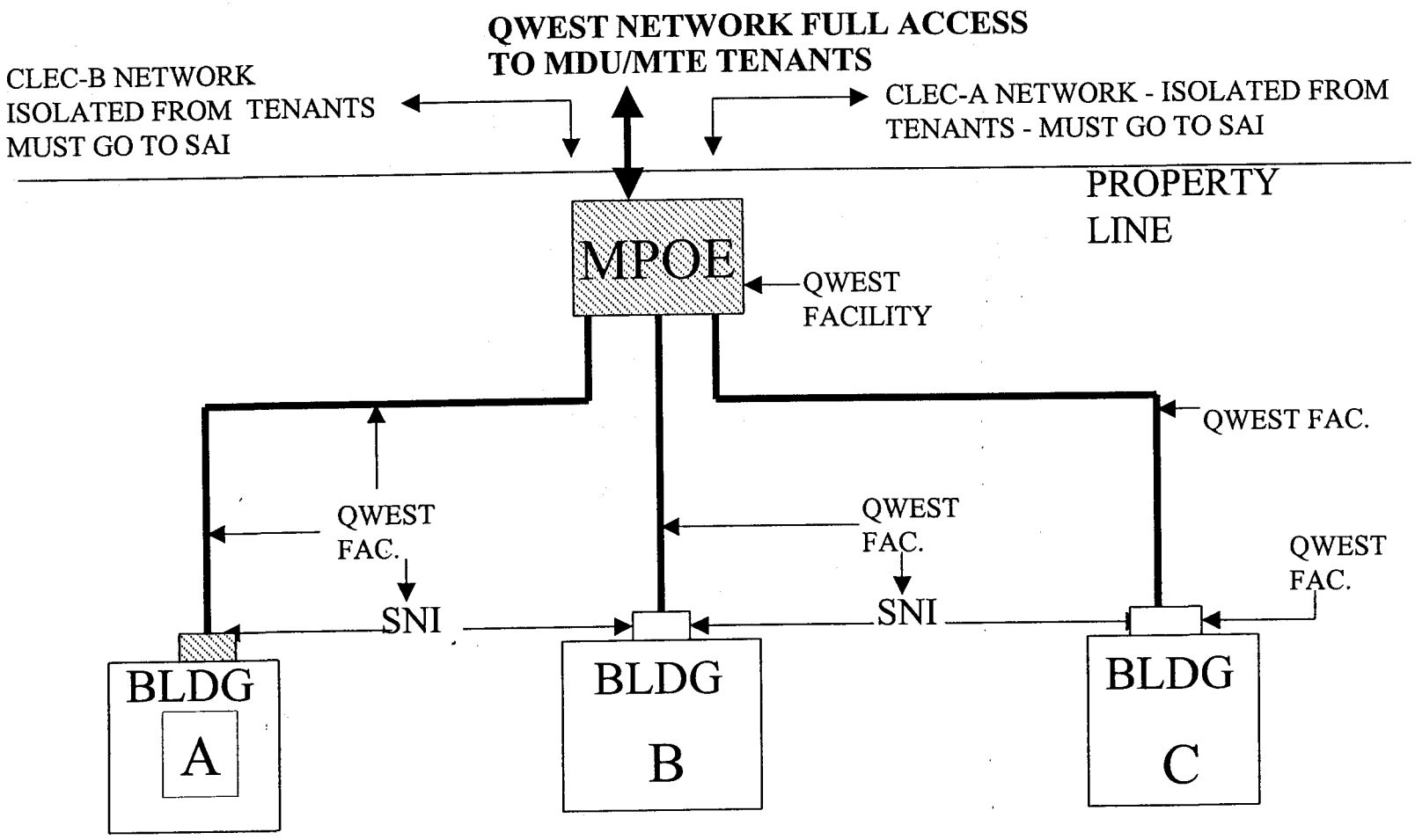


EXHIBIT FRC-C-1

QWEST MPOE AT PROPERTY LINE

DEMARCATION POINT AT PROPERTY



QWEST MDU/MTE & DEMARC

EXHIBIT FRC-C-1

EXHIBIT FRC-C-2

QWEST OWNED FACILITIES PROVIDE PHYSICAL AND ECONOMIC BLOCKADE TO HIGH-RISE MDU/MTE

QWEST MPOE AT PROPERTY LINE – DEMARC ON EACH BUILDING FLOOR

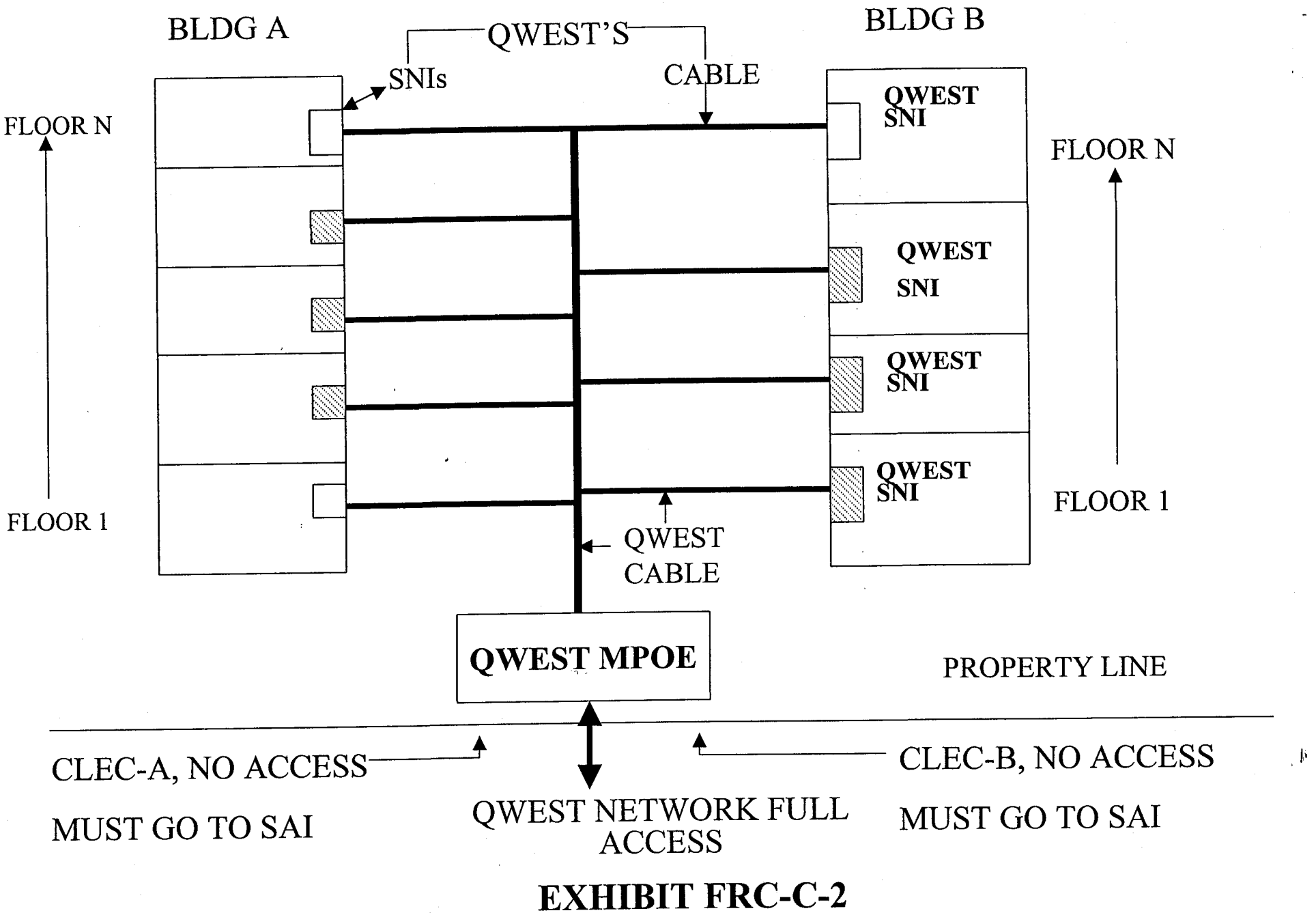


EXHIBIT FRC-C-2

EXHIBIT FRC-C-3

QWEST ISOLATES TENANTS IN MDU/MTE FROM COMPETITIVE SERVICES

MPOE AT BUILDING ACCESS POINT – DEMARC ON EACH FLOOR

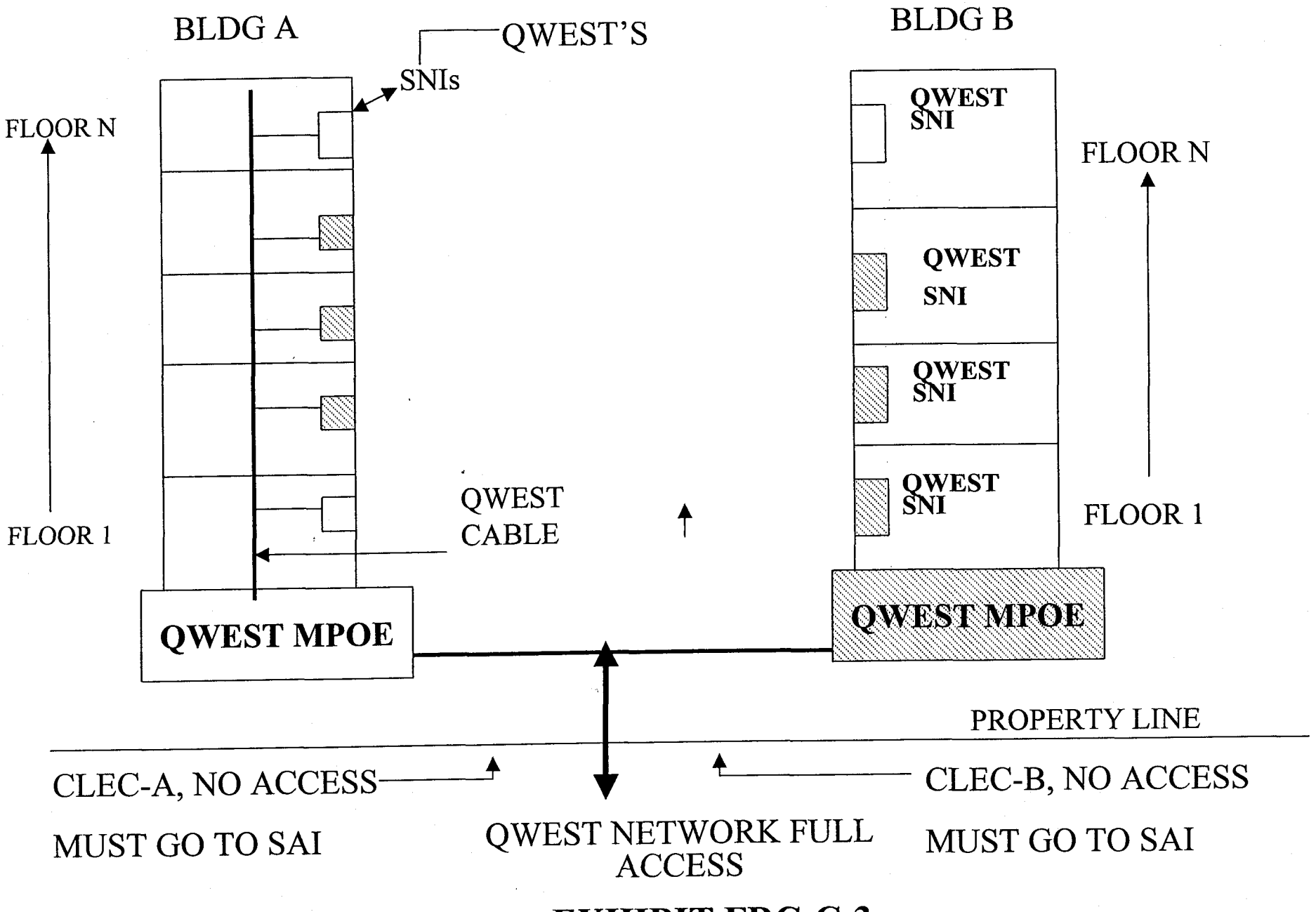


EXHIBIT FRC-C-3

EXHIBIT FRC-C-4

QWEST MPOE AT PROPERTY LINE – DEMARCs IN EACH UNIT

TENANTS ISOLATED FROM COMPETITIVE SERVICES

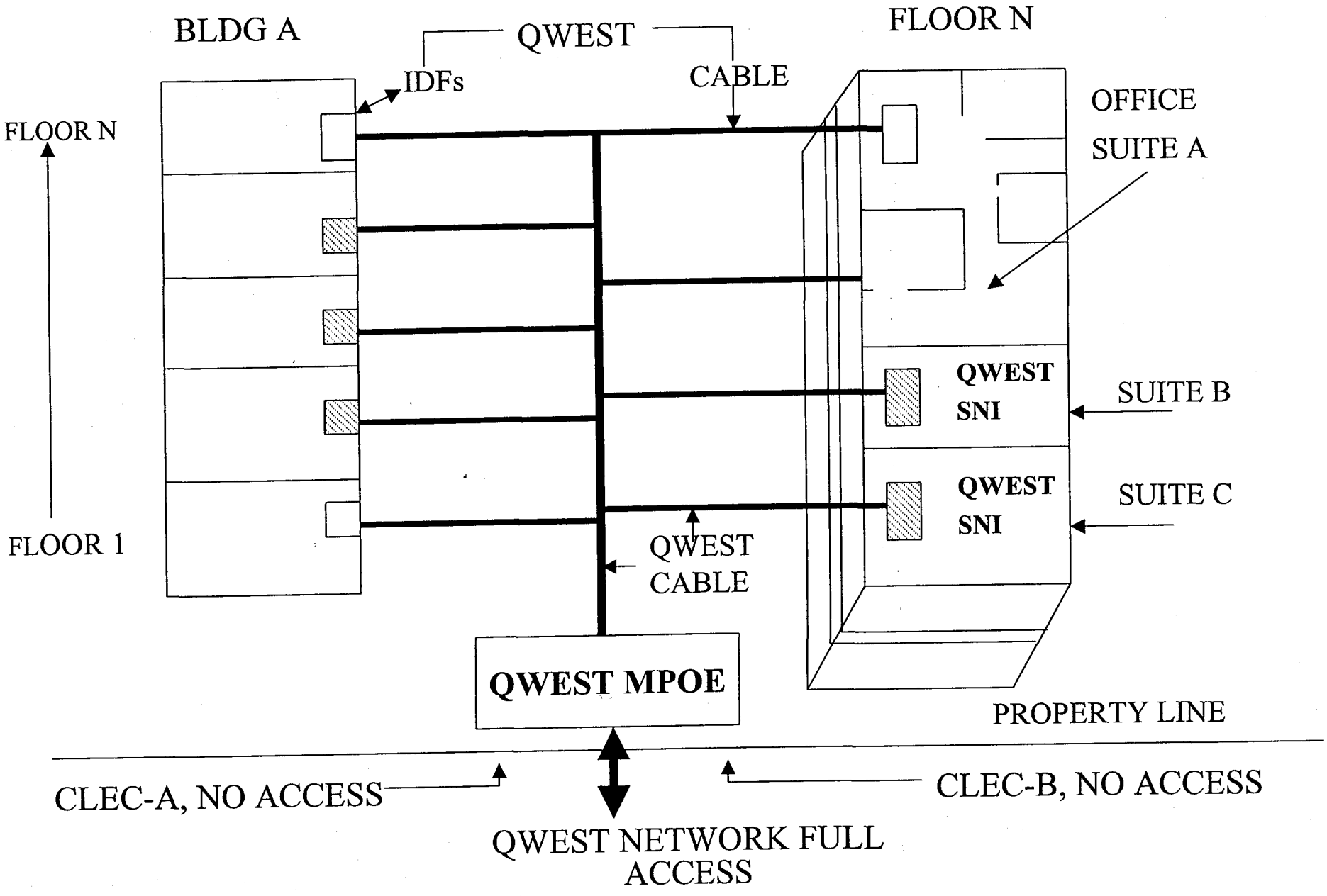
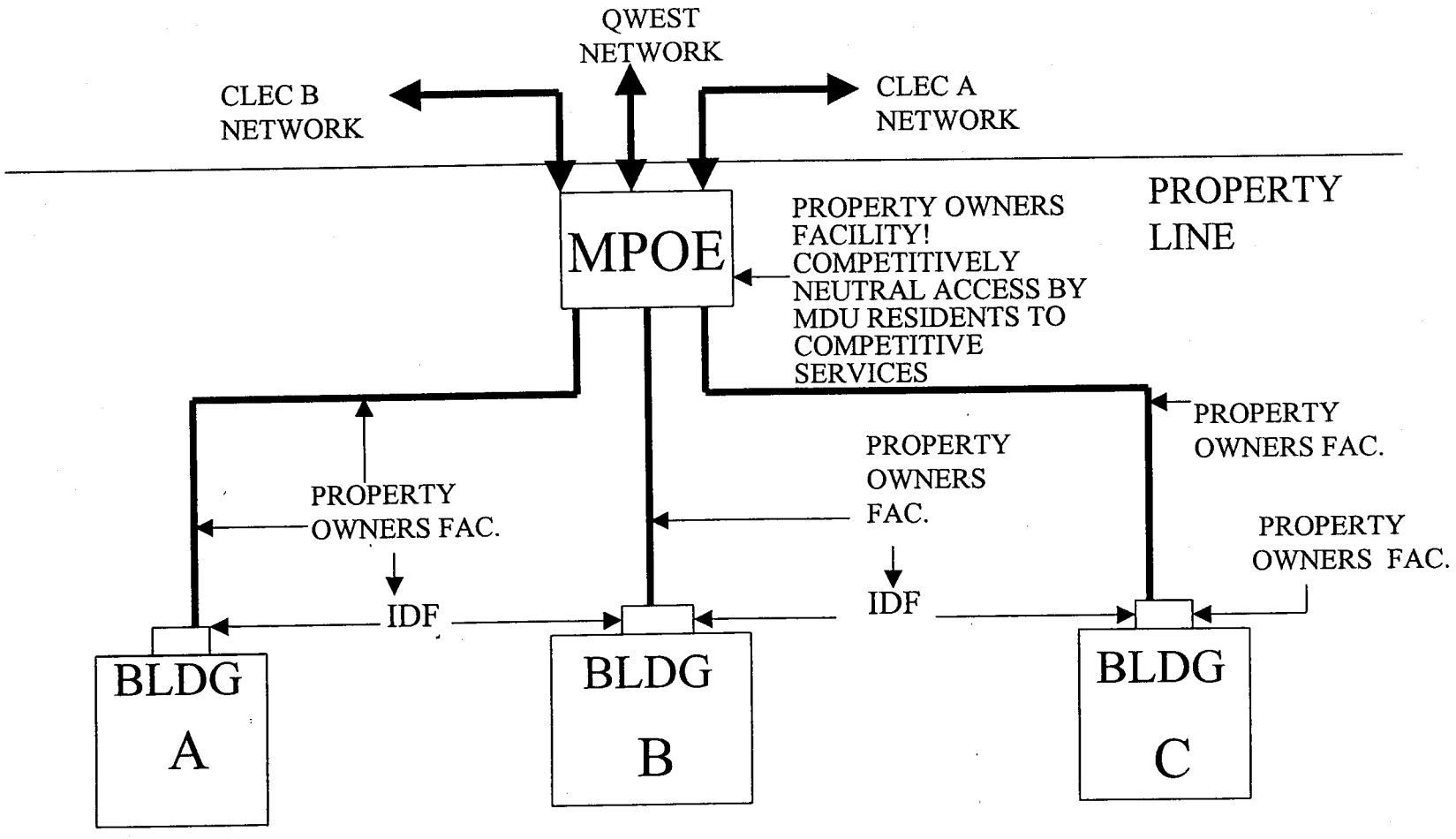


EXHIBIT FRC-C-4

EXHIBIT FRC-D

COX RECOMMENDED MPOE/DEMARC CONFIGURATION

OPEN ACCESS TO ALL COMPETITORS BY TENANTS



COX'S MDU OPTION

COMPETITIVELY NEUTRAL

EXHIBIT FRC-D

EXHIBIT FRC-E-1

(Proprietary)

COMPARISON OF QWEST DEPRECIATION SCHEDULES USED IN STUDY AND THOSE CLAIMED TO BE USED IN RESPONSE TO STAFF DW-01-017

EXHIBIT FRC-E-2

(Proprietary)

QWEST TELRIC STUDY DEPRECIATION SCHEDULE AND THAT APPROVED BY THE FCC AND USED BY COX

EXHIBIT FRC-F-1

(Proprietary)

COMPARISON OF QWEST AND COX TELRIC COST MODEL RESULTS FOR THE TWO-WIRE LOOP

EXHIBIT FRC-F-2

(Proprietary)

COMPARISON OF QWEST AND COX TELRIC COST MODEL RESULTS FOR THE TWO-WIRE SUB-LOOP

EXHIBIT FRC-G

(Proprietary)

COMPARISON OF QWEST AND COX TELRIC INVESTMENT BASED FACTORS

(annual charge factors)

EXHIBIT FRC-H

(Proprietary)

COMPARISON OF QWEST'S MAINTENANCE FACTORS AND THOSE APPROVED BY THE COMMISSION AND USED BY COX

EXHIBIT FRC-I

(Proprietary)

EXAMPLE ILLUSTRATION OF THE TELRIC COMPUTATION OF THE INVESTMENT BASED FACTOR FOR PLANT ACCOUNT 45C