

REPORT FOR DECRED DECENTRALISED GOVERNANCE ATTACK SIMULATOR

FILES TO BE GENERATED

decred-default.csv, decred-default.html, decred-default.pdf

VALUES PROCEEDING WITH

Attack budget (£): unspecified (cost estimated in attack phase two)
Decred price (£): 20.16 (real time value)
Decred ticket price (in DCR): 119.16 (real time value)
Inflation rate: 2.26 (default exponential)
Coins in circulation: 9726040 (real time value)
Ticket pool size: 1000 (user defined value)
Tickets already under control or bribe: 500
Target total tickets: 600 (user defined value)

ATTACK PHASE ONE: PRE-PURCHASE ANALYSIS

Ticket pool size before purchase: 1000
Tickets required for malicious 60% over honest tickets: 600
Attack budget (£): cost of realise target of 600 tickets
Therefore, target total tickets: 600
Excluding tickets already under control or bribe, total: 500
Finalised total of tickets to acquire: 100

Coins in circulation before purchase: 9726040
From which coins frozen for tickets: 119160
Therefore, coins remaining available to acquire and freeze: 9606880
These are enough for this number of tickets: 40960
While this attack will proceed with purchasing: 100
ATTACK PHASE TWO: EXECUTION

PURCHASE ATTEMPT FOR 100 TICKETS

PURCHASE OVERHEAD ESTIMATION: 1 DAY

REASON

Because 5 (honest) tickets per block will be used to vote and immediately expire which leads to 5 new spots for malicious tickets to take over. While this is the case for on-chain votes that vote towards PoW block validity, this is not to be confused with off-chain votes for proposals and consensus rules which is our focus in this simulation. Luckily, the right to vote for governance proposals remains valid during the entire voting window as long as tickets were part of the initial proposal quorum(contextually: snapshot of ticket pool at the time where the voting started).

The number of days required is because Decred blocks are solved every five minutes which equals 288 blocks per day, therefore 1,440 expired tickets per day able to be replaced by 20 biddable tickets per block that equals 5,760 tickets as candidates to replace those 1,440.

HYPOTHETICAL REALISATION

Decred coin price before attack initiation (£): 20.16
Estimated coin price after purchase (£): 20.19
Decred ticket price before attack initiation (in DCR): 119.16
Estimated ticket price after purchase (£): 119.19
Estimated total cost with inflation (£): 242082.73
Cost includes competent bidding with high transaction fees to increase chances of ticket bids being picked by miners and placed in ticket pool.

Coins in circulation after purchase: 9726040
From which coins frozen for tickets: 119190
Therefore, coins remaining available to acquire: 9606850
Ticket pool size after purchase: 1100
From which malicious: $100 + 500 = 600$ (54.5% of total tickets)

SUMMARY

Number of tickets required for malicious majority: 600

This will take this number of days to be realised: 1 DAY
Estimated total cost with inflation (£): 242082.73
Ticket pool size: 1100
From which malicious: 600 (54.5% of total tickets)

INSIGHTS: WHAT PROBLEMS CAN WE CAUSE RIGHT NOW?

(1) PREVENT HONEST PROPOSALS TO GO THROUGH

EXAMPLE

Downvote key consensus changes that would make the coin more scalable

DESIGN VULNERABILITY

Decred tries to be censorship-free and fully guided from its community, therefore all decisions are respected and final, without asking anything.

SUCCESS LIKELIHOOD: HIGH

Since the dominant motivation of ticket owners is profit from PoS rewards and not the coin development, it was noticed that governance proposals do not attract more than half of pool size votes therefore there exists high voting abstention which makes this attack very possible to happen.

METHODOLOGY

By down-voting proposals so that 60% margin is not achieved

EXPLOITATION

Total votes from malicious tickets: 600
Least honest votes required for net majority: 600 (60% of ticket pool)
While ticket pool has a size of: 1000

(2) MALICIOUS PROPOSAL PASSES BY NEGLIGENCE

EXAMPLE

Malicious proposal up-voted from malicious tickets that had net majority prior to the start of voting window or even if they had not they can still dominate when voting abstention is high as it is in 99 out of 100 cases.

DESIGN VULNERABILITY

Votes are never questioned therefore if a proposal is accepted, no censorship exists.

SUCCESS LIKELIHOOD: MEDIUM

The controversy of a malicious proposal is expected to unite honest owners.

METHODOLOGY

Malicious proposal starts to be up-voted as close as possible to the closing window.

EXPLOITATION

Total votes from malicious tickets: 600
Least honest votes required for proposal rejection: 246
While ticket pool has a size of: 1000