State: Washington

Date: 8/6/92
Time: 2:07:45 PM

Assumptions:
Copper Size Factors 1 reduced from 1.2 to 1.0
Copper Size Factors 1 reduced from 1.3 to 1.0
Copper Size Factors 1 reduced from 1.4 to 1.0
Fiber Size Factor reduced from 1.2 to 1.0

Aggregate Support		ARMIS
At $20 =	$	276,602,528
At $30 =	$	130,292,793
At $40 =	$	76,481,041
At $50 =	$	48,357,911
At $60 =	$	31,850,217
At $70 =	$	22,023,618
At $80 =	$	15,320,631
Annual Benchmark Cost =	$	,156,416,275
State Average Monthly Cost=	$	29.26

Density	Households	Lines
Less 5	19,098	26,849
5 to 200	408,594	634,397
200 to 650	266,499	487,515
650 to 850	101,986	181,135
850 to 2550	681,340	1,181,569
Greater 2550	397,991	782,457
Total	1,875,508	3,293,923

Cost Category	ARMIS Households
$0<=$ 5	-
$5<=$10	-
$10<=$15	16,216
$15<=$20	196,812
$20<=$25	446,708
$25<=$30	453,486
$30<=$35	348,588
$35<=$40	118,229
$40<=$45	65,027
$45<=$50	46,661
$50<=$55	49,588
$55<=$60	31,926
$60<=$65	21,659
$65<=$70	15,138
$70<=$75	9,298
$75<=$100	36,863
$100<=$150	14,510
$150<=$200	3,423
$200<=$250	1,353
$250<=$300	-
$300<=$500	23
$500<=$1000	-
$1000+	-
Total Households	1,875,508

Loop Category	Households
0 <= 5Kft	194,576
5Kft <= 10Kft	473,673
10Kft <= 15Kft	432,323
15Kft <= 20Kft	283,523
20Kft <= 25Kft	171,102
25Kft <= 30Kft	106,537
30Kft <= 40Kft	102,024
40Kft <= 50Kft	51,096
50Kft <= 60Kft	21,986
60Kft <=70Kft	14,541
70Kft <= 80Kft	10,481
80Kft <= 90Kft	7,398
90Kft <= 100Kft	3,685
100Kft <=150Kft	2,511
150Kft <= 200Kft	52
200Ktf+	-

Loop Information	Length
Minimum Loop Length	756
Maximum Loop Length	165,901
Average Loop Length	15,199

Maximum Monthly Cost	$	414.28
Average Monthly Cost	$	29.26
Lines Above $10K Loop Inv		1,307

State: Washington

Density	Summary Results		Weighted
Less 5	Sum of # Households		19,098
	Sum of # Lines		26,849
	Average of Loop Length		70,190
	Average of Loop $ per Line		$4,771
	Average of Total Invstmnt $/Ln		$5,196
	Average of Monthly Cost1		$ 110.80
5 to 200	Sum of # Households		408,594
	Sum of # Lines		634,397
	Average of Loop Length		29,933
	Average of Loop $ per Line		$1,811
	Average of Total Invstmnt $/Ln		$1,976
	Average of Monthly Cost1		$ 47.39
200 to 650	Sum of # Households		266,499
	Sum of # Lines		487,515
	Average of Loop Length		15,436
	Average of Loop $ per Line		$806
	Average of Total Invstmnt $/Ln		$924
	Average of Monthly Cost1		$ 26.74
650 to 850	Sum of # Households		101,986
	Sum of # Lines		181,135
	Average of Loop Length		13,082
	Average of Loop $ per Line		$805
	Average of Total Invstmnt $/Ln		$914
	Average of Monthly Cost1		$ 26.49
850 to 2550	Sum of # Households		681,340
	Sum of # Lines		1,181,569
	Average of Loop Length		11,279
	Average of Loop $ per Line		$694
	Average of Total Invstmnt $/Ln		$801
	Average of Monthly Cost1		$ 24.25
Greater 2550	Sum of # Households		397,991
	Sum of # Lines		782,457
	Average of Loop Length		7,629
	Average of Loop $ per Line		$564
	Average of Total Invstmnt $/Ln		$665
	Average of Monthly Cost1		$ 21.53

State: Washington

Date: 8/6/92
Time: 5:58:38 PM

Assumptions

HM Fill Factors substituted

Aggregate Support		ARMIS
At $20 =	$	275,410,772
At $30 =	$	126,607,867
At $40 =	$	73,324,482
At $50 =	$	46,014,945
At $60 =	$	30,688,172
At $70 =	$	21,234,597
At $80 =	$	14,795,942
Annual Benchmark Cost =	$	1,157,067,353
State Average Monthly Cost=		29.27

Density	Households	Lines
Less 5	19,098	26,849
5 to 200	408,594	634,397
200 to 650	266,499	487,515
650 to 850	101,986	181,135
850 to 2550	681,340	1,181,569
Greater 2550	397,991	782,457
Total	1,875,508	3,293,923

Cost Category	ARMIS Households
$0<=$ 5	-
$5<=$10	-
$10<=$15	12,159
$15<=$20	181,832
$20<=$25	440,801
$25<=$30	467,006
$30<=$35	367,854
$35<=$40	118,525
$40<=$45	61,759
$45<=$50	50,565
$50<=$55	51,327
$55<=$60	28,341
$60<=$65	18,151
$65<=$70	12,363
$70<=$75	10,336
$75<=$100	35,447
$100<=$150	14,243
$150<=$200	3,423
$200<=$250	1,353
$250<=$300	-
$300<=$500	23
$500<=$1000	-
$1000+	-
Total Households	1,875,508

Loop Category	Households
0 <= 5Kft	194,576
5Kft <= 10Kft	473,673
10Kft <= 15Kft	432,323
15Kft <= 20Kft	283,523
20Kft <= 25Kft	171,102
25Kft <= 30Kft	106,537
30Kft <= 40Kft	102,024
40Kft <= 50Kft	51,096
50Kft <= 60Kft	21,986
60Kft <=70Kft	14,541
70Kft <= 80Kft	10,481
80Kft <= 90Kft	7,398
90Kft <= 100Kft	3,685
100Kft <=150Kft	2,511
150Kft <= 200Kft	52
200Ktf+	-

Loop Information	Length
Minimum Loop Length	756
Maximum Loop Length	165,901
Average Loop Length	15,199

Maximum Monthly Cost	$	414.28
Average Monthly Cost	$	29.27
Lines Above $10K Loop Inv		1,307

State: Washington

Density	Summary Results		Weighted
Less 5	Sum of # Households		19.098
	Sum of # Lines		26.849
	Average of Loop Length		70.190
	Average of Loop $ per Line		$4.727
	Average of Total Invstmnt $/Ln		$5.152
	Average of Monthly Cost1		$ 109.94
5 to 200	Sum of # Households		408.594
	Sum of # Lines		634.397
	Average of Loop Length		29.933
	Average of Loop $ per Line		$1.774
	Average of Total Invstmnt $/Ln		$1,939
	Average of Monthly Cost1		$ 46.67
200 to 650	Sum of # Households		266.499
	Sum of # Lines		487.515
	Average of Loop Length		15.436
	Average of Loop $ per Line		$805
	Average of Total Invstmnt $/Ln		$923
	Average of Monthly Cost1		$ 26.71
650 to 850	Sum of # Households		101.986
	Sum of # Lines		181.135
	Average of Loop Length		13.082
	Average of Loop $ per Line		$815
	Average of Total Invstmnt $/Ln		$924
	Average of Monthly Cost1		$ 26.68
850 to 2550	Sum of # Households		681.340
	Sum of # Lines		1,181.569
	Average of Loop Length		11.279
	Average of Loop $ per Line		$707
	Average of Total Invstmnt $/Ln		$813
	Average of Monthly Cost1		$ 24.49
Greater 2550	Sum of # Households		397.991
	Sum of # Lines		782.457
	Average of Loop Length		7.629
	Average of Loop $ per Line		$579
	Average of Total Invstmnt $/Ln		$680
	Average of Monthly Cost1		$ 21.82

State: Washington

Date: 8/6/92
Time: 4:10:19 PM

Assumptions

Drop Cost per Foot reduced from $0.10 to $0
Pedestal Cost reduced from $48.22 to $0
Network Interface Device cost reduced from $30 to $0

Aggregate Support		ARMIS
At $20 =	$	265,432,102
At $30 =	$	1,[illegible]3,378,657
At $40 =	$	[illegible]2,863,293
At $50 =	$	[illegible]5,951,705
At $60 =	$	[illegible]0,513,914
At $70 =	$	1,154,600
At $80 =	$	4,714,794
Annual Benchmark Cost =	$	1,1[illegible]9,774,105
State Average Monthly Cost=	$	28.84

Density	Households	Lines
Less 5	19,098	26,849
5 to 200	408,594	634,397
200 to 650	266,499	487,515
650 to 850	101,986	181,135
850 to 2550	681,340	1,181,569
Greater 2550	397,991	782,457
Total	1,875,508	3,293,923

Cost Category	ARMIS Households
$0<=$ 5	-
$5<=$10	-
$10<=$15	17,419
$15<=$20	209,822
$20<=$25	458,528
$25<=$30	488,463
$30<=$35	316,802
$35<=$40	99,734
$40<=$45	61,785
$45<=$50	48,699
$50<=$55	48,690
$55<=$60	28,714
$60<=$65	18,680
$65<=$70	15,952
$70<=$75	8,352
$75<=$100	35,142
$100<=$150	13,927
$150<=$200	3,474
$200<=$250	1,302
$250<=$300	-
$300<=$500	23
$500<=$1000	-
$1000+	-
Total Households	1,875,508

Loop Category	Households
0 <= 5Kft	194,576
5Kft <= 10Kft	473,673
10Kft <= 15Kft	432,323
15Kft <= 20Kft	283,523
20Kft <= 25Kft	171,102
25Kft <= 30Kft	106,537
30Kft <= 40Kft	102,024
40Kft <= 50Kft	51,096
50Kft <= 60Kft	21,986
60Kft <=70Kft	14,541
70Kft <= 80Kft	10,481
80Kft <= 90Kft	7,398
90Kft <= 100Kft	3,685
100Kft <=150Kft	2,511
150Kft <= 200Kft	52
200Ktf+	-

Loop Information	Length
Minimum Loop Length	756
Maximum Loop Length	165,901
Average Loop Length	15,199

Maximum Monthly Cost	$	414.28
Average Monthly Cost	$	28.84
Lines Above $10K Loop Inv		1,307

State: Washington

Density	Summary Results		Weighted
Less 5	Sum of # Households		19,098
	Sum of # Lines		26,849
	Average of Loop Length		70,190
	Average of Loop $ per Line		$4,718
	Average of Total Invstmnt $/Ln		$5,143
	Average of Monthly Cost1		$ 109.77
5 to 200	Sum of # Households		408,594
	Sum of # Lines		634,397
	Average of Loop Length		29,933
	Average of Loop $ per Line		$1,768
	Average of Total Invstmnt $/Ln		$1,934
	Average of Monthly Cost1		$ 46.56
200 to 650	Sum of # Households		266,499
	Sum of # Lines		487,515
	Average of Loop Length		15,436
	Average of Loop $ per Line		$784
	Average of Total Invstmnt $/Ln		$902
	Average of Monthly Cost1		$ 26.31
650 to 850	Sum of # Households		101,986
	Sum of # Lines		181,135
	Average of Loop Length		13,082
	Average of Loop $ per Line		$787
	Average of Total Invstmnt $/Ln		$897
	Average of Monthly Cost1		$ 26.15
850 to 2550	Sum of # Households		681,340
	Sum of # Lines		1,181,569
	Average of Loop Length		11,279
	Average of Loop $ per Line		$677
	Average of Total Invstmnt $/Ln		$784
	Average of Monthly Cost1		$ 23.91
Greater 2550	Sum of # Households		397,991
	Sum of # Lines		782,457
	Average of Loop Length		7,629
	Average of Loop $ per Line		$553
	Average of Total Invstmnt $/Ln		$655
	Average of Monthly Cost1		$ 21.32

State: Washington

Date: 7/24/92
Time: 1:04:34 PM

Assumptions:
Copper/Fiber Crossover Point = 9,000

Aggregate Support		ARMIS
At $20 =	$	298,458,281
At $30 =	$	1[illegible]4,240,149
At $40 =	$	76,710,033
At $50 =	$	48,383,527
At $60 =	$	31,861,000
At $70 =	$	22,029,327
At $80 =	$	15,325,477
Annual Benchmark Cost =	$	1,[illegible]95,639,907
State Average Monthly Cost=	$	30.25

Density	Households	Lines
Less 5	19,098	26,849
5 to 200	408,594	634,397
200 to 650	266,499	487,515
650 to 850	101,986	181,135
850 to 2550	681,340	1,181,569
Greater 2550	397,991	782,457
Total	1,875,508	3,293,923

	ARMIS
Cost Category	Households
$0<=$5	-
$5<=$10	-
$10<=$15	12,836
$15<=$20	141,986
$20<=$25	314,735
$25<=$30	536,216
$30<=$35	442,589
$35<=$40	128,189
$40<=$45	66,324
$45<=$50	48,817
$50<=$55	49,588
$55<=$60	31,961
$60<=$65	21,659
$65<=$70	15,138
$70<=$75	9,298
$75<=$100	36,863
$100<=$150	14,510
$150<=$200	3,423
$200<=$250	1,353
$250<=$300	-
$300<=$500	23
$500<=$1000	-
$1000+	-
Total Households	1,875,508

Loop Category	Households
0 <= 5Kft	194,576
5Kft <= 10Kft	473,673
10Kft <= 15Kft	432,323
15Kft <= 20Kft	283,523
20Kft <= 25Kft	171,102
25Kft <= 30Kft	106,537
30Kft <= 40Kft	102,024
40Kft <= 50Kft	51,096
50Kft <= 60Kft	21,986
60Kft <=70Kft	14,541
70Kft <= 80Kft	10,481
80Kft <= 90Kft	7,398
90Kft <= 100Kft	3,685
100Kft <=150Kft	2,511
150Kft <= 200Kft	52
200Ktf+	-

Loop Information	Length
Minimum Loop Length	756
Maximum Loop Length	165,901
Average Loop Length	15,199

Maximum Monthly Cost	$	414.28
Average Monthly Cost	$	30.25
Lines Above $10K Loop Inv		1,307

State: Washington

Density	Summary Results		Weighted
Less 5	Sum of # Households		19,098
	Sum of # Lines		26,849
	Average of Loop Length		70.190
	Average of Loop $ per Line		$4,773
	Average of Total Invstmnt $/Ln		$5,198
	Average of Monthly Cost1		$ 110.83
5 to 200	Sum of # Households		408,594
	Sum of # Lines		634,397
	Average of Loop Length		29,933
	Average of Loop $ per Line		$1,820
	Average of Total Invstmnt $/Ln		$1,985
	Average of Monthly Cost1		$ 47.57
200 to 650	Sum of # Households		266,499
	Sum of # Lines		487,515
	Average of Loop Length		15,436
	Average of Loop $ per Line		$847
	Average of Total Invstmnt $/Ln		$965
	Average of Monthly Cost1		$ 27.56
650 to 850	Sum of # Households		101,986
	Sum of # Lines		181,135
	Average of Loop Length		13,082
	Average of Loop $ per Line		$871
	Average of Total Invstmnt $/Ln		$981
	Average of Monthly Cost1		$ 27.84
850 to 2550	Sum of # Households		681,340
	Sum of # Lines		1,181,569
	Average of Loop Length		11,279
	Average of Loop $ per Line		$760
	Average of Total Invstmnt $/Ln		$867
	Average of Monthly Cost1		$ 25.58
Greater 2550	Sum of # Households		397,991
	Sum of # Lines		782,457
	Average of Loop Length		7,629
	Average of Loop $ per Line		$623
	Average of Total Invstmnt $ Ln		$724
	Average of Monthly Cost1		$ 22.72

State: Washington

Date: 7/24/92
Time: 1:32:13 PM

Assumptions:
Copper/Fiber Crossover Point = 15,000

Aggregate Support		ARMIS
At $20 =	$	263,003,771
At $30 =	$	127,610,722
At $40 =	$	76,447,550
At $50 =	$	48,305,002
At $60 =	$	31,826,103
At $70 =	$	22,008,787
At $80 =	$	15,314,240
Annual Benchmark Cost =	$	1,134,447,213
State Average Monthly Cost=	$	28.70

Density	Households	Lines
Less 5	19,098	26,849
5 to 200	408,594	634,397
200 to 650	266,499	487,515
650 to 850	101,986	181,135
850 to 2550	681,340	1,181,569
Greater 2550	397,991	782,457
Total	1,875,508	3,293,923

	ARMIS
Cost Category	**Households**
$0<=$ 5	-
$5<=$10	-
$10<=$15	14,110
$15<=$20	212,050
$20<=$25	559,132
$25<=$30	405,668
$30<=$35	287,671
$35<=$40	102,458
$40<=$45	62,938
$45<=$50	47,890
$50<=$55	49,610
$55<=$60	31,904
$60<=$65	21,469
$65<=$70	15,287
$70<=$75	9,149
$75<=$100	36,863
$100<=$150	14,513
$150<=$200	3,423
$200<=$250	1,350
$250<=$300	-
$300<=$500	23
$500<=$1000	-
$1000+	-
Total Households	1,875,508

Loop Category	Households
0 <= 5Kft	194,576
5Kft <= 10Kft	473,673
10Kft <= 15Kft	432,323
15Kft <= 20Kft	283,523
20Kft <= 25Kft	171,102
25Kft <= 30Kft	106,537
30Kft <= 40Kft	102,024
40Kft <= 50Kft	51,096
50Kft <= 60Kft	21,986
60Kft <=70Kft	14,541
70Kft <= 80Kft	10,481
80Kft <= 90Kft	7,398
90Kft <= 100Kft	3,685
100Kft <=150Kft	2,511
150Kft <= 200Kft	52
200Ktf+	-

Loop Information	Length
Minimum Loop Length	756
Maximum Loop Length	165,901
Average Loop Length	15,199

Maximum Monthly Cost	$	414.28
Average Monthly Cost	$	28.70
Lines Above $10K Loop Inv		1,303

State: Washington

Density	Summary Results		Weighted
Less 5	Sum of # Households		19,098
	Sum of # Lines		26,849
	Average of Loop Length		70.190
	Average of Loop $ per Line		$4,773
	Average of Total Invstmnt $/Ln		$5,198
	Average of Monthly Cost1		$ 110.83
5 to 200	Sum of # Households		408,594
	Sum of # Lines		634,397
	Average of Loop Length		29.933
	Average of Loop $ per Line		$1,820
	Average of Total Invstmnt $/Ln		$1,985
	Average of Monthly Cost1		$ 47.57
200 to 650	Sum of # Households		266,499
	Sum of # Lines		487,515
	Average of Loop Length		15.436
	Average of Loop $ per Line		$847
	Average of Total Invstmnt $/Ln		$965
	Average of Monthly Cost1		$ 27.56
650 to 850	Sum of # Households		101,986
	Sum of # Lines		181,135
	Average of Loop Length		13.082
	Average of Loop $ per Line		$871
	Average of Total Invstmnt $/Ln		$981
	Average of Monthly Cost1		$ 27.84
850 to 2550	Sum of # Households		681,340
	Sum of # Lines		1,181,569
	Average of Loop Length		11.279
	Average of Loop $ per Line		$760
	Average of Total Invstmnt $/Ln		$867
	Average of Monthly Cost1		$ 25.58
Greater 2550	Sum of # Households		397,991
	Sum of # Lines		782,457
	Average of Loop Length		7.629
	Average of Loop $ per Line		$623
	Average of Total Invstmnt $/Ln		$724
	Average of Monthly Cost1		$ 22.72

State: Washington

Date: 7/24/92
Time: 2:06:45 PM

Assumptions:
Copper.Fiber Crossover Point = 18,000

Aggregate Support		ARMIS
At $20 =	$	250,302,289
At $30 =	$	124,821,817
At $40 =	$	76,233,069
At $50 =	$	48,229,867
At $60 =	$	31,776,375
At $70 =	$	21,994,281
At $80 =	$	15,301,946
Annual Benchmark Cost =	$	1,12,383,267
State Average Monthly Cost=	$	28.14

Density	Households	Lines
Less 5	19,098	26,849
5 to 200	408,594	634,397
200 to 650	266,499	487,515
650 to 850	101,986	181,135
850 to 2550	681,340	1,181,569
Greater 2550	397,991	782,457
Total	1,875,508	3,293,923

	ARMIS
Cost Category	Households
$0<=$ 5	-
$5<=$10	-
$10<=$15	14,501
$15<=$20	230,522
$20<=$25	645,102
$25<=$30	373,964
$30<=$35	227,721
$35<=$40	93,595
$40<=$45	59,160
$45<=$50	46,997
$50<=$55	50,155
$55<=$60	31,953
$60<=$65	21,491
$65<=$70	15,032
$70<=$75	9,167
$75<=$100	36,839
$100<=$150	14,519
$150<=$200	3,417
$200<=$250	1,350
$250<=$300	-
$300<=$500	23
$500<=$1000	-
$1000+	-
Total Households	1,875,508

Loop Category	Households
0 <= 5Kft	194,576
5Kft <= 10Kft	473,673
10Kft <= 15Kft	432,323
15Kft <= 20Kft	283,523
20Kft <= 25Kft	171,102
25Kft <= 30Kft	106,537
30Kft <= 40Kft	102,024
40Kft <= 50Kft	51,096
50Kft <= 60Kft	21,986
60Kft <=70Kft	14,541
70Kft <= 80Kft	10,481
80Kft <= 90Kft	7,398
90Kft <= 100Kft	3,685
100Kft <=150Kft	2,511
150Kft <= 200Kft	52
200Ktf+	-

Loop Information	Length
Minimum Loop Length	756
Maximum Loop Length	165,901
Average Loop Length	15,199

Maximum Monthly Cost	$	414.28
Average Monthly Cost	$	28.14
Lines Above $10K Loop Inv		1,300

State: Washington

Density	Summary Results		Weighted
Less 5	Sum of # Households		19,098
	Sum of # Lines		26,849
	Average of Loop Length		70,190
	Average of Loop $ per Line		$4,768
	Average of Total Invstmnt $/Ln		$5,193
	Average of Monthly Cost1		$ 110.73
5 to 200	Sum of # Households		408,594
	Sum of # Lines		634,397
	Average of Loop Length		29,933
	Average of Loop $ per Line		$1,797
	Average of Total Invstmnt $/Ln		$1,963
	Average of Monthly Cost1		$ 47.11
200 to 650	Sum of # Households		266,499
	Sum of # Lines		487,515
	Average of Loop Length		15,436
	Average of Loop $ per Line		$729
	Average of Total Invstmnt $/Ln		$847
	Average of Monthly Cost1		$ 25.16
650 to 850	Sum of # Households		101,986
	Sum of # Lines		181,135
	Average of Loop Length		13,082
	Average of Loop $ per Line		$730
	Average of Total Invstmnt $/Ln		$840
	Average of Monthly Cost1		$ 24.96
850 to 2550	Sum of # Households		681,340
	Sum of # Lines		1,181,569
	Average of Loop Length		11,279
	Average of Loop $ per Line		$615
	Average of Total Invstmnt $/Ln		$722
	Average of Monthly Cost1		$ 22.62
Greater 2550	Sum of # Households		397,991
	Sum of # Lines		782,457
	Average of Loop Length		7,629
	Average of Loop $ per Line		$532
	Average of Total Invstmnt $/Ln		$633
	Average of Monthly Cost1		$ 20.86

State: Washington

Date: 8/6/92
Time: 3:09:14 PM

Assumptions

Minimum Slope Factor reduced from 1.1 to 1.0
Maximum Slope Factor reduced from 1.05 to 1.0
Combined Slope Factor reduced from 1.2 to 1.0

Aggregate Support		ARMIS
At $20 =	$	269,360,689
At $30 =	$	121,672,057
At $40 =	$	68,366,534
At $50 =	$	40,842,026
At $60 =	$	25,443,976
At $70 =	$	16,873,495
At $80 =	$	11,266,856
Annual Benchmark Cost =	$	1,148,241,469
State Average Monthly Cost=	$	29.05

Density	Households	Lines
Less 5	19,098	26,849
5 to 200	408,594	634,397
200 to 650	266,499	487,515
650 to 850	101,986	181,135
850 to 2550	681,340	1,181,569
Greater 2550	397,991	782,457
Total	1,875,508	3,293,923

	ARMIS
Cost Category	**Households**
$0<=$ 5	-
$5<=$10	-
$10<=$15	13,423
$15<=$20	186,337
$20<=$25	447,735
$25<=$30	460,069
$30<=$35	361,913
$35<=$40	115,993
$40<=$45	64,158
$45<=$50	48,798
$50<=$55	52,018
$55<=$60	32,775
$60<=$65	22,987
$65<=$70	11,051
$70<=$75	11,778
$75<=$100	31,707
$100<=$150	11,710
$150<=$200	1,986
$200<=$250	1,047
$250<=$300	-
$300<=$500	23
$500<=$1000	-
$1000+	-
Total Households	1,875,508

Loop Category	Households
0 <= 5Kft	195,575
5Kft <= 10Kft	473,569
10Kft <= 15Kft	433,724
15Kft <= 20Kft	286,710
20Kft <= 25Kft	167,056
25Kft <= 30Kft	113,504
30Kft <= 40Kft	96,831
40Kft <= 50Kft	53,378
50Kft <= 60Kft	21,428
60Kft <=70Kft	13,670
70Kft <= 80Kft	8,801
80Kft <= 90Kft	5,937
90Kft <= 100Kft	3,313
100Kft <=150Kft	1,960
150Kft <= 200Kft	52
200Ktf+	-

Loop Information	Length
Minimum Loop Length	756
Maximum Loop Length	158,299
Average Loop Length	15,054

Maximum Monthly Cost	$	414.37
Average Monthly Cost	$	29.05
Lines Above $10K Loop Inv		1,307

State: Washington

Density	Summary Results		Weighted
Less 5	Sum of # Households		19,098
	Sum of # Lines		26,849
	Average of Loop Length		66,386
	Average of Loop $ per Line		$4,451
	Average of Total Invstmnt $/Ln		$4,876
	Average of Monthly Cost1		$ 104.54
5 to 200	Sum of # Households		408,594
	Sum of # Lines		634,397
	Average of Loop Length		29,394
	Average of Loop $ per Line		$1,746
	Average of Total Invstmnt $/Ln		$1,912
	Average of Monthly Cost1		$ 46.13
200 to 650	Sum of # Households		266,499
	Sum of # Lines		487,515
	Average of Loop Length		15,386
	Average of Loop $ per Line		$804
	Average of Total Invstmnt $/Ln		$922
	Average of Monthly Cost1		$ 26.69
650 to 850	Sum of # Households		101,986
	Sum of # Lines		181,135
	Average of Loop Length		13,065
	Average of Loop $ per Line		$810
	Average of Total Invstmnt $/Ln		$919
	Average of Monthly Cost1		$ 26.59
850 to 2550	Sum of # Households		681,340
	Sum of # Lines		1,181,569
	Average of Loop Length		11,275
	Average of Loop $ per Line		$700
	Average of Total Invstmnt $/Ln		$807
	Average of Monthly Cost1		$ 24.37
Greater 2550	Sum of # Households		397,991
	Sum of # Lines		782,457
	Average of Loop Length		7,629
	Average of Loop $ per Line		$574
	Average of Total Invstmnt $/Ln		$676
	Average of Monthly Cost1		$ 21.73

Appendix 5B | WEIGHTED COST FACTOR TABLES

BCM Weighted Cost Factor Table

CostFactorTable					
				Surface	Weighted
Row #	Plant Type	Urban/RuraL	Density	Category	Cost Factor
1	Distribution	Urban	>2550	RockH	1.4208
2				RockS	1.088
3				Normal	1.0176
4	Distribution	Urban	850-2550	RockH	1.194
5				RockS	0.924
6				Normal	0.858
7	Distribution	Rural	650-850	RockH	0.709
8				RockS	0.4165
9				Normal	0.2905
10	Distribution	Rural	200-650	RockH	0.702
11				RockS	0.407
12				Normal	0.279
13	Distribution	Rural	5-200	RockH	0.688
14				RockS	0.388
15				Normal	0.256
16	Distribution	Rural	0-5	RockH	0.674
17				RockS	0.369
18				Normal	0.233
19	Feeder	Urban	>2550	RockH	1.9584
20				RockS	1.5616
21				Normal	1.4208
22	Feeder	Urban	850-2550	RockH	1.446
23				RockS	1.146
24				Normal	1.047
25	Feeder	Rural	650-850	RockH	0.688
26				RockS	0.388
27				Normal	0.256
28	Feeder	Rural	200-650	RockH	0.702
29				RockS	0.407
30				Normal	0.279
31	Feeder	Rural	5-200	RockH	0.709
32				RockS	0.4165
33				Normal	0.2905
34	Feeder	Rural	0-5	RockH	0.716
35				RockS	0.426
36				Normal	0.302
37	Fiber	Urban	>2550	RockH	11.5456
38				RockS	9.2416
39				Normal	8.3968
40	Fiber	Urban	850-2550	RockH	8.468
41				RockS	6.748
42				Normal	6.154
43	Fiber	Rural	650-850	RockH	3.25
44				RockS	1.74
45				Normal	1.276
46	Fiber	Rural	200-650	RockH	3.375
47				RockS	1.885
48				Normal	1.404
49	Fiber	Rural	5-200	RockH	3.4375
50				RockS	1.9575
51				Normal	1.468
52	Fiber	Rural	0-5	RockH	3.5
53				RockS	2.03
54				Normal	1.532

BCM2 Weighted Cost Factor Table

CostFactor Table

Row #	Plant Type	Urban/RuraL	Density	Surface Category	Weighted Cost Factor	Below Ground Density Adjustment	Aerial Density Adjustment
1	Distribution	Urban	>2550	RockH	23.59262	1.18	1.03
2				RockS	17.56779	1.30	1.21
3				Normal	13.31148	1.30	1.04
4	Distribution	Urban	850-2550	RockH	16.58868	0.83	0.97
5				RockS	10.07238	0.72	0.97
6				Normal	7.62624	0.72	0.96
7	Distribution	Rural	650-850	RockH	13.13253	1.07	1.22
8				RockS	7.76892	1.36	1.30
9				Normal	6.07944	2.10	1.46
10	Distribution	Rural	200-650	RockH	12.43557	1.04	1.05
11				RockS	6.43722	1.13	1.07
12				Normal	3.48428	1.01	1.16
13	Distribution	Rural	5-200	RockH	11.922	0.96	0.92
14				RockS	4.95988	0.85	0.89
15				Normal	2.45968	0.77	0.81
16	Distribution	Rural	0-5	RockH	11.95461	0.92	0.87
17				RockS	4.83508	0.84	0.82
18				Normal	1.77132	0.57	0.67
19	Feeder	Urban	>2550	RockH	23.59262	1.18	1.03
20				RockS	17.56779	1.30	1.21
21				Normal	13.31148	1.30	1.04
22	Feeder	Urban	850-2550	RockH	16.58868	0.83	0.97
23				RockS	10.07238	0.72	0.97
24				Normal	7.62624	0.72	0.96
25	Feeder	Rural	650-850	RockH	13.367325	1.07	1.22
26				RockS	7.7797	1.36	1.30
27				Normal	6.0882	2.10	1.46
28	Feeder	Rural	200-650	RockH	12.718575	1.04	1.05
29				RockS	6.44915	1.13	1.07
30				Normal	3.3951	1.01	1.16
31	Feeder	Rural	5-200	RockH	11.47224	0.96	0.92
32				RockS	4.985432	0.85	0.89
33				Normal	2.544192	0.77	0.81
34	Feeder	Rural	0-5	RockH	10.85823	0.92	0.87
35				RockS	4.82844	0.84	0.82
36				Normal	1.98516	0.57	0.67
37	Fiber	Urban	>2550	RockH	23.59262	1.18	1.03
38				RockS	17.44071	1.30	1.09
39				Normal	13.31148	1.30	1.04
40	Fiber	Urban	850-2550	RockH	16.58868	0.83	0.97
41				RockS	10.07238	0.72	0.97
42				Normal	7.62624	0.72	0.96
43	Fiber	Rural	650-850	RockH	13.13253	1.07	1.22
44				RockS	7.76892	1.36	1.30
45				Normal	6.07944	2.10	1.46
46	Fiber	Rural	200-650	RockH	12.43557	1.04	1.05
47				RockS	6.43722	1.13	1.07
48				Normal	3.48428	1.01	1.16
49	Fiber	Rural	5-200	RockH	12.2031	0.96	0.92
50				RockS	4.94391	0.85	0.89
51				Normal	2.40686	0.77	0.81
52	Fiber	Rural	0-5	RockH	12.228705	0.92	0.87
53				RockS	4.83674	0.84	0.82
54				Normal	1.71786	0.57	0.67

Table 5.3

Structure Cost Multipliers ("Weighted Cost Factors") in BCM2 have increased an Average of 917% from the BCM

BCM	BCM2	Percentage Increase
Weighted Cost Factor	Weighted Cost Factor	
1.4208	23.59262	1561%
1.088	17.56779	1515%
1.0176	13.31148	1208%
1.194	16.58868	1289%
0.924	10.07238	990%
0.858	7.62624	789%
0.709	13.13253	1752%
0.4165	7.76892	1765%
0.2905	6.07944	1993%
0.702	12.43557	1671%
0.407	6.43722	1482%
0.279	3.48428	1149%
0.688	11.922	1633%
0.388	4.95888	1178%
0.256	2.45888	861%
0.674	11.95461	1674%
0.369	4.83508	1210%
0.233	1.77132	660%
1.9584	23.59262	1105%
1.5616	17.56779	1025%
1.4208	13.31148	837%
1.446	16.58868	1047%
1.146	10.07238	779%
1.047	7.62624	628%
0.688	13.36733	1843%
0.388	7.7797	1905%
0.256	6.0892	2278%
0.702	12.71858	1712%
0.407	6.44815	1485%
0.279	3.3851	1117%
0.709	11.47224	1518%
0.4165	4.985432	1097%
0.2905	2.544192	776%
0.716	10.85823	1417%
0.426	4.82844	1033%
0.302	1.98516	557%
11.5456	23.59262	104%
9.2416	17.44071	89%
8.3968	13.31148	59%
8.468	16.58868	96%
6.748	10.07238	49%
6.154	7.62624	24%
3.25	13.13253	304%
1.74	7.76892	346%
1.276	6.07944	376%
3.375	12.43557	268%
1.885	6.43722	241%
1.404	3.48428	148%
3.4375	12.2031	255%
1.9575	4.94391	153%
1.468	2.40886	64%
3.5	12.22871	249%
2.03	4.83674	138%
1.532	1.71786	12%
	Average % Increase:	917%

6 | ECONOMIES OF SCALE AND SCOPE

6.1 Any model that is used to determine universal service costs must correct for the overstatement of such costs incurred due to the accommodation of services other than primary residential access lines

In our April report, we concluded that the aggregate cost of providing outside plant was materially increased by virtue of the ILECs' decisions to accommodate the demand for additional residential access lines and other services that go well beyond any universal service obligation which is properly associated with the non-growing, non-variable primary residential access line demand.[123] Although the original BCM did not explicitly include additional residential lines and only incorporated business lines in the allocation of non-traffic-sensitive switch costs, the BCM implicitly reflected these lines by virtue of the low fill factors assumed (and thus the substantial excess capacity deployed by the BCM).[124] Therefore, we corrected the original BCM to incorporate the higher fill factors appropriately associated with the stable demand of primary residential access lines and to eliminate the excess capacity.

As discussed in Chapter 5 above and with respect to Washington State, the BCM2 explicitly reflects approximately 1.2-million lines in addition to the approximate 1.8-million primary residential lines. The fill factors for the modelled network are summarized in Table 5.5, in Section 5.3, above. The recommendation we discussed at length in our April report, however, is still germane: the economies of scale and scope inherent in the ILECs' network should be flowed back to primary residential basic exchange service before any assessment of universal service funding is made.

---

123. See Chapter 6 of ETI's April 1996 Report, particularly Section 6.2 (pp. 101-107).

124. As we explained in our April report, the extremely low penetration rates associated with additional residential access lines account for a disproportionate amount of the excess capacity in the local distribution plant. In calculating the costs of primary residential access lines, it is essential that such excess capacity be associated with the cost causer, additional access lines in this case.

In our earlier report, we described the underlying theory and general methodology associated with ensuring that an appropriate portion of the savings resulting from the economy of scale and scope inherent in an ILEC's network should be flowed back to primary line residential service.[125] In this chapter, we take this discussion further by applying the theory to the BCM2 through an illustrative example. Thus, the combination of the discussions in our April report and in this report demonstrate why and how such savings should be incorporated into universal service funding deliberations.

Method for quantifying the savings

We conducted two additional runs of the BCM2 to model the two following scenarios:[126]

- Network A A stand-alone network sized to support only first residential access line demand. In this case, we set the residence lines per household multiplier equal to 1.00 (rather than the default value of 1.21) and eliminated business lines entirely from the input data. For this run, we assumed the BCM2's default fill factors.

- Network B A stand-alone network designed to support all services *other than the initial residential access line*. For this network, we set the residence lines per household multiplier equal to 0.21 and left the business lines at the BCM2's default values. For this run, we assumed the BCM2's default fill factors.

Once these two individually engineered networks are developed, the resulting total investment figures are then summed to compute the combined cost (this result is shown in Column "C" of Table 6.1, on the following page). This combined cost can then be compared to a network constructed to serve all of the services encompassed by Networks A and B, that is, the network represented by the BCM2 default (Network D). The difference between the cost of Network D and the combined cost of Networks A and B represents the savings, i.e., the amount that should be flowed back, at least in part, to primary line residential customers (in other words, the customers of Network A).

125. As explained in our April report, if, by contrast, the entire stand-alone cost of serving primary line households is assigned to universal service, then all of the benefits associated with the economies of scale and and scope that result from the ubiquitous deployment of plant would flow to services *other than the first residential access line*. See April report at 103 through 107.

126. The results of these runs, and the result of the BCM2 default run are in Appendix 6B.

Table 6.1

Calculation of Total Savings from Economies of Scale*

(Network A) Single line Residential	(Network B) Add'l Residence Lines and Business	(C) Sum of Networks A & B	(Network D) Default: Combined Network	(E) Total Savings (C)-(Network D)
$2,953,941,637	$2,563,892,069	$5,517,833,706	$3,501,878,128	$2,015,955,578

* Non-plant-related expenses (i.e., Other Annual Cost) are excluded because they are identical for all three networks.

Table 6.1 shows that there is an approximate $2-billion savings in investment associated with the fact that one combined network serves all demand rather than deploying two separate standalone networks.[127] As we have explained, a substantial portion of this benefit of scope should properly inure to universal service. By way of illustration, if all of the benefits of the economy of scale and scope flowed through to households, the savings translate into a savings in investment per household of $1,075.[128] The weighted average investment cost factor is 0.237828,[129] and thus the final monthly cost per household should be reduced by $21.30.[130] The result of the run of Network A (the stand-alone network) shows that the cost per line is $39.42. Subtracting $21.30 from this amount yields a corrected figure of $18.12.[131]

Before universal service funding requirements are computed, however, additional steps must be taken in the model to reflect this corrected number. Because the computation of the value of the economies of scale and scope was done "outside of" the model, a user must

127. Except where otherwise noted, the figures discussed in this chapter reflect the use of the BCM2's default values for all other algorithms and input values.

128. $2,015,955,578/1,875,508.

129. The default cost per line is $29.41 of which $8.34 is associated with non-plant-related expenses. We derived the figure of 0.237828 as follows: ($21.07 * 12)/1063.12.

130. Were one to flow back the savings to all lines, the per-line savings would be calculated as follows: $2,015,955,578/3,293,923 = $612.02. ($612.02 * .237828)/12 yields a reduction of $12.13 per line.

131. The precise number would depend upon the portion of the savings that regulators choose to flow back to universal service.

then "hardwire" the corrected number into the BCM2 before universal service funding requirements are computed by the model. One straightforward way, from an operational perspective, would be to simply raise the relevant price thresholds by the $21.30 savings, which achieves the same result far more simply than if one were to go to each of the results for the 200,000 CBGs nationally and subtract 21.30 from each. For example, if the user were interested in computing USF requirements for the price thresholds of $30, $40, and $50 and also wanted to reflect the per-line savings associated with the economies of scale, one would change the price threshold to $51.30, $61.30, and $71.30 and then run the BCM.

Revising the analysis to reflect corrected fill factors

In our analysis of this issue, we assumed the default fill factors for Network A, Network B, and Network D. In the following discussion we describe the results of the analysis of the following corrections to the fill factors.[132]

Network A: We used the 95% objective fill factors for feeder in all six density zones and the 95% objective fill factor for distribution in all but Zone 1 and Zone 2. In these two zones we used the BCM2 default factors, i.e., 40% and 45%, respectively.[133] These corrections reflect the fact that primary line residential service is a stable service and thus the fill factors should be significantly greater than those assumed by the BCM2 Sponsors, but also reflects the fact that lower fill factors may be appropriate in the most rural zones.

Network B: Based upon the default fill factors used in Network D, and the corrected fill factors assumed for Network A, we derived the implied fill factors for Network B.[134] These fill factors are low because this standalone network reflects the volatile demand of business lines and additional residential lines.

Network D: We simply used the default fill factors.

132. See the results of the runs in Appendix 6B.

133. See Appendix 6B.

134. See Appendix 6A for the derivation of the fill factors used in this run of Network B.

The stand-alone cost of Network A, under this scenario is $39.12 per month, and the total potential savings flowing to households from the economies of scale and scope is $21.06 per month, yielding a number (corrected *solely* for this issue) of $18.06.[135]

This section describes how regulators can quantify and account for the economy of scale and scope that should be flowed back to primary residential lines. However, before these runs of the two stand-alone networks are conducted, we recommend that the regulator make all other appropriate corrections to the BCM2 (e.g., revising the structure cost, correcting the cost factor, etc.). The purpose of this section is to demonstrate how to apply the relevant economic theory, but not to develop the final, corrected number, because that number depends critically upon the other revisions and corrections discussed in the preceding three chapters, several of which cannot be readily incorporated into the BCM2 because of the "locked" nature of the BCM2 (see Chapter 2, above).

6.2 The algorithm for assessing whether a given area requires high cost support should recognize the economies of scale and scope associated with telecommunications networks

The potential extent of high-cost support should be determined at the *wire center* level, whereas most of the incumbent local exchange carriers (ILECs) argue that support requirements should be measured at a far more granular level, the Census Block Group (CBG). As is discussed in detail in Chapter 2, above, the BCM2 Sponsors have, in fact, locked the BCMs so that the basic BCM2 supports an analysis only at the CBG level. The quantitative analyses in this section are drawn from our previous analysis of the original BCM. Most likely, the order of magnitude of the impact of this issue is analogous in the BCM2. The following are the major reasons that the wire center, and not the CBG, should be adopted as the costing unit:[136]

- The *wire center*, rather than the CBG, reflects the current architecture of the public switched network. Wire center locations and their associated feeder and distribution networks have been optimized to cover most efficiently the entire area that each serves. Under the so-called "scorched node" philosophy of the Benchmark Cost Model (BCM) and other cost proxy efforts (including Pacific

135. $1,993,248,404/1,875,508 = $88.56. ($88.56 * .237828)/12 yields a reduction of $21.06 per household. Although the analysis in this section demonstrates that the impact of changing the objective fill factors is de minimis using the default values of the BCM2, if other corrections to the BCM2 were made, this analysis could be more sensitive to changes in assumptions regarding fill factors.

136. See also Letter from Lee L. Selwyn to the Federal-State Joint Board on Universal Service, dated June 19, 1996, also filed with William F. Caton, Acting Secretary, FCC, June 19, 1996 ("June 19, 1996 Letter").

Bell's "Cost Proxy Model" (CPM)), the prevailing network architecture is maintained, even if a more efficient design would be adopted were the network to be constructed from scratch (a so-called "green field" or "scorched earth" approach) using state-of-the-art switching and transmission technologies. Under a "scorched earth" approach, wire center locations are not retained, and new (and probably far fewer) locations would be determined based upon optimal designs using currently available technology. Hence, it would be inconsistent to rely upon a "scorched node" model such as the BCM while requiring that costs be measured at a level that exaggerates the very inefficiencies that are necessarily retained under the "scorched node" approach.

- The Census Block Group is a construct of the US Census Bureau and has nothing whatever to do with the manner in which a telecommunications network would be designed, either in the past or in the future. Consequently, there is no basis whatsoever to expect that, on a forward-looking basis, any (i.e., scorched node or scorched earth) network would be constructed around the geographic properties of a CBG.

- The public switched network is, however, structured around the *wire center* as the basic network unit. Within the area served by a wire center, there are extensive scale and scope economies arising from the ability of subscribers in all parts of the wire center serving area to share certain resources in common. Assessment of costs at a level below the wire center (e.g., at the CBG) necessarily requires an arbitrary assignment of such shared switching and distribution network costs as among the various CBGs and, in particular, as between those located close to the wire center itself vs. those located more remotely.

Because networks are not structured around the geography delimited by CBGs and because there exists an extensive level of resource sharing among the individual CBGs within a single wire center serving area, there is simply no economically valid basis to accurately measure or assign costs at the CBG level, and for this reason the CBG approach must be rejected.

Basing cost proxies and cost support determinations at the wire center level does not preclude one from utilizing *data* that is disaggregated at the CBG level in calculating wire center-level proxy costs, which is what the BCM does. Wire center costs can be determined by simply aggregating the per-CBG costs that are derived by the BCM for all of the CBGs within each wire center. In our May report, we demonstrated that the original BCM could be readily used to develop wire center level cost proxy estimates. Hence, the question for the Joint Board should not be constrained by the ability of proxy models to reflect this level of analysis, the question should simply be one of determining which approach better achieves an economically efficient and competitively fair result. As is

discussed in Chapter 2, however, one of the major deficiencies of the BCM2 is that the Sponsors have thwarted interested parties' ability to continue to conduct the type of analysis discussed in this section.

US West's claims of a USF support "bonanza"

During the June 5 panel discussion before the Federal-State Joint Board on Universal Service (Joint Board), US West sought to portray wire center aggregation as providing a "bonanza" for low-cost CBGs and the local telecommunications providers that serve these areas. US West did so by describing the La Junta, Colorado wire center, claiming that, for La Junta, assessing the need for high cost support at the wire center level would result in "unnecessary" funding to low cost CBGs. In making this assertion, US West implied that a CBG-based assessment of the high cost support requirement is somehow more "accurate" than a wire center-based assessment because it would examine the universal service funding requirement on a more granular level. Carrying this line of reasoning to its logical extension — i.e., that more granular is more "accurate" — would lead to the conclusion that the requirement for high cost support for residential local exchange service should be computed separately for each and every household. This would be as inappropriate as would be the opposite end of the spectrum, that is, comparing the cost of residential local exchange service that is averaged over the entire country with the desired price threshold for support.[137]

In discussing US West's La Junta example, we noted that it was entirely idiosyncratic in that precisely the opposite conclusion would be drawn if even a small change in the hypothetical data were made. US West offered no evidence that his example was in any sense representative or typical, and there is no reason to believe it is. In fact, using the original BCM, ETI has performed this analysis not for one isolated exchange, but for an entire state — Washington. In that analysis, we found that calculating proxy costs at the wire center level results in a lower support requirement overall, at each of the three price support thresholds. Table 6.2 below presents the results of extrapolating our Washington State analysis to the national level — the more economically appropriate wire center based approach produces a nationwide high cost funding requirement that is $500-million lower at the $20 support level than when CBG-based proxy costs are used.

Clearly, the "bonanza" suggested by US West arises not when costs are assessed at the wire center level, but when this is done at the CBG level, and flows not to the "new" telecommunications providers (who the ILECs believe will serve only low-cost areas) but to the ILECs themselves, who will be net recipients of CBG-based high-cost funding.

137. The national average cost is less than $13.00 (based upon the BCM using ETI's partial corrections), i.e., a level far below any of the three price thresholds reflected in the BCM.