Experiments

The goal is to experimentally verify that Triblerchain rejects free riders. Success is defined as rejecting free-riders that would not be detected/rejected through the native bittorrent tit-for-tat mechanism.

For a single swarm, it is not expected that Triblerchain will perform better than bittorrent tit-for-tat. It is only when considering multiple swarm interactions that the habitual free rider can be observed. Depending on the freerider detection policy, different results could be achived. The following policies will be tested:

- The absolute cutoff will refuse service to peers that have a total upload to download difference that is larger than a set parameter.

- The probablistic cutoff is similar to the absolute cutoff, but with a probablistic chance of providing service if it normally would not. This is to induce a measure of forgiveness, and to ensure that nodes can "redeem" themselves.

- The ratio cutoff will refuse service to peers that have a total upload/download ratio that is smaller than a parameter percentage.

- The Netflow algorithm as described by Otten<cite>. It is mathematically proven to work and serves as a benchmark for evaluating the other policies.

An experiment was conducted with 10 peers and 15 consecutive downloads of 10MB random data. It has the following sequence of events for the basic experiment:

1. The dht is isolated to ensure only the experiment nodes see each other, and no experiment contamination is possible from the real bittorrent DHT.

2. The hidden seeding and triblerchain communities are isolated from the real Tribler communities. This prevents contamination of the experiment with real world complications.

3. Tunnel parameters are set to renew tunnels every 60 seconds. This cannot be smaller since dhts will not update more frequently. Thus this time is needed for the seeder introduction points to remain visible in the dht. Nodes 1, 2 and 3 are set to serve as Exit nodes for the isolated tunnel community

4. Two seeders are started for each download, and the upload state is allowed to settle and be announced. While it would be more pure to use just one seeder, the isolated DHT is rather small and does not work as well as the real world DHT at this scale. So it is possible that some downloaders will not find the seeder if there is just one. For this experiment, two seeders seem to work well.

5. Five regular downloaders are started. Each is observed for completion every second. The results are plotted in a graph.

6. One free rider download is started with an upload speed restricted to 400KB/s. This is roughly half of the full throughput of a tribler tunnel on the testing system.

7. One free rider download is started with an upload speed restricted to 40KB/s.

8. After a timeout of 200 seconds all downloads and seeders are stopped.

9. Steps 4 to 6 are repeated another 14 times.

This experiment represents the situation as it is with the native tit-for-tat operation of bittorrent. As can be seen in figure 1. As expected, it takes slightly longer for the free riders to complete the downloads, they still complete in roughly the same pattern each download.

<figure 1>

Now the experiment is executed with the different free rider detection policies set.

<figure 2>