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practices</u>
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Chairman Martin and Members of the Commission:

I'm extremely grateful for the opportunity to speak to you today and would like to thank you for inviting me. It's good to be back at my Alma Mater and again to be on this stage -- where I spoke and performed music several times while I was here obtaining my Master's Degree in Electrical Engineering. When I arrived at Stanford in 1983, the ARPAnet -- for that is what it was called at the time -- had just transitioned from the outdated "Network Control Protocol" to the newfangled "TCP/IP", which is now the *lingua franca* of the Internet. I followed the network's trials and tribulations as I studied, and also participated in a project, headed by Dr. Michael Flynn, whose goal was to develop digital radios for the recently available unlicensed 900 MHz band. As part of that project, I independently invented a digital coding technique known as Trellis Coding, which is used in all manner of modems and radio equipment today. At around the same time, our colleagues and football rivals across the Bay at UC Berkeley were working on a digital radio project called the Daedalus project. All of this work, and the work of other researchers, were eventually integrated by NCR into a product called WaveLAN -- the granddaddy of today's Wi-Fi.

Several years later, as the ARPAnet was becoming today's Internet, I moved from the San Francisco Bay area to Laramie, Wyoming, a city with which I had fallen in love when I was much younger and where I'd decided to put down roots. Folks there had heard about this Internet thingie, but all that was available at the time -- except on the University of Wyoming campus -- was CompuServe at 2400 bits per second. Not wanting our small city of about 25,000 people to fall behind the curve, I founded LARIAT -- a rural telecommunications cooperative -- to bring Internet to the community. I and other interested business owners started by borrowing a bit of bandwidth from the University to build a "proof of concept" network, and then transitioned to buying our own. At the time, a T1 line cost $6,000 a month, but we pooled our money and partnered with other providers to bring the connection into my office.

The problem, once we got it there, was how to divvy it up among all the people who were paying for it. The answer turned out to be the techology upon which I'd worked here at Stanford. We bought some of the NCR radio equipment and set up a metropolitan area network spanning downtown Laramie. As far as I or anyone else can tell, this made us the world's first WISP, or wireless Internet service provider.

Fast forward to 2003. The Internet was now well known, and the growing membership of

LARIAT decided that rather than being members of a cooperative, they simply wanted to buy good Internet service from a responsible local provider. So, the Board prevailed upon me and my wife -- who had served as the caretakers of the network -- to take it private. We did, and have been running LARIAT as a small, commercial ISP ever since. But after all these years, our passion for bringing people good, economical Internet service hasn't changed. And nothing can beat the sense of achievement we feel when we hook up a rural customer who couldn't get broadband before we brought it to them -- or when we set up a customer who lives in town but has decided to "cut the cord" to the telephone company or cable company and go wireless with us. We make very little per customer; our net profit is between $2.50 and $5 per customer per month. But we're not doing this to get rich. We're doing this because we love to do it.

In other words, from the Internet's earliest days, we at LARIAT have been the strongest possible advocates of consumer choice; of free speech; of inexpensive, fast, high quality access to the Internet. It's our mission and our passion. And we are unqualified advocates of network neutrality as it was originally defined: namely, the principle that Internet providers should refrain from leveraging their control of the pipes to engage in anticompetitive behavior. It is inexcusable for the cable company to throttle or block video because it competes with their own services, or for a telephone company to block Voice over IP because it's another way of making a telephone call. And I think pretty much everyone -- except maybe some of those monopolies -- agrees.

Unfortunately, because "network neutrality" seems like such a sensible idea and has so much momentum, various parties have sought to extend the definition beyond this basic principle -- in ways that favor their own interests and which are, ironically, non-neutral. These attempts to "hijack" the network neutrality bandwagon are dangerous because many of them seek to force ISPs not to manage our networks; not to stop abuse or exploitation of our networks; and not to insist that we be paid for the use of our networks. And if rules and legislation are enacted that enforce these expanded definitions of "network neutrality," they actually could put our small, competitive provider out of business.

Several people who have spoken before this Commission and before Congress have claimed that Internet service is the province of a cable/telco "duopoly" which must be reined in by regulations to keep it from exploiting its market power. Fortunately, as of the moment, this is not true. Estimates vary, but most agree that there are between 4,000 and 8,000 small, independent, competitive ISPs such as ourselves. These small operators need to be nurtured, protected from anticompetitive behavior, and given an opportunity to grow.

The "hot button" issue in the recent hearings has been ISPs' throttling or blocking of so-called "P2P" activities, including those carried on via software such as GNUtella, BitTorrent, eDonkey, and KaZaA. Because my time here is brief, I've summarized the situation in two slides. Here, in the first slide, you see the way that content and services are normally delivered on the Internet. The provider of the content or service sets up a server -- usually in a building

called a "server farm" -- where Internet bandwidth is cheap and plentiful. The information travels across the Internet backbone and reaches the ISP, which pays much higher prices for bandwidth -- often as much as $300 per megabit per second per month. (By the way, these prices have lately been increasing -- not decreasing -- due to mergers and consolidation in the backbone market.) The ISP also maintains the expensive infrastructure that connects users to the backbone. The user pays the ISP to do this. This situation fulfills the implicit contract of the Internet which has been in place ever since it stopped being the government funded ARPAnet: everyone buys his or her connection to the backbone.

In the second slide, you see what happens when you have P2P. In this case, the content or service provider doesn't pay its full freight for connectivity to the backbone. Instead, it turns the users' computers into servers, which in turn distribute its content or services. And users often don't even know that this is occurring. All they know is that they installed the "downloading software" or other software that let them access the product.

This situation is great for the content provider; its bandwidth costs are reduced to nearly zero. And the customer -- who in the United States virtually always has flat rate service -- doesn't pay any more, because the service is flat rate. So, where do the bandwidth costs go? The answer: they are dumped on the ISP. What's more, because the ISP -- especially a rural ISP, but it applies to all of them -- pays much more per megabit to buy bandwidth and deliver it to customers, the costs are not only shifted but multiplied several hundredfold in the process. It's obvious to anyone that this isn't fair and it isn't in any way "neutral." The content provider is, in essence, setting up a server on the ISP's network without permission and without compensation. This is why ISPs virtually always prohibit P2P and also the operation of servers on residential connections by contract. Our contract with our users says this, and we fully disclose it; we do not hide it. If someone does want to operate servers on our network, we can offer him or her "business grade" bandwidth, for which we charge a fair price that takes these extra costs into account. But P2P makes the bottom lines of such companies as Vuze look better, so of course they want to mandate that it be allowed on all connections -- no matter how non-neutral this is or what harm it does to ISPs.

This is clearly the motivation of companies like Vuze -- and also of BitTorrent, which provides its software -- in asking that P2P throttling be prohibited. But what about Free Press and the other petitioners who claim that limiting P2P harms free speech? As a strident advocate of free speech myself, I can say that their hearts appear to be in the right place, but they do not seem to recognize where the real threats to free speech lie. Throttling or prohibiting P2P activity is not a threat to free speech, because any content or service which can be delivered via P2P can also be delivered by conventional and fair means. (I've cited a few examples in my third slide.) What *would be* a threat to consumers and to free speech is the elimination of competition -- which, ironically, is just what would happen if rules were imposed which prevented ISPs from doing something to rein in P2P. If this Commission grants the petitions entered by Vuze and of Free Press et al, it will sting some of the large providers like Comcast.

But it would drive smaller competitors with higher backbone bandwidth costs out of business -- and thus would likely create the "duopoly" about which many are justifiably concerned. You may have seen the news reports from the United Kingdom that widespread deployment of the BBC's "iPlayer" P2P software is causing a similar effect. While the BBC is not a for-profit entity, the fact that it is shifting the cost of wildly popular and voluminous video content to ISPs is causing even some of the larger ones, such as Tiscali, to say, "That's not cricket."

There are other problems with P2P as well. It congests networks, degrading quality of service for other customers. It exploits known weaknesses in the TCP/IP protocol -- which became obvious when I was here at Stanford but have never been adequately fixed -- to seize priority over applications such as voice over IP that really need priority. And it's mostly used for piracy of intellectual property -- something we can't condone.

What's the answer to this problem? Some parties claim that we should meter all connections by the bit. But this would be bad for consumers for several reasons. Firstly, users tell us overwhelmingly that they want charges to be predictable. They don't want to worry about the meter running or about overage charges -- one of the biggest causes of consumer complaints against cell phone companies. Secondly, users aren't always in control of the number of bits they download. Should a user pay more because Microsoft decides to release a 2 gigabyte service pack for Windows Vista? Or because Intuit updates Quicken or Quickbooks? Or because a big virus checker update comes in automatically overnight? We don't think so. And we don't need to charge them more, so long as they are using their bandwidth just for themselves. It's when third parties get hold of their machines, and turn them into resource-consuming servers on our network without compensating us for those resources, that there's a problem. Thirdly charging by the bit doesn't say anything about the quality of the service. You can offer a very low cost per bit on a connection that's very unsteady and is therefore unsuitable for many things users want to do -- such as voice over IP. And finally, a requirement to charge by the bit could spark a price war. You can just imagine the ads from the telephone company: $1 per gigabyte. And then the ads from the cable company: 90 cents per gigabyte. And then one or the other will start quoting in "gigabits" to make its price look lower, and so on and so forth. All Internet providers will compete on the basis of one number, even though there's much more to Internet service than that.

The problem is, small ISPs cannot win or even compete in this price war, especially when -- as is true in most places -- the monopolies backhaul their connections to the Internet and thus control their prices. Again, we wind up with duopoly.

I would submit that the best answer is that, rather than micromanaging ISPs' businesses or trying to dictate their business models or price structures, the FCC should do three things. Firstly, it should make strong rules prohibiting anticompetitive behavior, since this is something nearly everyone agrees on. Secondly, it should ensure that all ISPs have access to the Internet backbone at a fair and reasonable cost -- something which, again, has become harder and harder due to mergers and acquisitions and refusal to deal. (For example, the three fiber

backbones traversing the Laramie valley, once owned by Wiltel, Broadwing, and Level3, are now all owned by Level3 -- which sells access to very large companies such as Cox and Echostar but has been refusing to open a point of presence to sell access to us.) And finally, the Commission should require full disclosure from all parties -- not only ISPs but also content and service providers who try to commandeer users' computers as their own servers. I've laid out a series of basic principles for network neutrality and sound regulation on my Web site at http://www.brettglass.com/principles.pdf. You'll note that the very first principle says that users should absolutely have access to the legal content and services of their choice -- but not in a way that abuses the network or allows third parties to abuse it.

Please consider that document -- which I have also submitted as an attachment to an ex parte memo in the docket -- as a basis for sound regulation that will help, rather than hurt, the cause of true network neutrality.

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