

Events on the Net: “The Pirate Bay” Goes Offline

What happened?

On August 24th 2009, Swedish court compelled The Pirate Bay’s largest upstream provider, Black Internet, to shut the site down under threat of massive fines to be issued daily. Within hours, The Pirate Bay had relocated, but due to technical issues the site remained completely down for roughly a day, and even now the trackers (the critical component) remain offline.

What Sandvine observed

When we became aware of the news of The Pirate Bay (TPB) being taken offline, we predicted that BitTorrent levels would start to drop off (as downloads finished and it was impossible to get updated trackers from TPB), before levelling off, and in all likelihood eventually returning to previous levels (as users discover other tracker sites or TPB pops back online).

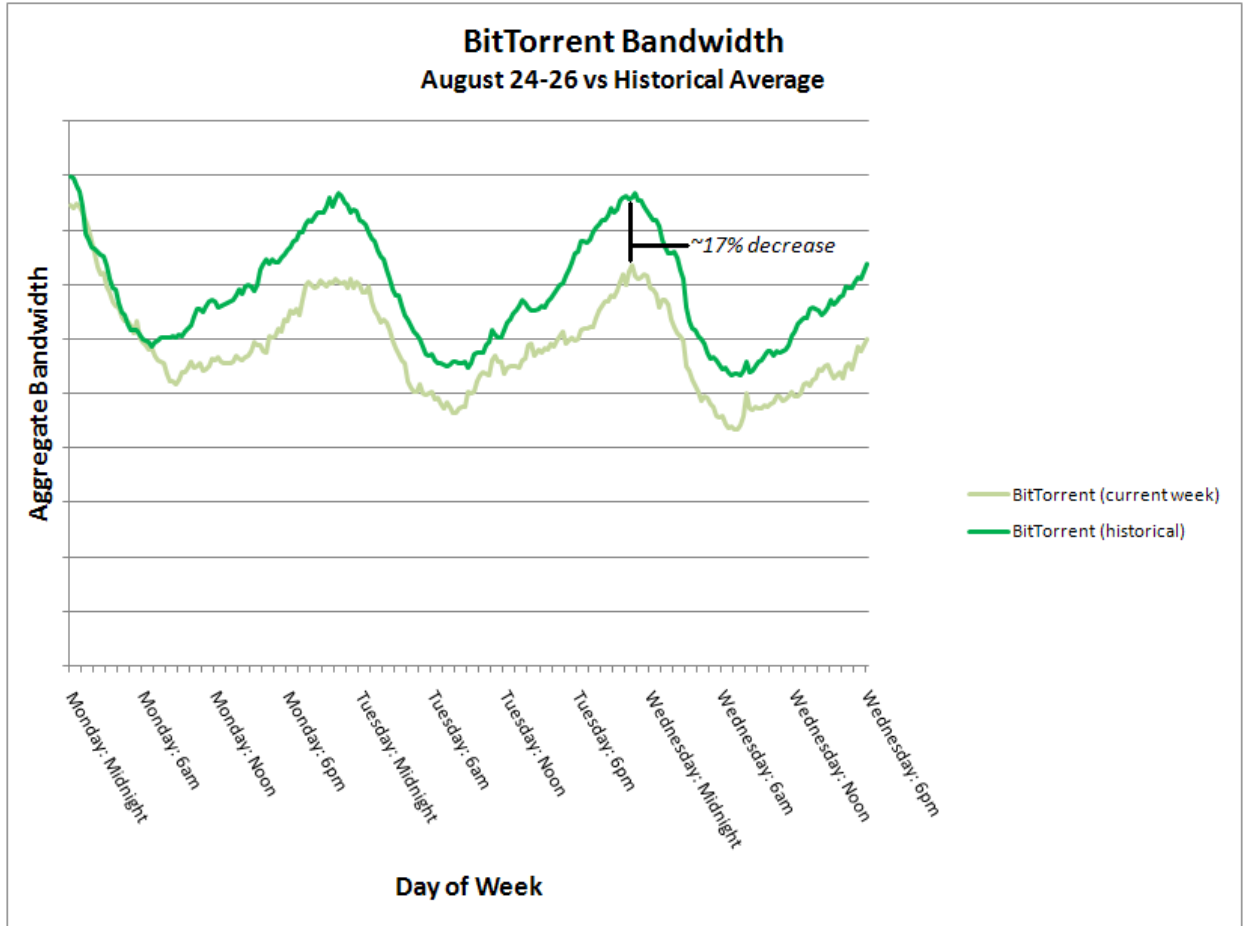
To investigate this event, we examined samples from networks representing more than 17 million subscribers. While the samples used were limited to North American networks, it is reasonable to assume that the observations are consistent with global trends. In fact, given the geographic home of The Pirate Bay and its popularity in Europe, examining North American networks exclusively might well understate the global impact of this event.

So far, the observations have matched the predictions. The graph below shows an average of the aggregate BitTorrent bandwidth on a number of North American sites. The graph compares the BitTorrent bandwidth of the period from Monday, August 24th to Wednesday, August 26th with the average of the Monday-Wednesday period of the previous three weeks. The decrease in BitTorrent traffic is easily visible. In fact, on the networks we examined, aggregate BitTorrent bandwidth dropped between 10 and 15 percent.

At the networks we examined in this study, BitTorrent represents 15-17% of total bandwidth. Consequently, the observed drop in BitTorrent traffic translates to a decrease in total Internet traffic of about 3%.

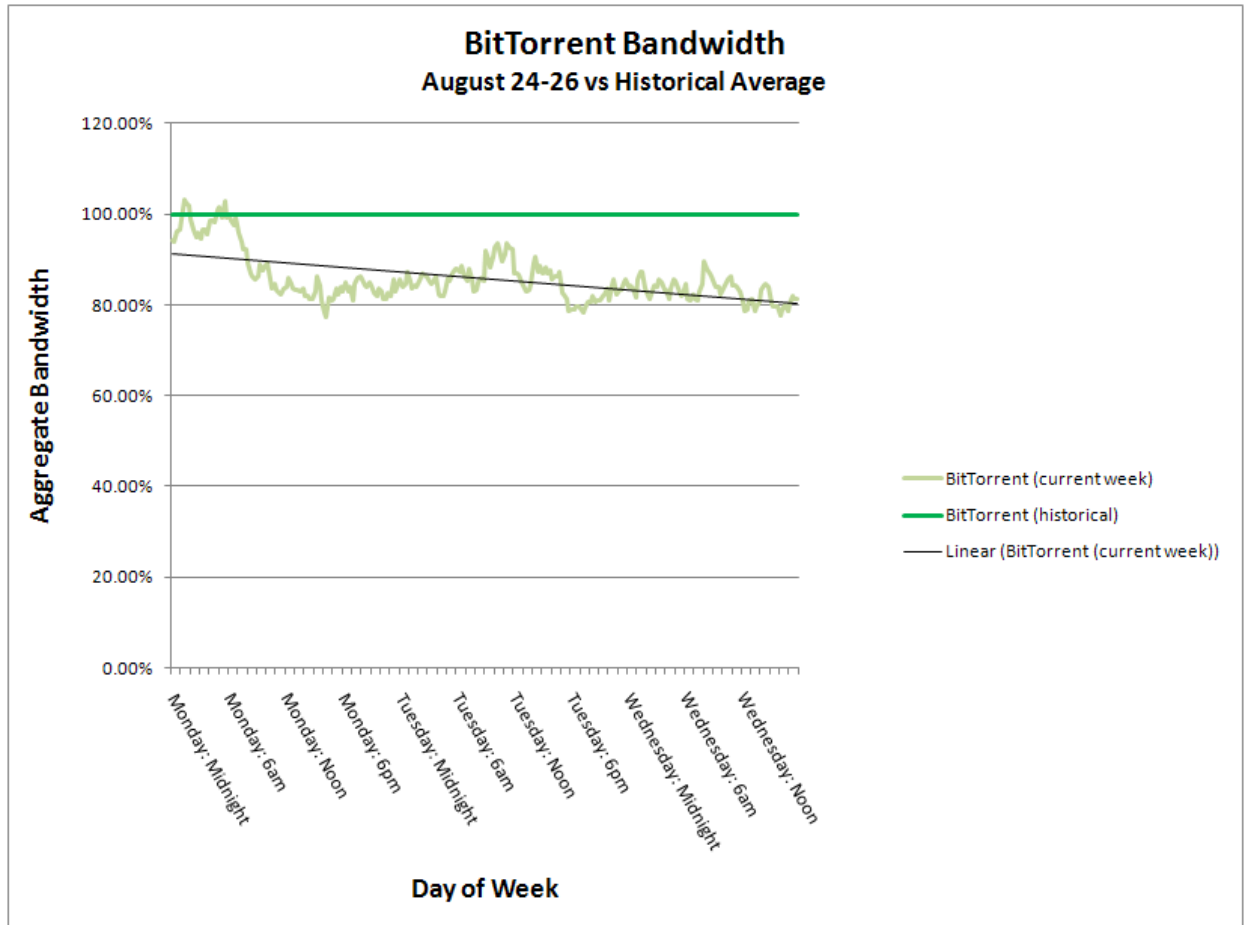
During the evening hours that correspond with peak Internet usage (in terms of both number of subscribers online and total bandwidth), the decrease is even more pronounced. From midnight to 6pm, this week’s BitTorrent traffic is about 13% below the historical average; however, from 6pm to midnight, BitTorrent traffic is roughly 17.5% below the usual level.

This fact is of particular importance because peak hour usage patterns are used for capacity planning and incidences of network congestion are far more common during peak hours. When a network is operating near capacity, a few percent could be the difference-maker and could potentially impact the Quality of Experience of a huge number of subscribers. Keep in mind that the evening is the period when most users come online to enjoy interactive applications such as online gaming, video streaming, and personal interaction with video and voice phone applications, so any degradation in service quality are readily apparent and not particularly welcome or tolerated.



As of the time of this writing (8am on August 27th), the trackers on The Pirate Bay remain offline, and BitTorrent levels continue to decrease relative to their historical averages. The graph below illustrates this – it is clear that the trendline for the current week is trending downwards as BitTorrent traffic continues to fall.

However, it is likely only a matter of time until The Pirate Bay’s full functionality is restored. Once the trackers being available once more, BitTorrent traffic should start to increase again to its normal levels. Even in the unlikely event that The Pirate Bay never returns to full service, users will gradually migrate to other tracker sites. Additionally, even with a rapid return to service this incident might spur users to look at other tracker sites as a back-up plan, so future outages might not have such a dramatic impact.



What is The Pirate Bay?

The Pirate Bay (often known as TPB) is a Swedish website that indexes and tracks the .torrent files used by BitTorrent clients to discover sources of desired content. TPB is notable in that not only are they arguably the world's largest BitTorrent tracker, but they also have taken on the copyright industry head-on in high-profile court cases and have gone so far as to launch a political party in Sweden dedicated to the reform of copyright and patent legislation. In terms of membership, The Pirate Party is the third-largest political party in Sweden, while their youth organization, Young Pirate, is now the largest political youth organization in Sweden. The Pirate Party received more than 7% of the total Swedish votes in the 2009 European Parliament elections, which will result in one seat in the European parliament.

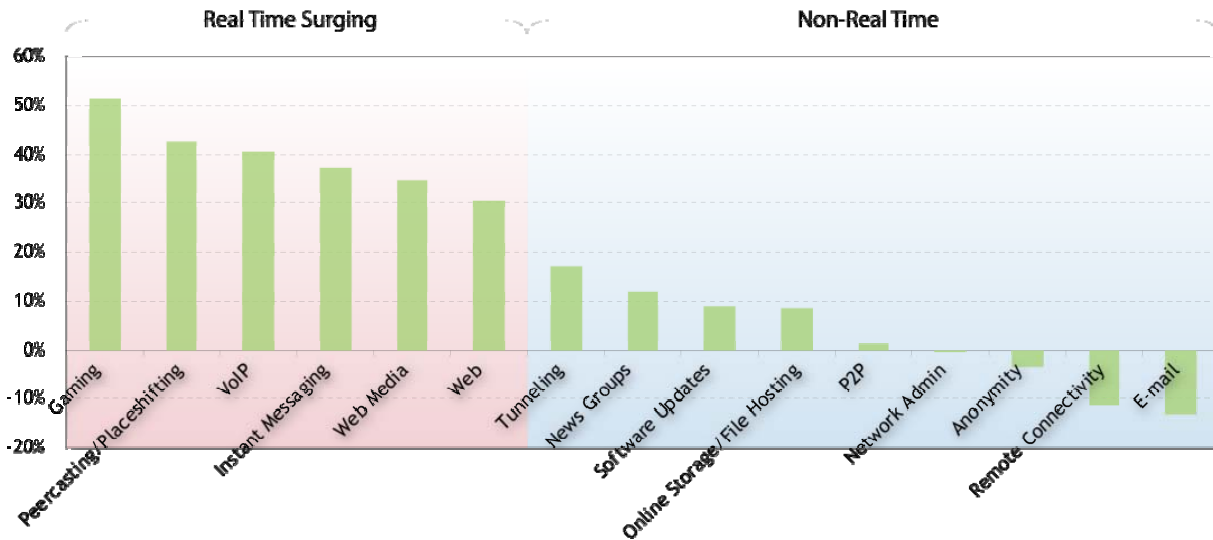


How can one site have such an impact?

Until this incident, it was difficult to quantify how much BitTorrent traffic was directly dependent upon The Pirate Bay. Indeed, it seems radical to think that a single tracker site, amongst many on the Internet, could have such an impact on global BitTorrent levels. However, with the frequent appearances in the media and dedicated usage base, The Pirate Bay has succeeded in becoming the major source of content for many BitTorrent users. Additionally, the files it (and other tracker sites) tracks are frequently many gigabytes in size. When one considers the factors at play, it becomes much less far-fetched that one website could play such a massive role in BitTorrent traffic levels worldwide.

Did any other applications “fill the gap”?

It is interesting to note that observations of the same networks did not reveal changes in any other protocols. Of particular note because of its absence, there was no correlated increase in streaming protocols or other real-time entertainment. This absence may surprise some, but is intuitive when one considers the use-cases at work: content downloaded on BitTorrent is typically to be stored in a library and consumed (watched, read, installed, etc) later, whereas streaming entertainment is an interactive experience to be enjoyed right now and is limited to a subset of the material available on the BitTorrent network (entertainment). It seems logical, then, that streaming entertainment is not a substitute for the primary BitTorrent use case: consuming content later. This distinction between interactive and non-interactive content is particularly apparent during the hours of peak usage. In Sandvine’s 2008 Global Broadband Phenomena study, we identified massive surges in the use of interactive entertainment applications during the evening hours and we expect this trend to continue, if not increase substantially, in the 2009 study to be published in October. At the same time that P2P and other large data transfer applications show only modest gains over their large daily averages, applications such as Gaming, VoIP, Peercasting/Placeshifting, and Instant Messaging surge by up to 50% per subscriber over their 24 hour averages, in both the upstream and downstream directions.



How does BitTorrent work?

To share a file, a BitTorrent user creates a small file called a *torrent*. This file contains metadata about the file to be shared (number of pieces, size of total file, etc) and about the *tracker* (the computer/server that coordinates the file distribution). Peers wanting to download a file must obtain the associated .torrent file and connect to the specified tracker which then tells them which other peers have pieces of the file. Once a BitTorrent user has the .torrent file, they are able to connect directly with other peers participating in the *swarm* and only need the tracker if they wish to update the list of peers. Plus, unlike the first generation of file-sharing applications, BitTorrent downloads and uploads content piece-by-piece from many users at once, as opposed to direct one-to-one transfers of massive files.

The Pirate Bay is an example of a tracker website. Thousands of BitTorrent users have uploaded .torrent files to the site, making it easy to find desired content that is readily available on computers worldwide. However, the tracker isn't the only mechanism by which peers can discover content - most BitTorrent clients now include options to search the swarm directly.

BitTorrent – that's only for illegal downloads...right?

While typically associated by the mainstream media with piracy, due to its technical efficiencies and popularity BitTorrent is used by many organizations for legal distribution of content. For instance, Blizzard Entertainment uses BitTorrent to distribute most content for World of Warcraft, including the game itself, and many major open source and free software projects encourage the use of BitTorrent to reduce the load on their servers. In Canada, by making *Canada's Next Great Prime Minister* available on BitTorrent, the CBC became the first public broadcaster in North America to make a full show available for download using the medium.

To learn more about broadband trends or for an analysis of what's happening on your network please contact us at info@sandvine.com.