



# Understanding Net Neutrality

A Technical, Regulatory,  
and Consumer Perspective

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# What is the Electronic Frontier Foundation?

- Nonprofit founded in 1990
  - 75% of funding from individual donations, 20% from foundations 5% from companies
  - 80 people: Lawyers, activists, technologists

- Primary Issues:

-  Free speech
-  Intellectual Property
-  Innovation
-  Privacy
-  Transparency



# What IS Net Neutrality?

- Internet “fast lanes”
- Peering/interconnection agreements
- CDN agreements
- Zero-rating
- Open access
- Data caps
- Traffic blocking/interference



# What IS Net Neutrality?

- **Global NN Coalition:**
  - “Net neutrality requires that the Internet be maintained as an open platform, on which network providers treat all content, applications and services equally, without discrimination.”
- **Public Knowledge:**
  - “The principle that the company that connects you to the Internet does not get to control what you do on the Internet.”
- **Me:**
  - “Don’t mess with my Internet traffic without my permission!”





# What IS Net Neutrality?

- **FCC Definition:**
  - No blocking
  - No throttling
  - No paid prioritization



# Why is this a big deal?

- **ISPs have interfered/are interfering with traffic**
  - Outright blocking (AT&T and FaceTime)
  - Discrimination (Charging for tethering)
  - Throttling (T-Mobile's Binge On, and now Verizon, AT&T, and Sprint too)
  - Traffic interference (Comcast and BitTorrent)



# Blocking: AT&T and FaceTime

- Jun 2012 – Apple announces FaceTime available for use over cellular networks
- Aug 2012 – AT&T announces that only MobileShare plans could use FaceTime
  - Verizon and Sprint allow all customers to use FaceTime
- Nov 2012 – AT&T relents, allows FaceTime on tiered data plans
- May 2013 – AT&T blocks video chat on Google's updated hangouts
- Jun 2013 – FaceTime finally allowed on all plans



# Blocking: AT&T and FaceTime

- **AT&T's blocking:**
  - Had nothing to do with amount of data used
  - Had nothing to do with congestion levels
  - Based purely on kind of data plan
- **Translation:**
  - Pay AT&T more, or they won't let you use your data the way you want to





# Discrimination: Tethering

- Many mobile ISPs forbid tethering or charge more for it in many of their plans
- Tethering discrimination is unconnected to the amount of data or bandwidth used
- Translation:
  - Pay us more if you want us to carry bits from certain devices



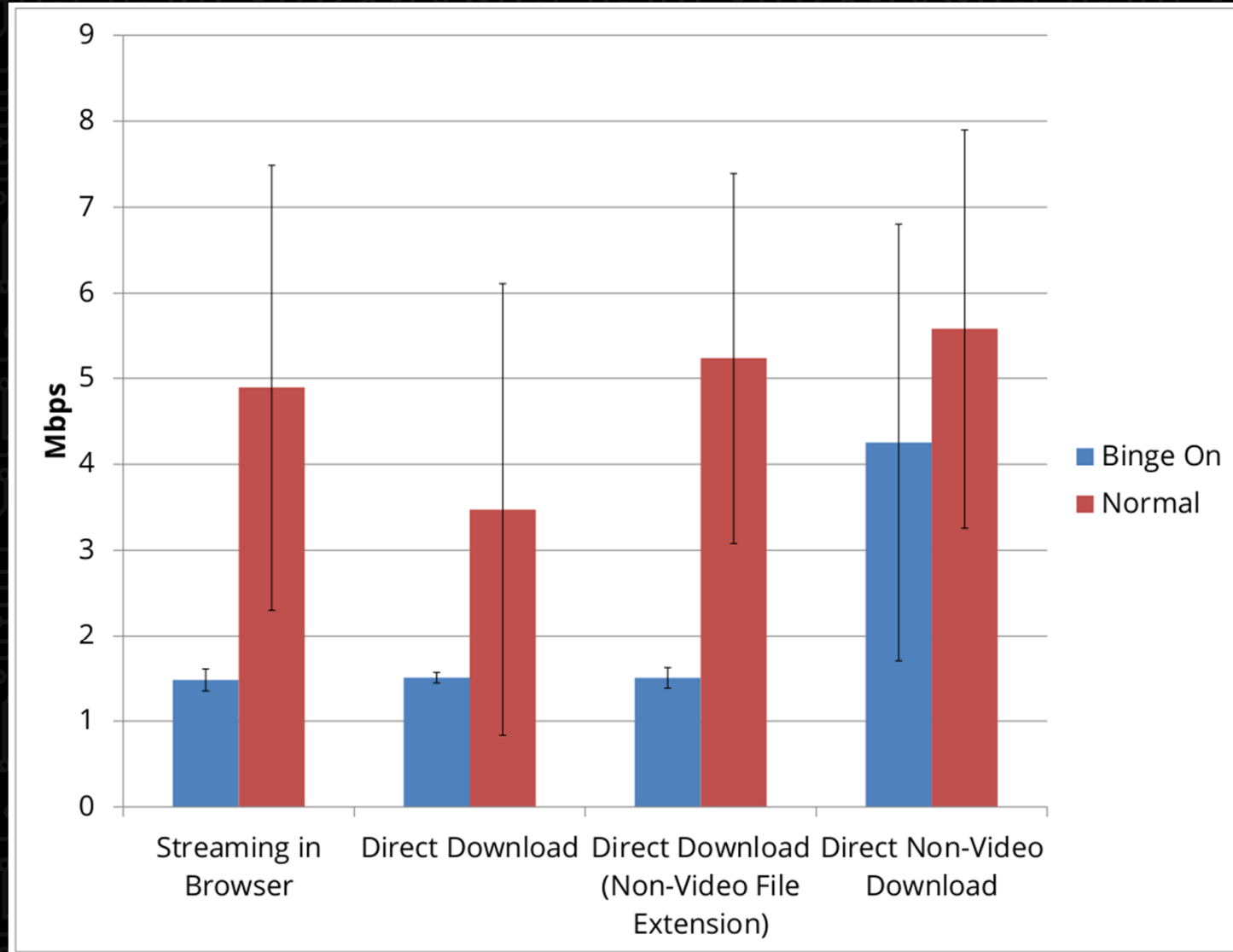
# Throttling: Binge-On

- T-Mobile plan to zero-rate video from certain providers
- Enabled by default for all T-Mobile customers
- T-Mobile claimed that it
  - “utilizes streaming video optimization technology throughout its network to help customers stretch their high-speed data while streaming video”



# Throttling: Binge-On

...except  
our tests  
showed  
that  
wasn't  
true





# Throttling: Binge-On

- **T-Mobile throttled all video traffic it could detect**
  - Even downloads
  - Also targeted some encrypted video
- **Relied on the video server to adapt the bitrate**





# What's Wrong With Binge On?

- Transparency
- Defaults matter
- Throttling traffic by type
- Zero-rating
  - Creates a walled garden
  - Dis-incentivizes encryption
- It doesn't work
  - Researchers showed how to use it to get unlimited free data



# Mobile Throttling

- T-Mobile: \$10/month extra to have non-throttled video
- Verizon: \$10/month extra to have non-throttled video
- AT&T: \$30/month extra to have non-throttled video



## Traffic Interference: Comcast & BitTorrent

- May 2007 – BitTorrent users on Comcast notice problems
- Sep 2007 – Comcast assures EFF it does not deliberately interfere with particular protocols
- Oct 2007 – EFF publishes an investigation, showing Comcast is injecting forged RST packets into BitTorrent TCP sessions
- Nov 2007 – Comcast still claims they're only “delaying” traffic



# Traffic Interference: Comcast & BitTorrent

- August 2008 – FCC orders Comcast to stop
- September 2008 – Comcast challenges
- April 2010 – D.C. Circuit rules in favor of Comcast

FCC realizes they need to  
change the regulations





# Why the FCC Created Net Neutrality Regulations

- **ISP behavior kept getting worse, not better**
  - Blocking
  - Discrimination
  - Throttling
  - Interfering
- **Competition wasn't happening**
  - As of 2016, more than half of Americans have only one fixed broadband provider



# A Brief History of Net Neutrality Regulation

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# A Brief History of Net Neutrality Regulation

- Dec 2010 – FCC releases first Open Internet Order, without reclassifying broadband; Verizon challenges
- Jan 2014 – D.C. Circuit strikes down first Open Internet Order, saying FCC can't impose common-carrier rules without reclassification



# Reclassification?

- **Information Service – Think AOL or Prodigy or Compuserve**
  - Offer the capability to store, transform, process, retrieve, etc. information via telecommunications
  - Limited regulation allowed
- **Telecommunications Service – Think modern ISPs**
  - Offer to transmit data to wherever the user wants without changing the content
  - More extensive regulation allowed







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# A Brief History of Net Neutrality Regulation

- Mar 2015 – FCC releases second Open Internet Order, this time reclassifying broadband and forbearing from most rules; order is challenged
- Jan 2017 – Trump sworn in, FCC goes from 3 Democrats and 2 Republicans to 3 Republicans and 2 Democrats
- Dec 2017/Jan 2018 – FCC repeals Open Internet Order



# Why the FCC Repealed Net Neutrality Regulations

- Reclassification was “heavy-handed, utility-style regulation”
- “Broadband investment has fallen for two years in a row”



# Was reclassification “utility-style regulation?”

- **FCC only kept regulations about:**
  - Customer privacy
  - Disability access
  - Access to poles and rights-of-way
- **FCC forebore from all other regulation**
  - No regulations about prices
  - No regulations about taxes
  - No regulations about interconnections





# ISP Capital Expenditures

- Comcast: in 2016 “capital expenditures increased 7.5% to \$9.1 billion”
- AT&T up 10%, \$22.9 billion in 2016
- CenturyLink up 3.5%, \$2.96 billion in 2016



# Their Own Words

- **“We’re investing aggressively in the network architecture that is going to give us a competitive advantage in cost...and we continue to invest in spectrum.”**
  - AT&T CEO Randall Stephenson, January 2016
- **““This growth [in non-programming expenses] reflects increased spending to improve the customer experience as we’ve added technicians and service personnel to strengthen our dispatch teams and operations and invested in training, tools and technology.”**
  - Comcast CFO Mike Cavanagh, February 2016



## Their Own Words

- **“Once again in 2015, we invested heavily in our network and equipment. Network investments to drive better reliability and greater capacity.”**
  - TWC CEO Robert Marcus, January 2016
- **“We remain committed to consistently investing in our networks for the future. Our 2015 investments have positioned us for growth and allow us to maintain our network leadership position as consistently acknowledged by third parties...We continue to invest in our 4G LTE network”**
  - Verizon CFO Fran Shammo, January 2016



# What's Next?

- **Congressional Review Act (CRA)**
- **Court Challenges**
  - 22 State Attorneys General
  - Mozilla
  - Public Knowledge
- **Congressional Action**
  - New bills
- **Change in administrations**





# What Should Consumers Expect?

- **ISPs walk back their neutrality promises**
  - As of April 2017, Comcast stopped promising not to engage in paid prioritization
- **Continued video throttling from mobile ISPs**
- **ISPs will make slow, subtle changes**



# What Should Consumers Expect?

- **Paid prioritization**
- **Possible video throttling by wired ISPs**
  - Maybe to HD, maybe only for competitors' video services
- **Possible a la carte Internet options**
  - Probably marketed as speed boosts
- **Possible extra charges for certain services**
  - VPNs, peer-to-peer filesharing



# To Recap

- **Where we are:**

- Some ISPs have demonstrated some bad behavior
- FCC wrote new rules to protect consumers
- FCC repealed those rules
- Repeal faces challenges in the courts and in Congress

- **Where we're going:**

- ISP changes will be slow and subtle
- Repeal may or may not be struck down

– ???



# Questions?

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GPG Fingerprint:  
4DCF A726 7C7D E327 7DD6  
863E A25B 3CE6 2CAC 7BE9