

# **Network Management and Consumer Expectations**

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for the **Federal Communications Commission**

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Thank you for inviting me to speak on this panel.

For the past 25 years, I've been working on Networking protocols, products and platforms, starting as a hobby and eventually, as a profession. I've worked on projects ranging from Amateur Radio packet BBS systems, to one of the first commercial ports of the NCSA Mosaic browser to scalable datacenter servers. Over the years, I have been responsible for ensuring that numerous networking products behaved according to established Standards.

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Another hobby of mine is barbershop harmony.

Over the years, I had collected samples of printed and recorded musical history, in the old-time Barbershop Quartet style. While trying to use the Peer-to-peer networks to share this with others, I found that I was completely unable to upload any of it on the Gnutella network.

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Using packet traces and end-to-end comparisons between Comcast and non-Comcast connections, I concluded that TCP Reset flags were being used to tear down P2P connections when the uploading peer was on the Comcast network.

Investigating this technology further, I found that it was nearly universally despised – it's the same method used by "The Great Firewall of China." Dr. Sally Floyd, wrote a paper which the IETF later adopted as a "Best Current Practice," demonstrated that TCP resets used for network management are both rare and harmful (BCP 60, "Inappropriate TCP Resets Considered Harmful").

As technologists are apt to do, I publically posted about my findings and described my tests and results. My findings have since been independently verified, have been covered in thousands of press articles, and are at the heart of these hearings on these practices.

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The impacts of an ISP behaving this way strike at the heart of the ability to innovate on the Internet. At the February hearing, David Reed told you that, "Providing Internet Access implies adherence to a set of standard technical protocols and technical practices that are essential for the world-wide Internet to work for all its users." The entire Internet community counts on that fact, every day.

I have to know, as a developer, that the Web Browser that I am developing in a lab in Santa Monica, California will work on an ISP anywhere in Africa. As a consumer, I expect that Slingbox, which was developed in Israel, will work on my Cable ISP in Hillsboro, Oregon.

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Consumers and the Internet community were harmed when Comcast offered “High Speed Internet” yet secretly delivered something much less and different.

Consumers obviously got significantly less product than they purchased; and they applications they tried to use did not work correctly. The developers were also harmed, as they down user issues that they could not reproduce to debug.

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This situation continues today. It has not stopped.

Using RST flags to tear down established and working TCP connections is an extreme act, having no place in Reasonable Network Management.

Comcast’s interference occurs during all hours of every day, a fact which does not jive with the idea that it is somehow responding to rare moments of congestion.

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As a ham radio operator, I see this simply as – without regard to the Network Neutrality implications – a jamming complaint.

The FCC usually does a fantastic job of putting active jamming activity on the top of their list, however this period of jamming has continued from sometime in 2006 until present day – and this “Jammer” assures us that he’ll stop when he’s damned good and ready to change his ways to something else yet to be determined – hopefully by the end of the year.

This is both unprecedented and unacceptable. The FCC should take immediate action, today if possible, to stop Comcast from using this technology any longer.

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The various complainants in this case have asked for certain relief. Considering those requests seems to be the appropriate and logical next steps in this case.

In such that we have a case of under-delivery of services, restitution is in order.

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Most importantly, the FCC needs to prepare. The advent of high-speed Deep-Packet-Inspection hardware such as that used by Comcast opens up a whole new set of capabilities – many involving changing the behavior or even the content of Internet messages.

These products are in the field, now.

Technology like this is nearly impossible to detect. For the integrity of the Internet “product,” there needs to be a way to monitor and protect it.