SegBit

selling segments of a torrented file using Lightning

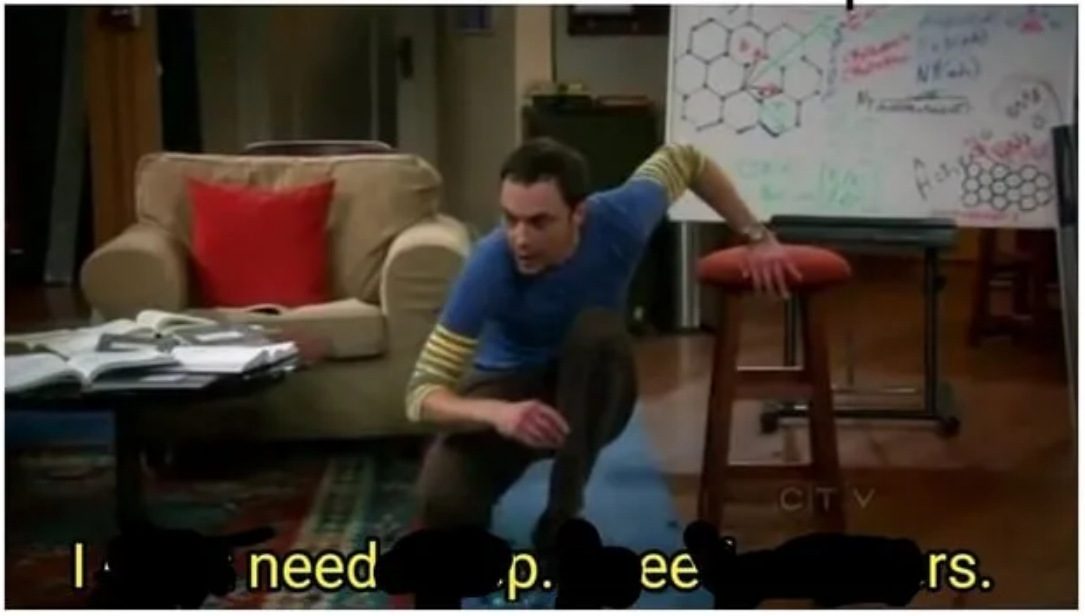
Motivation

Although "swarming" scales well to tolerate "flash crowds" for popular content, it is less useful for unpopular or niche market content. Peers arriving after the initial rush might find the content unavailable and need to wait for the arrival of a "seed" in order to complete their downloads. The seed arrival, in turn, may take long to happen (this is termed the "seeder promotion problem"). Since maintaining seeds for unpopular content entails high bandwidth and administrative costs, this runs counter to the goals of publishers that value BitTorrent as a cheap alternative to a client-server approach. This occurs on a huge scale; measurements have shown that 38% of all new torrents become unavailable within the first month.[25] A strategy adopted by many publishers which significantly increases availability of unpopular content consists of bundling multiple files in a single swarm.[26] More sophisticated solutions have also been proposed; generally, these use cross-torrent mechanisms through which multiple torrents can cooperate to better share content.[27]

Reference: https://en.wikipedia.org/wiki/BitTorrent

The evidence in memes

When your torrent download almost stops



When you find an ancient torrent with only 1 Seeder, so now you're waiting for some dude in India to turn on his computer

Motivation

Currently the network around the BitTorrent protocol heavily relies on altruistic behavior of few nodes (seeders). Although this is adequate for popular enough files, as a result there's a shortage of people with resources (storage & bandwidth) willing to seed the less popular files (e.g. specific technical content) in the same way that state-controlled prices cause a shortage of goods and resources.

While private tracker usually have a better chance at this, they're not immune, furthermore they come along with certain downsides, that make them unsuitable for many cases and are relatively isolated from each other.

We hereby present a free-market-style way to incentivize the seeders by enabling them to put a on each segment of each file resulting in a pay-as-you-go model for the leechers. Seeders therefore will have an incentive to seed files that don't have a large number of seeders, or their seeders can not provide the same speed for the leechers that are willing to pay.

A Solution

Seeder defines a price (sat/KB) for the file. A connected leech starts demanding segments, seeder issues an invoice for each demanded segment (he can also include the # of segment in the memo), leecher's client accepts the price and pays the invoice. Segment is transferred. Same process is repeated for the next segments. Leech will not pay the new invoice if the previous segments did not arrive. The result would be an stream of sats at the same time of file.

At the same time, leech also defines it's own price for the file, so any added peer can choose between the two (choose cheapest available series of requests or let the quality of service set the price in a natural manner)

for a relatively headache-free user experience, trackers also keep a track of price rates and inform the compatible peers of them. Trackers also could maintain a punishment system for the bad actors.

Further Minimizing the Trust

The leecher in the previous scenario risks losing a small amount of his money to seeders acting in bad faith.

with the help of a special kind of invoices called hodl invoices we can avoid this and further minimize the trust involved (and potentially avoid a decline in performance). Here's how it goes:

- Tracker issues random pre-image for each segment and sends the hash of it(/them) to the seeder
- The seeder generates invoice(s) with that payment hash(es) and sends it(/them) back, Tracker sends the invoice(s) to the leecher.
- The leecher pays the invoice, the seeder sends the segment and the Tracker reveals the pre-image to the seeder allowing him to settle the payment.
- If the seeder does not send the segment, the tracker will not reveal the pre-image. As such the invoice expires and the payment is cancelled.

Some Notes

- Seeder and tracker can collide to steal (a very low amount of) money but due to the centralized system of the trackers, they are subject to a social reputation system and therefore the reward to risk ration is negligibly low.
- Tracker can charge a fee for it’s services.
- Technically tracker and the payment intermediator does not have to be the same entity. But this is a simpler, more efficient scheme since the both entities need to be aware of file status on peers sides.
- In the non-hodl-invoice scheme tracker can keep a custodial bond from the seeder and punish the bad actor, simply by taking their money.