> asymmetric data service with 18 megabits per second outbound to the consumer and low-speed data on the return channel. Thus, the video service [my emphasis] could be used for high-speed access to the Internet, at rates ten to a hundred times faster than possible on an ISDN line and a thousand times faster than most households use today.[13]

This quotation raises two points: first, it is unclear how his description of voice service as a "two-way ISDN-like digital service" is different in any essential respect from how one would describe a narrowband digital local loop. Presumably, with appropriate interfaces either could carry ISDN or other digital services. The key question is: how does extension of fiber all the way to the curb, instead of to a neighborhood node (the digital loop carrier architecture), sufficiently enhance the capability of the network for narrowband applications to justify a cost assignment to telephony far in excess of the cost of building an entirely separate narrowband system? Failing to compare explicitly Bell Atlantic's proposed network to alternatives for "voice," Dr. Jackson does nothing to answer this question.

Second, Dr. Jackson correctly recognizes that "video service" encompasses more than just video transmission taken literally, but can also include high speed data such as "high speed access to the Internet." A broadband channel is merely a conduit for passing millions of bits per second. Whether the bits are converted to data or to video is only a matter of the particular application at hand. Accordingly, Bell Atlantic's costing methodology assigns all such broadband channels to the video side and narrowband channels to the telephony or voice side. In some of its worksheets, Bell Atlantic uses the caption "voice;" in other worksheets "telephony/other." It is unclear what "other" includes in addition to "telephony," or what "voice" encompasses other than just telephony. In any event, if "voice" is taken as synonymous with "telephony/other," consistent both with Bell Atlantic's worksheets and

[13] Id. at 4.

Dr. Jackson's statement, then the cost assignments shown for "voice" encompass only narrowband ("ISDN-like") channels.

This is an important inference because it leads to the conclusion that the portion of the network used for "voice" (or "telephony/other") is confined to narrowband transmission -- the same kind of transmission on today's telephone network. Thus, the key question I have posed throughout can be rephrased: What useful "voice" services can the integrated network provide that cannot be provided on either the existing telephone network, or on a digital loop carrier network, given that both Bell Atlantic's voice portion of the broadband network, and alternatives to it, would be confined to narrowband service?

In his affidavit, Dr. William E. Taylor throws an interesting (and as it turns out highly significant) contradictory twist to the above discussion. He observes that "[l]ike the narrowband network before it, the integrated broadband network is a platform that supports a variety of services including broadband [my emphasis] telephony as well as video services."[14] What is "broadband" telephony? One possibility is high speed data. But, in accordance with Dr. Jackson's description, such applications would be considered on the video side of the ledger. The second is the videophone or picturephone. To my knowledge, Bell Atlantic mentions this specific application no where else in its filing, and in light of the picturephone's checkered history, perhaps that is just as well.[15]

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[14] Id. at 12.

[15] For a devastating critique of the history of the picturephone, see A. Michael Noll, "Anatomy of a Failure: Picturephone Revisited," Telecommunications Policy, May/June 1992. In his words, "most business customers and residential consumers simply had little need for two-way, face-to-face visual telecommunication. The reasons for the picturephone's market failure had little to do with either technology or cost. Picturephone service simply had little incremental value compared to a telephone call -- and perhaps even negative value for some users." Id. at 367.

Nonetheless, to illustrate the potential hurdles for Bell Atlantic in its imaginings of new services, let us assume that "broadband" telephony -- an enhanced version of today's picturephone -- does become a serious candidate for residential and business use. The two-way broadband capacity required for this service would go far beyond the capabilities of Bell Atlantic's proposed one-way video network. Recall Dr. Jackson's description of "video" involving "18 megabits per second outbound to the consumer and low-speed data on the return channel [my emphasis]."[16]

To upgrade to a broadband return channel from each subscriber required for broadband telephony (as well as additional capacity required for outbound traffic), would surely involve an enormous increase in cost beyond Bell Atlantic's estimate of $68.4 million (or $1785 per potential subscriber) for a network consisting only of narrowband telephony plus one-way video.

This additional cost is of basic significance in shedding additional light on the threat of cross-subsidy. Recall the argument that even though Bell Atlantic assigns much more investment to narrowband in the integrated network than is involved in a stand-alone telephone network, this practice is allegedly justified if new telephone services -- not possible on the stand-alone network, emerge to cover this cost differential, thus leaving basic telephone users with a net cost no greater than (or possibly lower than) their stand-alone cost. The critical point to recognize, however, is that revenue from these new services -- broadband telephony in the above example -- must cover not only the cost differential between the assigned cost and the smaller stand-alone cost, but also the additional or incremental investment (and expenses) required to support these new services.

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[16] Jackson, supra, at 4.

To drive home this point, let us extend the broadband videophone illustration. Suppose that $1000 per potential subscriber is required for videophone in addition to the $1785 investment quoted by Bell Atlantic. Thus, even more than two-thirds of the expanded network would be assigned to telephony than is now proposed. In addition to Bell Atlantic's charge of $1191 to telephony, an additional $1000 would be added for broadband videophone for a total of $2191. In this case, to avoid cross subsidy, videophone revenues would have to cover not only the difference of $491 between the $1191 charge to telephony and the stand-alone (digital loop) telephony cost of $700, but also the $1000 in additional cost required for two-way broadband capacity.

Thus, it is not enough for Bell Atlantic to conjure up the possibilities of additional revenues from new telephone services going beyond the capability of stand-alone narrowband networks. It must also consider the additional costs of such imagined services. To my knowledge, nowhere in its filings does Bell Atlantic say a word about the costs of such services, as additional amounts beyond the figures shown in its worksheets.

This omission is brought home all the more graphically in Dr. Taylor's further testimony. He goes on to say that "the proposed network architecture supports many additional services other than traditional voice telephony ...", at which point he adds in a footnote "[i]ncluding services such as packet switching, ISDN services, private line and high-speed data services, infrastructure for cellular, PCS and other wireless services, interactive information services, and video dialtone services."[17] In listing "infrastructure for cellular, PCS and other wireless services" Dr. Taylor fails to tell the Commission that such services would entail substantial costs in addition to those listed in Bell Atlantic's worksheets. The

[17]Taylor, supra at 3, n. 6.

additional wiring to link radio transmitter sites with the network routings shown in the volumes of street maps in Bell Atlantic's filing, plus any additional trunk capacity requirements on the integrated network itself for wireless services are just two examples. Moreover, the existing network also can be upgraded, if necessary, to provide the infrastructure for wireless services. It is not at all obvious that the cost of this upgrade would be any greater than that required for Bell Atlantic's new network.

To demonstrate further how Bell Atlantic has stunningly failed to show that the telephone portion of its network can carry new narrowband services that are infeasible to provide on a stand-alone telephone network, it is instructive to consider separately each of the services Dr. Taylor lists, in addition to infrastructure for wireless:

- Packet switching. Dr. Taylor tells us nothing about why the new network is any better able to take advantage of packet switching than today's networks.
- ISDN services. These services are designed to be carried on today's networks. The overarching problem with ISDN has been weak market demand.
- Private line. These services are easily carried today.
- High-speed data. Already discussed in connection with Dr. Jackson's affidavit.
- Interactive information services. Not clear how these differ from the video dialtone (rather than narrowband) services Bell Atlantic listed originally in its Dover Section 214 application, such as "interactive data base," "how-to instructional," and "financial services."[18] Also not clear how these differ from those widely available today with automated voice instructions and keypad

[18]For a discussion, see Johnson Affidavit, supra at 15.

response. Adding question-and-answer text on the screen is easily accommodated today.

- Video dialtone services. A redundant listing.

In short, the threat of subsidization of Bell Atlantic's video services by its monopoly telephone ratepayers is abundantly clear. Bell Atlantic proposes to charge to telephony $1191 per potential subscriber, compared to a stand-alone cost for a new narrowband (digital loop carrier) network that might cost in the neighborhood of $700. The difference of $491, covered by telephone users, would represent a subsidy to video users who would be called upon to cover only Bell Atlantic's assigned $594 charge per potential video subscriber, instead of the higher $1085 ($1785 network cost minus $700) as the cost "caused" by the provision of video dialtone. Although Bell Atlantic argues that its integrated network will offer narrowband services in addition to those on a stand-alone telephone network, thus contributing additional revenues to offset the potential subsidy of $491 above, the company has been evasive and vague about the nature of such services, and why they cannot be adequately provided on a new telephone stand-alone network or, indeed, why they cannot be provided even on the existing telephone network. Moreover, these new services would themselves involve additional costs, as well as hoped-for revenues -- a subject about which Bell Atlantic is totally silent.

As a more general response to objections raised previously in this proceeding, Dr. Taylor takes two other tacks in an unsuccessful attempt to deflect criticism of Bell Atlantic's decision to allocate far more investment to telephony than required for a stand-alone system. First, he claims that "[n]o stand alone cost test is required to detect the presence of a subsidy ... indeed ... every other service could be priced above its stand-alone cost, and if VDT were priced above average incremental cost, it would still not receive a

subsidy."[19] This statement is true -- and most revealing. If every other service is priced above stand-alone cost, and VDT priced is priced above average incremental cost, the firm must be collecting excess profits.

To illustrate, the total cost of an integrated system supplying two services, A and B, is necessarily equal to the stand-alone cost of A (or B) minus the incremental cost of B (or A), since the very definition of incremental cost of a service is the additional cost of adding that service to another that otherwise would operate on a stand-alone basis. This situation can be shown straightforwardly in Table 1. If two services, A and B, are to share the same network, the incremental cost of adding A to B is equal to total cost minus the stand-alone cost of B. If revenues of the illustrative integrated system just cover the total cost of $1,000 (so that the firm just breaks even, including a "normal" profit to cover the appropriate cost of capital) any reduction in revenue for one service necessarily must be offset by an increase in revenue from the other.

TABLE 1
ILLUSTRATIVE STAND-ALONE AND INCREMENTAL COSTS
(per potential subscriber)

1	Total Integrated System -- Services A and B	$1000
2	Stand-Alone Service A	650
3	Stand-Alone Service B	750
4	Incremental Cost--A (row 1 minus row 3)	250
5	Incremental Cost--B (row 1 minus row 2)	350
6	Fixed Common Cost (rows 2 plus 3 minus row 1; or row 1 minus rows 4 plus 5)	400

[19] Taylor, supra at 11.

In contrast, if prices exceed the stand-alone cost -- analogous to the situation hypothesized by Dr. Taylor -- of service A, while B simultaneously covers more than its incremental cost, the firm must necessarily reap excess profits. Thus, if stand-alone A is priced to recover $800 instead of the stand-alone cost of $650 (row 2 of Table 1) and B simultaneously is priced to recover $450, instead of its $350 incremental cost (row 5), the firm has a total revenue of $1,250 which, against a total cost of $1,000, yields an excess profit of $250. If, however, the firm is constrained to earn normal profits, a price above the stand-alone cost of A would necessarily be accompanied by a price below the incremental cost of B; that is, revenues from A would subsidize B. The basis for concern about cross-subsidization rests on the notion that regulation constrains the firm, roughly at least, to earn normal profits needed to cover its cost of capital.[20] In short, Dr. Taylor seems to be telling the Commission:

> Don't worry about costs being assigned to telephony in excess of telephony stand-alone cost; this situation means only that Bell Atlantic will earn excess profits, not that it will necessarily subsidize video.

Second, Dr. Taylor claims that "once in place, Bell Atlantic's broadband network will have lower maintenance costs than traditional copper distribution plant."[21] The key comparison, however, involves not just Bell Atlantic's network against a "traditional copper distribution plant," but also against an upgraded distribution plant, and a new digital loop carrier network. Dr. Taylor goes on to claim that:

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[20]Baumol and Sidak define cross-subsidization within the context of the regulated firm as follows: "A cross-subsidy is present when the average-incremental revenue contributed by a product of a firm is insufficient to cover its average incremental cost, but the firm nevertheless earns sufficient revenue from all its products to cover its cost of capital [my emphasis] together with other outlays." William J. Baumol and J. Gregory Sidak, Toward Competition in Local Telephony (MIT Press and AEI Press, 1994) at 62.

[21]Taylor, supra at 3.

> In the current network, changing a customer's service or eliminating a faulty loop often requires a physical reconnection of wires in the central office or in the field. With a broadband network, subscriber moves and service changes, as well as network operations and maintenance, are accomplished mainly by using software either by the company from a central office or by a customer.[22]

Of critical importance is how the ease of performing these functions compare with that of a digital loop carrier or a simple upgrade of the existing network. If fiber is extended into the neighborhood, with copper to the subscriber's premises, is "changing a customer's service" not possible by "using software ... from a central office?" Although a faulty loop today would require physical reconnection, would not a faulty fiber also require physical reconnection? What about evidence that the cost of fiber reconnection exceeds that of copper?[23] Bell Atlantic fails to answer these and other relevant questions.

More generally, the company provides the Commission with nothing about expenses to be charged specifically to telephony. Its estimate of incremental cost of telephony from shared facilities of $346 (or more precisely, $345.73) covers only investment. It is silent about expenses to be charged to telephony, presumably because its tariff relates only to video dialtone, not to telephony. Thus, the Commission has no basis whatsoever for confirming the validity of any claim that telephone users will benefit from reduced maintenance and operations expenses.

This omission of supporting evidence is all the more worrisome in light of experience with broadband network initiatives outside Dover (and the Florham Park area). For the "hybrid" networks described in its Section 214 Applications, GTE is not planning the inclusion of telephony within the foreseeable future, because, among other things, of

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[22] Id.

[23] Reed, supra at 134.

"unknown quality and reliability aspects" and "high maintenance cost."[24] Ameritech also fails to share Bell Atlantic's optimism about the benefits of adding telephony to the broadband network. As Ameritech said in its Section 214 Applications "The [broadband] system is capable of producing telephony with future enhancements [my emphasis], however at this time, it will only be used to provide video dialtone,"[25] Bell Atlantic says nothing about why its network architecture is superior to hybrid designs for telephony.

In conclusion, based on information in the record, Bell Atlantic should be permitted to charge to telephony at most only the cost of a stand-alone telephone system (for example, a digital loop carrier estimated at $700 per potential subscriber) rather than the $1191 it proposes to charge. Indeed, it should be required to show why the telephone portion of its network is superior even to the network as it exists today or with modest upgrade. Its failure to demonstrate this superiority would be grounds for assigning all, or nearly all, of the $68.4 million investment to video.

These relationships are summarized in Table 2. The underlined numbers denote those I derive directly from Bell Atlantic's worksheets. The others are calculated from the underlined numbers. Table 2 shows, for example, that if the cost assignment to telephony is limited to the stand-alone digital loop carrier, 76 percent rather than 33 percent of investment should be charged to video.

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[24] GTE Response, W-P-C 6955, 6956, 6956, 6957, 6958, December 16, 1994 at 4.

[25] Ameritech Application, W-P-C 6926, 6927, 6928, 6929, 6930, January 31, 1994 at 10.

TABLE 2

BELL ATLANTIC'S MISASSIGNMENT OF COST
($ per potential subscriber)

		Bell Atlantic Assignments	Digital Loop Carrier Baseline	Telephone Upgrade Baseline
1	Integrated Network	$1785	$1785	$1785
2	Telephony Stand-Alone (1-5)	1525	700	308
3	Video Stand-Alone (1-4)	1439	1439	1439
4	Telephony Incremental (1-3)	346	346	346
5	Video Incremental (1-2)	260	1085	1477
6	Total Fixed Common Cost (2+3-1 or 1-4-5)	1179	354	-38**
7	Fixed Common Cost to Telephony (9-4)	845	86*	-7**
8	Fixed Common Cost to Video (10-5)	334	268*	-31**
9	Total to Telephony (4+7)	1191	432	339
10	Total to Video (5+8)	594	1353	1446
11	Percent to Video (10/1)	33%	76%	81%

* $86 = 346/(346+1085) x 354; $268 = 1085/(346+1085) x 354

** Negative common cost indicates diseconomies of scope. Customers would be better off with two separate stand-alone networks. The stand-alone telephone network cost of $308 is less than telephony incremental of $346 and video stand-alone of $1439 is less than video incremental of $1477.

Overhead as an Incremental Cost

In addition to Bell Atlantic's underassignment of network investment to video, it further underestimates the cost of video by treating overhead as a fixed cost instead of a variable cost. In Dr. Taylor's words, "by definition, overhead expenses do not change when a new service is initiated or the volume of a service is increased."[26] Nonsense. The items Bell Atlantic lists as overhead clearly do change with the number and volume of services. In its workpaper 5-18 it lists "other costs"

[26]Taylor, supra at 7.

(as distinguished from "direct costs") shown in Table 3.[27] These items, according to Bell Atlantic's overhead calculations, amount to about 64 percent (rounded by Bell Atlantic to 65 percent) of direct cost. By what stretch of the imagination can these costs be regarded as fixed? Would anyone seriously maintain, for example, that "customer operations -- services" are unaffected by whether "a new service is introduced or the volume of a service is increased" (to use Dr. Taylor's words)?

TABLE 3

BELL ATLANTIC'S "OTHER COSTS"

State and Local Income Taxes
State and Local Income Taxes COE, IOT, CWF
State and Local Taxes -- GSF
Plant Non-Specific
Customer Operations - Marketing
Customer Operations - Services
Corporate

Dr. Taylor confuses overhead, which is a variable common cost, with a fixed common cost. To illustrate, a fixed common cost could be represented by a trench for cables carrying video and telephony. Because the cost of the trench is fixed regardless of whether cables for either telephone or video are included, the incremental cost of adding either telephone or video cables is zero. Hence, whatever methodology is used to allocate the trench cost between telephony and video is arbitrary. Expressed differently, the construction of the trench creates "excess capacity" for cable laying. If video cables are laid, enough capacity remains for telephone cables at no additional cost.

The overhead costs listed by Bell Atlantic and shown in Table 3 stand in contrast. Consider, for example, the CEO's office in "Corporate." As a long-term proposition, it is hard to imagine that, at a fixed cost, the CEO would have "excess time" to oversee with no

[27]Tariff filing, January 27, 1995, supra workpaper 5-18, "Overhead Calculation."

additional personal burden video dialtone's development and deployment. To do so would mean that, at the margin, the opportunity cost of the CEO's time is persistently zero. On the contrary, as video dialtone is introduced and expanded (as with other services) over the years, the costs associated with the CEO's office must be expected to expand -- e.g., employee time devoted to video dialtone. The CEO's office represents a common or shared cost in that the costs of the office are spread over many services. But because the addition or expansion of each imposes an additional cost (i.e., no excess capacity can be presumed to exist, at least in the long run) the common or shared cost is variable rather than fixed.

In treating overhead, it is important to distinguish between cost causation and cost recovery. In the preceding example, we can properly say that one cause of the expansion in the CEO's office is the addition and growth of video dialtone. At the same time, overhead expenses differ from direct charges in that overhead expenses are generally difficult to track and to charge directly to the services that cause the expense increase. In such cases, costs are most easily recovered by charging them as a percentage markup against all the firm's direct costs or sales revenues.

Thus, the fact that Bell Atlantic loads a 65 percent markup against direct costs to recover overhead must not be interpreted as evidence that overhead costs are fixed, or that an expansion of a particular service has no effect on overhead. The increase in overhead caused by a service expansion is properly regarded as an incremental cost of that expansion, no different from the principle of cost causation that underlies the estimation of other incremental costs.

Since, however, specific overhead items are difficult or impossible to attribute directly to a given service, as noted above, how can we measure the additional or incremental overhead "caused" by a service such as video dialtone?

The answer involves taking two steps: First, we must ask whether video dialtone is different from Bell Atlantic's other services in such a way that it would be expected to generate or "cause" less, or more, overhead per dollar of direct cost than other services. Bell Atlantic says that "it is unlikely that Bell Atlantic would incur an increase in its own marketing, advertising or customer service expenses significantly above that incurred upon introduction of any new telephone access service. If such unusual substantial additional costs were to be incurred, however, they would appropriately be treated as direct costs of providing video dialtone service, not as overhead."[28] Thus, according to this statement, video dialtone is apparently no different from other new services, with respect to generating overhead.

Second, we must examine the relationship between changes in overhead and changes in direct costs as a consequence of service expansion. Does overhead grow in proportion to growth in direct cost, or does it grow faster or more slowly? Consider the possibility of overhead growing less than in proportion to growth in direct costs. For example, while Bell Atlantic's average overhead per dollar of direct costs is 65 cents, the additional or marginal overhead accompanying an additional dollar of direct cost might be, say, only 50 cents.[29] In this case, the marginal overhead rate (50 percent), not the average rate (65 percent) would reflect the incremental overhead cost of video dialtone (as well as other services). If, in contrast, overhead grows in proportion to direct costs so that the overhead rate remains constant at 65 percent (i.e., the average and marginal rates are the same), the overhead that

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[28] Direct Case, Introduction and Summary, supra at 63.

[29] At the extreme, if overhead growth were zero regardless of additional growth in direct costs, we would have the fixed cost overhead case asserted by Dr. Taylor.

should be charged as an incremental cost to video dialtone is also equal to 65 percent of video dialtone's direct cost.

The key question, then, is, does overhead grow in the same proportion as direct cost? In response, I construct Table 4 with two categories of overhead included by Bell Atlantic and shown in Table 3. Table 4 suggests that for the Bell Atlantic companies, the overhead items shown grow roughly in proportion to growth in volume, measured either in revenues or access lines.[30] The smallest two companies -- C&P and Diamond State show expenses as the highest percentage of revenues, suggesting that overhead rises less than in proportion to a rise in volume. At the same time, the lowest percentages are recorded not by the largest companies, but by middle-sized ones (C&P Virginia and C&P W. Virginia). With respect to expenses per line, the highest numbers were recorded by smaller companies, but the smallest company -- Diamond State -- shows the second smallest per-line expense for the group. As a first approximation, then, it seems reasonable to conclude that these overhead expenses bear a constant relationship to line growth. More generally, with access line and revenue growth used as a proxy for growth in direct cost, Bell Atlantic's overhead grows in about the same proportion as direct cost. Thus, if Bell Atlantic records an overhead rate of 65 percent of direct costs, the incremental cost reflecting overhead expenses for video dialtone (or any other service) would approximate 65 percent of its direct costs.

[30] Ideally, I would want to include all of Bell Atlantic's overhead components instead of only two, and compare them with direct costs instead of with revenues and access lines. However, my source of data in Table 4 does not permit reliable compilation of these missing magnitudes.

TABLE 4

COMPARISONS AMONG BELL ATLANTIC COMPANIES: 1992

	Corporation Operations, Plant Non-Specific (Millions $)	Operating Revenues (Millions)	Expenses % of Rev.	Access Lines (Millions)	Expenses Per Line
New Jersey Bell	$529.4	$3154.5	16.8%	5.19	102.00
Bell Pa.	505.1	3134.2	16.1	5.46	92.51
C&P Maryland	295.9	1846.0	16.0	2.99	98.96
C&P Virginia	276.7	1752.6	15.8	2.81	98.47
C&P W. Virginia	89.1	561.9	15.9	0.71	125.49
C&P	105.4	538.6	19.6	0.92	114.57
Diamond State	43.5	233.7	18.6	0.45	96.67

Sources: FCC, Statistics of Common Carriers, 1992/93, pp. 55-74, at lines 187, 245, 276; pp. 159-161.

Because Bell Atlantic treats overhead as a fixed common cost, it views overhead allocations as an arbitrary process under which any allocation of overhead to video is regarded as simply reduced overhead charges to other services. Accordingly, Bell Atlantic chooses to load video dialtone direct costs with a 20 percent, not a 65 percent, overhead charge. To insist that direct costs for video be loaded with a 65 percent markup would be, in Bell Atlantic's view, insistence that prices be set to recover fully distributed cost.[31] Wrong. What I am saying has nothing to do with fully distributed cost procedures. My emphasis on a 65 percent loading reflects only the fact that each dollar of video dialtone direct cost generates (again as an approximation) about 65 cents in overhead, which is properly regarded as an incremental cost of video, not as a fixed shared or common cost to be allocated in some arbitrary fashion among

[31] In Dr. Taylor's words, "As shown in the tariff workpapers. Bell Atlantic's proposed prices are set below fully distributed cost and, on average, about 20 percent above the direct costs of the component services." Taylor supra at 6.

all services.[32] Consequently, Bell Atlantic's proposed overhead loading of 20 percent on video direct costs greatly understates the cost basis for the video dialtone tariff rates.

Bell Atlantic resists charging the full 65 percent because "market conditions" might not permit the recovery of such a large mark-up. As Dr. Taylor claims, "[t]he loadings chosen by Bell Atlantic are reasonable because they do not require VDT services to recover more of the overhead costs than VDT market conditions permit."[33] But this is only a way of saying that by pricing below incremental cost (which includes roughly a 65 percent overhead component) the company, indeed, intends to subsidize its video offerings!

The Failure of Tariff Rates to Cover Cost.

In light of the preceding discussion, the overarching question remains as to how the underassignment of investment and overhead costs affects the per-channel rates in Bell Atlantic's tariff filing. In response, I discuss briefly the major cost components in the filing, and how they relate to each other. Subsequently, I construct Table 5 to identify the major components of cost for Broadcast Channel Service and to show how each is affected by the underassignments. I conclude that Bell Atlantic's tariff rates, for both month-to-month and five-year contract service, would have to be more than doubled to cover actual incremental cost plus the share of fixed common cost computed on the basis of Bell Atlantic's methodology. Moreover, the rate required to cover incremental cost alone for month-to-month and five-year

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[32]For a detailed treatment of the arbitrary nature of outcomes arising from use of fully distributed cost pricing in regulated industries, see Ronald R. Braeutigam, "An Analysis of Fully Distributed Cost Pricing in Regulated Industries," Bell Journal of Economics (1980), pp. 182-196. He defines a fully distributed cost methodology as one with which "regulators do (somehow) allocate shared production costs to individual services. Each service is then required to generate revenues which will cover all of the costs associated with that service" at 182.

[33]Taylor, Affidavit, Bell Atlantic Direct Case, Introduction and Summary, October 26, 1995, Sec. III, Exhibit A at 7.

service is at least 75 percent and 83 percent above the respective tariff rates set by Bell Atlantic for the two services.

Bell Atlantic's rates are based on five cost categories. In its words:

> Bell Atlantic based its cost development on the requirements of the Reconsideration Order. [footnote omitted] As required in that Order, direct costs of Bell Atlantic video dialtone service include the [1] primary plant investment, [2] incremental costs associated with shared primary plant, [3] a reasonable allocation of other shared plant, and [4] an assessment of other costs, including maintenance and administration expenses. In addition, [5] all video dialtone services were assigned a share of overhead costs.[34]

1. Primary Plant Investment. Includes the costs associated with facilities used only for video dialtone. For example, Bell Atlantic identifies about $75 per potential subscriber for its Broadcast Channel Service as an incremental investment associated with such dedicated facilities.[35]

2. Incremental Costs of Shared Primary Plant. Many facilities shared by video and voice exhibit costs that depend on whether one or the other service is being carried. For example, an amplifier built to carry both one-way video and two-way voice may cost more than if only voice were carried. This difference is an incremental cost of video. If the amplifier costs, say, $100, but would cost only $60 for voice alone, then $40 is chargeable as an incremental cost of video. Conversely, if the amplifier costs $55 for video alone, then $45 is the incremental cost of voice. The total cost ($100) minus the two incremental costs ($40 and $45) is a remaining shared cost ($15), treated immediately below. Using Bell Atlantic data, I compute the total incremental cost for video dialtone, consisting of Categories 1 and 2, at $260 per potential subscriber as shown in Table 2 (row 5).

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[34] Direct Case, supra at 13.

[35] Id. Workpaper 5-3.

3. Other Shared Plant. This category, also called "fixed common cost" includes, for example, the $15 immediately above and the cost of the illustrative trench for cable described earlier. There is no clear cut "right" way to allocate fixed common costs to the services involved; any allocation is arbitrary. Bell Atlantic allocates them on the basis of the relative values of the incremental shared plant costs in Category 2. Thus, for Broadcast Channel Service, it allocates 28.32 percent of "other shared plant" costs to video dialtone.[36] The total of other shared plant, or fixed common costs, of $1,179 per potential subscriber in Table 2 (row 6) is divided between telephony and video as shown (rows 7 and 8).

4. Maintenance, Administration and other Costs. Includes the recurring expenses associated with video dialtone. Bell Atlantic tells the Commission essentially nothing about how these costs are estimated. For purposes here, I accept the company's figures on faith alone.

5. Overhead. Bell Atlantic computes overhead as about 65 percent of direct cost, where direct cost includes Category 4 figures on a per-year or per-month basis, plus the investment figures in Categories 1, 2 and 3 converted to an annual or monthly basis by adopting rates of depreciation and taking into account the cost of capital. As noted earlier, Dr. Taylor confuses overhead with fixed common costs in Category 3. As I emphasize above, overhead is not a fixed cost as he describes, but grows with service introduction and expansion. The overhead generated per dollar of video dialtone direct expenditure approximates the 65 cents that Bell Atlantic reports as the average across all of its services. Thus, each dollar of video dialtone direct cost should be loaded with 65 cents of overhead as an incremental cost

[36] Id. Workpaper 5-4. Total incremental shared plant cost is shown as $482.34 of which $136.61 or 28.32 percent is associated with video dialtone. Hence, 28.32 percent of "other shared plant" or fixed common cost is allocated to video dialtone.

component (not as an arbitrarily allocated fixed cost as Dr. Taylor describes) in addition to the other components of incremental cost associated with video dialtone.

The Five Categories Together. Table 5 shows how the costs in the five categories are brought together to provide the basis for Bell Atlantic's tariffs for Broadcast Channel Service. Depreciation and cost of money in rows 1 and 2 convert to an annualized basis the total investment assigned to video dialtone in Table 2 (row 10) and included in Categories 1, 2 and 3 above. Rows 3-7 cover recurring expenses in Category 4. Row 10 shows the inclusion of overhead, Category 5. The resulting rates of $0.05 and $0.045 per month per potential subscriber for month-to-month and five-year service respectively are shown in rows 11 and 12.

Now consider figures revised to reflect the underassignment of investment and overhead to video dialtone. With digital loop carrier as the baseline in Table 2, the total cost assignment to video dialtone of $1,353 per potential subscriber is 128 percent greater than Bell Atlantic's figure of $594. Correspondingly, estimates for depreciation and cost of money in Table 5 are revised upward by 128 percent. The expense figures (rows 3-7) are left unchanged, rates are adjusted to reflect a 65 percent (more precisely 64.05 percent) overhead loading and, for illustrative purposes here, the $0.005 discount for 5-year service is left unchanged. As shown, the revised rates are more than twice as large as Bell Atlantic's figures.

TABLE 5

RECURRING COST AND TARIFF RATES
PER BROADCAST CHANNEL

		Bell Atlantic Figures*	Revised Figures*	Percentage Increase
1	Depreciation	$0.1306	$0.2978	128%
2	Cost of money	0.1271	0.2898	128%
3	Income tax	0.0504	0.0504	0
4	Maintenance	0.0610	0.0610	0
5	Administration	0.0438	0.0438	0
6	Other tax	0.0110	0.0110	0
7	Host digital terminal software	0.0013	0.0013	0
8	Total annual cost	0.4252	0.7551	78%
9	Monthly cost	0.0354	0.0629	78%
10	Fully loaded cost (1.6405)	0.0581	0.1032	78%
RATE PER POTENTIAL SUBSCRIBER				
11	Month-to-month	0.05	0.1032	106%
12	Five-year	0.045	0.0982	118%

*Bell Atlantic Workpaper 5-6.
**Table 2 above, with digital loop carrier baseline.

To be sure, my revised figures include a fixed common cost allocation to video dialtone of $268 per potential subscriber (Table 2, row 8). If this allocation is excluded from video dialtone, with this service then responsible only for its incremental costs, my revised estimates would still be much higher than Bell Atlantic's figures in Table 5. For month-to-month service, I compute a figure of $0.0873 or 75 percent higher than Bell Atlantic's $0.05; and for five-year

service a figure of $0.0823 or 83 percent greater than Bell Atlantic's $0.045.[37] Of course, these percentages would be even greater if I were to take the upgraded existing telephone plant as the baseline, as shown in Table 2.

Clearly, Bell Atlantic's tariff rates fall far below the level required to cover the incremental cost of video dialtone -- let alone any "reasonable" allocation of fixed common costs. Thus, the rates fail by a wide margin the incremental cost test that is the cornerstone of the Commission's rules to safeguard against anticompetitive cross-subsidization.

Price Caps as an Inadequate Safeguard Against Cross-Subsidization

Even if all I say above were true, Bell Atlantic would insist that cross-subsidization is rendered impossible by price cap regulation to which it is subject. Thus, the company emphasizes that "in the pure price cap regulatory environment by which Bell Atlantic recently elected to be governed, there is no possibility that Bell Atlantic could raise prices of other regulated services to subsidize below cost rates for video dialtone service."[38] Dr. Taylor goes on to claim that "[b]ecause price cap regulation decouples prices from regulatory costs, users of other regulated services cannot be burdened by the inappropriate allocation of regulatory accounting costs or by investments that may not prove to be economic."[39] Wrong again. To explain why, I examine the price cap plan that, for Dover, is in effect in New Jersey, along with the Commission's price cap regime for interstate access services.

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[37] Video dialtone incremental cost of $1,085 (Table 2, row 5) is 83 percent greater than Bell Atlantic's total cost allocation to video dialtone of $594. Thus, I adjust upward Bell Atlantic's depreciation and cost of money figures by 83 percent. Applying the 1.6405 overhead loading against the revised monthly total of $0.0533, I compute a month-to-month rate of $0.0873 and a five-year rate of $0.0823, or 75 percent and 83 percent above Bell Atlantic's respective figures.

[38] Reply of Bell Atlantic, May 19, 1995 supra at 2.

[39] Taylor, March 6, 1995, supra, at 10.

By no stretch of the imagination can the New Jersey price cap regime be regarded as decoupling prices from costs. The plan permits an increase (or requires a decrease) in the individual rates for its regulated services by the percentage change in the prior year's Gross National Product Price Index minus a two percent productivity growth factor.[40] Accordingly, rates are to fall by two percent per year in real terms (subject to possible adjustments to reflect other exogenous factors). However, three characteristics of the plan show stunningly how Bell Atlantic has leeway to shift costs to its monopoly services.

First, the plan stipulates that the company will not be required to reduce real rates during any year in which the average intrastate rate of return on equity for its rate regulated services for the applicable twelve-month period falls below 11.7 percent. Consequently, if shifting video dialtone costs onto local telephony reduces the return to below 11.7 percent, the company can pass these costs onto local subscribers by denying a rate decrease to which they otherwise would have been entitled.

Second, if the company's intrastate return on equity exceeds 13.7 percent, the excess earnings are to be shared equally between the company and its customers (most likely by appropriate price reductions or monetary refunds). Consequently, by shifting video costs onto telephony, the company may avoid triggering this sharing provision, again denying customers benefits to which they otherwise would be entitled.

Third, the price cap plan expires at the end of 1999. Consequently, excessive video costs shifted to telephony in the next few years will provide the basis for a subsequent lower productivity factor than would exist in the absence of video dialtone. In this event, telephone customers will enjoy smaller real rate decreases after 1999 than otherwise.

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[40] Plan for Alternative Form of Regulation for New Jersey Bell Telephone Company, New Jersey Board of Regulatory Commissions, Docket No. T092030358.

For the price cap regime initiated by the FCC, Bell Atlantic recently opted for the relatively high productivity adjustment of 5.3 percent in return for price caps not subject to sharing.[41] This may be the plan to which Bell Atlantic was referring in the preceding quotation, since price caps without sharing are regarded in some quarters as "pure."[42] However, even without sharing, price cap regulation resembles rate-of-return regulation with a formal time lag. The federal price cap regime is subject to formal review after some interval whereupon past performance is evaluated (including the historic rate of return) and adjustments are made in the productivity factor and other elements of the formula to bring the projected rate of return in line with what regulators would regard as appropriate. In no sense can the company's prices be regarded in the long-run as frozen irrespective of costs.

To protect against cross-subsidy, price caps would have to be fully divorced from costs, meaning that the productivity factor would be fixed now and forever. Under this circumstance, "pure" price caps that offer full protection do not exist nor can they ever be expected to exist. The reason is simply that regulators cannot in the long run ignore the company's profits or losses. If profits are persistently high, regulators will be under strong public pressure to revise the price cap formula. Conversely, low profit levels or losses will bring pressure to adjust the formula in the other direction. Notably, Professor Alfred Kahn agrees that pure price cap regimes do not exist.

> To be sure, we have to my knowledge yet to see a scheme of pure price regulation. All of the schemes of which I am aware contemplate review within a few years of how they are working. Since the indexation formulas are inevitable

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[41] First Report and Order, Price Cap Performance Review for Local Exchange Carriers, CC Docket No. 94-1, FCC 95-132 (released April 7, 1995).

[42] See, for example, David E. M. Sappington and Dennis L. Weissman, *Designing Incentive Regulation for the Telecommunications Industry* (draft), American Enterprise Institute, Washington D.C. March 1995, Ch. 11, p. 12.

> based on estimates -- in particular, estimates of how the costs of the regulated companies may be expected to behave relative to the basis for indexation (such as the Consumer or GNP price index) -- it is difficult to imagine a scheme under which the government would surrender for all time the option of testing the accuracy of those estimates against actual experience. Such reexaminations have typically involved some correction of the formula if profits prove to be too high or too low -- in which event price regulation turns out to resemble rate of return regulation.[43]

Thus, we can anticipate the LECs seeking to game the price cap regimes by shifting costs and thereby establishing a basis during the review for a revised formula (for example, reducing or eliminating the productivity factor) to permit higher prices than otherwise.[44] With these costs passed on to consumers, these companies could subsidize video activities in competition with cable and other video suppliers at the expense of telephone ratepayers.

Consequently, it is not enough to ensure against telephone rate increases. To protect against cross-subsidy, users must be assured of no smaller rate decreases (through smaller productivity adjustments) than they would enjoy in the absence of video.

What the Commission Should Do

Assignment of Investment. Clearly, the Commission must probe further into Bell Atlantic's VDT tariff now based on an assignment of two-thirds of investment to telephony. It must press the company to demonstrate that the assignment -- far in excess of that required to upgrade the existing network, or even to install an entirely new digital loop carrier system -- is economically justified. Among the questions the Commission must raise are: What new

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[43] Affidavit of Alfred E. Kahn, *Review of Regulatory Framework,* Canadian Radio-television and Telecommunications Commission, Telecom Public Notice CRTC 92-12. Filed on behalf of AGT, April 13, 1993 p. 21. Emphasis in original.

[44] As an example, in a meeting with the California Public Utilities Commission to discuss plans for broadband network construction, Pacific Bell representatives stated that "[i]n order to accomplish fiber deployment by the year 2000, rather than 2015, an additional investment of 10-15 billion dollars would be required, and should the Commission desire Pacific to undertake a more aggressive investment program, funds would be available by lowering or eliminating the productivity factor. California PUC, Notice of Ex Parte Communication. Applications Nos. 92-06-002 and 92-05-004, August 23, 1993, pp. 2-3. Emphasis added.