FCC Request
Attachment 3

Number of Switches - 511

Switch Name	Number of Lines
PTARTXPEDS0	12,340
PTARTXWORS0	21,358
PTARTXYUDS0	31,802
PTBLTXPTRS0	1,897
PTETTXPORS0	8,067
PTISTXPIDS0	5,991
PTISTXSPDS0	2,095
PTSBTXSTDS0	5,302
PYTETXPYRS0	1,055
QANHTXMORS0	2,933
RCDLTXRDCG0	7,531
RCPTTXRPDS0	11,729
RDOKTXHODS0	13,212
REFGTXRFRS0	3,208
RGANTXRGRS0	857
RHNDTXRHDS0	4,157
RKWLTXPACG0	16,507
RNGETXRURS0	1,071
RNGRTXMIRS0	1,751
ROBYTXRBRS0	509
RONKTXWODS0	12,245
ROSCTXRSRS0	1,447
RSBGTXRRCG0	40,692
RTANTXRTRS0	1,858
RYCYTXNERS0	1,824
SAGSTXSARS0	4,630
SBNLTXSBRS0	1,386
SBPSTXSBRS0	1,086
SELYTXSERS0	7,765
SGINTXMQDS0	5,312
SGINTXSGDS0	23,190
SHNRTXSHRL0	4,459
SHRKTXSRRS0	2,394
SINTTXSIRS0	6,163
SKDMTXSKRS0	2,098
SKLYTXSKRS0	551
SLATTXSLRS0	5,775
SLCYTXSCRS0	7,227
SLSBTXSLCG0	13,702
SMFRTXSFRS0	3,692
SMNLTXSMRS0	6,558
SMRCTXXA01T	25,609
SMVLTXSMRS0	4,449
SNANTXBACG0	35,962
SNANTXBRRS1	87,997
SNANTXCADS0	77,722
SNANTXCUCG0	78,499

FCC Request
Attachment 3

Number of Switches - 511

Switch Name	Number of Lines
SNANTXDICG0	79,127
SNANTXEDDS0	33,727
SNANTXGECG0	61,758
SNANTXHEDS0	5,256
SNANTXICDS0	17,664
SNANTXJARS0	3,979
SNANTXLADS0	50,605
SNANTXLECG0	57,319
SNANTXLSRS0	5,762
SNANTXMADS0	29,119
SNANTXMCDS0	67,699
SNANTXPACG0	7,822
SNANTXPECG0	68,335
SNANTXSARS1	5,368
SNANTXSLDS0	21,113
SNANTXSODS0	10,535
SNANTXTACG0	66,752
SNANTXTHDS0	4,560
SNANTXUCDS0	36,270
SNANTXWACG0	79,424
SNANTXWEDS0	39,747
SNBNTXSBDS0	20,882
SNDGTXSDRS0	3,613
SNTNTXSNRS0	2,501
SNYDTXSDDS0	11,438
SPLDTXSPDS0	11,829
SPRGTXSPRS0	3,290
SPRNTXNODS0	49,627
SPRNTXSOCG0	37,775
SRLKTXSRRS0	1,974
STNTTXSTRS0	2,384
STRWTXORRS0	539
SWTWTXSWDS0	11,089
TAYLTXTADS0	12,451
TBLLTXKLCG0	27,762
TBLLTXTBDS0	16,700
TGUETXTERS0	3,336
TMPLTXDNCG0	43,560
TMPSTXTMRS0	1,568
TRMNTXTERS0	2,601
TROYTXTRRS0	1,205
TRRLTXJODS0	16,270
TXCYTXLMCG0	24,638
TXCYTXTCDS0	24,299
TYLRTXCHCG0	9,888
TYLRTXLYCG0	42,305
TYLRTXSODS0	46,387

FCC Request
Attachment 3

Number of Switches - 511

Switch Name	Number of Lines
UVLDTXUVDS0	13,829
VCTATXVICG0	58,831
VDORTXRORS0	13,306
VDORTXSURS0	4,567
VERNTXLIDS0	10,377
VLLDTXVLCG0	1,856
VNTNTXMARS0	4,968
WACOTX01DS0	52,130
WACOTXCSRS0	2,968
WACOTXEDRS0	1,545
WACOTXGHRS0	4,039
WACOTXHEDS0	13,670
WACOTXLORS0	3,092
WACOTXMDRS0	1,614
WACOTXMGRS0	4,441
WACOTXMORS0	11,956
WACOTXMTRS0	2,213
WACOTXSBRS0	8,205
WACOTXSWDS0	19,525
WACOTXWERS0	3,462
WBRYTXWBRS0	3,855
WCFLTXCFCG0	43,604
WCFLTXNIDS0	30,815
WCFLTXTFDS0	14,664
WDBOTXWBRS0	1,817
WDVLTXWDDS0	7,159
WFCYTXGYDS0	2,168
WHTNTXWHDS0	10,008
WINKTXWKRS0	1,000
WLLRTXWLRS0	4,464
WLPTTXNORS0	3,022
WLPTTXTRRS0	4,871
WLWDTXWLRS0	593
WRHMTXWRRS0	730
WRRNTXWRRS0	2,634
WSBKTXWBRS0	675
WTFRTXLYDS0	23,404
WXHCTXWEDS0	17,513
YKUMTXYKRL0	9,097
YRTWTXYTRL0	3,335
ZPTATXZADS0	6,181

Attachment 4

Switch Curve Development

Best of Breed
Switch Sub-Group

Switch Curve Development Report

Introduction

The LEC industry, led by USWest, Sprint and Pacific Bell, is developing a Best of Breed model (referred to as the BCPM) for use in the Universal Service proceedings. This best of breed effort will combine the best attributes of the LEC proxy models currently available (the CPM and BCM2). To this end the LEC coalition has formed three design groups. The first two groups are focusing in on the Loop and expense portions of Basic Service. The third group is focusing in on the switch expenses. The efforts and methods of the Switch group are highlighted here.

The current method used by all proxy models to develop switching costs for Universal Service is based upon a switch curve. This switch curve represents total basic switch cost per line for switches of various line sizes. Based upon the characteristics of the group of customers being proxied, a switch cost will be pulled from the curve. The lookup of the curve point is quite simple. The proxy model can determine the approximate line size of the switch, the line size of the company owning the switch, and the current switch type installed at the location. However, the current downfall of all proxies is the data used to develop the switch curve. The reason for the data problems is that, currently, there is very little on the public record regarding a reasonable switch cost.

Therefore, the intent of the switch team was to replicate the switch curve function but base it on the better data. Vendor data with appropriate discounts was thought to be the ideal data source. However, this team could not get Nortel or Lucent to respond to our requests. In absence of vendor data, this team felt that company provided SCIS (Bellcore's Switching cost model) would be the comparable substitute[1].

Data Request

Attached in Appendix A is the Best of Breed (BOB) Switching team's SCIS data request to develop the switch curve, including suggested model office inputs to make resulting switch costs representative of a switch built for Universal service functionality and to make the various company data as comparable as possible.

Please, note that Bellcore owns SCIS and requested (after the data request was sent out) that the detail requested be simplified (in order to maintain as much confidentiality for both Bellcore and the Local Exchange Companies as possible). The BOB team complied with Bellcore's request and will only report costs by switch investment per line. In

---

[1] SCIS has been heavily scrutinized by many regulatory bodies. In addition, SCIS has been audited for FCC purposes in the ONA docket. Excerpts from Regulatory decisions affirming SCIS's accuracy and usability are attached in Appendix B.

addition, the names of the participating will not be included in any of the outputs, in order to further protect the confidentiality of the LECs.

Study Participants and Data Response

The LEC participants for this study included[2]:

Ameritech
Bell Atlantic,
Bell South,
Cincinnati Bell Telephone,
Nynex,
Pacific Bell,
Pacific Telephone,
Southwestern Bell,
Sprint, and
US West.

A complete listing of the data received is contained in Attachment C. Finally, the Best of Breed team expects that, over time, more companies will respond to this study. As data is received and interest exists, this study will be updated.

Study Methodology for Switch Investments:

Based on INDETEC's prior experience in analyzing switching data, the team expected that investment data would follow a 1/x curve shape. Additionally, the team wanted to test for company, company size, and host or remote impacts.

Basic Statistical Model:
An Analysis of Variance (ANOVA) model was employed. The basic form of the model is[3]:

Per line Investment = a + b/Lines,

where,
Per line investment = Total SCIS investment / Line Size,
Lines = Line size of the switch,
a = represents the per line cost (model output) and,

[2] Citizens Telecom responded to our request. However, we did not have sufficient time to include their data in this analysis.
[3] In addition to the basic function of 1/x, other functions were investigated (e.g., 1/x**2, 1/ln(x), etc..). However, no other investigated function provided a better fit to the data.

b = *represents the fixed cost of the switch (model output).*

In addition to the above variables, the following variables were tested using an ANCOVA model (Analysis of Covariance):

Company Size	= *S(mall), M(edium), and L(arge),*
Company	= *A, C, E, G, H, I, L, M, N, and O, and*
Host/Remote	= *H(ost), and R(emote).*

Study Results for Switch Investments

Removal of Company Data
In the analysis, two companies' data values were excluded. The first company was removed, because they do not use Bellcore's SCIS model, and therefore the comparability of the data was in doubt early in the analysis. The other company's data was removed, since it was difficult to prove the veracity of the data, especially when the data seemed well outside the normal distribution of all the other data.

Test of Additional Variables
Statistical analysis of the data from the LEC participants reveals that when all the variables are included in the regression analysis the results are statistically significant with a very good fit (i.e., an R^2 of over 70%). As stated above, the independent variables tested include the number of lines, the company, company size, and a host / remote indicator. Since the goal of the study is to develop a switch curve which will determine the investment per line based on publicly available data, it is crucial to analyze the need for each independent variable and its statistical impact on the results. If the model can be shown to be statistically significant using the most publicly available dependent variables, then the goal of this study will be satisfied.

The statistical analysis showed that company name is a significant dependent variable. This fact is probably due to several different factors which may result in unique cost structures for their switches. First, that each company has different engineering practices. Second, each company may have negotiated unique purchase arrangements with each switch vendor. Third, the way in which the cost estimates where generated may differ between the companies. While the first two factors may offer important insights into the underlying cost structures of these companies, the fact that some of the data may not have been produced in a comparable fashion becomes problematic. In any regards, the need to reveal company names in order to use the switch curve violates the need for confidential treatment of the data and therefore the variable is removed from the data set. Also, all LEC's did not provide data, the variable could not really be used in any Proxy model.

Best of Breed
Switch Sub-Group

Switch Curve Development Report

The investigation of the type of switch showed that the host / remote indicator was not statistically significant and thus the need for this variable did not exist. Since most of the remotes are associated with smaller line sizes, there is some impact on the fit of the data. Specifically, the data seems to be strongly weighted towards the lower end which may have skewed the models curve to fit the smaller switches better. However, even with the removal of the host / remote indicator the model produces significant results, likely because the error structure seems to be evenly spread within each line size range.

Finally, the company size variable is significant, but due to the limited number of medium sized companies in the data set there is some concern that it may be difficult to keep the medium sized companies' data confidential and that there may not be enough observations in the data set for a statistically significant sample. The likely reasons why company size is significance is due to the same reasons why company name is significant. That each company has different engineering practices, may have negotiated unique purchase arrangements with each switch vendor, and the way in which the cost estimates where generated may differ between the companies. Regardless, the concerns over confidentiality and sample size outweigh the statistical impact these variable have on the analysis.

Final Model Results

After eliminating all the independent variables except the number of lines and the incompatible data sets provided by two of the companies, a statistically significant curve was produced (see the results of the in Appendix D). The resulting switch curve is:

Investment per Line = 225 + 261,871/Line size of switch.

While the R2 may be at approximately 44%[4], the F statistic reveals the statistical reliability of the model and the t-test shows the statistical significance of the number of lines variable. As can be seen in the graph of the curve (see Appendix E), at low line levels the investment per line is high (as high as $1,000 per line at ~ 337 lines). However, the curve asymptotically approaches $225 per line for large line size switches.

Finally, the graph contained in Appendix F displays the error structure of the final model. This type of graph is used to visually determining the effectiveness of the model parameters. As one can see, it appears that, although their is a lot of noise in the low line count switched, no other anomalies existed. Therefore, it appears that the function 1/x fits the SCIS data well.

Study Results for Other Data

[4] However, please note that when all of the variables were included in the analysis, the R^2 was well over 70%.

The data requested also asked for Telco Installation/engineering factor, Company size, Land and Building Factor, Power and Common Equipment factor, Percent of Messages/MOU that are local, and Switching TPIS.

The response to this portion of the data request was not as complete. Only 6 companies provided this data (of that not all of the requested data was filled in). The data was weighted together (by company size) to developed inputs into the BCPM model. The results are as follows:

Telco Installation/Engineering factor	*5.77%*
Land and Building Factor[5]	*8.55%*
Power and Common Equipment factor	*6.82%*
Percent of Messages/MOU that are Local	*75.70%*
TPIS	*Not analyzed at this time*

Please keep in mind that SCIS already includes the Telco Installation/Engineering factor, the Power and Common Equipment factor, and the company discount (not requested). These values were requested in the case that the vendors provided data to this team (as mentioned above, the Vendors did not respond).

Summary

The goal of the study was to provide a statistically significant switch curve using the most publicly available. We feel that we have succeeded.

This analysis will be combined with the two other Best of Breed studies which are focusing in on the Loop and expense portions of Basic Service. The team will then use the data derived from these studies to construct a cost model to better analyze the issues surrounding Basic Services and the Universal Support Fund.

[5] Some data was omitted due to inconsistencies.

Appendix A

INDETEC International

Information Technology and Management Science Division
8945 Eagle View Dr.
Cincinnati, OH 45269
Telephone: **(513) 874-9748**
Fax: **(513)874-9749**

FAX TRANSMISSION

To:	*See Attached List*	*From:*	*Ed Frank*
Company:		*Date:*	*January 7, 1997*
Telephone:		*No. of Pages: (including cover sheet):*	*6*
Fax:		*RE:*	*Best of Breed Data Request*

Recipients:

The attached documents cover the industry wide data request being sent out. This request will help the Best of Breed cost proxy team develop the most defensible switch data. To that end, please provide the requested data by no later than November 12th, 1996. We would request that the results be transmitted in electronic form (via E-mail to efrank@indetec.com or via a disk mailed to the address above).

INDETEC International will act as the independent body to analyze the data and also as the screening agent to protect the confidentiality of the company data. INDETEC has non-disclosure statements with most of the companies involved. If you are unsure of this agreement or would like a new agreement signed, please contact INDETEC at 317-841-3729.

If you have any questions on any other matter related to this request, please contact me.

BOB - Switch Curve

Overview

To all recipients:

The Best of Breed (BOB) sponsored Switching team is requesting SCIS or "SCIS Like' output to develop a Switch curve to use in the BOB national proxy model. This curve will be used to "proxy' the local switching costs for Universal Service.

The LEC industry, led by USWest, Sprint and Pacific Bell, are developing a Best of Breed model that will be submitted to the FCC for use in the Universal Service proceedings. This best of breed effort will combine the best attributes of the LEC proxy models currently available (the CPM and BCM2). In addition, an intense effort is being made to populate these models with the best and most justifiable publicly available data. To this end the LEC coalition has formed three design groups. The first two groups are focusing in on the Loop and expense portions of Basic Service. The third group is focusing in on the switch expenses. The efforts and methods of the Switch group are highlighted here.

The current method used by all proxy models to develop switching costs for Universal Service is based upon a switch curve. This switch curve represents total basic switch cost per line for switches of various line sizes. Based upon the characteristics of the group of customers being proxied, a switch cost will be pulled from the curve. The lookup of the curve point is quite simple. The proxy model can determine the approximate line size of the switch, the line size of the company owning the switch, and the current switch type installed at the location. However, the current downfall of all proxies is the data used to develop the switch curve. The reason for the data problems is that, currently, there is very little on the public record regarding a reasonable switch cost.

Therefore, the intent of the switch team is to replicate the switch curve function but base it on the better data. We believe that the most reliable data would be that obtained from the vendors and/or the LEC industry. The attached sheets represents the Best of Breed (BOB) Switching team's data request to develop the switch curve. We have also attached suggested model office inputs to make resulting switch costs representative of a switch built for Universal service functionality and to make the various company data as comparable as possible.

BOB - Switch Curve

SCIS or "SCIS Like"
Model INPUTS

For the model office run, start with SCIS or "SCIS Like" input sheets populated with actual data from each of your sample central offices used in the data request. Using this base, incorporate the following modifications into the input data to develop the appropriate outputs for the BOB switch data request.

Basic Assumptions:

- Use the most recently available generic upgrade
- Use the most recently available equipment
- Attempt to eliminate investments needed to support non-POTS services, including ISDN-BRI & -PRI services, Packet Services and CLASS Features (see Note 1)
- Do not include costs for AMA
- Separate Remote & Host investments, & include NCT link & and any additional host switch investments required to provision a remote switch with the Remote Switch (if possible)
- When configuring Remote Switch Applications, please use only the intelligent (i.e., self switching) remotes for Northern Telecom systems, otherwise treat the non-switching remotes as digital loop carrier.
- Try to use only End Office switches only, however End Office/Tandem Office types are acceptable, but do not use Tandem only offices.
- Exclude any "hairpin" service arrangements.

Note 1: When determining the line sizes for the switch, use the actual number of lines from the sample, but when developing inputs for the study convert all line types to analog lines. Exclude ISDN-PRI services and 1.544 mbps switchable interface services totally (However continue to include Integrated Digital Loop Carrier caused investments and the number of lines served off of IDLC).

Other inputs that we should consider for all runs:

- Processor Utilization Factor (PUF) should be set to exhaust
- Include normal discounting
- Run in average mode
- No other Additional RTU's should be included
- Switch Module or Line Module memory should be set at standard levels & processor utilization be based on your engineering practices
- Use Integrated Digital Loop Carrier configurations. However, to account for the fact that current equipment will not support unbundling of a service, use the average of the Universal and Integrated Digital Loop Carrier equipment investments.
- Analog Trunk Services such as PBX lines should be treated as loops.

For all other inputs, use either data collected from the sample switch and / or the Company's standard engineering practice.

BOB - Switch Curve

SCIS or "SCIS Like"
Data Request

The BOB Switching team requests the following SCIS or "SCIS Like" output data:

- ***Each company should only provide information for those central offices whose characteristics match the combinations of switch types & line sizes that are shown in the table below.***
  - ***If more than one central office matches any particular combination, then choose one (representative) central office for that occurrence.***
  - ***By this definition, no one company should provide results for more than 27 central offices.***
  - ***Try to exclude central offices that serve predominantly Business Customers (at least 50% residential)***
  - ***When running remotes, please include*** *the investment in the host switch required to operate the remote.*

Line Sizes	DMS 10	DMS 100 end office	DMS 100 remote	5E end office	5E remote
0 - 500	*X*		*X*		*X*
501 - 1000	*X*		*X*		*X*
1001 - 2500	*X*	*X*	*X*	*X*	*X*
2501 - 5000	*X*	*X*	*X*	*X*	*X*
5000 - 10,000	*X*	*X*	*X*	*X*	*X*
10,001 - 25,000		*X*		*X*	
25,001 - 50,000		*X*		*X*	
50,001 & up		*X*		*X*	

Note: For those offices with remotes acting as pair gain systems, generate results for the entire office (including remote modules). Then run separately for only the Remote Modules (including the investment in the host switch required to operate the remote).

BOB - Switch Curve

SCIS or "SCIS Like"
Data Request (cnt'd)

- ***Based on these combinations, the following data is requested:***

Item	Host Switch	Remotes
Switch Type		
Number of Remotes		
Number of Lines by wire center (including carrier system lines)		
• *Host*		
• *Remote*		
Investment Totals		
• *Getting Started*		
• *Call Set-up (EPHC) (if available)*		
• *Line Termination (working plus excess)*		
• *Line CCS (O+T)*		
• *Call Type (if applicable)*		
• *SS7 Link Pair*		
• *Trunk CCS*		

- ***We would also like:***

Telco Installation/engineering factor	
Company Size (by lines)	
Land and Building factor	
Power and Common equipment factor	
Percent of Messages/MOU that are local	
Switching Telephone Plant Index (TPI)	
• *1986*	
• *1987*	
• *1988*	
• *1989*	
• *1990*	
• *1991*	
• *1992*	
• *1993*	
• *1994*	
• *1995*	
• *1996*	
• *1997*	
• *1998*	
• *1999*	
• *2000*	

Appendix B

Best of Breed
Switch Sub-Group

Switch Curve Development Report

Excerpt from FCC ONA Order (CC docket 89-79), paragraph 20.

"20. A third approach might employ a costing model, such as Bellcore Switching Cost Information System (SCIS), to develop costs for BSE type features. Many of the BOCs apparently use this model to develop incremental costs for switch-related features at the state level and, in some cases, for new services at the federal level.

Because SCIS is an established model frequently employed in the regulatory arena, requiring its use in federal tariffing would impose minimal implementation burdens and additional administrative expenses for the BOCs. By identifying incremental costs, the SCIS model would provide a floor that ensures that existing access services such as basic switching, are not subsidizing new unbundled BSEs or qualified non-ONA services. However, the model produces only a cost suitable for determining the level below which BSEs should not be priced. It does not yield a cost suitable for establishing a maximum rate. We seek comment on whether such a ceiling would be necessary in light of the overall constraint on switched element revenues, and if so, how such a ceiling could be developed."

Excerpt from Ohio Public Utility Commission order (Cincinnati Bell Telephone Company, Case No. 93-432-TP-ALT), p. 56

"The Staff has reviewed the SCIS user guide prepared by Bellcore, and finds that the SCIS model provides a reasonable tool to be used to determine the incremental investment of basic services as well as vertical services. Therefore, the Staff recommends the use of this model by CBT in the development of LRSIC studies. Also, the Staff recommends that whenever the Applicant uses the SCIS model in a cost study for calculating the incremental cost of a specific service, the Applicant should submit for Staff review, user inputs required for the SCIS model run for the specific service along with the associated outputs of that run."

Excerpt from FCC 93-531, Released December 15, 1997

82. "Anderson concluded in its report that, although SCIS permits users fairly wide discretion in selecting variables, the SCIS model itself is fundamentally sound. This funding is consistent with the findings of the Commission's review of the SCIS models submitted to us in camera in December 1991. Furthermore, the results of Anderson's analysis were consistent with our conclusions, based on independent staff review, regarding the appropriate treatment for BellSouth's model office development, noncurrent SCIS models and traffic data average or marginal SCIS studies, and embedded or prospective technology mixes. The staff review process did non duplicate the Anderson effort, but examined proprietary materials from additional or different perspectives. The different emphases of each approach, however, add to the scope of review and enable us to determine, contrary to Allnet's unsupported assertion, that the Andersen study is free of bias.
83. The issues raised by Wiltel regarding sources of BSE rate variation or whether the SCIS Average Study option results in long run rates do not in any way cast doubt on Andersen's conclusion that SCIS is fundamentally sound. In the Supplemental Report submitted used to evaluate SCIS costing principles. We have examined Andersen's supplemental report in light of the Commission staff's independent review of the models, and we find this explanation to be adequate. The SCIS model is internally valid; as described above, our concerns and revisions to BOC ratemaking practices involving SCIS-based rates are directed at specific exercises of the discretion afforded carriers by the model, not at the model's internal structure. It is not a criticism of the model proper to constrain the SCIS user's assumptions, or factual inputs, to assure their reasonableness..."

Appendix C

Best of Breed
Switch Sub-Group

Switch Curve Development Report

Company	Company Size	Host or Remote	Lines	Total Inv.	Inv. / Line
A	L	R	285	$ 144,991	$ 509
A	L	R	315	$ 189,587	$ 602
A	L	H	368	$ 166,356	$ 452
A	L	H	736	$ 204,539	$ 278
A	L	R	745	$ 168,464	$ 226
A	L	R	749	$ 215,607	$ 288
A	L	R	1,533	$ 280,080	$ 183
A	L	R	1,581	$ 227,501	$ 144
A	L	H	1,689	$ 506,138	$ 300
A	L	H	1,789	$ 311,051	$ 174
A	L	H	3,404	$ 456,230	$ 134
A	L	R	3,568	$ 420,949	$ 118
A	L	R	3,748	$ 521,396	$ 139
A	L	H	4,032	$ 964,856	$ 239
A	L	H	4,418	$ 1,050,474	$ 238
A	L	R	6,235	$ 809,472	$ 130
A	L	H	6,545	$ 700,698	$ 107
A	L	R	6,658	$ 688,968	$ 103
A	L	H	7,963	$ 1,640,358	$ 206
A	L	H	7,964	$ 1,028,743	$ 129
A	L	H	15,734	$ 2,495,597	$ 159
A	L	H	18,123	$ 1,961,573	$ 108
A	L	H	34,856	$ 3,751,937	$ 108
A	L	H	38,986	$ 4,863,230	$ 125
A	L	H	58,576	$ 5,764,109	$ 98
C	M	R	345	$ 389,287	$ 1,128
C	M	H	1,670	$ 859,744	$ 515
C	M	R	2,008	$ 619,742	$ 309
C	M	H	3,300	$ 1,294,488	$ 392
C	M	R	3,596	$ 912,886	$ 254
C	M	H	5,595	$ 1,741,696	$ 311
C	M	R	7,544	$ 1,717,073	$ 228
C	M	H	14,790	$ 4,440,265	$ 300
C	M	R	17,400	$ 3,941,490	$ 227
C	M	H	41,584	$ 9,908,749	$ 238
E	L	R	217	$ 561,450	$ 2,587
E	L	R	246	$ 103,717	$ 422
E	L	R	579	$ 1,110,493	$ 1,918
E	L	R	714	$ 124,350	$ 174
E	L	R	1,192	$ 139,514	$ 117

Best of Breed
Switch Sub-Group

Switch Curve Development Report

Company	Company Size	Host or Remote	Lines	Total Inv.	Inv. / Line
E	L	H	3,072	$ 2,413,250	$ 786
E	L	R	3,776	$ 869,270	$ 230
E	L	R	3,840	$ 264,410	$ 69
E	L	H	4,392	$ 581,959	$ 133
E	L	R	6,912	$ 506,795	$ 73
E	L	R	8,192	$ 1,681,734	$ 205
E	L	H	8,596	$ 1,301,398	$ 151
E	L	H	8,832	$ 2,476,735	$ 280
E	L	H	14,627	$ 1,506,839	$ 103
E	L	H	19,200	$ 4,073,235	$ 212
E	L	H	37,504	$ 7,136,911	$ 190
E	L	H	43,006	$ 3,608,386	$ 84
E	L	H	58,438	$ 4,442,800	$ 76
E	L	H	89,600	$15,401,911	$ 172
G	M	R	138	$ 219,391	$ 1,590
G	M	H	448	$ 480,665	$ 1,073
G	M	R	568	$ 316,128	$ 557
G	M	H	832	$ 557,551	$ 670
G	M	H	1,510	$ 899,976	$ 596
G	M	R	1,646	$ 934,710	$ 568
G	M	H	3,326	$ 1,062,170	$ 319
G	M	R	3,511	$ 1,378,805	$ 393
G	M	H	5,727	$ 1,685,517	$ 294
G	M	H	8,180	$ 6,727,990	$ 822
G	M	H	11,000	$ 7,824,353	$ 711
H	L	H	342	$ 345,942	$ 1,012
H	L	R	423	$ 608,393	$ 1,438
H	L	R	436	$ 251,469	$ 577
H	L	R	562	$ 564,092	$ 1,004
H	L	H	920	$ 413,595	$ 450
H	L	R	944	$ 316,131	$ 335
H	L	H	1,383	$ 455,863	$ 330
H	L	R	1,447	$ 743,280	$ 514
H	L	R	1,734	$ 329,116	$ 190
H	L	H	2,560	$ 634,783	$ 248
H	L	R	2,793	$ 432,661	$ 155
H	L	H	3,212	$ 1,932,136	$ 602
H	L	R	4,377	$ 1,242,625	$ 284
H	L	H	4,480	$ 2,033,989	$ 454
H	L	R	5,120	$ 1,282,825	$ 251
H	L	R	5,751	$ 590,690	$ 103
H	L	H	6,523	$ 2,438,661	$ 374

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Switch Curve Development Report

Company	Company Size	Host or Remote	Lines	Total Inv.	Inv. / Line
H	L	H	7,680	$ 1,385,930	$ 180
H	L	H	13,504	$ 3,782,275	$ 280
H	L	H	20,396	$ 4,729,945	$ 232
H	L	H	27,933	$ 5,304,658	$ 190
H	L	H	38,459	$10,063,514	$ 262
H	L	H	55,544	$12,624,226	$ 227
H	L	H	92,621	$20,677,012	$ 223
I	L	R	640	$ 223,868	$ 350
I	L	R	931	$ 601,964	$ 647
I	L	H	1,216	$ 1,514,732	$ 1,246
I	L	H	1,350	$ 2,679,579	$ 1,985
I	L	R	1,812	$ 694,152	$ 383
I	L	R	2,112	$ 390,100	$ 185
I	L	R	3,518	$ 523,557	$ 149
I	L	R	4,235	$ 829,702	$ 196
I	L	H	4,439	$ 2,156,964	$ 486
I	L	H	4,468	$ 2,593,455	$ 580
I	L	H	5,853	$ 2,370,333	$ 405
I	L	R	6,141	$ 765,907	$ 125
I	L	R	8,128	$ 1,867,942	$ 230
I	L	H	9,782	$ 2,470,214	$ 253
I	L	H	16,421	$ 3,770,634	$ 230
I	L	H	16,460	$ 2,804,794	$ 170
I	L	H	27,282	$ 5,137,531	$ 188
I	L	H	32,010	$ 7,222,032	$ 226
I	L	H	53,760	$ 8,893,799	$ 165
I	L	H	65,857	$12,610,307	$ 191
L	L	R	470	$ 207,429	$ 441
L	L	R	691	$ 353,041	$ 511
L	L	R	730	$ 357,300	$ 489
L	L	R	1,700	$ 400,743	$ 236
L	L	R	1,800	$ 339,486	$ 189
L	L	R	2,120	$ 363,402	$ 171
L	L	R	2,816	$ 443,296	$ 157
L	L	H	3,720	$ 945,714	$ 254
L	L	H	4,966	$ 1,600,672	$ 322
L	L	H	5,350	$ 2,140,848	$ 400
L	L	H	6,500	$ 2,401,321	$ 369
L	L	H	8,537	$ 2,044,662	$ 240
L	L	H	9,120	$ 2,333,221	$ 256
L	L	H	10,343	$ 1,921,643	$ 186
L	L	H	26,417	$ 4,335,835	$ 164
L	L	H	34,180	$ 6,069,887	$ 178

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Company	Company Size	Host or Remote	Lines	Total Inv.	Inv. / Line
M	L	R	110	$ 19,006	$ 173
M	L	R	549	$ 80,070	$ 146
M	L	R	964	$ 171,899	$ 178
M	L	R	1,353	$ 238,688	$ 176
M	L	R	1,669	$ 284,186	$ 170
M	L	H	2,274	$ 312,595	$ 137
M	L	R	2,656	$ 449,241	$ 169
M	L	R	3,443	$ 559,785	$ 163
M	L	H	3,981	$ 562,920	$ 141
M	L	H	4,995	$ 1,250,114	$ 250
M	L	H	6,980	$ 1,037,355	$ 149
M	L	H	7,298	$ 1,905,452	$ 261
M	L	R	7,767	$ 1,125,104	$ 145
M	L	R	8,118	$ 1,218,284	$ 150
M	L	H	13,798	$ 2,444,171	$ 177
M	L	H	20,140	$ 2,711,284	$ 135
M	L	H	31,369	$ 4,356,495	$ 139
M	L	H	44,918	$ 5,929,033	$ 132
M	L	H	64,332	$ 8,921,344	$ 139
M	L	H	69,481	$ 9,371,833	$ 135
N	L	R	512	$ 395,793	$ 773
N	L	R	640	$ 107,284	$ 168
N	L	R	896	$ 424,219	$ 473
N	L	R	1,120	$ 181,087	$ 162
N	L	R	1,920	$ 510,995	$ 266
N	L	R	2,040	$ 257,248	$ 126
N	L	H	2,400	$ 780,182	$ 325
N	L	R	3,200	$ 340,093	$ 106
N	L	H	3,328	$ 1,344,183	$ 404
N	L	R	3,584	$ 668,283	$ 186
N	L	H	4,096	$ 1,298,102	$ 317
N	L	H	5,120	$ 1,192,503	$ 233

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Switch Curve Development Report

Company	Company Size	Host or Remote	Lines	Total Inv.	Inv. / Line
N	L	R	7,168	$ 1,213,459	$ 169
N	L	H	8,960	$ 1,849,292	$ 206
N	L	H	9,440	$ 1,580,752	$ 167
N	L	H	17,856	$ 3,087,591	$ 173
N	L	H	21,120	$ 2,889,305	$ 137
N	L	H	42,048	$ 6,356,371	$ 151
N	L	H	44,800	$ 4,221,414	$ 94
N	L	H	60,392	$ 9,994,814	$ 166
N	L	H	70,080	$ 7,038,031	$ 100
O	L	H	619	$ 168,817	$ 273
O	L	R	1,920	$ 393,306	$ 205
O	L	R	2,560	$ 460,443	$ 180
O	L	R	6,720	$ 1,138,266	$ 169
O	L	H	7,632	$ 3,086,033	$ 404
O	L	H	20,780	$ 4,301,685	$ 207
O	L	H	38,839	$ 6,491,312	$ 167

Appendix D

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Switch Sub-Group

Switch Curve Development Report

Fit of BOB Switch Data
Final Run

General Linear Models Procedure

Dependent Variable: PERLINE

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	1	8576443.84511978	8576443.84511978	103.27	0.0001
Error	129	10713686.41404510	83051.83266702		
Corrected Total	130	19290130.25916480			

R-Square	C.V.	Root MSE	PERLINE Mean
0.444603	75.72567	288.18714868	380.56732824

Source	DF	Type I SS	Mean Square	F Value	Pr > F
OVERX	1	8576443.84511978	8576443.84511978	103.27	0.0001

Source	DF	Type III SS	Mean Square	F Value	Pr > F
OVERX	1	8576443.84511978	8576443.84511978	103.27	0.0001

Parameter	Estimate	T for H0: Parameter=0	Pr > |T|	Std Error of Estimate
INTERCEPT	224.8097	7.63	0.0001	29.47736
OVERX	261870.9734	10.16	0.0001	25769.63982