Q. Should unbundled network element prices include a mark-up above direct cost for the recovery of joint and common costs?

A. In my opinion, yes. However, the magnitude of this mark-up will depend on at least three different factors: the magnitude of the joint and common costs relevant to the unbundled element, the manner in which the cost of the element is calculated, and the appropriate interpretation of the 1996 Telecom Act.

Q. Let's consider these three factors individually. How does the magnitude of the joint and common costs affect the Commission's decision concerning the mark-up above direct cost?

A. If the relevant joint and common costs are small, a case can be made for setting prices with a relatively modest mark-up for such costs. If the relevant costs are large, then the argument in favor of a large mark-up is much stronger.

In the context of most telecom services, joint and common (shared) costs loom large. For example, the FCC notes that

> [t]he costs of local loops and their associated line cards in local switches, are common with respect to interstate access service and local exchange service, because once these facilities are installed to provide one service they are able to provide the other at no additional cost.

¶676. Since TSLRIC includes only those costs that increase or decrease with the presence or absence of an individual service, neither the TSLRIC of local service nor the TSLRIC of interstate access will include loop and line card costs. These costs can only be recovered if a mark-up, allocation, or similar procedure is used to increase the price above the direct cost of these services.

Q. Does this mean that joint costs are also a large problem in the context of unbundled element pricing?

A. Not necessarily. The joint and common cost problem can be greatly reduced when the TSLRIC concept is applied to an intermediate level of production. This is certainly the case with unbundled loops, when these are priced as discrete network elements offered to co-carriers. Stated differently, even if joint and common (shared) costs are substantial in the provision of telecom services, this does not necessarily mean that such costs are also substantial in the provision of the unbundled network elements that are used in producing those services.

The FCC reached a similar conclusion when it considered the application of incremental cost principles to unbundled elements, as contrasted with services:

> ... TELRIC-based pricing of discrete network elements or facilities, such as local loops and switching, is likely to be much more economically rational than TSLRIC-based pricing of conventional services, such as interstate access service and local residential or business exchange service.... [S]eparate telecommunications services are typically provided over shared network facilities, the costs of which may be joint or common with respect to some services. ... By contrast, the network elements, as we have defined them, largely correspond to distinct network facilities. Therefore, the amount of joint and common costs that must be allocated among separate offerings is likely to be much smaller using a TELRIC methodology rather than a TSLRIC approach that measures the costs of conventional services.

Implementation Order, ¶678. Stated another way, total *service* incremental cost estimates tend to be greatly depressed because of the dramatic impact of economies of scope. That is, because the same elements (e.g., local loops) are used in the production of various services, the costs of those shared elements (which occasion the economies of scope) are joint costs and must be excluded from the TSLRIC of any particular service. Thus the TSLRIC of local exchange service, for example, must by definition exclude the costs of the local loop, since that loop is also used in the provision of toll services and other separately tariffed services.

By contrast, a total *element* incremental cost estimate is less likely to be depressed by economies of scope, since most network elements are largely or entirely independent of each other. To the extent unbundled elements are not produced on a shared basis with other elements, the joint cost problem is greatly diminished or eliminated. For example, although loops physically connect with switches and other network elements, to a large degree they can be produced separately from those other elements, just as cattle and sheep can be produced separately by the same firm.

Accordingly, it is not surprising that the FCC concluded that "the amount of joint and common costs that must be allocated among separate offerings is likely to be much smaller using a TELRIC methodology rather than a TSLRIC approach that measures the costs of conventional services." ¶678. For the same reason, the FCC concluded that economic efficiency is a more viable pricing goal in the context of network elements than in the context of traditional telecom services:

> Because it is difficult for regulators to determine an economically-optimal allocation of any such joint and common costs, we believe that pricing elements, defined as facilities with associated features and functions, is more reliable from the standpoint of economic efficiency than pricing services that use shared network facilities. Id.

Q. Earlier you indicated that the appropriate mark-up above direct cost can depend upon the way the cost of an element is calculated. Would you explain this point more fully?

A. Yes. The extent to which a mark-up is justified depends in part on the type of economic cost being estimated. In general, a mark-up above marginal cost is more readily justified than a mark-up above TSLRIC. With the FCC's TELRIC concept, certain joint and common costs are supposed to be included in the TELRIC estimate, and thus the justification for any additional mark-up is reduced.

In terms of the underlying economic theory, it is clear that the problem of economies of scale and scope is greatest when the marginal costs of telecom services are estimated, and

smallest when the average cost of network elements are estimated. Baumol and Sidak explain the issue in the context of marginal cost:

> [I]t is ... well known that if the firm's production process is subject to economies of scale, then the requirement that prices be set equal to marginal costs is a recipe for bankruptcy. Under economies of scale, the revenues yielded by marginal-cost pricing will necessarily fall short of the total costs of the firm's outputs. An easy way to see this proposition intuitively is to recognize that substantial fixed costs are a primary source of scale economies because the fixed cost per unit of output obviously falls when output increases (the "spreading of overheads"). By its very definition, however, fixed cost is a cost whose amount does not change when output varies. Hence, a price equal to marginal cost, which is *the addition* to total cost resulting from an output change, cannot include any contribution to fixed cost. Other things being equal, marginal cost stays precisely the same, whether fixed costs are large, small, or zero. Consequently, prices that cover only marginal costs cannot be expected to cover fixed costs as well.

William J. Baumol and J. Gregory Sidak, *Toward Competition in Local Telephony*. Cambridge (MA): MIT Press, 1994, p. 34. Only if the cost function does not exhibit substantial economies of scale and scope can prices safely be set at marginal cost, without any mark-up for the recovery of joint and common costs.

However, the argument in favor of setting prices in excess of marginal cost is not necessarily applicable to incremental costs. By definition, incremental costs can fall anywhere along the conceptual continuum from marginal to average cost, depending upon the specific methodology used and the specific increment which has been selected. As Baumol and Sidak explain:

> Incremental cost is a generic concept... marginal cost can be approximated by incremental cost when the increment in question is small. But if the increment is large, marginal cost and incremental cost can differ substantially, because the ranges of outputs examined in the two calculations are not the same.

Id., p. 57. In fact, to the extent the FCC's TELRIC concept is interpreted and implemented in a manner which approaches the average total cost of producing each network element on a stand-alone basis, no allowance for joint and common costs would be necessary in order to recover the firm's long run total economic cost.

This distinction between TELRIC (or TSLRIC) and marginal cost can be important, particularly in the context of economic efficiency. Economic theory suggests that allocative efficiency is most readily achieved when prices are set equal to marginal cost, assuming this can be achieved while still allowing the firm an opportunity to recover its total costs. However, in an industry where economies of scale and scope are pervasive, pricing at marginal cost may not allow the firm to recover its total costs, and thus some mark up above marginal cost may be necessary to ensure the long run viability of the firm.

While the FCC seems hopeful that pricing at TELRIC will encourage economic efficiency, this is not necessarily the case if TELRIC and marginal cost diverge significantly. As Baumol and Sidak explain, marginal cost provides an appropriate pricing floor but it doesn't necessarily establish the appropriate pricing level, since it is "a legitimate floor under prices, one prescribed by the competitive-market model and the requirements of economic efficiency." Id., p. 65.

However, marginal cost is not the only relevant cost. For instance, Baumol and Sidak conclude that TSLRIC also represents an appropriate price floor under certain circumstances (the authors use the term average-incremental cost to describe the TSLRIC concept):

> ...in an industry where average-incremental [TSLRIC] declines when output increases, AIC [TSLRIC] must be greater than marginal cost, and AIC [TSLRIC] must be the effective price floor.

Id., p. 68.

Q. Earlier you indicated that the appropriate mark-up above direct cost may depend in part on the interpretation of the 1996 Telecom Act. Could you explain this point more fully?

A. Yes. The question of how unbundled element costs should be calculated lies at the heart of the dispute that is currently pending before the federal Court of Appeals for the 8th Circuit. Some incumbent LECs have contended that the correct starting point for costing unbundled network elements is to look at their existing network. AT&T and MCI, on the other hand, have argued the correct method of costing is based upon an optimal, or idealized, scenario which yields the lowest feasible level of cost.

This difference in perspectives may also explain some of the differences which arise between different parties' incremental cost estimates. Even though different studies may all be labeled as providing "long run" cost estimates, they don't necessarily all follow the standard definition of the long run, as this term is generally used in economic theory. The different parties may assume different degrees of optimization or cost minimization when developing their cost estimates.

This issue can be most readily illustrated in the case of the utilization factor used in various studies. In the long-run planning horizon, the firm is able to optimize its capacity to precisely match its output. However, some cost studies provided by LECs include a substantial amount of extra capacity that would not be required in a true long run planning horizon. The justification for this extra capacity is typically based upon the firm's historical network characteristics, or current facility utilization rate, rather than on any claim that a higher utilization rate is not physically or economically feasible in the long run.

Other parties have sometimes argued that element pricing should be based on the lowest feasible level of spare capacity, consistent with a pure long-run costing approach. Using what is sometimes known as the "scorched earth" or "scorched node" approach, these parties look at the cost of constructing a network built from scratch with a minimal level of spare

capacity and maximum efficiency. They give no consideration to the existing or historical amount of spare capacity.

Essentially the same issue can apply to other aspects of an economic cost study, such as the mix of technologies. In a long-run cost study, the optimal, lowest cost technology can be selected. For this reason, some economic cost studies estimate a relatively low level of investment per line, compared with the embedded cost amounts incumbent carriers have actually incurred, as recorded on their books and records.

Returning to the policy issue, it is not clear how regulators should take this gap into consideration in setting unbundled element prices. Of course, if a large enough mark-up is added to the economic cost, the effect will be similar to setting the price equal to embedded cost, rather than economic cost. However, as I mentioned earlier, the 1996 Telecom Act prohibits reference to a "rate of return or other rate-based proceeding." While this language doesn't necessarily rule out a mark-up above long-run economic cost, it would be difficult or impossible to fill the entire gap between economic and embedded cost without running the risk of violating this portion of the 1996 Telecom Act.

In its Interconnection Order, the FCC attempted to prohibit any such mark-up. However, on October 15, 1996 the Eighth Circuit Court of Appeals stayed the FCC's pricing rules and returned discretion in this area to the state commissions (at least temporarily, pending the outcome of the appeal). The Court's description of this issue, although stated in terms of technology, also applies to utilization rates (spare capacity) and other aspects of the distinction between embedded and economic costs:

> Many of the incumbent LECs object to the TELRIC method for two reasons. First, it does not consider their "historical" or "embedded" costs (costs that an incumbent incurred in the past) in calculating the cost figure to be used to determine the rates. See id. SS 51.505(d)(1). Second, it requires that an incumbent LEC's cost be measured as if the incumbent were using the most efficient telecommunications technology currently available, regardless of the technology presently employed by the incumbent and to be used by the

> competitor. See id. SS 51.505(b)(1). The incumbent LECs argue that the TELRIC method underestimates their costs and results in prices that are too low. The incumbent LECs maintain that these low prices would effectively require them to subsidize their competitors and thereby threaten the viability of the LECs' own businesses.

Order Granting Stay Pending Judicial Review, p. 11.

This distinction between embedded and long-run economic cost, and the argument about how to ensure fair treatment of an incumbent when analyzing long-run economic cost has a parallel in the concept of "stranded costs" in the electric industry. In the debate over the deregulation of electric utilities, the following question is sometimes posed: Should currently regulated utilities who made excess investments under one set of rules (i.e., regulated monopoly), be allowed to recoup those embedded investments, even as new firms enter the market and prices are driven down towards economic cost? The FERC's answer appears to be "yes," and as a result end users will pay higher rates than if these historic costs were borne entirely by the stockholders of the incumbent firms. Notice of Proposed Rulemaking and Supplemental Notice of Proposed Rulemaking, FERC, Docket Numbers RM95-8-000, RM94-7-001, March 29, 1996. In contrast, in its Implementation Order, the FCC's implicit answer to a similar question appears to be "no." The FCC made no provision for a mark-up or other mechanism to ease the transition from the historic context of embedded cost recovery to the next context of increased competition and increased reliance upon economic cost calculations.

There are thus two distinct policy questions facing the Commission: (1) Should at least some recovery of historical costs be allowed when setting the price of unbundled network elements? (2) If so, can this allowance be quantified in a manner which is consistent with the 1996 Telecom Act's prohibition against reliance upon "rate based" proceedings, while avoiding the problem of excessive recovery or double counting?

If unbundled network element prices are to be increased above long-run economic cost in an effort to help the incumbent recover its historical costs, it may not be feasible to accomplish this mark-up through traditional embedded cost (rate-of-return or rate-base) calculations. The larger the mark-up contemplated, the more effort required to avoid a potential double recovery problem. For instance, if a large mark-up were applied, great care would need to be taken to ensure that the unbundled element price does not exceed both the economic cost and the historical (embedded) cost of the item. Similarly, if a surcharge or mark-up is added to economic cost in an effort to recover stranded historical costs, care would need to be taken to prevent this mark-up from continuing beyond the time these stranded costs have been fully recovered or amortized. In so doing, the Commission would have to avoid relying upon a rate-of-return or rate-base type proceeding. Clearly, then, achieving equity and accuracy for all concerned under these circumstances could be an exceedingly difficult task.