participation, primarily covered the areas of systems requirements, and modem performance and testing.

2. My name is Evertt H. Williams. I am the Vice President of National Data Market Management for GTE Service Corporation. In this position I am responsible for GTE's National Data Strategy, which includes managing GTE's ADSL Program Office. My work with the ADSL Program Office involves product and market development, market assessment, and price and cost planning. In addition, I have been employed by GTE in various capacities since 1980, focusing most of my attention toward business development for new GTE technology.

3. We have been asked to discuss the technological and economic issues surrounding the competitive performance of ADSL in the broadband access marketplace.

4. GTE uses ADSL technology to provide broadband Internet access service over the same twisted-pair copper loop used to provide traditional voice telephony. Customers purchasing ADSL service receive both digital and voice signals transmitted together over the local loop from the Central Office (CO), where GTE joins the signals transmitted from the public switched telephone network and the Internet. The local loop consists mainly of copper wire, which has a bandwidth that usually far exceeds the 4 KHz required for voice. To permit both data and voice to be transmitted over the same wire, this transmission bandwidth is divided. The lower frequencies (under 4 KHz) are reserved for voice, while the higher bands are reserved for both upstream and downstream digital data. GTE's downstream ADSL data speeds are between 256 Kbps and 1.5 Mbps, while its data upstream speeds are between 64 Kbps and 768 Kbps.

Thus, ADSL technology is "asymmetric" because it allows more bandwidth downstream from the CO to the customer premises than upstream from the customer to the CO.

5. GTE must install a considerable amount of equipment both at its COs and at a new customer's premises to provision ADSL. For instance, in each CO, GTE relies on DSL Access Multiplexers (DSLAMs) to join voice and data signals from the telephone and data networks and deliver the signals to the customer over the local loop. A splitter on the customer's premises (CPE Splitter) is also required to split the incoming signal into separate voice and data signals, sending the voice signals to the telephone and the data signals to the customer's PC through an ADSL Modem.

6. GTE's DSL network is an open access system that allows customers to choose from a variety of Internet Service Providers (ISPs). Currently, when a customer calls GTE to obtain ADSL service, GTE offers them a connection to almost 200 different ISPs, including GTE.Net, and America Online. Participating ISPs establish a connection to GTE's ADSL customers by interconnecting with local Frame Relay or ATM networks used to aggregate DSL traffic from multiple COs. These local networks are sometimes referred to as "Frame Relay clouds" or "ATM clouds." Because GTE primarily uses Frame Relay rather than ATM technology to aggregate its DSL traffic among COs, this discussion will use the term "Frame Relay Cloud" to describe a network of multiple GTE COs connected through a Frame Relay network.

7. Participating ISPs are able to interconnect with 34 separate Frame Relay Clouds located throughout GTE's service territories. Each of these 34 clouds has a separate connection

point to which ISPs may connect just as they would establish any other traditional Internet interconnection. Connection to a single Frame Relay Cloud affords ISPs access to multiple COs and hundreds of thousands of telephone subscribers in a local area. ISPs are thus able to tailor their DSL entry strategies to their own scale and scope; large national ISPs may elect to interconnect with each of GTE's 34 Frame Relay Clouds, while regional ISPs may connect to only one. ADSL customers are free to select any ISP that has interconnected with the Frame Relay Cloud covering the CO where their loops terminate. ADSL subscribers initially designate an ISP from the list of possible providers and may change ISPs simply by calling their new ISP of choice, which then transmits the customer's preference to GTE.

8. Cable companies have a significant head-start in the broadband access market compared to other providers of competing broadband technologies like DSL. This fact is widely recognized by industry analysts and is confirmed by a recent GTE study of its Tampa market, where Time Warner's cable modem service holds a strong lead over GTE's DSL service. At the end of 1998, Time Warner had acquired 10,000 cable modem customers -- a total that has doubled to roughly 20,000 customers in the first eight months of 1999. GTE, on the other hand, had less than 100 ADSL customers through the early months of 1999 and hopes to acquire 3,000 by the end of this year.

9. Once cable-companies secure an established first-mover advantage, it will be extremely difficult for ADSL providers to wrest away their position of market dominance. One reason for this is the high cost to customers of switching from cable modem access to ADSL. GTE's current total non-recurring cost to visit a customer's home to install ADSL service

exceeds $450. This cost covers modem installation plus the modem itself, wiring inside the customer's home, personal computer configuration, a Network Interface Card (NIC), and a CPE Splitter. Although GTE does not charge customers the full measure of this expense, it may cost a customer as much as $300 to switch from cable access to ADSL, not including the cost and inconvenience associated with waiting at home during the work-week for an installer's visit.

10. In addition to the high costs of switching to ADSL, the technology itself has several limitations that make it an ineffective substitute for broadband cable access in a number of markets. *First*, loop length is one key limitation of ADSL technology. Signals passing over a copper loop degrade as they travel farther from their point of origination. Unlike ordinary voice signals, ADSL signals cannot be repeated or amplified at points between the CO and the customer's premises. Because data signals cannot travel over 18,000 feet without degrading so much as to impair the service, ADSL is not provided to customers whose loops are longer than 18,000 feet. As a result of this technological constraint, it is estimated that only 65 percent of GTE's customers qualify for DSL service.

11. *Second*, the quality of the local loop is often marred by inhibitors in the wire, such as bridged taps and loading coils. Bridged taps are sections of copper that are connected to, but not located along, the circuit from the CO to the customer's premises. They are similar to "dead end" streets branching off a single roadway. When a signal travels past a bridged tap, it is weakened because it splits between the loop and the bridged tap. For some significant percentage of customers -- as many as five percent -- the presence of bridged taps on their lines will entirely disrupt the provision of ADSL service. Although this problem can be solved by

removing the bridged tap, documentation of existing taps is virtually non-existent. It is therefore extremely difficult to predict in advance whether a particular customer's service will be disrupted by the presence of a bridged tap on their line.

12. Similarly, loading coils (which were installed years ago to improve the performance of copper wire for voice signals) buffer voice bandwidth but disrupt higher frequency signals, making ADSL transmission over copper loops with loading coils impossible. An estimated 15-20 percent of local loops have loading coils. Once the presence of a bridged tap or loading coil is identified, the problem can be addressed only by accessing the rights-of-way between the customer's home and the CO to remove the obstruction -- an expensive manual process that often involves digging up the streets.

13. *Third*, perhaps the most significant challenge to ADSL deployment is providing service to customers whose loops are provisioned through digital loop carriers (DLCs). DLCs are separate metal cabinets mounted on concrete pedestals that function as remote COs, although they are much smaller than COs and serve fewer customers. DLCs are connected to the COs they serve by a T1 line or by fiber; copper loops emanate from the DLC to the customers' premises. Because ADSL service only works when provided over an uninterrupted copper wire, customers whose loops are provisioned through DLCs cannot be served by DSLAMs located in the CO. To serve these customers, several upgrades must therefore be made to DLCs. The backplane of existing DLCs (into which ADSL and POTS cards are inserted) cannot carry the increased bandwidth of ADSL, and the fibers linking the COs and DLCs are typically not

designed to carry the additional bandwidth. This means that the circuits connecting DLCs and COs must be upgraded, as must the backplanes.

14. Moreover, each DLC must also be equipped with a DSLAM -- a very expensive proposition given that most DLCs have no empty space that can be allocated to DSLAM equipment. The only solution currently available to address this problem is to collocate an additional DSLAM-equipped cabinet next to existing DLCs. In addition to the cost of installing a new concrete pedestal, cabinet, and fiber to the co-located equipment, this may require the acquisition or lease of additional easements. Given these costs, it is currently unprofitable for GTE to offer ADSL service to customers whose loops are provisioned through DLCs. Likewise, it would never be profitable -- given the potential per-customer revenue from DSL service compared to the cost of building new DLCs-- for GTE to attempt to reach customers whose loop-length exceeds 18,000 feet by building DLCs closer to their homes. Currently, about 30 percent of GTE's customers are served through DLCs, and many of these customers live in newer suburban subdivisions that house some of the most likely broadband customers.

15. Due to these limitations, GTE is unable to provide ADSL service to a substantial percentage of potential broadband Internet access customers. The distance limitation on ADSL service alone precludes GTE from serving 35 percent of its current local customers. Moreover, GTE may not be able to provide ADSL service to a significant percentage of customers whose loops are not disqualified due to their length because of interfering bridged taps, loading coils, and DLCs. ADSL providers like GTE would therefore be unable to curb the exercise of market power by a combined AT&T/MediaOne for a substantial percentage of broadband customers.

And although these problems -- apart from the 18,000 foot limitation -- can be addressed with time and with considerable expense, if AT&T and MediaOne are allowed to merge and establish a first-mover advantage as a result of anticompetitive behavior, high switching costs will make it impossible for DSL providers like GTE to catch up once these strides are made.

I declare under penalty of perjury that the foregoing is true and correct. Executed on August 17, 1999.

[signature]

Dale E. Veeneman

I declare under penalty of perjury that the foregoing is true and correct. Executed on August 20, 1999.

Evertt H. Williams

Before the
Federal Communications Commission
Washington, DC 20554

In the Matter of	)	
	)	
Applications for Consent to the Transfer of Control of Licenses	)	
	)	
MediaOne Group, Inc., Transferor,	)	CS Docket No. 99-251
	)	
To	)	
	)	
AT&T Corp., Transferee.	)	

DECLARATION OF ALBERT PARISIAN

1. My name is Albert Parisian. I am the Director of Business Development for Broadband Data Services for GTE Media Ventures (GTEMV). I am currently on special assignment to demonstrate the technical feasibility of open cable access and the ease with which cable modem customers can be provided a choice of ISPs. Prior to this special assignment, I was responsible for a variety of broadband data and convergence initiatives at GTE based on Very High-Speed Digital Subscriber Line service, Multichannel Multipoint Distribution Service, Hybrid Fiber-Coaxial systems, and other networks. During this same time I was responsible for authoring several Broadband Data Strategy reports for use by GTE executive management and the GTE/Bell Atlantic Merger Team. In 1996 and 1997, I was responsible for developing GTE's first cable modem consumer service. This included developing the business plan, selecting technology, designing product offerings, writing marketing plans, creating operational methods,

launching the service, and scaling the service to six cities before transitioning it completely to GTEMV's ongoing cable operations. Prior to this, I developed and ran several technology businesses for GTE as a principal in a corporate venture fund arrangement. The majority of my 21 years in the telecommunications industry has been in general and strategic management of data or information technology-based business.

2. In this Declaration, I have been asked to describe: (i) the architecture of closed and open cable systems; (ii) how closed systems reduce consumer choice and can be used to disadvantage other industry participants; and (iii) how open systems enhance consumer choice and promote the development and availability of broadband content and services.

Basic Cable Architecture and the Deployment of Closed Cable Modem Systems

3. Cable providers like GTEMV, AT&T, and MediaOne have added cable modem systems to their pre-existing video systems. These video systems are themselves closed systems. The network physically belongs to the operator and at no point can a consumer's request for video branch out to other video suppliers. Nor can competing video suppliers access the customer without accepting the operator's terms. In fact the operator can, and does, even refuse advertisements based on self-interest. These video systems were originally designed, built, and upgraded to provide a variety of video entertainment operations and services, and only in the last three years were seriously considered for providing Internet access. Cable providers built these video systems with three distinct steps: (i) the node, which serves groups of homes in a neighborhood; (ii) the distribution head end, which serves all of the nodes in a given franchise-

authority-defined municipal area; and (iii) the main head end, which creates the main video feed and serves the distribution head ends in its region.

4. Nodes serve, through a two-way tree and branch coaxial infrastructure, between 500 and 2000 individual households. Groups of these nodes are connected to distribution head ends, which serve two primary functions. The first is to receive the video feed from the main head end and add local content; the second is to serve all of the nodes attached to the distribution head end by sending and receiving traffic, either over coax or (more commonly) fiber. Distribution head ends typically serve groups of 2-5 nodes as defined by the transmission engineering of optical splitters attached to the distribution head end. Each distribution head end has a series of such optical splitters, engineered in total to serve all the nodes in a given franchise area.

5. Collections of distribution head ends are likewise served by a main head end. The main head end collects video programming from several sources, adds the requisite program information, and builds and distributes the main video feed to its distribution head ends over a high-bandwidth dedicated connection. The main head end also provides a wide range of interactive, business support, operations support, set top box, and customer management services. Cable providers use two-way communications from the household to the main head end (and sometimes beyond) to support digital services, new channel offerings, set top box software, program information loads, pay-per-view transactions, and other interactive television transactions.

6. To this two-way video plant, cable providers add the equipment needed to provide cable modem service. Each Internet customer has a cable modem that connects into the coaxial wire already provided to his or her home by the cable provider. As noted above, this coax leads to a neighborhood node that itself leads back to the distribution head end. At the distribution head end, each transmission group of nodes, as defined by optical splitter engineering, makes up a single Local Area Network whose resources are shared by all cable modem subscribers served by those nodes. At the optical splitter within the distribution head end, data traffic is branched to and from a Cable Modem Termination System (CMTS), whose function is to manage all of the cable modem traffic generated by its "neighborhood" of cable nodes. Functionally, CMTSs serve the same purpose as Digital Subscriber Line Access Multiplexers in a DSL system -- to manage the traffic to and from a neighborhood group of individual broadband customers and translate data between unique modem protocols and the traditional IP Protocol. This network architecture is depicted graphically in Attachment 1 to this Declaration.

7. Based on the pre-existing distribution head end design, metropolitan areas served by cable providers typically have several "CMTS neighborhoods," or groups of aggregated cable nodes each served by a single CMTS. The several CMTSs at a given distribution head end are connected directly through a traditional IP/Ethernet connection into a co-located switch or router "hub" that aggregates traffic for the whole metropolitan area. This expanded network architecture is depicted graphically in Attachment 2 to this Declaration.

8. Finally, cable providers aggregate traffic from multiple city hubs at a single regional router. In a closed system architecture, the cable system's affiliated ISP connects directly

to the provider's cable network through these regional routers. Indeed, a major purpose of this regional architecture is to minimize the number of connections required between the cable provider and its ISP, a design that allows for more efficient traffic management and limits expense on costly high-capacity connections. Within the ISP's point of presence linked to the regional router, the affiliated ISP is able to cache preferred content for the fastest possible delivery to customers (though this may be done elsewhere in the ISP's very-high-speed national backbone). In closed systems, cable modem customers do not need to access the public Internet to reach content supplied directly by their cable provider's affiliated ISP.

9. Content from outside ISPs (like AOL), portals (like Yahoo!) and content providers (like Broadcast.com), on the other hand, can only be reached by sending and receiving data through the affiliated ISP's backbone and over the public Internet connection maintained by that ISP. Because the system is closed, when cable customers turn on their modem service, they have no choice but to enable a hard-wired connection to their cable provider's ISP. In Excite@Home's environment, there is no way to dial around the ISP or otherwise establish a direct connection to any other provider. This final piece of the closed architecture is depicted graphically in Attachment 3 to this Declaration.

10. On August 3, 1999, I attended a meeting held at the Commission with Milo Medin, Excite@Home's Chief Technical Officer. In this meeting, Mr. Medin described the architecture of the cable modem networks operated by Excite@Home and confirmed AT&T's public position that Excite@Home operates a closed cable system. The description of Excite@Home's network

architecture presented at this meeting conforms to the basic structure of a closed cable system I have described above.

The Anticompetitive Potential of Closed Cable Systems

11. Based on my review of publicly available data detailing the number of broadband customers served by Excite@Home, Road Runner, and alternative broadband technologies like DSL, I understand that a combined Excite@Home/Road Runner would serve almost 80 percent of the total residential broadband market. By continuing to operate a closed system, a firm with this much control over the emerging broadband marketplace could engage in a number of activities designed to undermine competitors. In general these strategies have two architecturally enabled themes: Either they use the hard-wired feature of a closed system to quickly consolidate a position in industries related to and inter-dependent upon residential broadband access, or they use a combination of closed-system services to consolidate an entrenched position within the residential broadband marketplace.

12. A cable modem service provider with a national footprint and a large percentage of customers would need only a few years to consolidate the contractual, equity, and intellectual property positions required to assert control over industries related to broadband access. These established positions could, even if competition in access more fully develops, be used to raise the entry and operational barriers facing competitors or extract margins from successful entrants. For example, a cable modem service provider that successfully secured a dominant position in markets for content, software, and network services, could limit competitors' access to needed inputs. Alternatively, such a cable provider could allow competition to develop in the market for

broadband access, but compel every new access firm -- if it wanted to offer a product customers demand -- to buy the cable provider's related services (extracting margins from another part of the value chain).

13. During this window of opportunity, the closed cable provider would also have an opportunity to consolidate its first-to-the-home advantage by extending the reach of its network within the customer's household. Such a provider could bundle and blend existing (video, Internet, and voice) and future services in ways that competing broadband providers (due to closed architecture and regulation) cannot. To these bundled services, a closed cable provider could add usage and application hooks -- for example, having the TV screen alert subscribers of incoming e-mails, faxes, or voice mails -- that would make stand alone offerings by competitors less valuable. A closed cable provider could likewise require its customers to use equipment (including set top boxes, cable modems, and gateways) that relied on proprietary components -- protocols that would keep the equipment from working with services or equipment offered by competitors. Ultimately, the cable provider will have succeeded in establishing a dominant position in new and inter-related markets. Internet to the television and interactive television are just two examples of emerging services that could easily be captured in this way.

14. A dominant cable modem provider could secure these advantages by engaging in three forms of anticompetitive behavior linked to its operation of a closed system. *First*, the cable provider could use its closed system to discriminate against portals and other content providers operating on the public Internet. Discrimination may take the form of artificially increasing consumers' cost of using a competitive portal or content provider, of impairing the portal or

content provider's performance over the cable modem delivery system, or denying consumer market access to competing types or sources of content altogether. Such a strategy would encourage customers to rely more extensively on the cable provider's own content and spend more time on its network, which in turn would increase the premium the provider could charge to advertisers, portals, and content providers for preferred placement on its system. By attracting more and more content to the closed system and away from the public Internet, the cable provider would achieve a dominant position in these vertically related markets.

15. Closed providers maintain exclusive control over their customers' Internet connections and are able, by establishing routing protocols, to block or hobble content coming from targeted Internet sites. This blocking capability is already marketed to closed data system providers by router manufacturers (like Cisco), enabled in part by the openness of the IP Protocol, which places a signature on each data packet identifying its point of origin. It is a simple matter to configure router filters to block packets coming from particular portals (like Yahoo! or Lycos) or particular content providers (like Broadcast.com or ESPN.com). Indeed, Excite@Home has effectively conceded that this is possible by agreeing with its cable partners to preclude customers from viewing more than 10 minutes of streaming video -- a limitation that could be enforced only if Excite@Home maintained the ability to selectively block incoming Internet content that competes with its own (or its affiliate's own) product.

16. *Second*, a closed cable provider serving a dominant share of the broadband market could establish proprietary network and software protocols designed to keep software, content, and applications from running on any system other than its own. Excite@Home's own efforts --

which would be dramatically reinforced if it merged with Road Runner -- provide a case-in-point. During the August 3 meeting at the Commission, Milo Medin explained that he was working with cable modem manufacturers to make proprietary changes to cable modems and CMTSs. He explained that these changes were necessary to fulfill his vision of multi-casting, quality of service, and other high-speed data communications parameters needed to support broadband content, software, and applications. Because a combined Excite@Home/Road Runner would control more than 90 percent of the cable-modem market -- wielding extreme buying power against equipment manufacturers -- the merger would make equipment manufacturers almost certain to incorporate these closed protocols into their equipment.

17. A similar logical progression follows from Excite@Home's claim that it must retain the ability to manage all data provided to consumers over its closed national network. In a competitive market, an open cable provider would have an incentive to establish open and compatible networking protocols governing security, database and server management, compression, and application uses. A closed provider like a combined Excite@Home/Road Runner would have precisely the opposite incentive -- to create closed and proprietary protocols governing these network management functions and to incorporate these protocols into hardware strategically placed in its customers' homes.

18. Given that a combined Excite@Home/Road Runner would serve almost 80 percent of broadband customers, such a strategy would encourage software writers -- and the creators of content running on that software -- to develop applications for Excite@Home/Road Runner first. This would give Excite@Home/Road Runner an extraordinary advantage over broadband

competitors by delaying or precluding outright their access to new and popular applications. This advantage would be extreme in a market, like broadband Internet access, where almost all of the applications are new and the development of software and content will accelerate rapidly over the next few years.

19. The creation and widespread implementation of proprietary protocols would also create high barriers to entry because every customer's home would be stocked with equipment incompatible with the services and equipment offered by competitors. Competitors unable to replace the full bundle of services offered by Excite@Home/Road Runner and its cable affiliates would therefore have little hope of offering consumers a valued product. Moreover, once these protocols are established and incorporated into equipment throughout the network, Excite@Home/Road Runner would be able to demand equity interests or revenue sharing from broadband content providers wishing to operate on its system. The development and implementation of proprietary protocols in a closed cable system therefore presents an extreme anticompetitive threat both to other broadband access providers and broadband application developers.

20. *Third*, by continuing to operate a closed system, a dominant cable operator could, by pricing its service below cost, ensure its ability to undercut any competitor that presents a threat to its market dominance. By operating a closed system, such a provider would be assured that any new broadband customers would take its ISP service to the exclusion of any other. This assurance would give the provider the flexibility needed to price its service below cost until targeted competitors expire. The closed provider could then recover its foregone profits by

charging inflated prices for its broadband service, not having to worry that customers could evade this recovery by selecting a different ISP. Anticipating that such a strategy could be successfully deployed against them, providers of competing broadband technologies would choose not to invest rather than risk stranding investments made in advance of market entry.

21. Ultimately, the operation of a closed system by a dominant cable modem provider would have far reaching effects on the American public's school, work, cultural, and community lives. A combination of physical, network, software, and application proprietary layers reduces the number of non-ISPs that can provide broadband services to their constituents. Only those entities that agreed to the dominant provider's terms would be able to participate, and only those entities with sufficient scale to command a huge audience could compete for attention on a single monolithic portal.

The Architecture of and Procompetitive Benefits of Open Cable Systems

22. An open cable system, by contrast, affords broadband customers the ability to select the ISP of their choice. There is no question about the technological feasibility of creating and maintaining an open system -- GTE has done so itself, as have others. Likewise, there is no question that such a system would maximize consumer choice, spur the creation and wide dissemination of new broadband software and content, and encourage investment in competing broadband technologies. Moreover, the introduction of open access would allow the American public to enjoy the diversity and market stimulation that comes from having a wide variety of local, state, and regional level ISPs involved in the marketplace.

23. GTEMV recently demonstrated open cable access on its own Clearwater, Florida cable system. This change was easy to engineer and offered GTEMV's Clearwater customers a choice among ISPs for the first time. GTEMV was able to open its cable system by adding a single piece of equipment to its network -- generically referred to as an ISP Subscriber Manager -- that allows multiple ISPs to interconnect. The Subscriber Manager, which is a traditional Internet router with some table-driven software added, was simply connected to GTEMV's existing regional router.

24. Multiple ISPs were invited to establish a connection with the Subscriber Manager, which involved nothing more than establishing a traditional Internet Protocol (IP) interconnection between an ISP and a router. (This same kind of interconnection occurs in innumerable spots across the Internet, with backbone providers connecting to one another at public and private peering points, smaller ISPs connecting to one another, and high-traffic customers establishing dedicated connections with their ISPs or backbones.) In a closed model, the cable provider's affiliated ISP connects to the cable modem network at the regional router; but in GTEMV's open architecture, GTEMV's affiliated ISP (GTE.net) was routed through the Subscriber Manager just like every other ISP. This open network architecture is depicted graphically in Attachment 4 to this Declaration.

25. ISP Subscriber Managers are a commonly available product manufactured by a number of leading data equipment makers, including Cisco, Assured Access, and RedBack. Cisco's Subscriber Manager can accommodate connections with more than 400 ISPs, affording access to as many ISPs as could possibly want interconnection in a given market. Moreover,

Subscriber Managers are stackable, meaning that if one Subscriber Manager were filled to capacity, a second could be added in the same location to accommodate still more ISPs. Lastly, cable providers building new regional hubs would not need to install both a router and a Subscriber Manager. GTE added a Subscriber Manager because the regional hub was already in place. In a new regional hub, a cable provider could install just the Subscriber Manager and use its existing router functionality.

26. The open cable architecture demonstrated by GTEMV and others is highly beneficial to consumers and developers of broadband applications. Such a system allows cable customers to choose their own ISP, maximizing the value they get from the purchase of broadband service and introducing the beneficial effects of competition to the market for broadband ISP service. Furthermore, open cable providers relying on GTEMV's network architecture would have no ability to discriminate against competing ISPs, portals, or content providers. Because the cable provider's affiliated ISP interconnects through the same Subscriber Manager as all other ISPs, the cable provider would have no incentive to place this equipment in a disadvantageous location or limit the capacity of its connection to the cable modem network. Likewise, because each ISP would control its own connection to the public Internet, the cable provider's affiliated ISP would have no incentive to limit its customer's access to outside portals and content. Doing so would only prompt customers to change ISPs. Thus, open access would drive cable providers to offer as much choice and quality as possible to cable subscribers (as this would increase the number of broadband customers) while ISPs would be driven to offer the best

new products and services (as their best opportunity to differentiate themselves in consumers' minds).

27. Similarly, open cable providers would have significantly less incentive to develop closed proprietary network and software protocols that limit the interoperability of new broadband applications. Without locked-in control over a large segment of the broadband market, a cable provider's affiliated ISP would lack the leverage required to force the adoption of proprietary protocols and -- if it succeeded in doing so -- could find itself *last* in line for new software and content, with application developers intent on reaching as much of the market as possible. Indeed, under an open system, cable providers and ISPs would have an incentive to collaborate to develop network protocols and industry standards that are themselves open, affording all participants in the market equal access to new applications. Because open access precludes any one provider from achieving a position of dominance, industry participants are more likely to work together to increase the size of the market pie than work against each other to corner the market.

28. Adoption of an open cable architecture would also promote expanded investment in broadband technologies. Competing broadband providers -- including DSL, wireless, and satellite -- would have an enhanced incentive to invest if they knew their investments would not be stranded as a result of below-cost pricing by cable modem competitors. Such providers would also have a greater incentive to invest if they were assured access -- on equal terms with other competitors -- to new broadband software and content. Moreover, open cable systems spur broadband investment in communities that would go unserved by closed systems. Open systems

invite participation by a far more diverse group of ISPs that, on the whole, are better able to serve customers of all backgrounds and interests than a single monolithic network. Diversity in ISP offerings will therefore spur consumer demand in markets that would have appeared unprofitable candidates for cable modem service, and will increase penetration rates (lowering per-customer costs) in markets that have already been targeted. Open cable systems are therefore far more effective at reaching traditionally underserved markets and communities than closed systems.

29. The benefits that would flow to consumers as a result of this expanded broadband investment would not come at the expense of cable providers upgrading their networks to support cable modem service. Independent of open access considerations, the decision to upgrade cable networks to provide data services is usually an easy one. Most of the plant changes needed to support the service are by-products of plant upgrades already made to increase channel capacity, add digital tiers, add pay-per-view, use intelligent set top boxes, introduce interactive television services, and offer on-set program information guides. Moreover, cable providers operating open networks are still able to charge the market price for broadband access -- a product for which there is currently little competition. Available market information on the pricing of broadband access -- including Excite@Home's 35-65 contract split of customer subscription revenues with cable providers, and Excite@Home's recent decision to offer a significant discount to AOL subscribers -- confirms that this business is highly profitable; indeed, the cable provider's most remunerative use of channel capacity. Once the DOCSIS standard for cable modems is fully implemented and consumers begin paying the full cost of their own modems, this level of profitability will only increase.

30. GTE's own experience confirms that an open architecture can create significant returns on investment. When GTE initiated its open access plan in Clearwater, it received requests to participate from several individual and at least two consortiums of ISPs. As a result of this unsolicited response and its own learning about the low cost of open access, GTEMV is in the process of developing a business plan that implements open access on all of its cable systems -- something GTEMV would not do if an open architecture precluded it from recovering its investment in system upgrades.