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APPENDIX A

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Declaration of Professors Janusz A. Ordover and Robert D. Willig

1. I (Janusz A. Ordover) am a Professor of Economics and Director of the MA Program at New York University, New York City, NY 10003.
2. I received my Ph.D. in Economics with the Highest Distinction from Columbia University in 1973. Since that time, I have engaged in extensive research in industrial organization economics and regulatory and antitrust economics. My writings on this subject have been published in numerous journals and books. In recognition of my work in this area, I was asked to serve as the Deputy Assistant Attorney General for Economics in the Department of Justice (1991-92). In that position, I led many merger reviews that employed and developed methodologies to define relevant markets in merger and other cases. I also have extensive experience in the analysis of competitive effects of business strategies, including tying and bundling.
3. I have been actively involved in the formulation of public policy in the telecommunications sector. In particular, on behalf of AT&T, I have submitted written and oral testimony to the Federal Communications Commission and to the state regulatory commissions in the mid-West, New England, and New York, on a number of issues, including the pricing of unbundled network elements and access to ILEC bottleneck facilities. My complete *curriculum vita* is attached as exhibit JAO-1.
4. I (Robert D. Willig) hold the position of Professor of Economics and Public Affairs at Princeton University, where I teach in the Economics Department and in the Woodrow Wilson School of Public and International Affairs. I served as Deputy Assistant Attorney General in the U.S. Department of Justice, Antitrust Division, from 1989 to 1991. Before joining the Princeton faculty in 1978, I was Supervisor in the Economics Research Department of Bell Laboratories. I received my Ph.D. in Economics from Stanford University in 1973, an M.S. in Operations Research from Stanford in 1968, and an A.B. from Harvard in 1967.
5. I have written, lectured and consulted widely on the subjects of industrial organization, the relationships between government and business, and domestic and international microeconomic policy. I was formerly a member of the Research Advisory Council of the American Enterprise Institute, a Member of the New Jersey Governor's Task Force on the

Market Pricing of Electricity, a Member of the Department of Defense Task Force on Defense Industry Consolidation, and a member of the editorial boards of the American Economic Review, the Journal of Industrial Economics, and the MIT Press Series on Regulation. I am an Associate of the Center for International Studies, and an elected Fellow of the Econometric Society.

6. I have been especially active in both theoretical and applied analysis of telecommunications issues. Since leaving Bell Laboratories, I have been a consultant to AT&T, Bell Atlantic, Telstra and New Zealand Telecom, and have testified before the U.S. Congress, the Federal Communications Commission, and the Public Utility Commissions of about a dozen states. I have been on governmental and privately supported missions involving telecommunications throughout South America, Canada, Europe, and Asia. I have written and testified on such subjects within telecommunications as the scope of competition, end-user service pricing and costing, unbundled access arrangements and pricing, the design of regulation and methodologies for assessing what activities should be subject to regulation, directory services, bypass arrangements, and network externalities and universal service. I have testified many times before the Federal Communications Commission in its process of promulgating rules to implement the Telecommunications Policy Act of 1996.

I. Summary of Main Conclusions.

7. We were asked by AT&T to respond to the main economic conclusions in the two Declarations filed by Professor Jerry A. Hausman on behalf of America On Line ("AOL"). We were also asked by AT&T to examine whether it would be in the public interest at this time to subject TCI's broadband "last mile" data transport to regulation that would force TCI/AT&T to offer access to its broadband last mile transport facilities on non-discriminatory and regulated terms to all potential customers, including competitors. (We shall use the term "common carrier" regulation for this sort of regulation here, although we recognize that this term has other meanings in other contexts.)

8. Our main conclusions are as follows:

   - It would be against the public interest to subject the parties' last mile broadband data transport facilities to any form of regulation at this time. It is against the public interest to impose "common carrier" obligations on TCI's broadband transport as a condition for approving the transaction because there is no reason to believe that TCI will have long-

run monopoly power in the provision of the relevant services and there is no reason to believe that TCI would have incentives and ability to abuse any such monopoly power.

- Broadband last mile data transport over cable networks is a nascent technology whose success in the market place is far from assured. Consequently, imposing heavy-handed common carrier regulation on TCI could stymie the development of the technology.
- In the absence of regulatory oversight, AT&T/TCI may well have appropriate private incentives to enter into commercial negotiations with ISPs and OSPs to implement efficient access to its fast data transport facilities. Moreover, antitrust laws can provide an effective check on TCI's pricing to the ISPs and OSPs, to the extent that such a check may be required to advert monopolization.
- "Common carrier" obligations are not necessary because AT&T/TCI does not have monopoly power in providing access to the Internet. Contrary to Professor Hausman, there is no evidence that broadband last mile data transport and narrowband last mile transport are in separate "antitrust" markets. Statistical analyses performed by Professor Hausman that purport to prove that broadband transport constitutes a separate antitrust market are poorly specified, inadequately described, and seemingly inapposite. It appears that these analyses may in fact contradict Hausman's key conclusion regarding the relevant market. Other available facts indicate that narrowband last mile transport competes directly with broadband last mile data transport.
- TCI is likely to be constrained by competition even within the unrealistically confined domain of broadband last mile data transport services. The future structure of broadband supply has not yet been determined. There are many likely competitors, including the ILECs, that are actively developing broadband transport services. It is wrong to base regulatory policy formulation on the unsubstantiated assumption that TCI will enjoy long-run monopoly power in the provision of broadband transport, and that it will have the ability and the incentives to abuse whatever power it may have.
- It is impossible to predict today what will prove to be, even in the next few years, the most effective, popular and profitable format and architecture for broadband service offerings. If it turns out that the most commercially desirable offering for TCI/ATT entails ISPs and OSPs having to "go through" @Home in order to provide their services,

it does not follow that such a policy would harm competition in the provision of Internet content or other Internet services.

- The assertion that such a policy would force subscribers to "pay twice" for content -- to @Home and also to AOL, for example -- is not grounded in sound economic analysis. Such an assertion is meaningless rhetoric without a standard of comparison, which includes a view of the hypothetical price that TCI would set for broadband transport alone, without content. Professor Hausman suggests that TCI should be allowed to charge any price it wants for transport. If so, then TCI would likely only choose to bundle @Home if it would be beneficial to subscribers, and thereby profitable for TCI. In this case, subscribers would find it less expensive and more desirable to access AOL through @Home than through any alternative unbundled arrangements. If, instead, TCI would choose not to bundle @Home, it would be the result of an assessment that TCI could earn greater returns on its investment in broadband from access fees alone, to be paid by subscribers to AOL, among others. The fact of the matter is that while Professor Hausman is (correctly) espousing the principles of efficient component pricing, AOL is advocating regulated prices for TCI's broadband offerings, at below-compensatory levels.

We develop those points more fully in the rest of our Declaration.

II. Broadband and Narrowband Last Mile Data Transport are Competing Products.

9. There are several undisputed advantages that broadband data transport over cable has in comparison with the traditional narrowband service. The first advantage is speed and bandwidth of transmission. The second advantage is that the connection to the Internet is "always on." However, the facts suggest that many consumers would find the combination of purchasing a LEC phone line in conjunction with dial-up internet access service more attractive than the integrated internet service provided by TCI (or any other cable company that upgraded its cable distribution system). Traditional dial up modem service is generally less expensive than TCI's @Home service, and uses customers' existing premises equipment (CPE).[1] Moreover, as AOL notes, (AOL comments, p. 32), purchasers of TCI's @Home service cannot use that service to access the internet or use e-mail from remote locations.

[1] Customers who have already purchased a modem may not wish to discard that modem and purchase or lease a cable modem instead.

Finally, when customers choose to purchase a second phone line to use with a dial-up modem service, those customers can obviously use that second line for regular voice communication, as well as for a fax. By contrast, consumers who purchase TCI's internet service instead cannot use that capability to make phone calls, hook up a fax machine, or dial up to an employer's server.

10. Indeed, actual marketplace evidence appears to support the conclusion that narrowband service is an attractive substitute to broadband services for many consumers. We understand that although the "base of homes with access to two-way upgraded plant" who can therefore order @Home's programming today now stands at 10 million homes, @Home itself reports an overall penetration rate of only 2.1% as of September 30, 1998. (Mullion Aft., Page 2.) That is, only 210,000 homes out of 10 million have subscribed to cable modem service today. Id. By contrast, approximately 29 percent of all homes nationwide subscribe to some form of internet access service.[2] Thus, we can presume that approximately 2.9 million households in @Home's upgraded distribution area subscribe to internet service, as compared with 210,000 using internet cable service. This is solidly consistent with the surmise that, at the present time, narrowband is a successfully close demand substitute for broadband service.

11. Public statements by AOL reveal judgments about consumer demand that are indicative of the same conclusion. We understand that AOL's chief executive officer has predicted that in "five years" "seventy-five percent of the market will be narrowband because people want it to be as easy and inexpensive as possible."3 We are likewise aware that AOL's Vice President and General Counsel, George Vradenburg, has publicly stated that the vast majority of AOL's customers have no need for access at speeds that are any greater than 28.8 kbps, and that AOL can take other steps (such as caching) to satisfy those customers who desire higher speed. Vradenburg likewise opined that in contrast to available narrowband offerings, broadband involves "pretty high" installation costs, are "pretty difficult" to install, and that customer demand for these high-priced alternatives is price sensitive.[4]

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[2] The Forrester Report Volume 4, Number 9, January, 1998, page 6, Figure 3.

3 Power Lunch, Television Interview with Stave Case (CNBC Broadcast, September 28, 1998).

[4] See Transcript of panel discussion between Peter Huber, moderator, and George Vradenburg, AOL, at Aspin Summit '98 (Cyberspace and the American Dream), August 25, 1998.

12. These judgments about demand add up to the conclusion that there is and will continue to be a great deal of demand cross-elasticity and opportunities for substitution between the two modes of transport, specifically for users of AOL, as well as for other consumers, for the foreseeable future. These are exactly the principal indicators that broadband access does not constitute a relevant market by itself, and that narrowband access must be included in the same relevant market for the assessment of whether TCI/AT&T would possess monopoly power and have the opportunity and incentive to monopolize by means of anticompetitive practices.

Peter Huber, Moderator:

How does the bandwidth situation look from AOL's perspective?

George Vradenburg, Senior Vice President and General Counsel of AOL:

Well the market is about 25 million households. It is growing about 5 to 7 million a year. Consumers are continuing to sign on in somewhat of an excess of an average 28.8 kilobits; we are seeing that most of that, virtually 99% of that, is narrowband services and so customers are continuing to sign up and they are using the service. It went from about 12 minutes a day a few years ago to 45 minutes today. So their average usage, even as the growth in the number of consumers is going up, their average use is going up. Most of the applications are E-mail or chat or access to information, and only to a limited extent do they go to the web, and to the extent that we have a little problem in performance on the web, we do a lot of caching to compensate for that . So basically in terms of the growth of our business, there's sort of not a wall that we are seeing in terms of access.

Peter Huber, Moderator:

No bandwidth crisis at all! This is going to be a short panel. You foresee a crisis coming or are we in good shape?

George Vradenburg:

I think we have an opportunity coming down the pike, but for all the reasons that were described by Mr. Trujillo, there are a lot of new applications that are potentially available on high-speed connections, and I think the question is whether or not those high-speed bandwidth services are going to get rolled out. We're not seeing them rolled out very quickly now. They're going very, very slowly. There's a price sensitivity. There's still a technology uncertainty. There are still penetration doubts. As I say, the cost to install is still pretty high; pretty difficult. So we're seeing a fairly slow roll out on the high-speed pipes so far.

III. Professor Hausman's Studies Do Not Prove That Broadband and Narrowband are in Separate Markets.

13. Professor Hausman attempts to discredit this plain market evidence with two econometric studies and vague claims about other unexhibited "various regression specifications." As they are described in Hausman's declaration, the studies are totally unsuccessful in attaining their goal. Moreover, surprisingly, Professor Hausman's descriptions of his econometric efforts are inadequate by normal professional standards. The specific equations that were estimated are not included, so that it is difficult to know just what are the claimed bases for the asserted conclusions. There is no reporting of the conventional diagnostic statistics that would assist the reader to assess the degree of power of the claimed statistical tests and the validity of the specifications. There is no reporting of the data that were analyzed to permit checking of the work, alternative tests, or even just informal assessments of whether the data are sufficiently informative for the claimed purposes. For example, without the reporting of the data, one has no basis for a judgment of whether there were sufficiently many significant enough differences in prices to induce noticeable consumer reactions in the sample.
14. The first test deployed by Professor Hausman is described as relating the price of broadband data transport to the price in the same region of narrowband data transport. While the price of narrowband data transport sounds like pertinent data, it turns out to be measured by Professor Hausman in terms of just the price of a plain old ("second") telephone line. Professor Hausman has no theory to explain the differences in prices for local residential service in his sample, so his estimated equations may be missing a number of salient explanatory variables, thereby potentially rendering the regression results quite meaningless.
15. For example, it might be that richer suburban areas have both relatively low prices for phone lines (due to regulatory "cost-based" formulae) and relatively high prices for broadband due to the consumers' greater willingness to pay for the luxurious quality of these services. Here, the competition to broadband may well come from narrowband in all regions, but negative coefficients, like those found, would still be expected in Hausman's regression.
16. Of course, the price of a residential phone line is only partially related to the provision of narrowband data transport. One missing element as an offset to the price is the value to the consumer of having the second line for purposes other than data transport. This may net out much of the cost of the line, to a degree that is statistically noisy and perhaps related to

missing variables (such as the average income of the community). Another possibly important missing element is the cost of the calls from the residence to the ISP. While these calls may incur no variable charges in some areas, they may be significantly expensive in other areas. The expected value of these costs may be inversely related to the size or density of the free calling area, which in turn may be positively related to the price of the phone line. If so, the total expected cost to the consumer of narrowband data transport to the ISP (especially with the additional value of the second line netted out) might be uncorrelated or negatively correlated with the total price of the second line. Such a relationship could reverse the interpretation of Hausman's econometrics, so that a significant negative coefficient in his estimation would signify that broadband data transport prices tend to be higher where the total effective prices of narrowband data transport to the ISP are higher.

17. Indeed, a red flag should have been raised for Professor Hausman when he discovered that "the estimated coefficient of the last mile narrowband data transport price variable is always estimated to be negative, and is often found to be statistically significant." (Hausman econometrics declaration at 4, emphasis in the text.) If it were to be taken seriously, this finding is not indicative of an absence of competition between broadband and narrowband data transport. That would be consistent with a zero coefficient or an estimate that were not significantly different than zero. Rather, the finding of a statistically significant negative coefficient indicates that there is some other effect or unstated spurious correlation (like those possibilities described above) at work that was unexplained and unanticipated by Professor Hausman. This finding simply indicates that the analysis put forward by Professor Hausman is inadequate for the purpose. It does not validly support a conclusion that narrowband is not a close substitute for broadband data transport.

18. Professor Hausman's second econometric cut at the market definition issue purports to estimate the effect of narrowband prices on broadband internet service demand. As described in his declaration, the analysis actually accomplishes nothing of the sort. First, Professor Hausman constructs a variable that, from the description in his Declaration, sounds like a single number: a ratio of growth in subscription rates for AOL, between June and July 1998, in markets in which @Home or RoadRunner were present, to the growth in subscription rates for AOL in markets in which they were not present. Of course, it is impossible to run a regression where the variable to be explained does not vary. Presumably,

although we are forced to guess here by the inadequacy of his declaration, Professor Hausman calculates one such ratio for each of the 21 studied markets in which @Home or RoadRunner are present, where the growth rate in the market having @Home or Roadrunner is scaled down by the average growth rate in the markets without broadband service.5

19. Professor Hausman does not appear to consider what common underlying factors might have caused these different markets to fall into their categories of analysis. For example, it is plausible that TCI and Time Warner upgraded their cable facilities first in those markets with favorable demographics. These same demographics might also be associated with relatively high levels of growth of AOL subscription rates. Such mutual correlations with omitted demographic variables would invalidate the estimations discussed in the declaration. Hausman neither displays the data nor explains how they were even arrived at. – the declaration neglects to state whether the average growth calculated for markets without broadband service included all MSO-based areas, how was the average constructed, and whether as we surmise the same average is used to deflate each growth figure for each of the studied 21 markets with broadband service.

20. It is most curious that Professor Hausman interprets his dependent variable as demand for broadband Internet service. Recall that the numerator of this variable is the growth in the particular market's rate of subscription to AOL, and of course this is typically a narrowband internet service. If the denominator of this variable is, as we surmise absent a description in the declaration, a figure that does not vary across the 21 markets, then this variable on its face is positively related to narrowband internet service demand, not broadband as claimed. As such, all of the rhetorical interpretations offered in the declaration of Professor Hausman would be at least upside down. If, however, the denominator does somehow vary across the 21 markets, then the reader of the declaration can have no idea what the variable signifies, since the declaration is silent on how it does so vary.

21. At the most concrete level, none of these speculations about the meaning of the regression analysis matter at all. The discussed regressions (which are never displayed) give coefficients that are said to be imprecisely estimated. The coefficient on the narrowband price variable is

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5 In the footnote, Professor Hausman interprets these regressions as a "difference-in-differences" regression. (Hausman decla at 5, n.4.) These regressions are notorious for giving imprecise results, because they eliminate much of the variation in the data and the variation that is left is often significantly contaminated with measurement error. This observation is consistent with the lack of statistical precision reported by Hausman.

small in absolute value and has a "large standard error." This is completely consistent with the true value of the coefficient being either positive or negative, and large. So, what Professor Hausman serves up is a regression without a clear theoretical basis, with an ill-defined dependent variable, without plausible explanatory variables, and which gives no significant results. Nothing can be responsibly inferred about the subject at hand from such econometrics.

22. At a far more straightforward level, the data alluded to by Professor Hausman may be at least somewhat informative. It seems from the declaration that AOL found that the growth in its subscription rates was greater in areas without @Home and RoadRunner than it was in areas where one of the broadband services was available. Since AOL is largely a narrowband accessed service, this fact would be consistent with and help to support the finding that narrowband data transport to internet services is a substitute for broadband services like @Home. As already discussed above, other market evidence in this record indicates the same conclusion – that at the present time the prices of available broadband services are constrained by the prices and availability of the narrowband ISP services.

IV. TCI Is Likely To Be Constrained By Competition Even Within the Unrealistically Confined Domain of Broadband Last Mile Data Transport Services

23. While it is clear that today broadband last mile data transport services compete with their narrowband counterparts, it is also clear that cable companies like TCI are far from alone in offering integrated broadband services.[6/] While the clearest and most certain source of competition to TCI in this regard is from the RBOCs,[7/] likely additional sources of competition include CLECs,[8/] ISPs,[9/] wireless providers,[10/] satellite companies,[11/] and others

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[6/] US WEST at 11 (emphasis added).

[7/] See Bell Atlantic 706 NOI Comments at 2; Bell South 706 NOI Comments at i, 17-37; GTE 706 NOI Comments at 10; SBC 706 NOI Comments at i, 5-7; US West 706 NOI Comments at 8-9.

[8/] See Allegiance Telecom 706 NOI Comments at 3; Association for Local Telecommunications Services 706 NOI Comments at 9; DSL Access Telecommunications Alliance at 4; Intermedia Communications 706 NOI Comments at 11; Northpoint Communications 706 NOI Comments at 1.

[9/] See AOL 706 NOI Comments; MindSpring 706 NOI Comments.

as well.[12/] Many of these rivalrous market participants are investing billions of dollars on timetables similar to TCI's to deploy broadband facilities and compete for customers. Local exchange carriers in particular are aggressively deploying xDSL service to compete with cable's broadband service.[13/] Thus, as this marketplace develops and evolves, it is impossible to predict from today's vantage point who the leading competitors will be and how the competitive uncertainties concerning technologies, qualities and design of services, availabilities and prices will resolve.

24. The xDSL services that are currently being deployed and offered by the incumbent LECs alone constitute a significant and attractive commercial alternative to the internet cable services that TCI and others offer. The LECs' xDSL services substantially overlap in their key characteristics with the internet cable services. They both offer an "always on" connection, and the transmission speeds the LECs offer over their lines match, or even exceed, those offered by TCI. While @Home typically operates at speeds in the range of 1,500 to 3,000 Kbps,[14] both Bell Atlantic and US WEST offer services at speeds of up to 7.1 megabits per second.[15]

[10/] See Cellular Telecommunications Industry Association 706 NOI Comments at 13-23; Personal Communications Industry Association 706 NOI Comments at 13-23; Teligent 706 NOI Comments at 4; Wireless Communications Association International 706 NOI Comments at 3-4.

[11/] See Skybridge 706 NOI Comments at 2, 3; Teledesic 706 NOI Comments at 2.

[12/] See "Reaffirming demand for bandwidth, Telecom CEOs see AT&T's move to acquire TCI as costly approach," TR DAILY, Nov. 3, 1998 (noting how RCN Corp. is building a network to provide video, voice, and data services to residential customers in the Northeast).

[13/] See, e.g., BellSouth 706 NOI Comments at 13-14, GTE 706 NOI Comments at 10, US WEST 706 NOI Comments at 8-9, MediaOne 706 NOI Comments at 11-12, Appendix 1, NCTA 706 NOI Comments at 14-17. Bell Atlantic recently announced that it was introducing its Infospeed DSL service in selected East Coast markets, including Washington, D.C., and that over seven million subscribers on the East Coast will have access to Infospeed DSL service by the end of 1999. See, e.g., Bell Atlantic Introduces Infospeed DSL Service (Oct. 5, 1998) <http://www.ba.com/nr/1998/Oct/19981005001.html>; Introducing Bell Atlantic Infospeed DSL, Wall Street Journal, October 5, 1998 at C26.

[14] The World Wide Wait is Over, <http://www.home.net/home/speed.html>.

[15] Bell Atlantic Introduces Infospeed DSL Service to the Washington, D.C. and Pittsburgh Markets, http://www.ba.com/nr/1998/Oct/19981005001.html; Megabit Services General Product Descriptions, http://www.uswest.com/com/customers/interprise/.

25. The pace of the growing availability of DSL offerings is not significantly slower than that for cable internet services. US WEST today offers DSL services in dozens of communities in its service area, including Phoenix, Tucson, Denver, Colorado Springs, Boulder, Minneapolis-St. Paul, Portland, Seattle, and Salt Lake City.[16] Bell Atlantic has advertised that by next year it will be offering DSL services in every major city in the corridor between Washington, D.C. and Boston.[17] In fact, generally speaking, the LECs can upgrade any loops that are less than 18,000 feet long to provide DSL services with relatively little cost. Although longer loops will require additional investments by the LECs, these are analogous to the types of investment costs that TCI is incurring – e.g. deploying fiber closer to the home and thus extending the length of the loop without exceeding the maximum copper wire length.
26. Although AOL claims that the LECs have been slow in deploying their DSL services, AOL Comments, pp. 52-54, until the advent of internet cable service the LECs have had relatively little incentive to provide their own advanced services. TCI's deployment of cable internet services has spurred the LECs to accelerate their competing offerings, and to lower their prices. Any market dissatisfaction with the pace and appeal of LEC DSL offerings is a rationale for applauding the deployment of TCI's competing services, and a reminder that policy measures that repress or slow that deployment should be avoided.
27. Competition between TCI and the ILECs will promote consumer welfare. Unwarranted regulation should not stand in the way of procompetitive technological development. The market for broadband transport is just opening up. Its future structure is totally undecided. While in some markets, cable companies, including TCI have gained a competitive advantage, in others, the ILECs and other vendors have pulled ahead. The danger that the service will be monopolized by TCI is non-existent or at best remote.

V. TCI Has Ample Economic Incentives to Offer Access to Its Broadband Transport on Economical Terms

28. The main reason for AOL's and others' demands for common carrier regulation of TCI's broadband last mile data transport is their concern that TCI will limit customers' ability to

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[16] www.uswest.com/com/customers/enterprise.

[17] www.bellatlantic.com.

access the Internet content of their choice.[18]/ In this section of our Declaration, we examine the economic soundness of these concerns. We conclude for several reasons that there is no support for such concerns as TCI will exert "vise-like control over the previously free-form and truly democratic medium of the Internet"[19]/ or TCI will "exercise disproportionate power over content matters, advancing its own editorial perspectives and discriminating against unaffiliated ISPs with a different viewpoint."[20]

29. Our analysis will show that TCI, like all other cable providers, has a strong financial incentive to offer a wide range of internet content to its customer base. This is because the attractiveness of its broadband offering depends not only on the speed with which the customer can receive information from the internet but also on what the customer can get from the internet when it gets there. This gives TCI an ample reason to accommodate any reasonable access requests by alternative content providers. If any such provider seeks to offer content that TCI's customers would find attractive, and the provider is willing to pay a compensatory access fee, it will be in TCI's interests voluntarily to come to agreement with the provider. In this regard, we understand that AT&T's Chairman has explained, "[c]ontent is essential to make money in networks. . . . And to invite as much content over that broadband set of network facilities is absolutely, Mr. Chairman, what we want to do."[21] As we shall see, AT&T's statements are consistent with standard economic theory, as discussed in the subsection below.

V.(1) *Simple Economics of Foreclosure and Leveraging*

30. In order to understand TCI's incentives to grant access to its broadband facilities, it is best to start with a simple economic model in which the owner of the bottleneck has no

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[18]/ See, e.g., Consumers Union et al. at 11; MindSpring at 12-13.

[19]/ Consumers Union et al. at 13.

[20]/ MindSpring at 14.

[21] See Remarks of Michael Armstrong before the Federal Communications Commission's En Banc Hearing on Telecommunications Mergers ("FCC Mergers En Banc"), transcript at 25 (Oct. 22, 1998)

anticompetitive incentives to deny access. Since the Commission is likely very familiar with the model and its application to telecommunications, our discussion will be very brief.22

31. Consider the owner of a bottleneck facility for broadband last mile data transport. This monopoly is restricted geographically, meaning that in other locales there is no broadband access to the internet or that other monopolists control such access. The bottleneck owner is also an internet content provider ("ICP"). The content market is highly competitive and characterized by a great deal of variety, inasmuch as consumers have differentiated tastes. The bottleneck owner's content is one of many choices potentially available to consumers. To complete the model, we may as well assume that the incremental cost of providing content to another subscriber is essentially zero, since most of the content costs are fixed (i.e., "first copy costs").

32. Assume that the bottleneck owner bundles its content with its access, and sells the package for some monthly subscription fee . Under this arrangement consumers cannot reach any other content through their subscription to the service. But is such an arrangement profit-maximizing? The answer is likely no, provided that there are some other sources of content that the bottleneck's actual and potential customers would find desirable. Indeed, by excluding the other content, the bottleneck owner diminishes the value of its scarce asset by some dollar amount that reflects the "average" consumer valuation of the available alternative sources of content.23 The bottleneck owner can adopt two alternative strategies. One is to "unbundle" access from content and sell access and its content as standalone products with consumers purchasing additional content at whatever prices the content sells for. The second alternative is for the bottleneck owner to "bundle" access and its content and set the bundle price low enough to ensure that customers buy additional content but, simultaneously, high enough to capture for itself some of the additional value that consumers gain from being able to access many alternative sources of content. With some simplifying assumptions, it can be readily demonstrated that the bottleneck owner, competing

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22 *See*, William J. Baumol and J. Gregory Sidak, Toward Competition in Local Telephony (MIT Press: Cambridge), 1994; Janusz A Ordover and Robert D. Willig, "An Economic Definition of Predation: Pricing and Product Innovation," Yale L. Journal, vol. 91, No. 1 (November 1981); Jean-Jacques Laffont and Jean Tirole, Competition in Telecommunications, (MIT Press: Cambridge), 1999 (forthcoming). Janusz A. Ordover and Robert D. Willig, "Access and Bundling in High-Technology Markets," in J. E. Eisenach and T. Leonard (eds), Competition, Innovation, and the Micorsoft Monopoly, Kluver Academic Publishing (1999, forthcoming).

23 Consumers perceive these different sources as substitutes, albeit imperfect ones. Plainly, if the different contents were complements, the concern with exclusion would not arise at all.

content suppliers, and consumers are fully indifferent between these two strategies. That is, both strategies generate the same net benefits for consumers and profits for the suppliers.24

33. Our conclusion is consistent with the well-accepted proposition that if the owner of the bottleneck service can implement a perfect "price squeeze," it has the optimal efficiency incentives to grant its rivals access to the bottleneck. In effect, the squeeze ascribes to the bottleneck asset the full monopoly rents that are available in the relevant market. It follows that when the squeeze is not very effective, so that the bottleneck owner cannot extract all the rents, it may have private incentives to deny access and extract additional rents in some other way.25 For example, the price for the monopoly asset may be set by regulation at below its full value. Alternatively, by denying access the owner of the bottleneck may be able to earn additional monopoly profits in markets where the bottleneck asset has no monopoly value. This strategy is commonly referred to as leveraging of market power from the monopoly market to other, potentially competitive markets.

34. With this economic background, we can examine various claims made by AOL, Professor Hausman, and others regarding TCI's incentives to exclude competitive providers of content and the allegedly pernicious effects of "tying" of broadband last mile data access to content through the @Home ISP service.

V.(2) *There Are No Possibilities for Leveraging Broadband Access.*

35. As we have seen, "leveraging" provides one possible motivation for exclusion and other abuses of bottleneck market power. In the instant context, there are two putative "markets" to consider for assessing whether there are any conceivable possibilities for concerns over whether TCI could leverage its alleged market power. The first is the domain of internet content and the second is the domain of internet advertising.26 It is totally implausible that through @Home TCI would be able to gain market power in these putative markets.

36. For leveraging to create a competitive concern, it has to be demonstrated that broadband data transport is a separate market and that TCI has or will likely have significant market power in the provision of such access. As we have indicated above, at the present time broadband

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24 For a full exposition, *see* Ordover and Willig, "Access and Bundling in High-Technology Markets", note 30, above.

25 Our result holds even if the squeeze is not "perfect" provided that consumers ascribe significant value to the alternative sources of content. A perfect squeeze transfers all the rents to the bottleneck owner.

26 Actually, the only content at issue here is that which is proprietary to an ISP or an OSP (such as AOL). Non-proprietary content can always be reached once the subscriber accesses the world wide web with his or her browser.

access does not constitute a relevant market. Moreover, TCI faces (or is likely to face) significant competition in the provision of broadband access. Consequently, even if competitive content providers were completely precluded from accessing @Home's subscribers via TCI's broadband last mile data transport, they would still be able to access these consumers through other means. For example, even in those market areas where TCI might have the only broadband pipe, some @Home's subscribers are also likely to subscribe to AOL directly or to reach it by means of a narrowband ISP, or to regard these options as reasonable substitutes for @Home entirely. Moreover, because the @Home consumer base is still very small and is likely to constitute a small portion of all Internet subscribers, exclusion from such a small customer base -- even if it did occur -- would not significantly raise AOL's costs, thereby rendering it a less capable competitor or less attractive to consumers. Since any unique content of @Home service does not compete with AOL in those markets where there is no broadband access, it is quite implausible that an exclusionary strategy would be profitable. TCI would lose profits by making @Home less attractive and generate no additional profits because @Home's content cannot plausibly gain market power that could be profitable for TCI.

37. Internet advertising is another source of revenues earned by @Home. It is equally implausible that the market for advertising can be monopolized. Advertisers have many venues through which to reach consumers, of which the internet is only one. Even if TCI were to foreclose OSPs from broadband transport in its cable markets, this would have zero impact on @home's ability to charge supracompetitive rates for advertising on @Home's web page and content screens.

V(3). *Pricing of Unbundled Access Should Reflect the Full Opportunity Cost.*

38. Unbundling of broadband transport, which AOL and others are asking for, is meaningless in the absence of some rules that determine how unbundled transport can be priced. There are at least two possibilities. The first is to rely on arms' length commercial negotiations between TCI and those who seek access to set appropriate access fees. In the event that such a negotiation fails, the party demanding access could, in principle, seek an antitrust remedy under section 2 of the Sherman Act. To gain relief, the party seeking access would have to demonstrate that TCI has market or monopoly power in some relevant market(s). As demonstrated above, the action would fail at this step.

39. It is reasonable to inquire what prices would likely result from such arms' length commercial negotiations. As explained above, such prices would reflect at least the full opportunity cost of granting access. Here, this opportunity cost would reflect the net revenues that TCI would lose if a subscriber were to choose AOL, for example, rather than @Home, plus the direct cost to TCI of providing access to the rival OSP, plus the reduced value to TCI of its investment in @home. In particular, if a consumer were to switch from @Home to AOL through the provision of access, that would reduce the advertising revenue that @home would earn, thus reducing the profitability of At Home Corporation and hence the value of TCI's investment in At Home Corporation. In an arms-length bargaining situation the price that TCI would charge an entity like AOL for unbundled transport would thus be the full subscriber rate that TCI would lose if a subscriber were to choose AOL, plus the net diminished value of TCI's investment in At Home Corporation.

40. On the surface, it appears that AOL agrees with this analysis. We understand that AOL's basic claim is that its "open access" requirement is necessary to ensure that it can compete with TCI's @Home service on a level playing field. At the same time, AOL appears to claim that "open access" is not synonymous with price regulation of last -mile high speed data transport. (AOL at 34.) Professor Hausman, AOL's economic expert, likewise asserts that "[n]o one has called for price regulation of last mile high speed data transport by TCI and by other cable companies. TCI could still charge the (unregulated) profit maximizing price for last mile high speed data transport over its network." Hausman Aff., para. 16. He goes on to say that "no one is calling for the cable companies to be required to sell last mile high speed data transport at prices determined by TELRIC." (Hausman Aff., para. 18, p. 10.) But if not TELRIC then what? Frankly, neither AOL nor Professor Hausman clearly resolves the conundrum of what AOL seeks: how to square AOL's demand for open access with its protestations that price regulation is unnecessary. Scratching under the surface reveals that Professor Hausman and AOL are less than enthusiastic about TCI's pricing freedom.

V(4). *The Current Access Arrangement Does Not Require AOL's Customers to "Pay Twice" for Access to Its Proprietary Content.*

41. Professor Hausman argues that because TCI ties "last mile high speed data transport and Internet access and other services" through its affiliate @Home, AOL customers have to pay twice for access to AOL's proprietary content. (Hausman Affidavit at 8.) Similarly, AOL

states that TCI forces @Home subscribers to "pay for two 'value-added' Internet services to get to the one source of online content they want."[27]/ AOL and Professor Hausman are wrong for two reasons.

42. First, we understand that today any @Home customer can "access AOL" through his or her TCP/IP connection, and that AOL itself actively markets such a connection as its "bring-your-own-access" plan ("BYOA plan").[28]/ We understand that the BYOA plan charges $9.95 per month, compared with the standard monthly charge of $21.95, and that the BYOA plan enables any customer, including @Home customers, to access AOL's content and features without paying AOL for contentless internet access. In sum, AOL can -- and does -- "unbundle" its service offering and charges separately for its content while letting consumers access it through @Home or any other means. This would greatly obviate the need for @Home to "unbundle" its service.

43. The second reason that AOL and Professor Hausman are wrong when they assert that if broadband transport were unbundled, consumers would not have to pay "twice," stems from our prior discussion of compensatory pricing. If AOL and Hausman are serious about letting TCI charge a profit-maximizing price for access, then they must acknowledge that such a price would appropriately and necessarily reflect all of the opportunity cost of providing access. It will be recalled that Professor Hausman clearly stated that access should not be priced at TSLIRIC, which does not here include opportunity costs. Because @Home collects advertising revenues that are associated with the content it provides, the fact that it provides content enables @home to defray part of its network costs and investments. If @home did not provide content, it would have to recover the diminished advertising revenue elsewhere, or else reduce the scope of its network. If @home were a wholly owned entity within TCI, then TCI would presumably recover these lost revenues by raising the rates to subscribers for an @home service that did not include content, as compared with the current content-enriched programming.

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[27]/ AOL at 14 n.29.

[28]/ See "Top 20 AOL Member Questions," <http://aol.com/nethelp/top20memberquestions.html>.

44. Of course, TCI and @home are separate corporations, and @home does not set the rate that subscribers pay. Instead, we understand that, as with cable programming generally, TCI purchases @home's programming and then delivers that internet service to its subscribers for a fee (a portion of which is remitted to @home). Nevertheless, TCI has a natural interest in ensuring the viability and attractiveness of the @home service, given that TCI has undertaken significant investments specifically geared to delivering @home's programming. Thus, if @home were required to offer its internet access service stripped of content, that effect could well place upward pressure on the rates that TCI would for its own reasons choose to charge subscribers. Thus, the effect could be higher rates for consumers. It is entirely plausible, therefore, that subscriber's might be better off in the long run by buying the full @Home service plus paying the AOL BYOA rate, as compared with purchasing an @home service that provided only internet access from TCI and paying whatever fees AOL would charge on top of it.29

V(5). *Current Financial Arrangements Between TCI and @Home Are Not Pertinent to the Pricing of Unbundled Transport.*

45. From this discussion it follows that neither Professor Hausman nor AOL are fully serious about allowing TCI to charge a profit-maximizing price for "unbundled" broadband transport. Indeed, Professor Hausman suggests that the price that should be established is the price that @Home "pays" to TCI for access. (Hausman Affidavit at para. 16.) In this he commits two errors. The minor error is a factual one: @Home does not "buy" access from TCI. The two entities -- TCI and @Home -- share the per-subscriber fee, which is independently set by TCI, according to a negotiated formula.

46. The more important error is an analytical one. Professor Hausman assumes that the split is determined by the same business considerations that would be pertinent in the event that TCI had to offer "unbundled" broadband transport to a rival supplier of content. The current revenue split provides no such guidance because TCI has an ownership interest in @Home. While TCI is not a 100% owner, it does have an ownership claim on a 40% share of the net revenues earned by @Home. If TCI were a sole owner, it would be totally indifferent -- barring some tax complications -- as to how the revenues were actually divided between TCI

29 We do not assume that a customer would procure access. Rather, the full rate for AOL would include the cost of broadband transport which would be procured by AOL.

and @Home. To the extent that such division matters now to TCI stems from the fact that profits booked at @Home have to be shared with other owners of the service. Thus, in proffering the current split as a benchmark for pricing unbundled access, Professor Hausman confuses internal "transfer prices" with access prices that would emerge from commercial arms' length negotiations between a vertically integrated supplier of a service and unintegrated rivals. This Commission is well-aware that internal transfer prices can be manipulated in a myriad of ways, not all of which are likely to benefit the rival.30

IV. "Common Carrier" Regulation of Broadband Last Mile Data Transport Is Unnecessary And Not In the Public Interest.

47. Despite their protestations, neither Professor Hausman nor AOL have advanced a workable proposal for how unbundled broadband access should be priced. In their hands, unrestricted profit-maximization quickly turns into an empty slogan. In fact, their demand to unbundle broadband transport will engender intrusive regulation of an emerging new service that requires massive entrepreneurial investments and whose marketplace success is far from assured. Such regulation is especially inappropriate since, as we have explained above, TCI and AT&T have now all the incentives to allow @Home's subscribers to access all the content that is economically available on the world wide web, including proprietary content provided by ISPs and OSPs.

48. Indeed, for @Home and other like services to succeed, they will have to deliver content that is worth viewing. As one commentator notes, "the key worry with launching broadband services is that nobody will develop any content for them until there are subscribers to finance it, but nobody will subscribe until there is content to justify the cost of higher speeds."31 This need to develop and encourage content worth viewing at high speeds offers a strong stimulus to open broadband to all content providers. Foreclosure is presently deadly to a broadband ISP because it narrows the scope of the available content and, at the same time, constricts the base of potential customers for the service.

49. Forced unbundling with its attendant regulatory uncertainty would likely slow down the investment in the development of broadband last mile data transport. Investing under the shadow of uncertain regulatory rules in an innovative service only exacerbates the already

30 *See*, Baumol and Sidak, op.cit., for the need for imputation tests aimed at detecting anticompetitive exclusion through overpricing of a bottleneck asset.

substantial risks associated with that investment. When an investor can be subjected to unanticipated regulatory constraints on its pricing or be required to sell its services at rates that do not reflect proper economic costs, the incentives to invest are potentially undermined. TCI and other cable companies did not sink hundreds of millions of dollars into upgrading their networks on the assumption that they will be forced to "unbundle" transport if it is not in their private economic interest to do so.

50. It must be recognized at this juncture that it cannot be reliably predicted what will prove to be the most effective, popular and profitable format and architecture for broadband service offerings. In particular, whatever are current prognostications, it is unknown today whether unbundled transport on appropriate terms might, as this new marketplace evolves, become a commercially desirable offering for TCI/ATT, or whether, on the other hand, demand for pure transport will even exist in meaningful or significant ways in the future. This inevitable uncertainty makes it all the more important for the public interest that the Commission leave it to the companies themselves to decide on their business strategies. These is no doubt that decentralized entrepreneurship is far and away the best process for generating new options for the utilization of broadband capabilities, and for the needed sorting out among them. Instead of direct regulation of cable companies, there are plenty of other forces and safeguards -- such as the private interests of the cable companies themselves, and competition from the ILECs -- that can be expected to ensure access to the broadband networks by providers of Internet content, so long as that access is efficient and consistent with consumers' demands.

51. The creative, efficient, and desirable evolution of cable company broadband offerings would also be endangered by unnecessary regulation of pricing. The needed entrepreneurship and investments would be predictably stultified and distorted by the challenges to pricing that are typical under regulation -- on grounds of being discriminatory, excessive, self-preferential or entailing cross-subsidies among different services that will commonly utilize the broadband network being built by the cable companies. With possibly significant joint and common costs in the broadband network, their recovery from the various services utilizing the network would likely require a complex of differential pricing terms, and maximal utilization and consumer welfare would mandate the commercial flexibility to find and implement them.

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31 Tim Jackson, "Breaking the internet's shackles," Financial Times, 11/9/1998, p. 12.

Unnecessary price regulation would inevitably elevate already difficult levels of investment risk, rigidify marketing and constrain Ramsey-pricing, and generally retard or even prevent the development and success of broadband cable offerings.

52. Regulation is a solution of last resort to a clear-cut danger that the owner of a genuine bottleneck will abuse its monopoly power. There is no evidence or other reason to believe that TCI now has or is likely to have monopoly power arising from its supply of broadband last mile data transport, or that it will have any incentive to abuse whatever market power it might have. This being so, the Commission should refrain from imposing "common carrier" or other forms of price regulation on TCI and AT&T as a condition for approving the transaction.

I declare under penalty of perjury that the foregoing is true and accurate.

Executed on November 12, 1998 in New Canaan, Connecticut

Janusz A. Ordover

I declare under penalty of perjury that the foregoing is true and correct. Executed on November 12, 1998, in Princeton New Jersey.

Robert D. Willig

Robert D. Willig

C

ALL-STATE LEGAL 800-222-0510 EDS11 RECYCLED

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the Matter of	)	
	)	
Joint Application of AT&T Corp.	)	
and Tele-Communications, Inc.	)	
for Transfer of Control to AT&T	)	CS Docket No. 98-178
of Licenses and Authorizations	)	
Held by TCI and its Affiliates	)	
Or Subsidiaries	)	

AFFIDAVIT OF TIMOTHY KIRK MULRON

1. My name is Timothy Kirk Mulron. I am Director, Financial Planning and Analysis, At Home Corporation (At Home). In that capacity I have personal knowledge of At Home's penetration rate as well as At Home's financial plans and pricing strategies.

2. As of September 30, 1998, a total of 10 million homes in North America have access to upgraded cable plant and can thus order At Home's service. As of that date, 210,000 households have ordered At Home service, thus yielding an overall penetration rate of 2.1%. Of those 210,000 At Home users, 23,000 are TCI subscribers. It is my understanding that to date only approximately 1.4 million of the 23 million homes passed by TCI have been upgraded with two-way upgraded plant (or roughly 6% of TCI passed homes).

3. In addition to a share of the subscriber fees collected by the cable operators who offer the At Home service, At Home receives significant advertising revenue, much of it tied to the proprietary content At Home provides. As At Home's user base increases, At Home expects that its content-linked advertising revenue will come to represent an increasingly larger share of At Home's total revenue stream. Indeed, because the advertising revenue that At Home receives has a fairly high margin, At Home's financial plans are premised on that expectation. The content that At Home provides thus is expected to pay for a significant share of At Home's costs and investments.

4. By contrast, if At Home were required to sell internet access service stripped of proprietary content it would lose a significant revenue source.

I declare under penalty of perjury that the foregoing is true and correct. Executed on November 12, 1998 in Redwood City, CA.

Timothy Kirk Mulron

D

ALL STATE LEGAL 800 222-0510 CDS11 RECYCLED

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the Matter of	)	
Joint Application of AT&T Corp., and Tele-Communications, Inc. for Transfer of Control to AT&T of Licenses and Authorizations Held by TCI and its Affiliates Or Subsidiaries	)	CS Docket No. 98-178

AFFIDAVIT OF MILO MEDIN

I, Milo Medin, declare as follows:

1. I am Senior Vice President and Chief Technical Officer of @Home Networks.

2. I have prepared this Affidavit in response to the Declaration of Suk S. Soo, which is attached as Appendix C to the Comments of America Online, Inc., filed October 29, 1998 in the above-captioned proceeding ("Soo Declaration").

- **Access Points**

3. There are actually few places that multiple service providers can realistically interface with the cable system. Virtually the only practical location for such interfacing is directly at the Cable Modem Termination System ("CMTS"). Most CMTS equipment has an Ethernet interface, which could be connected to an Ethernet switch,

which in turn could connect to an Internet service provider. At the Ethernet switch it is difficult to ensure that one ISP couldn't accidentally impair the service of another ISP. In the existing FDDI-based NAP locations, congestion of the layer-2 switch regularly causes increased packet loss to customers of all ISPs connected to the NAPs.

- **HFC Configuration, Data Link, and Physical Access**

4. To support multiple ISPs at a CMTS, there will need to be a number of changes in the HFC subnetwork. First, each ISP would need to have its own address space associated with the CMTS. Since most CMTS equipment are IP routers, each of these separate address blocks would need to be configured into the CMTS equipment. The provisioning systems would need to associate the correct IP address and other IP configuration information for both customer computer and MCNS cable modem into the DHCP server. The DHCP server provides this configuration to customer computers and cable modems at the time the devices boot. The DHCP server is typically shared across a large number of customers, often across many different CMTS devices. @Home currently has about 22 DHCP servers providing coverage for all of its North American markets. Because of the design of DHCP, it is impractical for each ISP in a multiple provider situation to have its own DHCP server.

5. With DOCSIS version 1.0, there is a provision for per-modem rate limiting, but there is no virtual circuit or separate physical circuit between the cable modem and the CMTS equipment. Hence, one ill-behaved modem or user will adversely impact all users on that portion of the cable plant. This is very different from the situation with telephone-based Internet access because one user's connection to the TAC

cannot adversely impact another user's connection to the TAC. If one user takes up an excessive amount of upstream bandwidth, other users will suffer network capacity shortages. When capacity runs out, the cable operator typically must change its "node combining plan", purchase and install more CMTS equipment, and reallocate IP addresses to cable modems and customer computers.

6. As noted above, layer-2 switch congestion is a problem at the current FDDI-based Internet NAPs. There is no reason to believe that layer-2 switch congestion could not also be an operational problem with the switch connected to the CMTS equipment in the head-end.

7. All users connected to a given CMTS interface share the same downstream and upstream bandwidth. If one user is consuming that bandwidth, the capacity is gone and is not available to other users concurrently. This is very different from a telephony or ATM network design.

8. In addition, although the CMTS's are owned by the cable operator, they are currently managed, configured and controlled by the relevant ISP (e.g, @Home, RoadRunner). In a multiple ISP scenario, the cable operator would need to develop their own capability to manage and configure the CMTSs as well as all associated cable modems.

- **Addressing & Routing Configuration**

9. There are a number of flaws in the example solution presented in the Soo Declaration. For example, in step (3) the declaration implicitly acknowledges that it is only practical to have one DHCP server and one provisioning system for a given CMTS.

These systems need to interface with the ISP's customer database and also the cable operator's *homes passed* and *node combining* information in order to provision a customer cable modem and customer computer. Such IT systems can be expensive to develop and maintain because of the requirement to interface with multiple databases. In the event such an automated system is not developed, then significant additional staff will be needed to manually provision each customer. In either event, the cable operator is required to make significant monetary investment.

10. Also, the approach described in step (5) of the declaration only applies to a bridged CMTS. Most CMTS devices are routers, not bridges. When the CMTS is a router, the CMTS itself is the gateway router for the cable modem and for the customer PC. Hence, the described approach for *gateway router address* configuration cannot be used to solve the multiple provider problem.

11. In step 6, the declaration assumes that the CMTS will route packets based on the source IP address. This is not the way IP routing is designed to operate. IP routers are designed to forward packets based on the destination IP address and the routing table information contained in the router. So an IP router does not normally behave in the manner described in the Traffic Flow section of this example. Neither the DOCSIS/MCNS standards nor the IETF standards require source address based routing.

- **Additional Items**

12. The AOL proposed "solution" is missing consideration for at least four critical issues:

a. Who provisions the cable modem? In current systems this is a single ISP, which is also responsible for the configuring the required DHCP servers as

well as the application servers such as Email and news. In addition, the cable modems must be provisioned with address anti-spoofing filters and quality of service parameters related to the specific customer configuration. The same DHCP server is used for both Cable Modem provisioning as well as customer provisioning and is not easily split. Under a Multi-ISP scenario, the cable operator would have to develop a capability and expertise similar to that provided by and ISP so they could run these servers.

b. How are customer interference issues resolved? For example, ISP A sells commercial service to businesses with the expectation the business will be running web servers. ISP B sells consumer service, but its customers are getting poor throughput because ISP A's customers are monopolizing the upstream bandwidth.

c. How are dynamic services enabled? For example, assuming the cable operator controls the cable modem, how does any given ISP signal to: 1) change quality of service parameters in the cable modem, 2) enable multicast sessions for pay-per-application streams, 3) configure small office, home office virtual private network parameters?

d. How are multicast services in general dealt with? Multicast has a specific set of address ranges that are global and not per ISP. Multicast has the potential to consume substantial amounts of downstream bandwidth. If both ISP A and ISP B enable large numbers of downstream multicasts without considering the impact of the other ISP's multicast most or all of the available downstream bandwidth can be consumed.

Conclusion

12. Cable operators have begun a long term plan to upgrade and 2-way activate their cable TV infrastructure. While this provides a basic capability for them to enable IP services over the MCNS/DOCSIS protocols, this does not provide a general capability for them to enable multiple ISP services over shared infrastructure. DOCSIS based cable data systems have a substantially different architecture than the traditional telephony infrastructure with its dedicated bandwidth from the customer to the ISPs TAC. Due to the shared nature of the cable media, multiple ISPs on a single cable plant would substantially interfere with each others ability to service their customers in a reliable and fair manner.

I declare under the penalty of perjury that the foregoing is true and correct.

Milo Medin
Senior Vice President and
Chief Technical Officer
@Home Networks
650/569-5000

Dated: 11/12/98

DCDOCS: 137420.1 (2y1801!.doc)

CERTIFICATE OF SERVICE

I, Cassandra M. de Souza, do hereby certify that I caused a copy of the foregoing "AT&T's and TCI's Joint Reply to Comments and Joint Opposition to Petitions to Deny or to Impose Conditions" to be served this 13th day of November, 1998, by First Class mail on all parties on the attached service list.

Cassandra M. de Souza

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