

Understanding the Nature of Internet Congestion

Srikanth Sundaresan, Amogh Dhamdhere,
kc Claffy, Mark Allman

ICSI

CAIDA

Internet traffic has changed



Search CNET 

Reviews

News

Video

How To

Games

Connect with us  

  US Edition

CNET • Internet • Netflix, YouTube gobble up half of Internet traffic

Netflix, YouTube gobble up half of Internet traffic

Netflix and YouTube together make up half of peak Internet traffic in North America while their main rivals barely register, a study says. At the same time, file sharing is a sliver of its former self.

**Netflix alone accounts for a third of US traffic
[2014]**

**As HD Video becomes more popular, this ratio is
likely to grow**

Is the Internet able to handle all this traffic?

The screenshot shows the top of a web page from 'THE VERGE'. The logo is in a red box on the left. To its right is a 'TRENDING NOW' section with a grey background and white text: 'Mack built a ridiculous truck for a sultan that's so expensive, its price is a secret'. Further right is a red box with '17 NEW ARTICLES'. Below this is a navigation bar with a user profile icon, 'LOG IN | SIGN UP', and various category links: 'LONGFORM', 'REVIEWS', 'VIDEO', 'TECH', 'SCIENCE', 'ENTERTAINMENT', 'CARS', 'DESIGN', 'US & WORLD', 'FORUMS'. Below the navigation bar are two boxes for 'PREVIOUS STORY' and 'NEXT STORY'. The 'PREVIOUS STORY' box contains the text 'Why I don't finish most video games'. The 'NEXT STORY' box contains the text 'HP's MB Chronowing smartwatch is more watch than gadget'. Below these boxes is a horizontal menu with categories: 'BUSINESS', 'POLICY & LAW', 'TECH', 'US & WORLD', 'REPORT'. The 'REPORT' category is highlighted in red. To the right of this menu is a black box with '41 COMMENTS' in white. The main content area features a large headline: 'Internet traffic jams are widespread in the US, and are probably about to get a lot worse'. Below the headline is a sub-headline: 'It's not just Netflix and Comcast that are to blame'. At the bottom left of the article is the byline: 'By Ben Popper on October 31, 2014 01:37 pm'. There are three red dots at the bottom right of the article content area.

THE VERGE

TRENDING NOW
Mack built a ridiculous truck for a sultan that's so expensive, its price is a secret

17
NEW ARTICLES

LOG IN | SIGN UP LONGFORM REVIEWS VIDEO TECH SCIENCE ENTERTAINMENT CARS DESIGN US & WORLD FORUMS

PREVIOUS STORY
Why I don't finish most video games

NEXT STORY
HP's MB Chronowing smartwatch is more watch than gadget

BUSINESS POLICY & LAW TECH US & WORLD REPORT

41
COMMENTS

Internet traffic jams are widespread in the US, and are probably about to get a lot worse

It's not just Netflix and Comcast that are to blame

By Ben Popper on October 31, 2014 01:37 pm

Short answer: maybe not

Who's responsible?

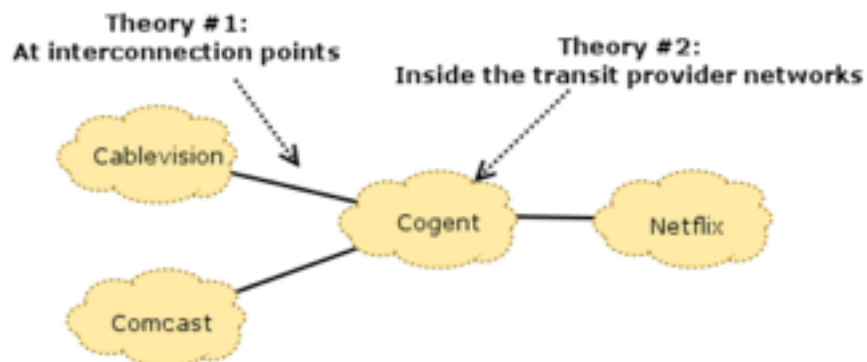
FREEDOM TO TINKER

research and expert commentary on digital technologies in public life

Where is Internet Congestion Occurring?

APRIL 2, 2015 BY NICK FEAMSTER

In [my post last week](#), I explained how Netflix traffic was experiencing congestion along end-to-end paths to broadband Internet subscribers, and how the resulting congestion was slowing down traffic to many Internet destinations. Although Netflix and Comcast ultimately mitigated this particular congestion episode by connecting directly to one another in a contractual arrangement known as paid peering, several mysteries about the congestion in this episode and other congestion episodes that persist. In the congestion episodes between Netflix and Comcast in 2014, perhaps the biggest question concerns *where the congestion was actually taking place*. There are several theories about where congestion was occurring; one or more of them are likely the case. I'll dissect these cases in a bit more detail, and then talk more generally about some of the difficulties with locating congestion in today's Internet, and why there's still work for us to do to shed more light on these mysteries.



Short answer: it's complicated

Can we understand the *nature* and pinpoint the *location* of bottlenecks?

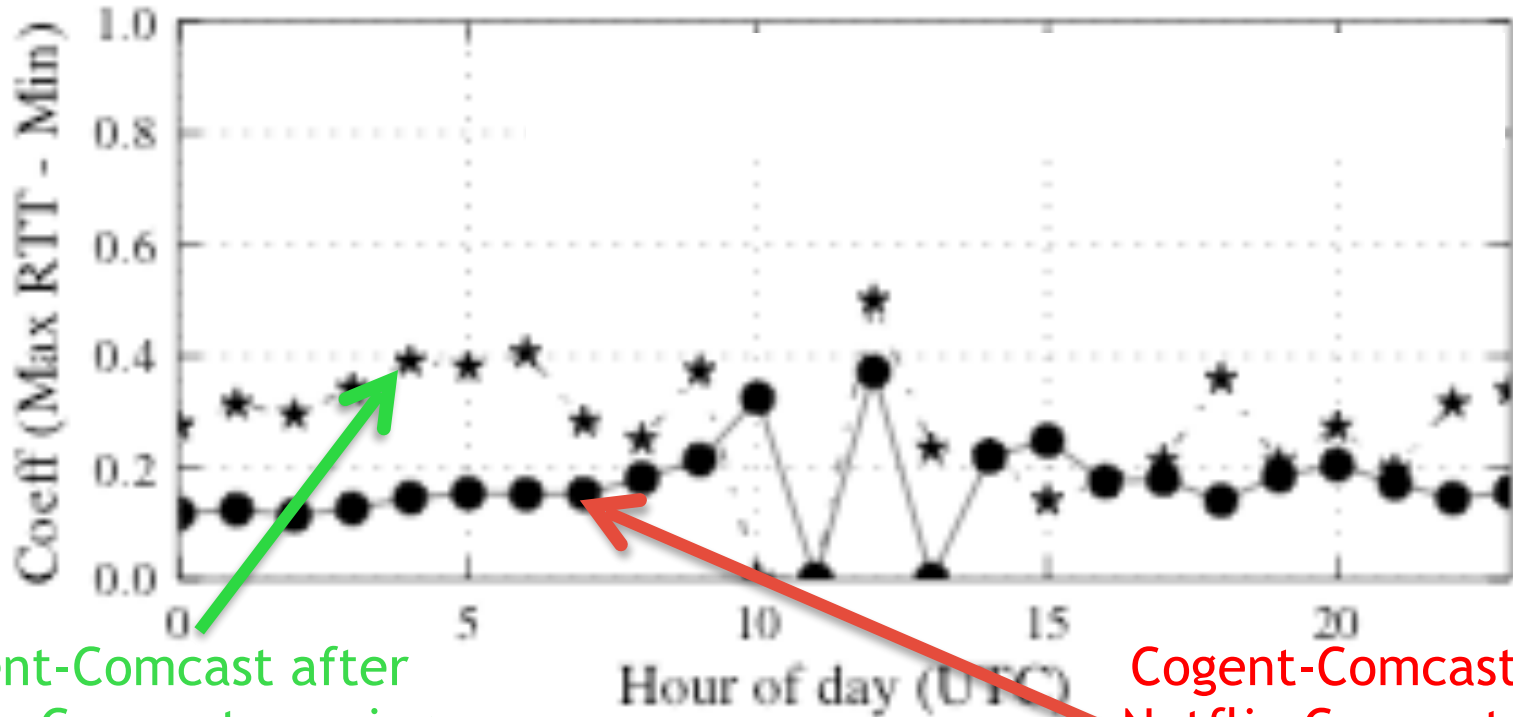
- The nature of throughput bottlenecks: Was a flow bottlenecked by:
 - An already congested link on the path (possibly a peering link) ?
 - A previously uncongested (possibly access) link that the flow managed to fill up?
- The location of the bottleneck: which link was the throughput bottleneck?
 - Can no longer assume that the bottleneck is always the last mile

Understanding where and how congestion occurs is critical

- Increasing number of “core” link congestion events
 - Last-mile bottleneck assumptions no longer valid
- Understanding congestion events can improve content delivery and user experience
 - Congestion in the core: Explore better peering or content delivery options
 - Congestion at the edge: Explore better encoding/rate adaption schemes for content, enable users to make better informed choices about ISPs and service plans

Using TCP RTT signatures

[Data from Measurement Lab]

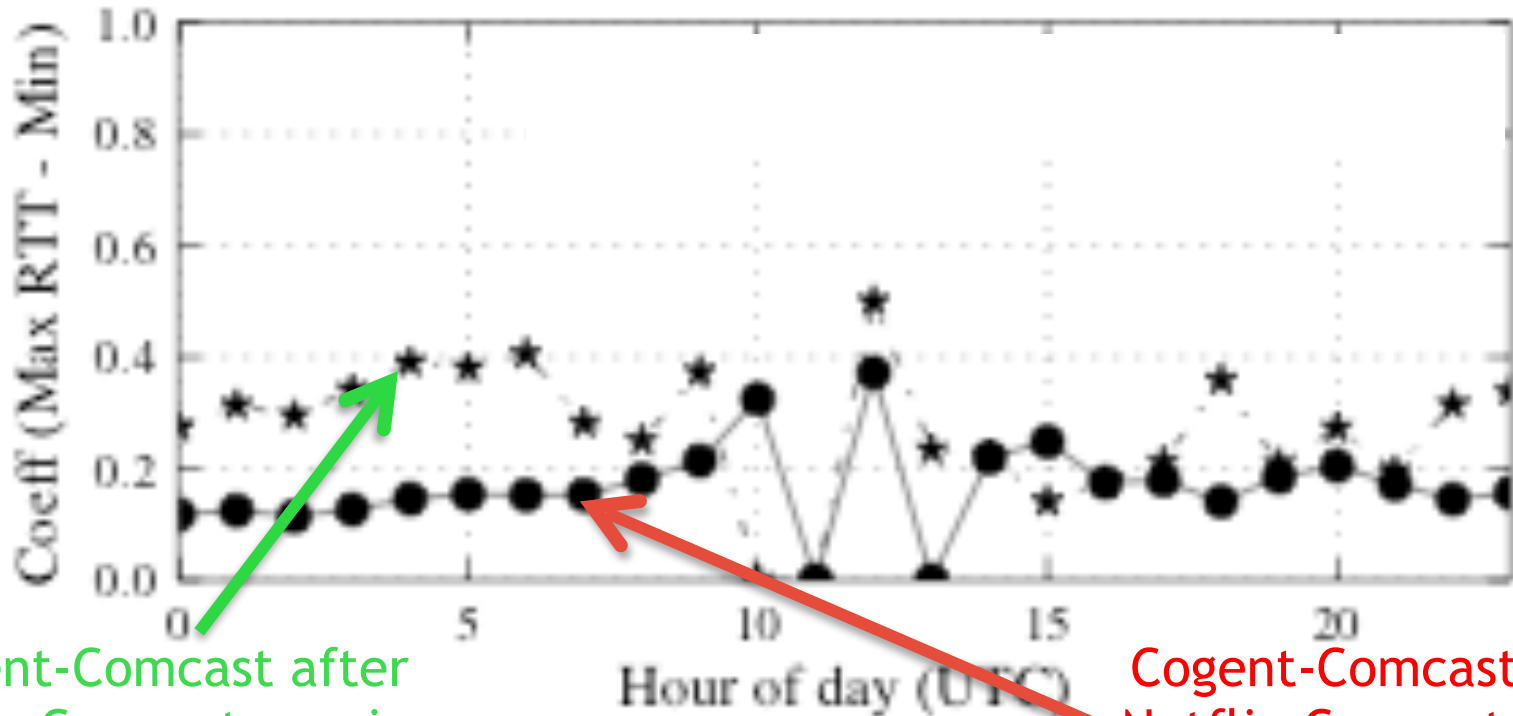


Cogent-Comcast after Netflix-Comcast peering agreement: likely access link bottlenecked

Cogent-Comcast before Netflix-Comcast peering agreement: likely core link bottlenecked

Using TCP RTT signatures

[Data from Measurement Lab]



Cogent-Comcast after Netflix-Comcast peering agreement: likely access link bottlenecked

Cogent-Comcast before Netflix-Comcast peering agreement: likely core link bottlenecked

Congested core links cause less variance in flow RTT during slow start

Understanding the location of congestion

- Passive measurements not enough beyond immediate vicinity
- Exploring *in-band* techniques to complement active measurements
 - E.g., In-band TCP traceroutes with a throughput test flow
 - Challenges: conceptually simple but implementing it without disrupting flows is more difficult

Thanks

- srikanth@icsi.berkeley.edu