

1 **Costs of Unbundled Loop Service**

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3 **Q. Have you prepared a cost study that is more appropriately focused on the**
4 **relevant marginal or incremental costs of unbundled loop service?**

5 A. Yes. In preparing this study, I used the same economic costing model that I relied upon
6 in the Universal Service docket; however, I used a lower equity ratio in developing the
7 annual cost factors used in that proceeding. The methodology, assumptions, and
8 procedures of my costing model are explained in detail in Appendix C.

9 I used this model to directly answer one of the questions of primary concern to
10 the Commission in this proceeding: *What is the incremental cost of providing*
11 *unbundled elements of Bell's loop network to wholesale customers?* A very large
12 number of retail customers will undoubtedly remain on the network, even if other
13 carriers are successful in gaining market share, and choose to resell Bell's unbundled
14 loops and other network components, rather than installing their own facilities. Thus, the
15 focus of this proceeding should not be on the cost of Bell's loop network in the
16 aggregate. Rather, the focus should be on the additional cost Bell will incur (or it could
17 save) if it provides (or it doesn't provide) unbundled network components to wholesale
18 customers.

19 I analyzed more than 375 specific wire centers, using data provided by the
20 Company in the Universal Service proceeding concerning the number of loops, and
21 average loop length within each wire center. I have developed a weighted average of
22 the costs per loop for each density category used by Bell Atlantic-PA in presenting its
23 cost estimates. I used the total number of loops in each wire center for weighting
24 purposes.

25 To provide an approximate indication of the extent to which costs tend to vary
26 due to heterogeneous conditions within the geographic area served by individual wire

1 centers, our model provides for two zones. Zone 1 is representative of the highest
2 density portions of the overall geographic area, which are assumed to be in the
3 immediate vicinity of the central office or switch. Zone 2 lies beyond this vicinity,
4 covering a much larger area, with greater loop lengths and a lower concentration of
5 customers. Admittedly, this approach simplifies the actual conditions in each wire
6 center, where customers may be scattered and distributed in something of a random
7 pattern. Also, due to rounding and other complications, the cost estimates for individual
8 zones within individual wire centers are not as reliable as the overall estimates.
9 Nevertheless, our model does provide some useful insights concerning into the degree
10 to which costs can be expected to vary even within the same wire center serving area,
11 due to the fact that customers are not uniformly dispersed. Customers who are
12 clustered close together (e.g., in a large apartment complex) tend to be less costly to
13 serve than customers who are widely scattered in remote areas far from the wire
14 center.

15 Although the overall results are the most reliable, results for specific zones may
16 be worth some consideration, since they provides a more complete picture of the
17 diversity of cost conditions that exist in the state. The overall estimates can actually be
18 viewed as composites--homogenized blends of inherently heterogeneous costs that vary
19 with geographic, demographic, and other conditions. For many purposes, such
20 homogenized overall cost figures for each wire center are entirely adequate. However,
21 it is important to remember that the heterogeneous cost differences are real and can be
22 very important.

23 For example, if a model exclusively focuses on the composite cost data for wire
24 centers as a whole, it may ignore the data that indicate whether "cream skimming" will
25 occur when new carriers consider installing their own facilities, rather than renting
26 unbundled loops from the incumbent LEC. By looking at differences between the zone

1 1 and zone 2 cost patterns, our model predicts that in some wire centers new entrants
2 may be forced to pursue a "creamskimming" approach to their facilities construction
3 and limit the geographic scope of their network to high density areas close to their
4 switch. In turn, this suggests that unbundled loop service will be particularly important to
5 the development of competition outside the high density areas. In other words, carriers
6 may be able to build their own facilities, or purchase wholesale service from another
7 facilities-based carrier in the highest density areas, closest to the urban centers.
8 However, in lower density, more remote locations, carriers may be forced to purchase
9 unbundled loop service, if they are to provide service at all. Accordingly, it is useful to
10 gain some appreciation for the differences in cost patterns between high and low density
11 zones.

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13 **Q. Can you please explain Schedule 1?**

14 A. Yes. Schedule 1 displays an estimate of how long run costs of a telephone loop
15 networks in Pennsylvania tend to vary within an average wire center, as the size of the
16 network expands within a range from 90% of the current level to 130% of its current
17 level. This schedule demonstrates that in the long run, total costs increase as the
18 network expands, but the rate of increase is less than proportional to the change in size.
19 As a result, average total costs per loop tend to decline as the network expands, as
20 summarized below:

		Zones 1&2		Zone 1	Zone 2
			Avg	Avg	Avg
	Total Cost		Cost	Cost	Cost
5	90%	110,392	9.52	5.97	11.27
6	95%	116,105	9.48	5.81	11.29
7	100%	122,073	9.47	5.80	11.28
8	105%	122,921	9.08	5.57	10.81
9	110%	127,283	8.98	5.36	10.76
10	115%	131,822	8.89	5.42	10.61
11	120%	133,973	8.66	5.24	10.35
12	125%	134,811	8.37	5.07	9.99
13	130%	142,892	8.53	5.71	9.92

As the number of loops increases, the average cost per loop declines from \$9.52 per month to just \$8.53 per month. The pattern of declining costs occurs within both the higher density zone 1 (close to the wire center) and the lower density zone 2 (farther from the wire center), but it is less pronounced in the former area, where the economies of scale come closer to being exhausted.

The rate of decline is not strictly linear, due to lumpiness of the investment needed to serve the network as it expands in the long run. However, the trend is clearly downward. Thus, as the network the firm will tend to experience a downward trend in its average cost per loop.

This pattern of declining costs is significant, because it demonstrates that the Company is operating in a declining cost industry, and thus the incremental cost of unbundled loops provided to wholesale customers will tend to be less than the firm's average cost per loop. In turn, this suggests that an opportunity exists for the Company to sell unbundled loop service at rates which exceed its marginal or incremental cost,

1 and which are well below its retail prices. Furthermore, the presence of these
2 economies of scale suggest that the Company will benefit from the sale of unbundled
3 loop service to competing carriers, even if the wholesale rate is less than its average
4 cost--provided that the rate exceeds the relevant incremental cost.

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6 **Q. Would you please explain Schedule 2?**

7 A. Yes. This schedule contains estimates of the Total Service Long Run Incremental Cost
8 of providing unbundled copper loops in the Company's Pennsylvania service territory.
9 These estimates exclude the cost of connecting the loops to the wholesale customer's
10 co-located equipment, and they exclude the cost of the drop and other connecting
11 facilities located at the end user's location. Since the cost of these items (located at
12 each end of the loop) do not necessarily vary by wire center, they can most
13 appropriately be presented separately. In other words, Schedule 2 reflects the cost of a
14 pair of copper wires between the wire center and the street adjacent to the end user. It
15 does not include the cost of connecting this loop to the end user, or to the purchasing
16 carrier's facilities. These connection costs may vary, depending upon the specific
17 circumstances that apply in each instance.

18 In preparing these estimates, I have focused on the cost of providing (or the
19 costs saved by not providing) unbundled loops to wholesale customers, assuming these
20 loops are added (or not added) to a ubiquitous network that serves a very large
21 fraction of the current retail customers in any event. For purposes of this schedule, I
22 have assumed this increment is equal to 20% of the existing number of active loops in
23 each wire center. While a different percentage could be used, and the cost estimates for
24 specific wire centers could vary, due to the effects of lumpiness, the overall weighted
25 averages would not differ substantially.

1 Defining the incremental service in this manner, I focused on the relevant
2 statewide incremental costs associated with the key purchasing decision of new
3 entrants. Should they acquire the Company's unbundled loops, or not? If they don't
4 purchase this service, they will be forced to install their own loop plant, or purchase
5 wholesale service from another carrier. Accordingly, it is appropriate to focus on the
6 additional costs that are imposed on Bell Atlantic-PA when carriers purchase
7 unbundled wholesale service, instead of using some other alternative to serve their
8 customers.

9
10 **Q. Would you please summarize your cost estimates?**

11 A. Yes. The first line of the following table summarizes the cost estimates from Schedule 2,
12 averaging the copper loop costs within each of the four density categories selected by
13 Bell. These are weighted averages, where the cost in each wire center is weighted by
14 the total number of active bops in that location. In addition to these costs, some
15 additional costs would be incurred, to connect the loop to the purchasing carrier's co-
16 located equipment, to bill the service, and perhaps to perform some additional
17 maintenance and testing beyond the level reflected in the first line. Although I have not
18 performed a detailed study of these costs, I have provided an allowance for these
19 items, as reflected in the second line of the following table. Because I relied in part on
20 data contained in documents provided by the Company which were marked
21 "proprietary" these results are being treated as if they were proprietary. *****B**egin
22 **Proprietary*****

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This table does not include the costs of connecting the end user to the loop, which depend on the number of lines going to the customer's premises, and other variables. These include the cost of the drop wire, building cable, network interface, and other facilities that are typically used to connect end users to the Company's distribution system. Most purchasers of unbundled loops will also want the use of these facilities, in which case an additional fee would apply. In some instances, a competing LEC may want to rent these connecting facilities for use with its own distribution (loop) facilities. In other instances, it may want to install its own connecting facilities, to use in conjunction with unbundled loops acquired from the incumbent LEC. In any event, these costs do not vary with the characteristics of the wire center as much as they do with the characteristics of the customer. Hence, it is appropriate to analyze these costs separately, and to provide a separate rate for this service. I estimate that these connecting costs will vary over a fairly wide range, approximately \$1 to \$4 per loop, per month.

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Q. Would you please summarize your cost estimates for zones 1 and 2?
A. Yes. The weighted average results for zone 1 (closer to the wire center) and zone 2 (farther from the wire center) are summarized below. *Begin Proprietary*****

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