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Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the Matter of	)	
	)	
Forward-Looking Mechanism for High Cost Support for Non-Rural LECs	)	CC Docket No. 97-160
	)	

Comments of the
Rural Utilities Service

Introduction

The Rural Utilities Service (RUS) appreciates the opportunity to offer comment to the Commission on the issue of a Forward-Looking Mechanism for High Cost Support for Non–Rural LECs.

Quality affordable telecommunications service is the lynchpin for rural economic development in a global digital economy. Rural Americans, whether served by rural or non-rural providers, are entitled to specific, predictable and sufficient universal service mechanisms. The RUS has 50 years of experience in helping to reach our Nation's universal service goals, and desires to share that expertise in this proceeding.

Although the information in these Comments is derived from the RUS' experience with Rural LECs, a Non-Rural LEC serving a rural area with core services will face similar engineering and construction challenges.

Background

The RUS has been tracking costs of central office switching equipment purchased by rural telecommunications borrower LECs for many years. Over the last five years the RUS has financed telecommunications borrowers' investments in central office switching equipment of approximately $550 million, which was about 20 percent of total plant investment financed in that period. The RUS requires competitive bidding wherever possible, which tends to reduce first costs of equipment. For subsequent purchases, such as additional lines or software upgrades to

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extend the useful life of the switch, however, as a practical matter, competition cannot be used and these prices are negotiated. For every purchase, the RUS requires the LEC to prepare a statement of work consisting of plans and specifications. Engineering fees charged to central office equipment purchases average about 8% of the purchase price.

Mix of Host, Stand-Alone, and Remote Switches

In paragraph 120 the statement is made that a remote switch relies on a host switch for interconnection with other switches. This is not always the case. Many of today's remote switches have a function known as "back-door trunking." This enables the remote switch to interconnect directly with other switches, generally on a non-toll basis, without transporting the traffic through its host switch.

The RUS agrees with paragraph 121 with regard to the cost-effective deployment of host-remote switching arrangements in lieu of stand-alone switches. The RUS telecommunications borrower LECs have been installing host-remote switching arrangements since the 1970's. For fiscal years 1992 through 1996 RUS telecommunications borrower LECs purchased a total of 1,042 new switches. Of these, 819 were remote switches (see Table 1). In fiscal year 1992, 68% of the new switches were remotes. This percentage has steadily increased. In fiscal year 1996 remotes accounted for 87% of the new switch purchases (see Table 2). These figures indicate that RUS telecommunications borrower LECs have found that the host-remote switching arrangement often is more cost effective than stand-alone switches.

Capacity Constraints

Although switch capacity maximums are generally not a factor in offices financed by the RUS, we agree that any cost model should include switch capacity limitations. Just as important as line size and traffic capacity in today's environment is processor capacity. With more and more special services such as ISDN and AIN being used by subscribers, switch processing power is being greatly stressed. It is essential that any mechanism used to estimate costs takes this into consideration.

Switch Costs

The RUS agrees with the Commission's suggestion that there is a cost differential between host switches and remote switches. A study of host switches and remote switches of similar size indicates that the average cost for host switches is consistently greater than for remote offices. The main reason for this is the inclusion of more common equipment in the host offices. More processor capacity and power is generally required in the host office and adjunct equipment for toll ticketing, traffic monitoring and testing is more extensive and costly in the host office.

Paragraph 131 suggests that the cost of a switch can be found using a fixed-cost input value plus a per-line cost value. The formula shown ($185,374 +$107 per line) may not accurately predict the cost of smaller rural offices. The RUS has compared the suggested computations of cost with recent switch purchases of various sizes (see Tables 3 and 4, Graphs 1 and 2). This comparison

shows that the formula usually underestimates the costs for host offices under 4,000 lines, but usually overestimates the actual costs of remotes. This suggests that no one formula can calculate the costs of host and remote switches.

This brings into importance the mix of host and remote switches discussed in paragraph 120. Table 2 shows that wire centers are increasingly served by remote switches for cost reasons. Remote switches tend to be clustered around host switches, and tend to be the smaller switches. When a remote switch and its supporting host switch are not owned by the same LEC, the owner of the remote contracts for those supporting services and thereby pays for part of the cost of the host switch. This illustrates a fact of remote switches: The true cost of a remote switch should include part of the supporting host switch. This suggests that a single formula to calculate the costs of host and remote switches is appropriate.

In the input values filing, the RUS will offer a formula or formulas that could be used for host offices and remotes.

In addition to the cost of new host and remote switches, the RUS believes that cost allowances should be included in cost models for additions and software upgrades to existing switches. Added lines cost on average about 20% more than initially-equipped lines. Software upgrades required to meet national network protocols or to otherwise prevent premature obsolescence of the switch are also a major part of switching cost. During fiscal years 1992 through 1996, approximately 50% of RUS telecommunications borrower LECs' expenditures for switching were for additions and software upgrades (see Tables 5 and 6 and Graph 3). While the total loan fund investments for new host switches dropped from 31% to 16% of total switching costs and new remote switch costs fell from 29% to 23%, the line addition loan fund investments rose from 26% to 38% of the total switching expenditures. The software upgrade investments increased from 14% to 23% of total switching costs during this same time frame. Forward-looking costs should include the true lifetime costs of switching systems, not just the first costs.

Interoffice Trunking, Signaling, and Local Tandem Investment

Paragraph 139 states Hatfield's assumption that all interoffice facilities for offices of 5000 or more lines would be SONET rings. The RUS believes that this assumption should apply to all offices below the 5000 line threshold also. The widespread use of economical remote switches makes reliable interconnection to host switches a necessity. SONET rings are used extensively in host-remote networks to prevent the need for costly stand-alone capabilities in remotes, so that these networks can provide contemporary levels of network reliability. The need for reliable telecommunications is at least as great in areas served by switches with less than 5000 lines as it is in areas served by switches with more than 5000 lines.

Conclusion

Switching costs for rural subscribers of Non-Rural LECs should be calculated carefully to provide sufficient universal service support. The Commission and the model sponsors have recognized that smaller switches have higher per-line costs. Cost models now need to include provisions for

the true lifetime costs of switching systems by including also the higher costs of lines additions and software upgrades that are necessary to keep switches in service. Also, the cost models should recognize that the need for interoffice connection reliability is as great in rural areas as it is in urban areas, and provide for SONET rings between offices of less than 5000 lines.

The RUS appreciates this opportunity to comment.

Dated: 8/7/97

for Administrator
Rural Utilities Service

Host - Remote Switching Costs

Fiscal Year	Host Switches		Remote Switches		Total Cost	Average Cost	
	Number	Cost	Number	Cost		Host	Remote
1992	60	$ 31,616,404	130	$ 29,522,724	$ 61,139,128	$ 526,940	$ 227,098
1993	80	$ 31,566,480	206	$ 32,665,047	$ 64,231,527	$ 394,581	$ 158,568
1994	44	$ 21,752,958	214	$ 36,106,599	$ 57,859,557	$ 494,385	$ 168,722
1995	23	$ 17,752,404	164	$ 29,085,207	$ 46,837,611	$ 771,844	$ 177,349
1996	16	$ 14,715,287	105	$ 21,532,900	$ 36,248,187	$ 919,705	$ 205,075
Total	223	$ 117,403,533	819	$ 148,912,477	$ 266,316,010	$ 526,473	$ 181,822

Table 1

Percentage of Hosts to Total New Switches

FY 1992	32%
FY 1993	28%
FY 1994	17%
FY 1995	12%
FY 1996	13%

Table 2

Calculated vs. Actual Costs
Host Offices

Number of Lines	Actual Cost	Calculated Cost *	Cost Differential
75	$ 81,000	$ 193,399	58%
120	$ 115,589	$ 198,214	42%
150	$ 121,319	$ 201,424	40%
253	$ 1,540,904	$ 212,445	-625%
443	$ 164,290	$ 232,775	29%
460	$ 354,675	$ 234,594	-51%
560	$ 467,603	$ 245,294	-91%
598	$ 329,951	$ 249,360	-32%
674	$ 163,218	$ 257,492	37%
684	$ 315,709	$ 258,562	-22%
820	$ 977,080	$ 273,114	-258%
850	$ 620,200	$ 276,324	-124%
960	$ 451,225	$ 288,094	-57%
1,412	$ 526,088	$ 336,458	-56%
1,779	$ 429,417	$ 375,727	-14%
2,100	$ 766,053	$ 410,074	-87%
2,615	$ 490,666	$ 465,179	-5%
2,714	$ 526,839	$ 475,772	-11%
2,830	$ 596,830	$ 488,184	-22%
3,810	$ 1,243,673	$ 593,044	-110%
4,760	$ 663,650	$ 694,694	4%

* $185,374 + $107 per line

Table 3

Calculated vs. Actual Costs
Remote Offices

Number of Lines	Actual Cost	Calculated Cost *	Cost Differential
75	$ 80,762	$ 193,399	58%
120	$ 46,328	$ 198,214	77%
151	$ 72,413	$ 201,531	64%
250	$ 109,381	$ 212,124	48%
440	$ 60,559	$ 232,454	74%
460	$ 98,249	$ 234,594	58%
578	$ 88,733	$ 247,220	64%
600	$ 104,276	$ 249,574	58%
680	$ 181,249	$ 258,134	30%
688	$ 256,750	$ 258,990	1%
810	$ 296,970	$ 272,044	-9%
865	$ 117,218	$ 277,929	58%
960	$ 176,249	$ 288,094	39%
1864	$ 117,218	$ 384,822	70%
1880	$ 229,663	$ 386,534	41%
2510	$ 273,000	$ 453,944	40%
2740	$ 281,600	$ 478,554	41%

* $185,374 + $107 per line

Table 4

Total Switching Costs

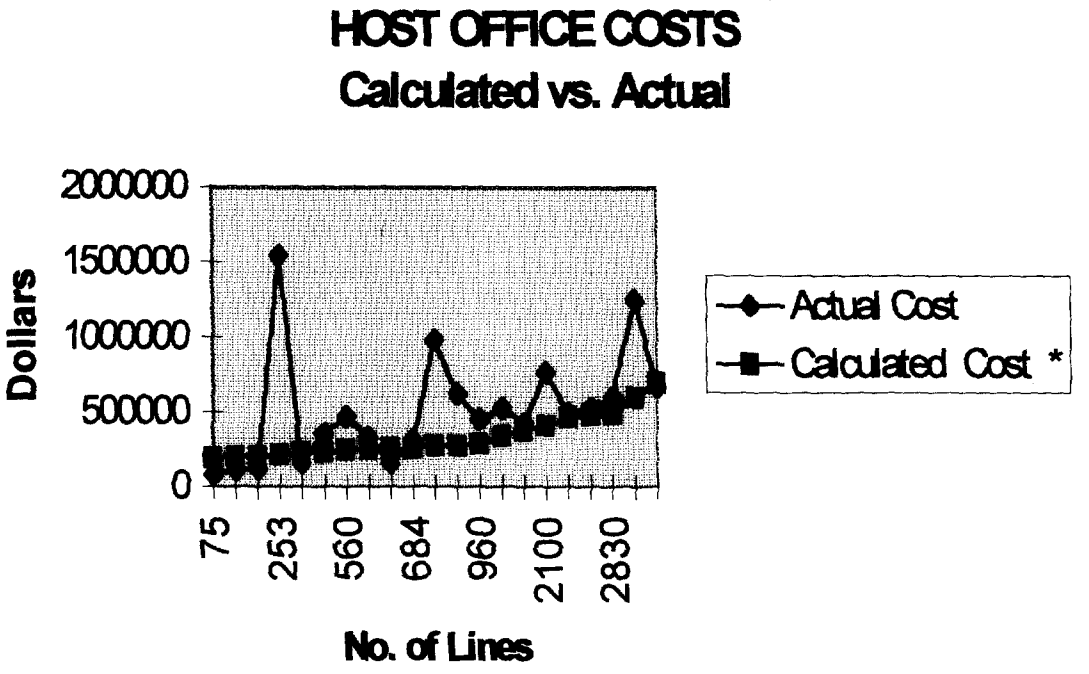
Fiscal Year	New Host Costs	New Remote Costs	Cost of Line Additions	Software Upgrade Costs	Total Costs
1992	$ 31,616,404	$ 29,522,724	$ 26,823,090	$ 14,363,346	$102,325,564
1993	$ 31,566,480	$ 32,665,047	$ 25,971,398	$ 27,774,115	$117,977,040
1994	$ 21,752,958	$ 36,106,599	$ 44,002,797	$ 28,159,057	$130,021,411
1995	$ 17,752,404	$ 29,085,207	$ 32,348,811	$ 27,105,737	$106,292,159
1996	$ 14,715,287	$ 21,532,900	$ 36,291,425	$ 21,944,449	$ 94,484,061
Totals	$117,403,533	$148,912,477	$165,437,521	$119,346,704	$551,100,235

Table 5

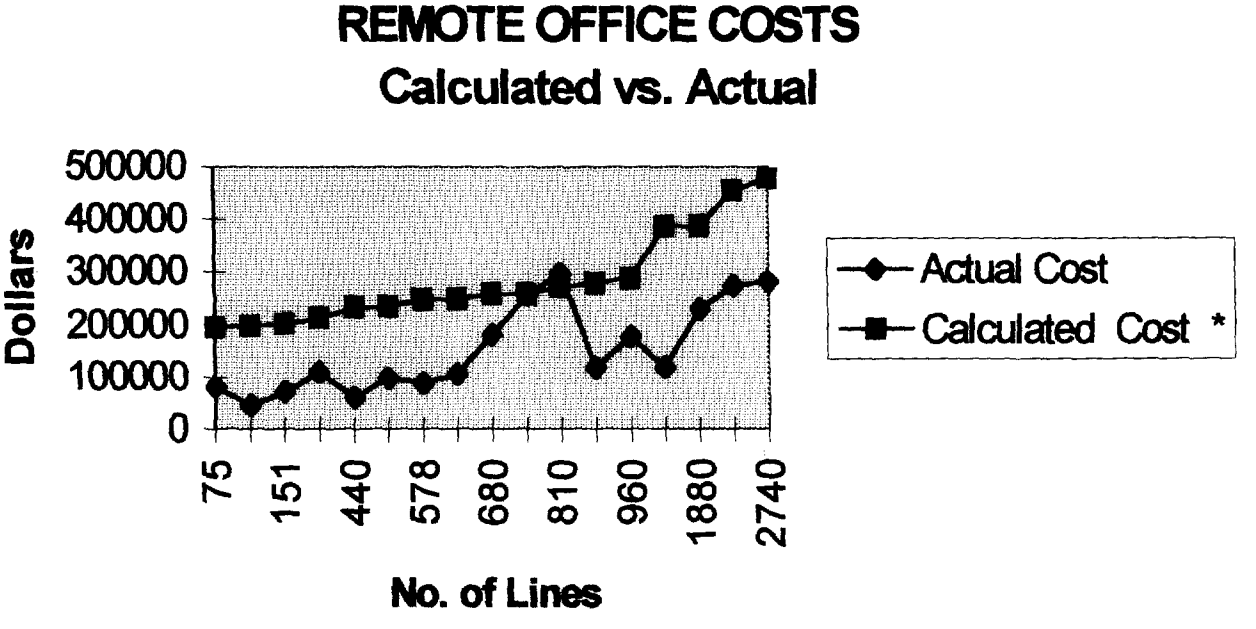
Percentage of Total Switching Costs

	New Host Costs	New Remote Costs	Line Addition Costs	Software Upgrade Costs
FY 1992	31%	29%	26%	14%
FY 1993	27%	28%	22%	24%
FY 1994	17%	28%	34%	22%
FY 1995	17%	27%	30%	26%
FY 1996	16%	23%	38%	23%
Totals	21%	27%	30%	22%

Table 6

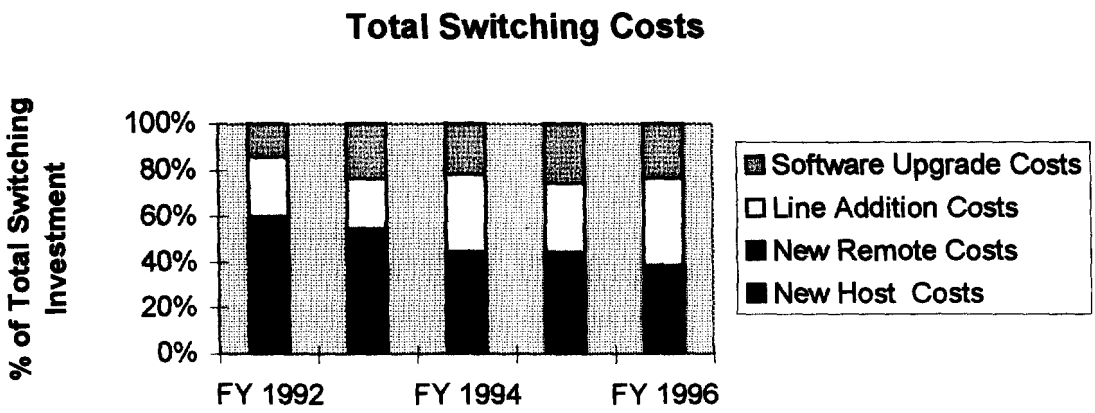


Graph 1



* $185, 374 + $107 per line

Graph 2


Total Switching Costs
% of Total Switching Investment
100%
80%
60%
40%
20%
0%
FY 1992
FY 1994
FY 1996
Software Upgrade Costs
Line Addition Costs
New Remote Costs
New Host Costs

Graph 3