Long Run Economic Cost Concept

Q. Has the FCC drawn any conclusions concerning the appropriate costing method to use in pricing unbundled network elements?

A. Yes. In its *Implementation Order*, the FCC developed its own variation on long run incremental costing. The FCC coined the term TELRIC (*total element* long run incremental cost) to describe the method of economic cost calculation it believes is most appropriate.

> 672. *Overview.* Having concluded in Section II.D., above, that we have the requisite legal authority and that we should establish national pricing rules, we conclude here that prices for interconnection and unbundled elements pursuant to sections 251(c)(2), 251(c)(3), and 252(d)(1), should be set at forward-looking long-run economic cost. In practice, this will mean that prices are based on the TSLRIC of the network element, which we will call Total Element Long Run Incremental Cost (TELRIC), and will include a reasonable allocation of forward-looking joint and common costs. The 1996 Act encourages competition by removing barriers to entry and providing an opportunity for potential new entrants to purchase unbundled incumbent LEC network elements to compete efficiently to provide local exchange services. We believe that the prices that potential entrants pay for these elements should reflect forward-looking economic costs in order to encourage efficient levels of investment and entry.

By coining its own term, TELRIC, the FCC has highlighted certain distinctions between its approach to costing network elements and the more generic LRIC and TSLRIC concepts that have previously been applied to telecom services. LRIC (long run incremental cost) is the additional cost incurred in producing the amount of product or service (the increment) in the long run. TSLRIC (total service long run incremental cost) is such a cost where the total quantity of the product or service is the increment. Thus, the TSLRIC of any service is the difference between the total cost of producing all the network's services, *including* the item in question, minus the total cost of producing all the network's services *excluding* the item in

question. Since many joint and common costs will not be avoided when a single service is deleted from the firm's total offerings, TSLRIC amounts tend to be lower than the corresponding average cost estimates.

TELRIC applies the same principles to UNEs rather than services. However, in its Order, the FCC required that an allocated share of the relevant shared or common costs be included in (or added to) TELRIC, even if they do not vary with the presence or absence of the element in question. Since the FCC's requirements in this regard are not consistent with the standard definition of TSLRIC in its pure form, by coining a distinct term (TELRIC), the FCC has avoided some potential confusion in this regard. When the TSLRIC concept is applied to elements (rather than services), the magnitude of the joint and common cost problem tends to be reduced, for reasons I will explain below. Furthermore, LRIC estimates typically do not include shared or common costs, which are instead recovered as a markup or contribution above the pure LRIC cost. Here again, by coining a separate term, the FCC has avoided confusion concerning this issue.

TELRIC, LRIC and TSLRIC are identical in one respect: they are all long-run economic cost concepts. The long run is a theoretical planning horizon in which all, or nearly all, inputs are variable, including the scale and type of plant used by the firm.

Q. Do you think it is reasonable to price unbundled network elements on the basis of long run economic costs?

A. Yes. The long run is a very useful concept that provides an appropriate foundation for costing and pricing decisions. When properly implemented, it yields cost estimates that have certain well understood and important qualities. While the 1996 Telecom Act does not mandate the use of long run economic cost data, it is reasonable to use this type of cost estimate in pricing unbundled network elements, as recommended by the FCC. Furthermore, section 252(d)(1)

of the Act specifically requires pricing of UNEs based on their cost of provision "determined without reference to a rate-of-return or other rate-based proceeding."

Q. Would you please explain the concept of the long run?

A. When considering long run production decisions, the firm can analyze virtually any size of plant and mix of inputs (e.g., copper vs. fiber) -- an option unavailable in the short run. While it is common practice to describe the long run in terms of time, in the strictest sense it does not correspond directly to any particular amount of time. Rather, the long run corresponds to the degree of flexibility the firm enjoys in sizing its capital investment and production process to best fit its output.

One way of understanding the long run planning horizon is to visualize the situation facing a potential entrant considering whether or not to enter a market. For such a firm, all costs are variable and it can optimize its plant scale and mix to match the volume of output that it intends to produce. In contrast, an incumbent will normally operate in the short run, because it is constrained by fixed and sunk costs and other limiting factors resulting from its prior decisions.

In the long run, a firm is free to select the size and type of investment that best matches its volume of output. With this flexibility, the firm operating in a long run planning horizon may be able to produce output at a lower total cost than is possible for firms operating in a short run planning horizon, like SWBT. The existing firms have fewer options and thus are often burdened with inefficiencies and added costs associated with past investment decisions. While it is convenient to visualize a potential entrant, unencumbered by past decisions, the long run planning horizon is not limited to new entrants. Long run cost concepts can be applied to any firm; the results can sometimes be strikingly different than those that apply to the same firm in a short run planning horizon.

By definition, firms with a long run planning horizon can optimize all inputs. In the classic explanation of how the long run and short run concepts relate to each other, the long run average cost curve is typically described as the envelope of the entire array of all possible short run cost curves. Mathematically, this simply means that the long run reflects a "best case" or lower bound on the potential range of average cost levels.

This follows directly from the added flexibility which is uniquely available to a firm operating in the theoretical long run planning horizon. The firm can pick and choose the exact mix of technology that minimizes total cost. Similarly, it can precisely match the scale of its operations (size of its network) to the volume of sales. This extra flexibility allows a firm to achieve a lower level of average cost in the long run than it would typically incur in the short run.

When properly estimated, long run costs can potentially be much lower than short run costs, due to the benefits of less costly technology and the added flexibility the firm has in optimizing the scale of its plant to precisely match its output. While long run average costs tend to be less than short run average costs in the classic example, the same pattern doesn't necessarily apply to comparisons between long run and embedded costs. Long run costs may be higher than embedded costs if the firm has acquired many of its assets at lower price levels in prior periods.

Q. How does the long run relate to actual firms' practices?

A. This theoretical construct--the long run--should not be confused with the evolutionary process that real-world firms like SWBT engage in as they expand, contract, and respond to changing market conditions and technologies. It is true that in the "real world" firms deploy networks over a period of years; and the incumbent LEC continues to grow and replace its facilities at a pace that minimizes its costs. But this is a description of a dynamic process that is more closely

analogous to a sequence of short run planning horizons, rather than a true long run planning horizon.

In the real world, at any given time, many of the firm's costs will be fixed (and some will be sunk). The presence of these fixed or sunk costs influences the firm's optimization criteria, and causes the firm to make decisions which are different from what would be optimal in the long run. For example, in the short run, a firm that needs to expand its loop capacity in a particular area may respond by installing a subscriber line carrier system which electronically derives 24 channels from just 2 pairs of copper wire. This modification creates a twelve-fold expansion of loop capacity at moderate cost given that the copper cable is already present. In the short run, this option may be cheaper than overbuilding the existing system with additional copper or fiber cable.

However, when our focus shifts to the long run planning horizon, the firm can almost undoubtedly find a cheaper alternative. It might substitute a larger copper cable for the one which is currently in existence, thereby providing a large enough cross-section (sheath size) to handle all of the demand. Or, if a fiber system would be cheaper than a large copper cable, it might select that option. Like a new entrant that is starting from scratch, an existing firm is assumed to have a complete array of options in the long run planning horizon. In the long run it can select the most cost-effective choice, and thus it is assumed to have complete flexibility to minimize its total costs (and thus its average costs). Such complete flexibility includes some options, like fine-tuning of cable sizes, which simply aren't practical in a short run planning horizon.

Q. In telecommunications cost studies, are all costs truly variable?

A. Almost. In a typical long run cost study, the only invariant features are the wire center and the location of the households and businesses. This simplification has become a standard practice in

the industry--known as the "scorched node" approach--because it fits the theory well yet simplifies the modeling process. Also, it makes it easier to relate the cost results back to the real world than in the pure scorched earth approach (where wire center locations would also potentially vary). But aside from keeping the wire center locations fixed, everything else should be allowed to vary, in order to appropriately match the scale and design of the network to the assumed level of demand.

Some are troubled by the theoretical nature of the long run planning horizon, which makes it seem irrelevant to real world problems. However, it is actually a very important concept in economics. Long run cost curves provide us with an understanding of certain tendencies, or limits, within which normal firms operate, as well as a better understanding of the equilibrium conditions towards which markets gravitate. The long run can be particularly useful to regulators, since it provides a benchmark indication of the level of costs that would be incurred if a firm were to select an optimal mix of technologies, and carefully match the scale and scope of its operations to the actual level of market demand.

Despite the somewhat hypothetical nature of long run cost estimates, and despite the fact that the FCC's rules requiring TELRIC estimates are not binding on state regulators, it is worth noting that many states have used the TELRIC concept, or a variant of this concept, in developing UNE rates.