Infrastructure Disputes Shape Future of Streaming Media

By Ethan Tussey and Kevin Sanson

9-12 minutes

In November 2010, tension between Internet infrastructure companies boiled over in a dispute between content distribution network (CDN) Level 3 and Internet service provider (ISP) Comcast. Level 3, a distribution partner of Netflix, accused Comcast of violating the principles of net neutrality when the ISP increased distribution fees for carrying high bandwidth services. Comcast justified its actions by stating that the price increase was standard practice and argued Level 3 was trying to avoid paying its fair share. The dispute exemplifies the growing concern over the rising costs of streaming media services. The companies facing these inflated infrastructure costs are CDNs (Level 3, Equinix, Limelight, Akamai, and Voxel), companies that host streaming media content on server farms and distribute the content to a variety of carriers, and ISPs (Comcast, Time Warner, Cox, and AT&T), the cable and phone companies that provide "last mile" service to paying customers. Both CDNs and ISPs are lobbying government regulators to keep their costs at a minimum. The outcome of these disputes will influence the cost, quality, and legal status of streaming media.

Here are five things you need to know about streaming media infrastructure:

1. Broadcast-quality streaming media raises infrastructure expenses and causes greater competition between technology companies.

2. The parameters of “peering agreements” are central to disputes between CDNs and ISPs.

3. Bandwidth caps are a preemptive strike against over-the-top services.

4. Streaming media disputes will force the government to formalize net neutrality regulation.

5. Infrastructure disputes ultimately penalize customers

1. Broadcast-quality streaming media raises infrastructure expenses and causes greater competition between technology companies.

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CDNs understand high quality streaming media is the future of Internet distribution but it requires expensive upgrades to ensure reliable service. Increased competition amongst streaming media services also is raising CDN operating costs as the latter companies battle for the most lucrative contracts. In the span of one year, the streaming media contract for industry leader Netflix passed between three different CDNs before landing with Level 3. Level 3 successfully lured Netflix away from competitors only after investing in costly enhancements to their streaming capabilities, server capacity, and facilities. Shortly after this pricey investment, Comcast levied additional fees against Level 3 for the additional bandwidth required to service Netflix. Level 3 bristled at the extra fees. As more entertainment studios launch streaming media services, CDNs face a serious threat to their bottom lines: rising bandwidth costs, expensive equipment upgrades, and costly bidding wars. Until recently, CDNs have accepted these extra expenses. Now they are looking to defer the costs, but it remains unclear whether ISPs, content owners, or customers will pick up the tab.

For more on the challenges of delivering streaming media, read [three white papers] prepared by CDNs.

2. The parameters of "peering agreements" are central to disputes between CDNs and ISPs.

ISPs and CDNs operate different networks across the Internet in order to connect cable subscribers to destinations like Netflix. CDNs and ISPs sign "peering agreements" to facilitate traffic across each other's networks. Since no single company has the infrastructure to facilitate worldwide Internet traffic, peering agreements ensure a level of functionality on the web. A key feature of the dispute between Comcast and Level 3 is the question of whether the acquisition of streaming media services requires a renegotiation of peering agreements.

Typically, [CDNs and ISPs renegotiate] their peering agreement when one of the partners decides to offer a new high bandwidth service. After Level 3 secured its contract with Netflix, however, the company argued the increased bandwidth should be covered as part of its existing peer agreements. Level 3 claimed the FCC's Open Internet rules protect individual services from being singled out and charged separately, meaning the additional bandwidth it requires to facilitate traffic to a popular destination like Netflix should not distinguish its service from any other website. Comcast argues that their decision to charge Level 3 increased fees has nothing to do with Netflix specifically. Rather, Comcast claims it is targeting any increase in traffic that requires the use of additional data ports. The presence of Netflix makes the dispute all the more contentious as it represents Comcast's competition and accounts for a substantial amount of Internet traffic during peak hours. Asked to rule on the dispute by the National Cable and Telecommunications Association, the FCC sidestepped the issue, explaining that they hoped the companies would come to an agreement behind closed doors. If the FCC eventually decides to issue a more direct ruling, they might determine who is responsible for paying the distribution costs of streaming services.

For a detailed analysis of Comcast's peering agreements, please read Vijay Gill, and for Comcast's own explanation of peering agreements, please read their Top 10 Facts about Peering Agreements and watch this informative video.

3. Bandwidth caps are a preemptive strike against over-the-top services.

ISPs are beginning to institute bandwidth caps as a strategy for deferring the costs of streaming media services and as a preemptive strike against competition from over-the-top services. As Comcast's dispute with Level 3 indicates, ISPs cannot count on CDNs to pay voluntarily for the increased bandwidth streaming media services require. Additionally, as the popularity of streaming media services increases, ISPs have to worry about their customers "cord-cutting"--ending cable television subscriptions in favor of streaming media options. Bandwidth caps provide a solution to both these problems as they restrict the amount of data downloaded and charge "cord-cutters" a higher rate for Internet services. In early 2011, AT&T issued a bandwidth cap for its DSL services and Comcast has had a cap since 2008.

Both companies claim caps affect only 2 percent of customers, but as more consumers shift to streaming media services, bandwidth caps will have a more noticeable influence on the home entertainment experience. Customers already have protested successfully against bandwidth caps: Time Warner subscribers were able to alter the plans for suggested pricing tiers. Despite this small victory, bandwidth caps and pricing tiers are popular options for ISPs looking to defer costs and slow competition from streaming media services.

For more details, read Betsy Schiffman on the inevitability of bandwidth caps.

4. Streaming media disputes will force the government to formalize net neutrality regulation.

Senator Al Franken (D-Minn)

Level 3's use of net neutrality policies to rally public opinion against Comcast will force the FCC to clarify how they will enact their Open Internet rules. The Open Internet rules are effective November 20 (if they survive a challenge by congressional Republicans), and they protect consumers from unjust fees for streaming video and video game services. It is unclear if the same rules apply to the fees CDNs have paid to ISPs for peering agreements. From the moment the net neutrality regulations were announced, they have been subject to criticism and legal challenges from ISPs. Congressional Republicans have largely supported these challenges, claiming the FCC has no jurisdiction over the Internet. In April 2010, an appellate court ruled Congress, not the FCC, held jurisdiction over the Internet. Nevertheless, the FCC has continued to move forward with its Open Internet policies. Republicans are not the only ones to take issue with the FCC's proposed rules. Many free speech organizations, along with congressmen like Senator Al Franken (D - Minn), have argued the regulations do not go far enough to protect the Internet. The coming legal disputes between the FCC, ISPs, and media watchdogs will determine if the proposed consumer protections extend to the business to business dealings of Internet backbone companies like Level 3 and Comcast.

Read the complete net neutrality rules here and *Wired*'s analysis of them here. Also for more on the subject of net neutrality, read this discussion of two recent books on the subject.

5. Infrastructure disputes ultimately penalize customers

Internet companies are reducing the quality of their services to keep costs low during bandwidth disputes. Netflix customers in Canada had their service downgraded after the rental company chose to cap the number of high definition streaming hours per billing cycle following a bandwidth dispute with Canadian ISPs. Netflix chose to lower the quality of their streaming service to provide more content to their customers while staying under the bandwidth caps. The decision invited speculation similar disputes might lower streaming quality in the United States. Canadian regulators maintain their Internet infrastructure cannot handle the amount of broadband traffic streaming services create and they are not yet willing to pay for upgrades. Netflix lawyers have suggested these bandwidth caps actually are part of a cultural protection scheme designed to help Canadian telecommunications companies compete with the popular streaming media service. Ultimately, consumers suffer from these disagreements between regulators and Internet infrastructure companies, as there seems to be little agreement on how best to pay for the high quality services people demand.

For a more detailed analysis of Canadian bandwidth caps, read this *Wired* piece.