## *3. Overview of Model Methodology*

**Q. What do you consider to be the most important assumptions used by the various models?**

A. All the models employ numerous user-defined assumptions or inputs. Some are fairly straightforward, others are more complex or subtle. Most models come pre-loaded with default values for the user-defined assumptions, thereby simplifying the process of operating the model. However, the user can modify these inputs to improve the accuracy of the cost estimates, to better match the type of study being developed, or to more appropriately fit the context in which the estimates are being developed.

Some of the most significant assumptions include the extent to which fiber cable is used (instead of copper), the utilization or fill factors associated with cable and other plant investment, the economic lives or depreciation rates, and the cost of capital.

**Q. Let's turn to the fill factors employed by each model. Can you please explain this input?**

A. Certainly. Fill factors are simply the ratio of the number of items in question which are in use to the total number of items which are present in the network. The reciprocal of the fill factor indicates the amount of spare capacity present in the network, or the percentage of total capacity which is in excess of the actual amount in use. Where fill factors are relatively low, a substantial level of spare capacity is present, relative to the actual volume of working plant required to provide service. In turn, a low fill factor can inflate the resulting cost estimates per unit (e.g., cost per loop). In a long-run study, fill factors should logically be higher than is typically achieved in actual practice, reflecting the fact that the long run is a planning horizon in which the size of the system can be optimally matched to the volume of output.

**Q. Next, could you briefly discuss the importance of the assumed depreciation rates?**

A. Yes. The time period over which capital assets are used has a significant impact on the resulting monthly costs. To use a simplified example, if a $50,000 switch is presumed to fully depreciate in 5 years, its annual cost (assuming a straight-line depreciation method and carrying charges at 10%) would be $13,190. In contrast, if this same asset is assumed instead to depreciate over 15 years, the annual cost would be just $ 6,514.

**Q. Finally, would you briefly discuss the importance of the assumed cost of capital?**

A. Yes. The cost of capital, the rate at which the firm is able to raise funds for capital investment, consists of two components--cost of equity and cost of debt. Although there are numerous considerations involved in the choice of a debt/equity ratio, it is clear that within limits, a lower cost of capital can be achieved by maximizing the use of the lower debt component and minimizing the higher cost equity component. Thus if the cost of equity is 12% and the cost of debt is 8%, it makes economic sense, all other things being equal, to maintain a relatively high debt level and a relatively low equity level.

**Q. If each model used the same inputs, would the resulting costs generated by each tend to be similar?**

A. Yes. It is my impression that the wide differences one observes in cost estimates from different models tend to primarily result from differences in the input values or assumptions used in running the models, rather than differences within the models themselves. There have been several studies performed using publicly available models that tend to support this conclusion. For instance, the Utah Division of Public Utilities recently attempted to put the predecessor to the BCPM (BCM2), Pacific Bell's Cost Proxy Model (CPM) and the Hatfield Model on a comparable basis. A Comparative Analysis of Loop Cost Proxy Models, Preliminary Draft No. 2, October 18, 1996. Despite acknowledged difficulties in making the user-defined

assumptions consistent across the models, the Division found that once the inputs were set at relatively similar values, the resulting loop costs from the BCM2, CPM and Hatfield Model were $16.80, $15.70 and $13.77, respectively. Id., at 3. This represents a range of only $3.03, despite the fact that the three models are all quite different. The Division concluded that "the models may be reconstructing the local network in a cost-comparable manner even though they employ different methodologies. Furthermore, it may suggest that what distinguishes one model from the others, in practice, are the values of the user-defined assumptions employed rather than inherent differences in the hardwired network architecture" reflected in the model's algorithms. Id. at 5.

Others have also concluded that input assumptions are the primary difference between various telecommunications cost proxy models. For example, on January 9, 1997, Christensen Associates, on behalf of the United States Telephone Association, issued a report comparing cost estimates generated by the Hatfield and BCM2 models. *Economic Evaluation of Proxy Cost Models for Determining Universal Service Support*, Christensen Associates, January 9, 1997. The authors report running the two models for five states--Arkansas, California, Texas, Utah and Washington. They concluded that "most of the disparity, if not all" is accounted for by differences in input assumptions. Id., at 3. Specifically, Christensen Associates concluded that for the five states, between 83% and 109% of the discrepancies could be eliminated by removal of the differences in just three primary input assumptions. Id., at 4.