Tentative Project Proposal for Distributed and Decentralized Consensus

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Proposal:

Design Avalanche Consensus protocol and run experiments and benchmarks on this either independently or on PAXI framework. Since the protocol is not a variant of Paxos, I'm not sure if PAXI can facilitate the development of this protocol.

Avalanche Consensus is introduced as a family of leaderless Byzantine fault tolerant protocols, inspired by Gossip Protocol (Epidemic Protocol Family). It claims to provide a strong probabilistic safety guarantee in the presence of more than a third Byzantine adversaries. It's concurrent and leaderless nature enables it to achieve high throughput and scalability. Unlike blockchains that rely on proof-of-work, they are quiescent and green. Unlike traditional consensus protocols where one or more nodes typically process linear bits in the number of total nodes per decision, no node processes more than logarithmic bits. It does not require accurate knowledge of all participants and exposes new possible tradeoffs and improvements in safety and liveness for building consensus protocols.

I would like to build this protocol in golang and test it for the following properties:

1. Is there a change in performance, throughput, time required to reach finality if the number of byzantine nodes increase from less than 1/3 to more than 1/3.
2. Performance affected by scaling the protocol.
3. The number of rounds of polling required to achieve promised metastability with increase in Byzantine nodes and with scaling.
4. Explore the probability of 50-50 splits on consensus as the number of rounds of polling increase.