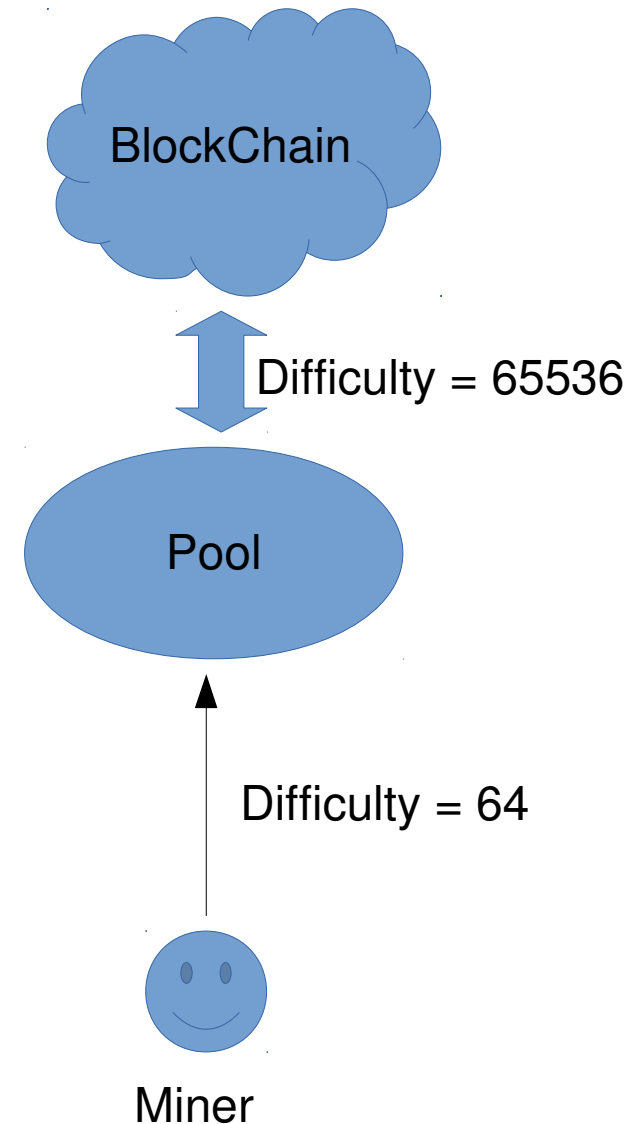


Stratum Relay

A better option to stratum proxy?

Pools

- Real difficulty for finding a valid coin block is huge
- Pools split the work among multiple miners:
 - Asking for a smaller difficulty
 - As the result is random, a valid solution for diff=64 might be also valid for diff=65k
 - When a miner finds a solution which accomplish real difficulty, block is valid, pool publish the solution in the p2p network, and a new problem is sent to the miners

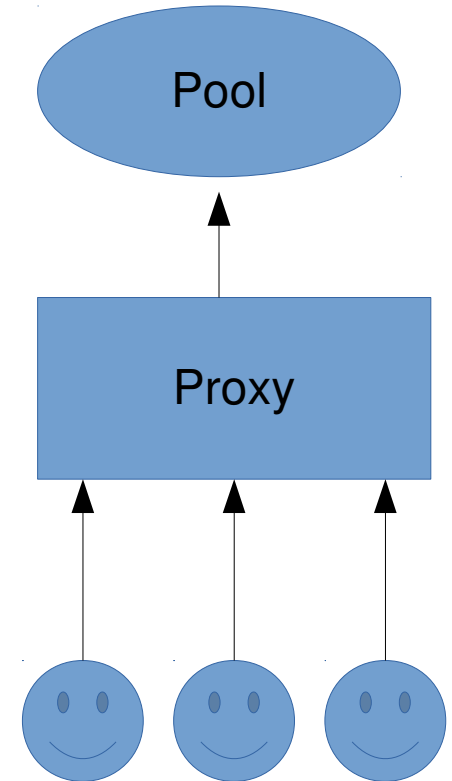


Stratum

- Protocol to communicate the pool with the miners
- It uses JSON over a TCP persistent connection
- Examples of stratum instructions:
 - mining.authorize: pool/worker authorization mechanism
 - mining.notify: pool sends block information to make the maths
 - mining.set_difficulty: pool sets a new target difficulty
 - mining.submit: worker sends a solution
- To find a valid hash solution the worker can randomly modify some values
 - Ntime: current time
 - Nonce: can be any number of 32 bits
 - Extranonce2: size depends on extranonce2_size given by the pool (normaly 32bits)

Startum Proxy

- The proxy manages multiple worker connections, and uses a single connection to talk to the pool
 - For the pool it looks like there is a single miner behind the proxy
 - The proxy must split the work to ensure workers not looking for or find the same solution
 - To this end the proxy splits extranonce2_size, if it is 32bits it asks workers for extranonce2 of 16 bits so the maximum workers for the proxy would be $2^{16} = 65k$
 - Reduce extranonce2 size may cause some problems, for instance NiceHash is following the same technique so they may send an extranonce2_size of 2 bytes (16 bits), in this case the proxy only can send 1 byte of extranonce_size and it can only handle 2^8 workers (256)
- In addition some software miners (like some cgminer version) do not handle and extranonce2_size of less than 32bits

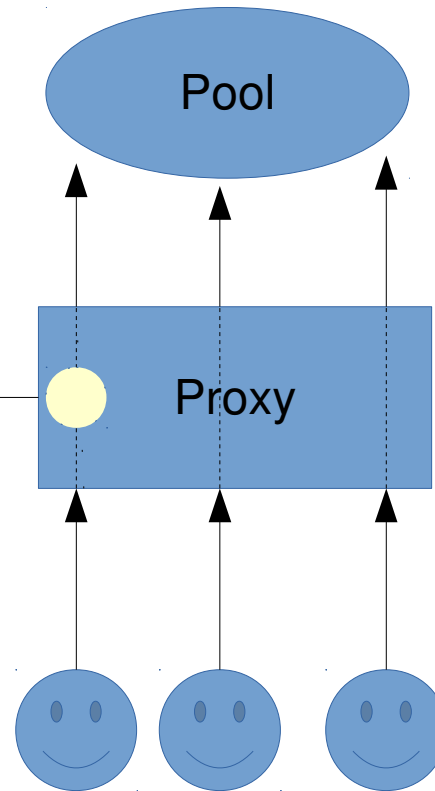


Stratum Relay

- New concept! A different kind of proxy
- Proof of concept developed successfully!
- Let's not implement another stratum server in the proxy, let's just resend the packets.
- Each worker client is a new TCP connection to the pool
- Just look at the packets sent by the worker, extract the payload and analyze the content to get the statistics
- An why not? Let's modify some specific packets, for instance the mining.authorizee where we can put our own user/pass

Stratum Relay

Capture TCP connection
we can know the number
of accepted shares for the
worker (hashrate stats).
We also modify worker
username and password
to our owns



Comparison

Proxy

- Quite complex
- Work must be split
- Need of reduce extranonce2
- Single connection to the pool
- Same Difficulty for all workers
- If there are new methods in stratum, we need to implement them in the proxy

Relay

- Very simple!
- No need of splitting work
- Extranonce2? What is that?
- As many connections as workers to the pool
- Each worker has its own difficulty
- I don't care about new stratum methods! I just relay packets

Conclusion

- Stratum relay seems a better solution than a proxy. It is much more simple and easy to maintain in the future.
- Modify extranonce2_size in the proxy creates lots of problems with many pools and miner softwares which are not prepared for that. Relay would solve it.
- The only inconvenience is the number of TCP connections made to the origin pool. Some DOS protection may limit the number of active connections for a single IP. It may be solved using a load balancer to distribute the incoming stratum connections among several relay servers.
- The first developed version of the relay works very good!