

Net Neutrality and Copyright

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Net Neutrality

I'd like to talk a little about net neutrality. Net neutrality is the idea that all packets are created equal, and that all packets should be treated equally by network operators.

For example, suppose I have a 20 mbit broadband connection; I should be able to receive 20 mbit of bandwidth, from any source. Provided, of course, that the source has enough capacity to transmit at that rate, and my ISP has enough physical capacity to deliver it.

Throttling. Have you heard of Golden Frog? They're a company that runs a VPN service, and recently filed a complaint with the FCC. One of their subscribers noticed very low bandwidth when watching videos over Netflix, over their Verizon broadband connection. They tried watching the same videos over Golden Frog's VPN, and the problems went away.

The implication here: Verizon was throttling streaming video from Netflix. Or, Verizon is throttling traffic from a company that just happens to compete with Verizon's own business offerings. In effect, Verizon is saying "yeah we sold you a 20 mbit connection ... except when your traffic is coming from a streaming video service. In that case, we'll give you 1 mbit, or 0.5 mbit, but not 20 mbit". Or, Verizon is saying "Yeah, we're not going to provide the service that you've already paid for".

Now don't take this as an endorsement of Netflix. They're carrying plenty of baggage around themselves, but I want to focus on net neutrality for now.

Traffic Management. Companies like Comcast and Verizon typically say that network neutrality would hurt their ability to manage traffic. That seems like a fair statement, but in order to make a judgment, we need to know what "managing traffic" means.

Most individual don't use their full bandwidth all of the time; in fact, most of the time, you're probably using a small portion of it. Network operators know this, and they oversell. That's a reasonable thing to do: you can oversell bandwidth, as long as you have enough capacity to meet demand. This is not a new idea – phone companies did the same thing back in the day of analog circuits and switching.

Suppose that something happens to saturate the network. It might be an inauguration ceremony, or the final game of the world cup. If a carrier's network becomes physically saturated, then it's completely reasonable for them to take action to prevent things from grinding to a halt.

These are "unusual circumstances", and they're outside the net neutrality argument. Net neutrality is concerned with what network operators do, when traffic levels are well within the physical capacity of their network. We're concerned about ISPs throttling traffic when there is no technical reason for them to do so.

Dialup, DSL, and Net Neutrality. I will make the case that net neutrality is what allowed the internet to become popular. In the old days, we connected to our ISPs with dial up. This was data encoded as audio, transmitted over plain old telephone service. I might spend 3–4 hours a day on a dialup connection; much longer than I'd spend talking on the phone. That increased demand on the telcos. But, since the telephone companies were classified as title II common carriers, they couldn't discriminate against data traffic traveling over the phone lines.

After dial-up, DSL was a popular way to connect. This was digital data transmitted over copper wire, typically at a few mbps. But again, since the phone companies were common carriers, they couldn't discriminate against DSL traffic being sent of copper phone lines.

Broadband is categorized as an "information service", rather than a "telecommunications service". Which means that broadband providers aren't common carrier, and the *are* allowed to discriminate.

Effect on Internet Broadcasters. So far, we've focused on the consumer side of

things; I'd like to switch gears, and talk about internet broadcasters. Let's go back to Verizon and streaming video services. Verizon, in an effort to produce value for their shareholders and executives, might try to get a little extra money out of (*insert name of streaming service here*). "Nice little streaming service you've got there. Be a shame if something bad happened to it".

A big, well funded company (for example, Netflix), might be able to pay this "protection money". But what about companies that don't have such deep pockets? Startups can fall into this category, but so can independent media. When I say "independent media", I'm thinking of organizations like TOUCHFM (a streaming radio station in Dorchester), and community access TV: ACMI (Arlington), BNN (Boston), CCTV (Cambridge), SCATV (Somerville), and so forth. They're community-based broadcasters, and some of them run on volunteer time and a shoestring. They also fill local niches that large media companies tend not to serve. I've spoken with people in community media, and they're very concerned about net neutrality. They see how it can potentially affect them, and the relationship between their broadcast service, and the people they're trying to reach.

Economics. There's another closely related issue: broadband availability and affordability.

The OECD is the Organization for Economic Co-Operation and Development. There are (I believe) 34 member countries, mostly from North America, Europe, and Australia, but also from South America and Asia. OECD publishes economic data from member countries, and they have an entire category on broadband services.

From <http://www.oecd.org/sti/broadband/oecdbroadbandportal.htm>:

- US is 21st in median download speeds (13 mbit)
- US is 13th in average download speeds (48 mbit)
- US is 16th in broadband penetration (30 broadband connections per 100 inhabitants)
- South Korea has the highest median download speed (75 mbit)
- In the 30 mbit category, we have the 4th highest cost per month: \$73
- in the 45 mbit category, we have the 4th highest cost per month: \$89.82.
- Korea is least expensive in the 30, 45 mbit categories: \$16.35/month
- Countries where broadband is more expensive: Turkey, Chile, Mexico

To summarize, we're in the upper half (average speed), or lower half (median speed), and we're one of the most expensive places in the world for broadband. Internet access is becoming essential for many things; what does this mean for people who can't afford it? It's becoming a class issue: there are haves and there are have nots.

Copyright

The Printing Press. Before the invention of the printing press, books were copied by hand. Usually by monks in monasteries. Books were really expensive, and only very wealthy people could afford them.

Towards the end of the 15th century, Gutenberg invented movable type and the printing press. This made it much less expensive to copy a book. The church and the monarchies didn't like this. People might print things that the church (or the king) didn't approve of. Or even worse, they might learn how to read.

The church spoke out very strongly against the use of printing presses. One of their arguments: how will the monks get paid?

France banned printing presses, and printing shops sprang up all around the French border. Kind of like liquor stores on the MA/NH border. You'd have your printing done outside of France, and smuggle it in. The policy didn't work very well.

The origins of copyright. The English came up with a different strategy. Rather than banning printing presses, your work had to be authorized for printing. The London Company of Stationers was given a monopoly for deciding what got printed, and for doing the actual printing. This monopoly was called *copyright*. The English monarchy had extensive say over which works would be authorized for publication.

That's how copyright got started – it was a form of censorship.

Technology and the Content Industry. The copyright industry has never taken well to technological advances. We've already talked about the printing press, but there are plenty of other examples.

- Recorded music was a scandal. If people can buy a musical recording, then who will ever go to see live music?
- Radio was a scandal. If people can hear music for free (on the radio), then who will ever buy a sound recording?

- Libraries were a scandal. If people can read books for free, who would ever buy a book again?
- Videocassette recorders were a scandal. Universal Studios sued Sony over the introduction of their Betamax video tape recorder. Universal claimed that taping things from television amounted to making an infringing copy. The supreme court ruled in Sony's favor, finding that Betamax offered substantial non-infringing uses.

What was Universal's concern? People taping movies that aired (for free) on broadcast TV, and watching them later.

Copyright Clause. The US constitution's copyright clause reads:

To promote the Progress of Science and useful Arts, by securing for limited Times to Authors and Inventors the exclusive Right to their respective Writings and Discoveries.

(From Article I, which enumerates the powers of congress).

That's the purpose of copyright: *to promote the progress of Science and useful arts*. It doesn't say anything about publishers, or about making money. The whole purpose was to foster the growth of culture, and the spread of knowledge – for the public.

Music Industry and copyright law. Computer science is my second career. My first was music. At music school, I took courses about the music industry and contract law. Main lesson: record labels have never been interested in paying artists, they are only interested in making money. Period. This was pre-internet, when we used audio cassettes to share music with our friends.

The next time you hear the phrase “how will the artists get paid”, ask yourself “what aspect of the internet brought such a change in morality to the music industry”.

I see two big problems with current copyright law. First, copyright law is designed to benefit *copyright holders* – not authors, not creators, and not the general public. Once upon a time, (book) publishers wanted laws to prevent other publishers from copying and selling their books. But with the internet, everyone's a publisher.

Second, the content industry still tries to follow the model of mutual exclusion. You buy a CD or a record; you have it and the seller doesn't. If you give the CD to your friend, then they have it and you don't. The internet doesn't work that way. It's a terribly efficient copying machine. I love the way Bruce Schneier put it: trying to make bits less copyable is like trying to make water less wet.

DRM and copy protection. DRM is one of the worst outcomes of trying to apply pre-internet copyright models to digital technology. The technical measures they use for enforcement amount to malware.

- in 2005-2007 Sony/BMG essentially installed rootkits on CDs, to prevent copying. There were class action lawsuits, and Sony BMG had to replace the CDs with non-rootkit versions.
- Thomas Hesse, Sony BMG's Global Digital Business President, said: "Most people, I think, don't even know what a rootkit is, so why should they care about it?"

Adobe is the latest company to have a DRM fiasco. Their e-reader software (Adobe Digital Editions) "phoned home" with

- your local username, since DRM-encumbered media is generally licensed to a single person
- some information about the device the the e-reader was running on, since DRM-encumbered media is generally licensed to a particular device
- The book you're reading, since the books are licensed
- GeoIP information. Some DRM agreements vary based on the country where the reader is located. So in order to ensure compliance, Adobe needs to know what country you're located in.
- The amount of time you spent reading. Since some DRM models are time/usage based.
- The pages you read, and the total number of pages. Some DRM models allow for pro-rating, based on the number of pages read.

Adobe was collecting this information, regardless of whether DRM was in use. They were also sending this information to their servers in the clear, over HTTP. Adobe "fixed" reader, to submit usage data over HTTPS, and only when you're reading a DRM protected work.

I don't know if Adobe limited the scope of collection to information that's applicable to the particular DRM usage model.

And that's one of the biggest problems with DRM: in order to enforce it, you have to resort to malware, or intrusive surveillance.