Before the

WASHINGTON UTILITIES AND TRANSPORTATION COMMISSION

In the Matter of	**)**	**DOCKET NO. UT-003013, PHASE B**
The Continued Costing and Pricing	**)**	
of Unbundled Elements, Transport	**)**	**VERIZON NORTHWEST INC.**
and Termination, and Resale	**)**	**RESPONSE TO BENCH REQUEST NO. 42**

Bench Request No. 42

The Commission requests that the parties comment on the following proposal for identifying the cost of an end-office digital switching machine. The procedures described below could be used to establish the cost of the traffic sensitive elements on a switch, as well as the port.

In the Eighth Supplemental Order, Docket UT-960369 (Incrafter Eighth Supplemental Order), the following cost function for digital switching is described at paragraph 299.[1] Switching investment = 185,374 + 107 * numbers of lines.

This cost function could be used to estimate the cost of call set-up, port termination, and per minute of use.[2] The following numerical example illustrates how the calculation could be undertaken.

Paragraph 300 of the Eighth Supplemental Order indicates that the average line size of a GTE switch is 4,300. In this proceeding the Bench requested data from Qwest and Verizon on the number of originating and terminating calls during the busy-hour, as well as busy hour CCS per line. For the limited purpose of this question, we will assume that each line places or receives 2 calls during the busy-hour and that the busy-hour CCS per line is 3 CCS (or 5 minutes).

For the limited purpose of this cost calculation, we will assume that the getting-started investment of a switch, $183,374, is only used to set up and take down calls.[3] This would suggest that the busy-hour investment per originating or terminating call is $185,374 dollars divided by $8,600 (4,300 lines times two calls per line). This suggests an investment per busy-hour call of $21.55.[4]

Calls can be placed during any hour of the day and therefore the busy-hour investment has to be converted to a per call investment. This process is described at paragraph 316 of the Eighth

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[1]Now that these figures are in 1995 dollars. Interested parties are asked to address the need to use a telephone plant index to convert the 1995 to 2001 dollars.

[2]As pointed out at paragraph 299 of the Eighth Supplemental Order, the FCC Staff developed this investment function. Subsequently the Federal Communications Commission adopted "the fixed costs (in 1999 dollars) of a remote switch as $161,800 and the fixed cost (in 1999 dollars) of both host and stand-alone switches as $486.700. [The FCC] adopt[ed] the additional cost per line (in 1999 dollars) for remote, host, and stand-alone switches as $87 [footnote omitted] Tenth Report and Order, CC Docket No. 96-45, FCC 99-304, released November 2, 1999. Par 296. The parties may want to comment on substituting the investment function adopted by the FCC in it's 10th Report and Order at paragraph 296 for the investment function identified at paragraph 299 of the Eighth Supplemental Order.

[3]The getting started investment, such as the central processor, is used for other purposes (e.g., billing, providing vertical features, conducting maintenance tests) than just origination and terminating calls.

[4]As pointed out at paragraph 312 of the Eight Supplemental Order, if the cost function $185,374 + $107*line is used to estimated the investment in switching, the average investment per line for GTE was $150. The value of $150 was used by the Commission at paragraph 305 of the Eighth Supplemental Order the Commission noted that Qwest had 10.740 lines at each switch. Using the formula identified at paragraph 299 of the Eight Supplemental Order, this would suggest an investment of [183,374 +107 * 10,740]/10,740+$124.26 per line. The Commissions calculations at paragraph 312 assumed an investment per line of $150. Parties are encouraged to address how, if the Commission were to adopt the procedure described in this bench request the difference in the number of lines at Qwest and Verizon's switching machines should be taken into account.

Supplemental Order. Using the data from paragraph 318 for US WEST, we assume for the purpose of this question that one busy-hour call is equivalent to 3,296 annual calls. This suggests an investment per call of $.00654.

Per paragraph 319 of the Eighth Supplemental Order, the investment per call can converted to a cost call by multiplying the investment by the annual charge factor. The Eighth Supplemental Order used a value of 22.95%. This suggests that the set-up (direct) cost per call is $0.00654 * .2295 = $0.001501.

Finally, at paragraph 207 of the Seventeenth Supplemental Order, the Commission adopted a 4.05% common cost mark-up for switching elements. This would suggest that the TELRIC for a call set-up is $0.001501 * 1.0405 = $.001562.

The Table below summarizes the calculations described above:

Table One

Line Number	Value	Description
(1)	185,374	getting started investment assigned to messages
(2)	4300	number of lines
(3)	2	number of calls per line during busy-hour
(4)=(1)/[(2)*(3)]	21.5561163	investment per busy-hour call
(5)	3296	peak to total conversion per par. 318, 8th Supp.Order
(6)=(4)/(5)	0.00653978	annualized per message investment
(7)	22.95%	annual charge factor per par. 320, 8th Supp.Order
(8)=(6)*(7)	0.00150088	per message direct cost
(9)	4.05%	common cost factor per par. 207, 17th Supp Order
(10)=(8)*(1+(9))	0.00156167	TELRIC per message

Assuming that the getting started investment of a switch is a traffic sensitive investment, this implies that the port rate developed by the Commission in Docket UT-960369 does not need to be modified. The per minute rate would need to be adjusted. The following table provides the methodology that could be used to develop the per minute rate:

Table Two

Line Number	Value	Description
(1)	645,474	total investment + 185,374+4300*107
(2)	55%	percent traffic sensitive per par 314 8th Supp Order
(3) = (1)*(2)	355,011	traffic sensitive investment
(4)	185,374	getting started investment assigned to messages
(5) = (3)-(4)	169,637	traffic sensitive investment assigned to minutes
(6)	5	minutes of use per line per busy-hour per par 318, 8th Supp Order
(7)	4300	number of lines
(8) = (5) / (7) / (6)	7.89007907	investment per busy-hour minute
(9)	3296	peak to total conversion per par 318 8th Supp Order
(10) = (8) / (9)	0.00239383	annualized per minute investment
(11)	22.95%	annual charge factor per par 320 8th Supp Order
(12) = (10)*(11)	0.00054939	per minute direct cost
(13)	4.05%	common cost factor pr par 207 17th Supp Order
(14) = (12)*(1+(13))	0.00057164	TELRIC per minute

The tables rely on usage data from UT-960369. If this methodology were to be adopted by the Commission, the Table would need to be updated to reflect more current data
(e.g. current busy- hour minutes of use).

Response:

The procedure described above does not give this Commission the means to conduct a valid investigation into the nature of switching costs. Following is a list of reasons why this approach is unsound:

1) The approach described above starts with a switching investment function of Y = 185,374 + 107*lines, which appears to be the result of a regression run. In an attempt to separately identify the cost of call set-up, port termination, and minutes of use, certain assumptions are made as to the share of total switch cost attributable to each of these functions. These assumptions are imposed on the switch investment function in Tables One and Two (above) in order to yield a result entitled "TELRIC per message" and "TELRIC per minute." Unfortunately, a simple sanity check applied to the procedures set forth in Tables One and Two indicate that this type of arbitrary construct falls apart under scrutiny. First, Table Two yields a negative "TELRIC per minute" for smaller switch sizes. This result can be verified by changing the Table Two input for number of lines to 1,400 (See Attachment 42A). Second, as the input for number of lines, i.e. switch

size, increases, so does the "TELRIC per minute" result (See Attachment 42A). This indicates that there are diseconomies of scale in switching, which is incorrect. If there were such diseconomies, then we would see firms buying thousands of small switches and placing them next to each other. Third, as the "number of lines" increases along with the "TELRIC per minute" result, the "TELRIC per message" result falls. In fact, for switches with more than 9,000 lines, the call set-up TELRIC result falls below the minute of use TELRIC (See Attachment 42A). This also cannot be correct in light of common knowledge about the nature of switching costs. As a result, a simple test involving the inputting of different numbers of lines reveals the potential problems with the modeling process proposed in the bench request.

2) Neither the approach described in this bench request nor the approach adopted by the FCC for universal service purposes is appropriate for use in a UNE case. The FCC explicitly recognized that the approach it adopted was perhaps only adequate for use in a case where switching costs were not only of secondary importance, but also where differences in costs were being measured, as opposed to absolute levels as would be the case in a UNE docket.

> Fifth Report and Order, CC Docket No. 96-45, FCC 98-279, par. 75:
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> In our evaluation of the switching modules in this proceeding, we note that, for universal service purposes, where cost differences caused by differing loop lengths are the most significant cost factor, switching costs are less significant than they would be in, for example, a cost model to determine unbundled network element switching and transport costs.

Also in CC Docket No. 00-217, FCC 01-29, at paragraph 84 the FCC warned:

> Our cost model provides a reasonable basis for comparing cost differences between states. We have previously noted that while the USF cost model should not be relied upon to set rates for UNEs, it accurately reflects the relative cost differences among states.

3) The proposed procedure does not provide this Commission with an adequate tool to separately identify the costs of POTS calling and that of ISP-bound traffic. There is no engineering basis contained within the proposal that would allow for a meaningful identification of traffic sensitive vs. non-traffic sensitive costs in the case of ISP-bound traffic terminating on ISDN PRI trunks. In contrast, the record evidence provided by Verizon in this case does provide this Commission with the methodology and detail required to make a supportable determination on this issue.

4) The procedure does not provide the means to identify costs related to the various switch ports, e.g. analog, DS-1, ISDN BRI, ISDN PRI, etc. The proposed procedure simply assigns a percentage of total switch costs to the port and provides no means by which different port costs might be determined. In simplistic terms, the primary cost driver for port costs is the particular type of switch port termination equipment required for the service in question. This is an engineering issue that is best handled through a modeling process that is engineering-based, such as the one put forth by Verizon in this case.

5) The procedure also does not have the capability of differentiating between the different types of switching, i.e. line-line, line-trunk, trunk-trunk, etc. Cost differences are based on the different types and amounts of switching resources utilized for each type of switching activity. For example, it is widely known that a trunk-to-trunk call switched by a tandem switch has a different cost than a line-to-line call switched by a class 5 end office.

6) The switch investment function is presumably the result of a regression involving switch investment and lines per switch. The data used for this purpose was likely drawn from the time period when most digital switches were being purchased, i.e. mid 1980s to mid 1990s. One of the problems one runs into in attempting to estimate switch costs in this way is that changes in technology can obscure the relationship between the explanatory and dependent variables. In the case of switching, there has been a growing divergence between the number of lines served by the switch and the number of line terminations at the switch. In the 1980s, the use of digital loop carriers was much more limited than it is today and almost non-existent relative to the amount of DLC lines placed in a network used to estimate loop TELRICs. For example, a switch in 1987 may have been equipped to serve 10,000 lines with 10,000 analog line terminations. Assuming zero line growth for simplicity, that same switch in a TELRIC model today might be equipped with only 5,000 analog line terminations. The other 5,000 lines are served via fiber-fed DLC, which does not require analog line terminations at the switch. Verizon pays its switch vendors for each analog line termination on a switch. Therefore, the distinction between lines and line terminations has become very important. However, it is not clear how a simple regression equation could account for this phenomenon. Also, it is not clear as to exactly how the regression results are intended to be used, i.e. is it 107*(lines served by switch) or 107*(analog line terminations in the switch)? Regardless of the answer to the question, the application of the parameter estimate will lead to erroneous results due to the unaccounted-for change in technology. What is very clear is that this issue can be addressed from a switch engineering perspective, which is capable of accurately reflecting the specific switch resource requirements in a TELRIC study.

7) The investment levels generated by the switching investment equation are significantly understated when compared to the fully-supported and unrebutted investment figures for Verizon that are on the record in this case. Noted below is a comparison of ICM investment figures on the record in this proceeding (items c, d, and most notably item e)

with the figures generated by the proposed switch investment equation (either item a or b):

Total Switching Investment Comparison

Source	**Investment**
a) y= 185,374 + 107x, where x = analog line terminations in switch	$ 69,831,203
b) y= 185,374 + 107x, where x = lines served by switch	115,799,045
c) 1998 Account 2212 plant Balance	**(Confidential)**
d) 1998 Reproduction Cost	**(Confidential)**
e) ICM Investment	**(Confidential)**

Notes:

a) Equation applied to each Verizon switch using the number of line terminations at each switch. Total line terms = 470,719. Total switches = 105.

b) Equation applied to each Verizon switch using the total number of lines served by each switch. Total lines = 900,325. Total switches = 105.

c) 1998 ARMIS Report plant balance for Account 2212. See Binder 6, Tab 14, page 14_597.

d) 1998 ARMIS plant balance adjusted by C.A. Turner Index to yield 1998 reproduction cost. See Binder 6, Tab 14, page 14_597. Also, see pages 14_601 and 14_602 for details behind C.A. Turner Index application.

e) See Binder 6, Tab 14, page 14_620. The ICM switch investments are based on actual vendor quotes that would apply if these switches were to be purchased today.

8) The proposed approach is likely to be missing the significant investment in software that is required to make switch features operational. Also, besides failing to identify on a cost-causative basis the separate costs caused by vertical features, the proposed approach does not have an explicit mechanism to account for the cost of additional hardware required to make some switch features work (See Exhibit No. T-1174, p.11 for examples of vertical features requiring separate hardware investment).

9) Footnote 2 of this bench request also asked for comment on the FCC regression equations. As mentioned above, the FCC has warned against using such an approach when the absolute cost level is required, such as in a UNE case. Therefore, use of any of the regression equations is not appropriate for use in this case, especially in light of the fact that substantial unrebutted evidence is already on the record in this case which provides this Commission with the tools it needs to properly address any switching cost issues. In terms of the FCC regression equations themselves, they do not fare any better than the one proposed in this bench request. Their approach was soundly criticized by the industry. In addition to the many flaws uncovered by numerous commenters, the FCC's regression equations will have the same problem with the impact of changing technology on the measurement of lines (as discussed in item 6 above). Also, the nonlinear specification that imposes a 1/x functional form on the data is highly suspect. The variable, x, in this case refers to time. The year 1985 is assigned an x = 1, while the year 1999 is assigned an x = 15. This imposes a downward sloping switching cost through time in the form of 1/x, which means that switching costs in 1999 are only 1/15 of those in 1985. A quick look at the C.A. Turner Index for 1985 will show a factor nowhere near as low as the .067 (1 divided by 15) figure implied in the FCC's specification. It is doubtful that the FCC undertook a specification test of their model, since it is very likely that it would have failed.

10) Finally, it is very difficult to provide a comprehensive evaluation of the proposed procedure since it was not mentioned until just recently. Granted, this type of procedure was introduced in the Eighth Supplemental Order as an alternative to the use of the industry standard switching model, SCIS. A closer review of the Eighth Supplemental Order in light of evidence on record in this proceeding gives this Commission the evidence it needs to alter its previous findings. First, SCIS was rejected because "Commission staff attempted, but was unable, to verify the switch prices that were used as inputs to the GTE and U S West switch models" (at par 296). Verizon has provided switching cost documentation tracing all the way back to actual vendor quotes (See Exhibit C-1171, Binder 5, Tab 11, Section B). Second, SCIS was rejected because "the reported cost levels are not reasonable" (at par 302). The evidence now on the record in this case shows not only that Verizon's switching cost levels are reasonable, but that the alternative approach adopted is entirely unreasonable. In addition, footnote 34 of the Eighth Supplemental Order cites the New York Public Service Commission as having declined to use the SCIS model because the cost estimates were unreasonably high. This is incorrect. The NYPSC did not reject SCIS. They simply adjusted the discount input to SCIS to yield a per line investment amount of $286.51.[1] It then ran the NYT Model with the adjusted inputs, yielding a local switching per minute TELRIC of $.003673[2], which is nearly three times higher than the TELRIC ordered for Verizon using the same methodology proposed in this bench request. The fact that the adopted cost for a company that serves approximately 10 times the lines served by Verizon in Washington

[1] Docket 95-C-0657, April 1, 1997, p. 85.
[2] Id at Attachment C, Schedule 1, page 2 of 3.

is this much higher than Verizon's adopted cost gives a strong indication that the proposed methodology outlined in this bench request is unreasonable. Finally, paragraph 304 (8th Supp.) indicates that "we will use reasonable non-proprietary alternatives whenever they exist." The alternative proposal offered in this bench request is clearly unreasonable and does not provide this Commission with what it needs to make sound switching cost decisions not only in this case, but in future cases where different switching cost requirements may materialize (e.g. retail price floors, ICBs, reciprocal compensation, etc.).