

I. “Express” Checkout at the Grocer, Holiday Air Travel Rates, the “Singles” Lift-Line, the Telephone “busy” Signal, and Other Sundry Traffic Management Tools

Demand for most any service offered to the public will ebb and flow. Finding a seat on an air-carrier the Wednesday before Thanksgiving likely will be more difficult than on any other Wednesday of the year. Telephone network congestion on Mother’s Day is so familiar as to have become a cliché. Power brownouts on hot summer days, extended queues for show tickets on opening night, long checkout lines at the supermarket the day before a winter storm: all are commonplace occurrences when demand for services spikes and resources are strained.

Not all potential consumers of a limited service can make use of it at the same time. When demand outstrips supply, some would-be users must go wanting. Those unmet needs lead to consumer frustration and dissatisfaction with the service provider. As a result, virtually every provider of a service subject to occasional demand overload has some mechanism for reducing consumption at peak periods, minimizing delays when an overload occurs, or channeling demand in such a manner as to speed the provision of service to the majority of users.

In general, the use of some form of traffic differentiation, discrimination, or channeling is non-controversial; indeed, we take the application of these traffic management tools for granted.

For example, it would surprise or offend very few to learn that airlines charge more for seats during peak travel periods, or that subway fares are higher during rush hours. Price discrimination in these cases is an accepted mechanism for shaping demand to accommodate available system capacity. Nor are we generally put out by the fact that the supermarket offers express checkout lines for shoppers with fifteen or fewer items. It strikes us as inherently fair that light users of the checkout resources available get favored treatment so that those whose usage requires more intensive checkout services do not delay them.

Similarly, when a busy signal greets our attempt to call home on Mother's Day we do not file a complaint at the FCC, the "singles" lift lines at ski resorts do not incite consumer riots, and early-bird specials at chain restaurants are all but *de rigueur*. Those who provide services to the public generally use some tool to shape demand for the benefit of all users.

Traffic shaping or channeling by broadband Internet access providers should be no more controversial than the examples provided above. Broadband access is not an unlimited resource. To the contrary, video and other rich media applications are profoundly changing the nature and volume of Internet traffic, straining network capacity. Video applications require between 100 and 1,000 times more bandwidth than static applications involving text, voice, or simple graphics. As video and graphics move to high-definition, many observers believe that web content and applications will grow in data-density by yet an *additional* factor of 10. Internet and IP traffic in the U.S. could grow more than 50-fold by 2015.⁵

The challenge facing providers of broadband access is how to maintain high-speed service for the vast majority of consumers while demands on the network mount. Free Press, *et al.*, and Vuze complain that at least one service provider has answered this challenge by delaying certain peer-to-peer communications. Both posit that this conduct is not designed to protect against network overload, but rather an effort to "censor legal content or discriminate against applications and services that [the network operator] may perceive as competing with [its] offerings."⁶

The negative inference is unwarranted and unsubstantiated. It may be that the kind of peer-to-peer traffic in question involves content or applications that could compete with other offerings of network operators, but coincidence is not causation. To the contrary, peer-to-peer Internet

⁵ See, e.g., Swanson, Bret, and George Gilder. "Estimating the Exaflood: The Impact of Video and Rich Media on the Internet." Discovery Institute. (Jan. 2008).

⁶ Vuze Petition at 2; see also Free Press Petition at 24-25 (suggesting that Comcast has an incentive to discriminate against applications that provide Internet-based video content).

Communications, although still used by a small minority of consumers, is precisely what is increasingly causing network overload.⁷ It is hardly surprising that one or more broadband access providers may have elected to delay or otherwise channel such bandwidth intensive traffic in order to maintain high-speed access services for the majority of their customers.

One might think of this response as analogous to the creation of two “checkout” lines for access traffic: an express line for those whose use typically will not place inordinate burdens on the network, and a somewhat slower line for those who wish to run applications that have the potential to overwhelm the entire network. Alternatively, delaying certain peer-to-peer traffic until the network is less burdened might be thought of as a telephone busy signal, the implication of which is not that the communication may never be completed, but only that it must await an open circuit.

Far from some nefarious plot to undermine the communications of their own subscribers, broadband access providers using traffic management tools to maintain the highest level of service for the greatest number of users simply are mirroring the commercially reasonable conduct of service providers everywhere, in nearly every field.

II. Government Agencies Should Not Dictate the Means Or Manner of Broadband Access Traffic Management.

The Petitioners do not deny that delaying some peer-to-peer communications will reduce network overload. Instead, the Petitioners claim, broadband network operators should use other means to prevent access gridlock. Free Press, *et al.*, suggests that network operators should impose “dynamic quotas” on users, or charge by system usage rather than on a flat rate basis.⁸ Vuze asks that the

⁷ See, e.g., Michael Calore, *Wired* (Aug. 30, 2007) (“ISPs say the looming growth of true peer-to-peer applications threatens to overwhelm them”); *The Economist*, *Technology Quarterly* (June 7, 2007) (p2p applications may overload current network infrastructure).

⁸ Free Press at 29. Alternatively, Free Press suggests that broadband network operators should offer higher symmetric broadband speeds, though it is not clear how that resolves any underlying scarcity problem.

Commission prohibit network management tools from discriminating against particular content or services.⁹

The cold reality, however, is that discrimination is the nature of network management. Whether the service provider is charging more for certain kinds of access, favoring certain traffic, or limiting the service available to any particular user, maintaining a network that can meet the access needs of the vast majority of subscribers at any given time requires some kind of demand shaping. The underlying question is: who is to decide how to best protect the network from overload and ensure the highest quality of services for the most users?

In a market system, and premitting Constitutional limitations, that decision is – and should be – left to the service provider. Although individual strategies or mechanisms may differ, whether it is price discrimination, traffic channeling, favored access, or temporary service denials, service providers generally have a free hand to implement a traffic management protocol that will best meet their customers' demands. The right to make that kind of determination is fundamental to the private ownership of property.

Neither Free Press, *et al.*, nor Vuze has provided any substantial basis for deviating from this general rule in the case of broadband access providers. Both make allusions to the “growing power of network operators” or the supposed “broadband duopoly” to suggest that perhaps there is a market failure justifying government intervention.¹⁰ The facts simply do not support such a hypothesis. Although many still subscribe to broadband services provided either by a cable operator or a wireline communications company, wireless and satellite-based broadband services are available, and consumer choice among providers is growing, not shrinking. Accordingly, as commercial choices for consumers expand, the relative market power of any one broadband access provider correspondingly decreases.

⁹ Vuze at 16.

¹⁰ Vuze Petition at 3; Free Press Petition at 26.

In the face of rapidly increasing competition, better and faster service, and increased service options, Vuze and Free Press, *et al.*, would have the government step in and effectively nationalize the operation of these networks.¹¹ Such an approach would be unfounded as a matter of law and unwise as a matter of policy.

III. The Bandwidth-Quality of Service Mix Cannot Be Mandated From Washington, D.C.

In the last few decades, new high-frequency optical, coaxial, copper, and wireless technologies have dramatically expanded communications bandwidth. Fast digital signal processing and low-noise amplifying have likewise increased capacity. We call this the Information Age for a reason.

Although communications bandwidth is becoming more abundant all the time, *it is not infinite*. For any particular channel, link, or network at any given time, it is possible that demand will outstrip supply.

In many cases bandwidth can act as a substitute for quality of service (QoS), and vice versa. The mix of raw capacity, or bandwidth (which is a physical resource) and of coding and traffic management (which are logical resources) is the very stuff of network architecture and planning. Network architecture decisions are based on a complex interplay of bandwidth technologies, digital technologies, capital and operating expenses, financial projections, and of course the business plan.

The use of buffering, queuing, scheduling, marking, labeling, parsing, replicating, prioritizing, modifying, metering, policing, collision avoiding, packet re-setting, and packet re-sending is becoming ubiquitous. Today's newest communications equipment is specifically designed for ever-more fine

¹¹ Free Press, *et al.*, goes so far as to argue that these networks should be operated for the benefit of those who are not subscribers to the system in question. *See* Free Press Petition at 22. Vuze, for its part, complains of provisions in some service agreements that prohibit conduct detrimental to the network operator. *See* Vuze Petition at 12, n.17. These kinds of suggestions and concerns might be appropriate for public or common carrier networks; they are completely inapposite to networks that are privately funded and built.

grained “traffic management” so that “triple play services”—voice, data, video—and service level agreements—SLAs—can be delivered efficiently and robustly on converged networks. The newest 30-gigabit per second single-chip network processor at the heart of a router or switch has two integrated traffic managers for both ingress and egress ports. This single chip supports functions like: Per Flow Queuing with four level hierarchical scheduling; Per Flow Metering for millions of flows; configurable WRED (weighted random early detection); WFQ (weighted fair queuing) and priority scheduling; and single and dual leaky bucket shaping to control committed, peak rate, and bursts with IFG (inter frame gap) emulation for accurate rate control. Nevermind what this all means. But imagine micromanaging these network functions from Washington, D.C.

Networking technology companies have studied and deployed “traffic management” for many years, many decades in fact. Old and now ubiquitous systems like Ethernet were specifically designed to detect “collisions” and “manage” traffic, though in a rather simplistic way compared to newer QoS methods. When sophisticated new applications exploit the weaknesses of shared systems like an Ethernet LAN or a cable modem network and consume all its bandwidth, it is perfectly reasonable to deploy more sophisticated QoS techniques. Network congestion is not a new phenomenon.

Some opponents of the traffic management techniques under question have proposed that service providers instead use some form of “dynamic throttling.” They assert that the techniques under question—namely packet re-sets—are too crude and blunt. More sophisticated and agile methods should be used, they say. But networks are made of real hardware and software that must last years to recoup large investments. Most networks today do not have the capabilities called for by the critics. Because networks require large capital investments and must last many years, they are at the outset rather capacious. Only as new applications and demands grow does congestion normally arise. Congestion is then relieved through a mix of traffic management and capacity increases. But it is often possible to

deploy traffic management solutions more quickly than it is to build more capacity. Thus in the intervening period, we may see disputes, like the one at question here.

New, more supple traffic management technologies are indeed on the way, but it will take years to deploy them across the world's networks. In addition, it is by no means obvious that the newer techniques will satisfy the critics. Many of the harshest critics of today's relatively crude traffic management techniques have denounced the new, sophisticated, and supposedly menacing QoS technologies. Too crude, or too sophisticated? Which is it? One can only conclude that the critics do not want service providers to be able to manage their networks at all.

With the large capacity demands of video and the bursty nature of data traffic, today's "peak-to-mean" traffic ratios are higher than ever, and will continue to rise. Whether on the old telephone voice network or the original cable TV networks, single-use networks carried one type of data and one type of service. Although telephone call volume waxed and waned, each voice call required the same capacity, and traffic was fairly predictable. No longer. Converged networks with unpredictable bursts and sustained transmissions of everything from text messages to high-definition video require *both* a large expansion of raw capacity *and* very sophisticated quality of service techniques.

Capacious big-bandwidth networks will transcend many of the issues now under debate. As raw capacity expands, more and more applications and users can peacefully coexist. But inevitably, no matter how much new bandwidth is deployed, sophisticated network users employing innovative applications will find creative ways to push the boundaries of capacity on certain network links. Thus, traffic management techniques will continue to play an important roll in broadband networks.

Neither economics nor the law, however, requires service providers to indulge the whims of a small class of customers at the great expense of other paying customers. A large expansion of bandwidth, with accompanying fine-grained traffic management technology, will be very expensive.

Service providers will invest some \$100 billion over the next five years. But the new rules and regulations sought by Vuze and Free Press, *et al.*, would block the service providers, who must depend on Wall Street to fund these massive infrastructure projects, from consummating the broadband expansion. This is the very expansion that would relieve many of the disputes under question. Consumers, especially those with the most voracious bandwidth demands, would be the biggest losers.

IV. Disclosure: Consumer Friendly Information, Not Trade Secrets or Micromanagement from Washington.

Consumer education is one of the best ways to resolve the issue at hand. If consumers have clear knowledge of the product they are purchasing and the terms of service, most, if not all, of the disputes considered here will vanish. In addition to clear terms of service, new applications that measure throughput and service reliability will help consumers gauge the quality of communications products. Consumers should have information about the impact and resulting service quality of a service provider's network policies.

Any rules that forced service providers to divulge particular *methods* of network management would be highly counterproductive. Such disclosures of trade secrets could allow wrongdoers to attack networks in a way that erodes service quality and security.

Broadband communications technologies are advancing faster than almost any technology on earth. Architectures, protocols, equipment, and services are changing constantly. The dispute in question arises because in such a dynamic realm, supply and demand are not always evenly matched at every moment. Resolution will come through better consumer education, more bandwidth, better traffic management, and new pricing plans that reflect the realities of supply and demand.

Resolution will not come through Washington's micromanagement of the exceedingly complex, fast-moving, and exciting Internet economy.

For the foregoing reasons, the Petitions of Vuze and Free Press, *et al.*, should be denied.

Respectfully submitted,

THE PROGRESS & FREEDOM FOUNDATION

W. Kenneth Ferree
President
The Progress & Freedom Foundation
1444 I Street, NW Suite 500
Washington, DC 20005
(202) 969-2943

Bret T. Swanson
Senior Fellow
The Progress & Freedom Foundation
1444 I Street, NW Suite 500
Washington, DC 20005
(202) 969-2943

February 13, 2008