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Comcast, BitTorrent, the FCC, and *You*:

What the FCC's decision means for your network

Background

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Introductory Remarks

- **Why have this session?** FCC has outlined important concepts that will shape future governance.
- **Does this really apply to me?** If it doesn't today, it will.
- **Caution:** *I may be a lawyer, but I am not your lawyer.* Today's session is meant to introduce you to the FCC's Comcast Order, one view of what's to come, and some of the best practices that ImageStream recommends, *not* to create any lawyer/client relationship.
- **None of these remarks should be taken as legal advice**. Please consult a qualified attorney for legal advice on managing your business!

Session Roadmap

- Survey of Session Attendees
- Network Neutrality Defined
- What's the Big Deal?
- The FCC's Decision in the Comcast complaints
- Best Practices
  - Quality of Service policy design
  - Quality of Service policy disclosures
- Legislative Enforcement

If you remember nothing else…

- **A general policy point:** "Network Neutrality" is not now, nor was it ever, the status quo on the Internet
- Monopoly power among Internet providers has never materialized, and is far less likely to emerge now than it was in 1994.
- If you must fear monopolies, fear:
  - content provider monopolies
  - the DMCA
  - Google's control of advertising market
- **Remember:** *Content* drives *Internet access*

Attendee Survey

- Content management
  - Spam/Spyware/Virus Filtering
  - Content Filtering
- Advanced/Converged IP Services
  - VoIP
  - Video
- Quality of Service
  - DPI, Layer 7 analysis/filtering
- Terms of Service
  - Bandwidth limits?
  - Exclusions/Limitations?
  - Disclosure?

What is Network Neutrality?

- Literally under Section 202(a) of the Communications Act of 1934, as amended, providers of traditional telecoms services in the United States may not:

- "make any unjust or unreasonable discrimination in charges, practices, classifications, regulations, facilities, or services . . . or . . . make or give any undue or unreasonable preference to any particular person, class of persons, or locality . . . ."

What is Network Neutrality?

Depends on who you ask!

The principle that Internet users should be in control of what content they view and what applications they use on the Internet.

Google

If I pay to connect to the Net with a certain quality of service, and you pay to connect with that or greater quality of service, then we can communicate at that level.

Tim Berners-Lee, Inventor of the WWW

…the role that government should take relative to Internet access providers providing multiple levels of service for different fees.

Wikipedia

This term has become a nebulous catchall for a number of competing public policy issues.

Sen. Jim DeMint

The only way . . . to attract the . . . capital needed to build out these networks is to strike down governmental entry barriers and allow providers to realize profits.

Verizon

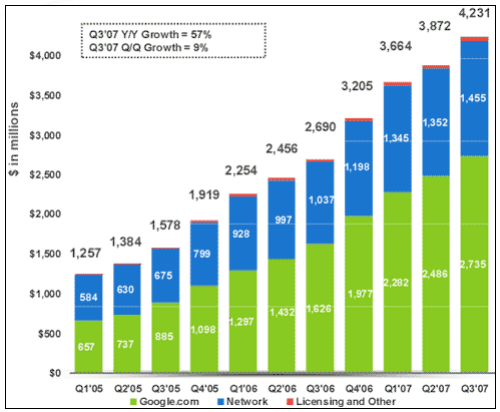
So what *is* Network Neutrality then?

- Essentially, Network Neutrality is:
- one view of how things ought to be (but not how things are or ever were)
- a policy statement of "non-interference"

Why does this matter to me?

- If:
  - the Internet isn't neutral by common definitions
  - no one can agree on what "neutrality" even is
  - the Internet is still growing anyway
- Then, why should I care? Why does the FCC care?

- Money
  - Providers (ISPs, content) want to make more of it
  - Some companies make enough to lobby the government to help them make more
  - (…and everyone wants Google's money)

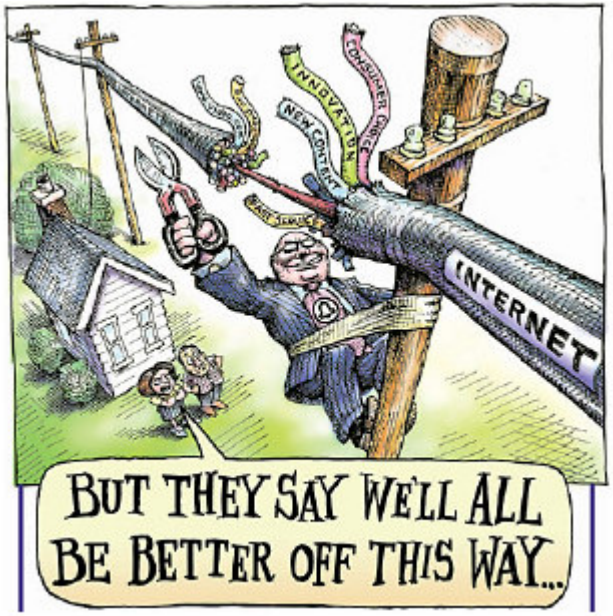


Why does this matter to me?

- O.k., it's not just money—everyone wants the best deal.
  - Customers
  - Providers
  - Google
  - Politicians
- What are the problems then?
  - Poisonous debate
  - Rogue actors (Comcast, Madison River)
  - Potentially Dangerous FCC intervention
  - Misguided Congressional legislation

Poisonous Debate

Regulation stifles innovation



The telcos stifle innovation

Does either stifle innovation . . . or could either encourage it?

Government Regulation

Government regulators have been screwing up the Internet for 100 years

100 years?

". . . messages received from any individual, company or corporation, or from any telegraph lines connecting with this line at either of its termini, shall be impartially transmitted in the order of their reception, excepting that the dispatches of the government shall have priority . . ."

-An act to facilitate communicate between the Atlantic and Pacific states by electric telegraph.
Pacific Telegraph Act - 37th Cong. (1860)

In other words: Network Neutrality[1]

[1]Unless we decree otherwise

Government Regulation

Government regulators have been screwing up the Internet for 100 years

". . . backbone services are provided to support open research and education in and among US research and instructional institutions, plus research arms of for-profit firms when engaged in open scholarly communcation and research. Use for other purposes is not acceptable."

-Early 1990s NSFNet (Government-run precursor to the commercial Internet) Acceptable Use Policy

In other words: Network Neutrality[1]

[1] subject to certain nebulous and undefined terms and conditions, including a prohibition on making money from this thing. Except as stated herein, We make no representation and gives no warranty with respect to the accuracy of any information found or displayed on the Network. We will not be held responsible for the accuracy of such information and that this information is being provided to you on an "as is" basis. Therefore the content of this Network, whether in part or in whole, shall not constitute any part of a contract unless expressly agreed in writing by Us. We accept no responsibility for any loss or damage you sustain by using any information or data on this Network. We specifically disclaims all warranties, either express or implied, including, but not limited to, warranties of merchantability, fitness for a particular purpose and non-infringement, and those arising from a course of dealing, usage or trade practice. Local blackout rules in effect. Void where prohibited. **Do not eat silica gel. It is not a packet of chiclets.**

The Pre-Comcast Landscape

- FCC's "Four Freedoms" became 3 freedoms
  - What happened to disclosure/information?
  - Is there a fundamental right to choose platform, service, and application? Some subset?
- Regulation?
  - The "Internet Freedom Preservation Act"
  - FCC Regulations
  - React only to "harmful" activity?
- Do nothing . . . (solution in search of a problem)
- The "reasonable network management" loophole

FCC's 2007 Broadband "Inquiry"

- Early 2007: FCC seeks information concerning practices
- Late 2007: Watchdogs Free Press and Public Knowledge file FCC complaint alleging FCC "secretly degrades" BitTorrent
- The "reasonable network management" loophole
  - Comcast alleges it has right to manage network, deter overuse, battle congestion

What Comcast was doing

- In 2006 and 2007, Comcast deployed Sandvine switches
- Sandvine partially blocked P2P protocols (Ares, BitTorrent, eDonkey, FastTrack, Gnutella) using TCP resets
  - Why did BitTorrent get all the attention?

Protocol	Ratio Bi:Uni	Session Equivalence[11]	Uni Threshold	Notes
Ares	(N/A)	150	150	Many overhead flows exist for signaling, using little or no bandwidth. The session limit is set higher to account for this. Ares is typically used for small files.
BitTorrent	~20:1	~160	8	High ratio of bidirectional to unidirectional flows. The bidirectional to unidirectional ratio varies. Typically used for large files.
eDonkey	~.3:1	~42	32	Low ratio of bidirectional to unidirectional flows. Used for large files.
FastTrack	(N/A)	24	24	Typically used for large files.
Gnutella	(N/A)	80	80	Typically used for small files.

FCC's August 20 Order

- Prior to ruling, Comcast agreed *voluntarily* to change to "protocol agnostic" management
  - Why?
    - Filings show Comcast's blocking was **ineffective**!
    - 50% of upstream bandwidth still P2P
    - Sandvine method easy to defeat:

```
iptables -A INPUT -p tcp --dport <#> --tcp-flags RST RST -j DROP
```

    - Seeing the writing on the wall…
- FCC orders Comcast to:
  1. *Stop discriminatory practices by end of 2008*
  2. *Disclose details of practices to FCC within 30 days*
  3. *Disclose details of new practices to FCC and customers*

FCC's August 20 Order

- Factual findings
  - *Smoking gun*: Comcast used deep packet inspection to a) monitor connections and b) block specific types of P2P traffic
  - *Misleading the Commission*: Comcast had denied its tactics until presented with irrefutable evidence by AP and EFF
  - *Not "Congestion"*: Comcast's practices were not based on congestion or actual network harms

An Important Loophole Closes: FCC says: Comcast's activity did ***not*** violate FCC rules or Comcast's own terms of service!

FCC's August 20 Order

- Legal/Regulatory Findings
  - Comcast
    - impeded consumers' ability to run own applications
    - discouraged "development of technologies" like P2P
    - had anticompetitive motives
    - implemented "invasive" rather than "minimally intrusive" practices
    - exacerbated the problem by failing to disclose practices

FCC's August 20 Order

They can't do this! They have no jurisdiction!

- This was Comcast's argument
- Federal court appeal alleges both jurisdiction and due process issues

- FCC jurisdiction based on:
  1. Section 230(b) of the Communications Act of 1934
  2. Section 706(a) of the Act
  3. 2005 Internet Policy Statement and Wireline Broadband Order

FCC's August 20 Order

Well, surely, I'm OK, right?

I'm not Comcast. My customers love me!

- FCC Wireline Broadband Order:

  "Should we see evidence that providers of telecommunications for Internet access or IP-enabled services are violating these principles, we will not hesitate to take action to address that conduct."

- Any *one* customer can file a complaint

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American Recovery & Reinvestment Act of 2009

- *Applies to stimulus grantees only*
  - But…$7.2 billion to be spent on broadband initiatives
- Requires compliance with 2005 Broadband Order
- Government must publish non-discrimination, network interconnection obligations of contracts
- FCC currently accepting comments
  - Docket No. 09-51
  - Deadline: June 8, 2009 (July 7, 2009 for replies)

Tiered Pricing, Meaning of “Access”

- April 1: Time Warner announces tiered access
  - Abandoned (for now) on April 16
  - Senator Charles Schumer (D-NY)
  - Congressman Eric Massa (D-NY)
    - "Broadband Internet Fairness Act"
- April 8: FCC Notice of Inquiry
  - Docket No. 09-51
  - Asks how FCC "should evaluate the term 'access' with certain basic consumer expecations in mind"

Takeaway Points

The FCC's Order:

1. Firmly establishes FCC jurisdiction
2. Establishes that *any* member of public impacted can file complaint
3. Providers *must give clear notice* to users
4. Establishes *very* low bar to prove blocking/degradation. Burden is on *provider* to justify or explain.
5. Establishes *very* high bar for justification as a "reasonable network management" practice

Three "FCC-Approved" Tools

- Impose caps, charge overage fees
- Throttle connection speeds of high-bandwidth users
  - NOT based on mere *use* of P2P or other applications
- Work with application vendors

Although Comcast did all these things…FCC still required more: ***DISCLOSURE***

Best Practices Post-Comcast

- FCC Order requires a "tight fit" between QoS practices and network management goals
- Activity must be "carefully tailored to . . . easing network congestion"

- ***Not acceptable:***
  - Affecting customers based on "disfavored application"
  - Employing QoS when congestion not prevalent
  - Exempting some applications in times of congestion
- ***Acceptable:***
  - Application/content-specific practices, if carefully tailored

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Best Practices: Treating Content & Users Differently

- Is disfavoring P2P still permissible?
  - Yes! Standard relative to "best effort"
  - Limited, especially if not clearly disclosed

Key concepts:

- Quality *enhancement* v. Quality *reduction*
  - OK: “enhanced” service to selected users, applications
  - NOT OK: “reduced” service to disfavored users or applications
- FCC implies strong preference for either:
    - Content-agnostic, network-wide tools
    - Content-specific, customer-by-customer tools
      - Quality *enhancement* probably o.k.
    - **Best practice: combination of both**

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Best Practices: Treating Content Differently

Quality *reduction* options

- Virtually impossible to show "narrow tailoring"
- Likely needs to be aligned with business model

Quality *enhancement* options

- Always relative to the "neutral" default of best effort
- *Congestion triggered*
- Without a fee
  - Based on user preference
  - Network-wide
- For a fee
  - *Available to all* at a posted price
  - *Available to all* at prices dependent on user or content
  - Available to some by exclusive contract

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Best Practices: Treating Content Differently

Blocking options

- By source, consumer, content/application
- FCC: delay=blocking
- *Must* be narrowly tailored:
  - Spam, virus, spyware OK if disclosed
  - Port 25 OK if disclosed
  - Business model OK if disclosed
- Blocking illegal activity always OK

- *Delay, blocking NOT "reasonable network management"*

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Best Practices: Treating Users Differently

Charge for usage

- "FCC-approved" in Comcast Order
- Widely used by mobile phone companies
  - Return to the days of dial-up?
- Most effective: with quota + overage charges
  - Goal: capture top 10-20% of users
  - Comcast
  - AT&T Wireless

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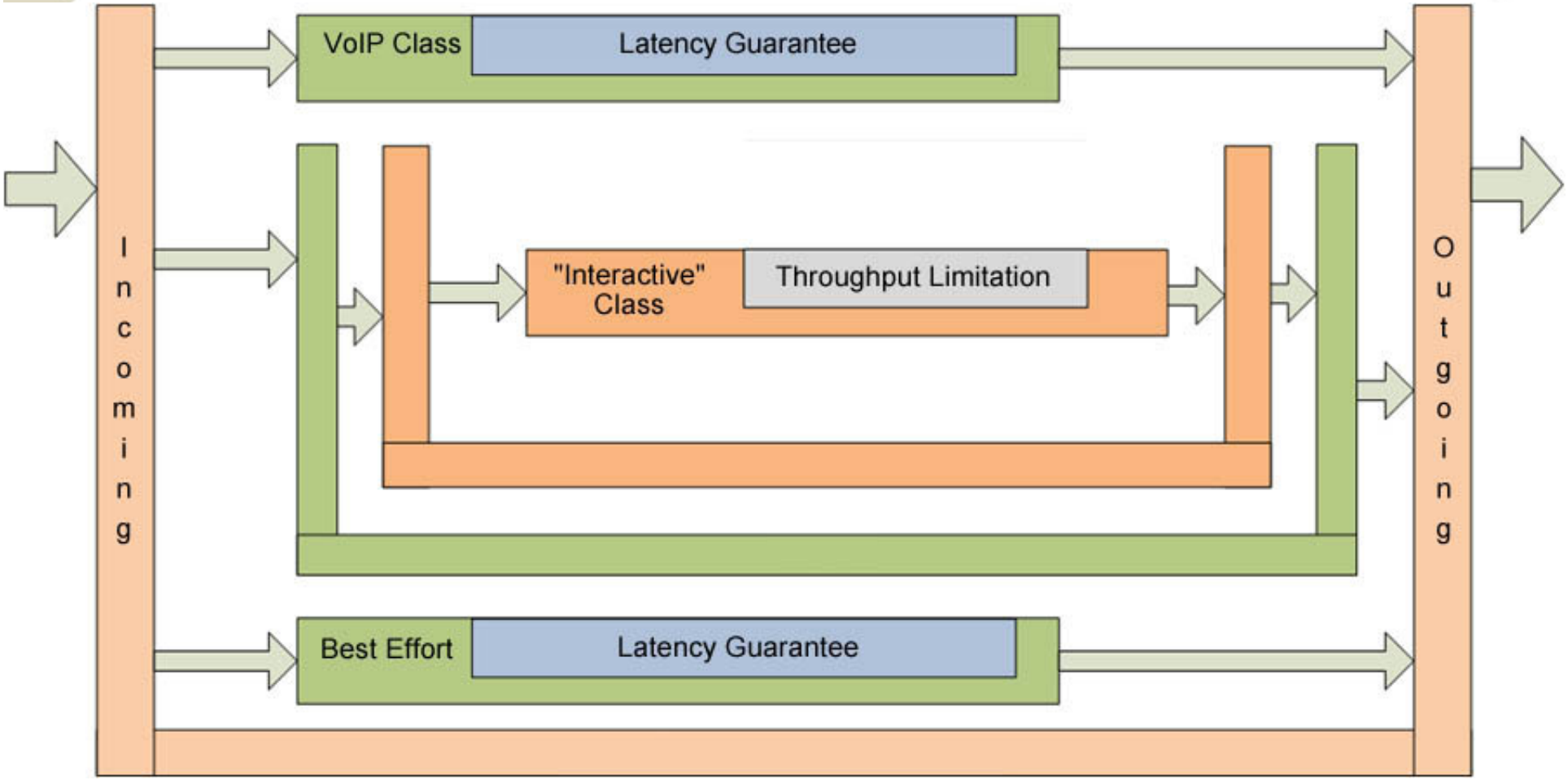
Best Practices QoS Example



Quality of Service Disclosures

- **Disclosures should accomplish 3 goals:**
  - *Notice*: Conspicuous, prominent postings; oral or written disclosure by sales staff; proactive updates
  - *Choice*: Penalty-free cancellation after trial period; rights to reject changes; rights to select QoS regimes, if available
  - *Education*: easily understandable, accurate information about policies, applications
- **Disclosure should include 4 categories:**
  - *Classification, policing, queuing, shaping*
  - Expands on guidelines in RFC 4084

Sample Quality of Service Disclosure

Network Traffic Management Disclosure

Maximum bandwidth **• Download** **• Upload**	 5 Megabits per second (Mbps) 1 Megabit per second (Mbps)
Maximum data transfers **•Total Data Transferred Per Month** **• Overage charges**	 120 Gigabytes (GB) 5¢ per Megabyte (MB)
Traffic Policing (implemented at all times)	Outbound (sending) e-mail through external mail servers* "Spam," virus, phishing e-mails identified by our e-mail security systems NETBIOS and IPX protocol traffic
Traffic Classification (implemented during Network Congestion Periods)**	*Voice over IP (VoIP) Connectivity*: To ensure Internet voice call quality, regardless of voice provider *Web Connectivity*: To ensure minimum standards for an interactive Web site browsing experience *Best Effort Connectivity*: All other traffic, regardless of content
Traffic Queuing (implemented during Network Congestion Periods)**	*Priority #1*: VoIP: Our network attempts to maintain a latency of less than 50 ms across our network, the minimum required for a clear-sounding voice call, by limiting the amount of data queued for transmission *Priority #2:* Web: No queuing policy *Priority #3:* Best Effort: Our network attempts to maintain a latency of less than 150 ms across our network by limiting the amount of data queued for transmission
Traffic Shaping (implemented during Network Congestion Periods)**	*Priority #1*: No bandwidth limits *Priority #2*: Web: Up to 50% of network capacity, as needed *Priority #3*: Best Effort: All remaining network capacity

*To protect you and our network against spam, virus, or phishing e-mails, our network will *block* attempts to send e-mail using the SMTP protocol to mail servers not located on our network. This restriction **does not** affect your ability to send e-mail using the servers we provide, and **does not** affect Web-based e-mail or e-mail sent using a VPN or other remote connection service.

** A "network congestion period" occurs only when the total traffic on a portion of our network exceeds 95% of capacity. Our network **does not** implement traffic classification, queuing, or shaping at any other times.

Recent Draft Legislation

- " Broadband service providers" (poorly defined in 1934 Act, as amended) would be subject to the following requirements relating to "customer freedoms" (undefined)
- IFPA, Sec. 12(a)

  Service providers may not "block, interfere with, discriminate against, impair, or degrade" . . .
  - *None of the terms are defined*
- IFPA, Sec. 12(b)

  Sec. 12(a) can be ignored for security (similar to "reasonable network management" in Comcast complaints), "consumer protection services," terms of service breaches, or as required by law
  - *Only "consumer protection services" are defined*

- IFPA, Sec. 12(a)(3): Nebulous, undefined . . . but perhaps on the right track

  Providers must "provide and make available to each user information about such user's access to the Internet, and the speed, nature, and limitations of such user's broadband service"

Legislative Enforcement Problems

- "Sinister Cable"
  - Introduces jitter, latency to purposely delaying a content service
  - Can hide it easily
  - Can claim that shared architectures, normal transient Internet issues, or even software bugs cause the problem

- "Neutrality Internet Company"
  - Allows VoIP, video to commingle with data traffic
  - Makes no provisions for service differentiation or quality of service
  - Streamed applications fail to work well, delaying a content service

- *To regulators, both look the same!*
- FCC must read minds? Not likely . . .
- Should FCC guess? Everyone loses (remember the 1996 Telecom Act?)