

Practical Connection Assessment - Lex Cryptographica and Infrastructure

It would raise quite a few eyebrows within the blockchain community if one were to advocate for greater cooperation between legal entities, such as courts or regulatory agencies, and blockchain companies. Indeed, the blockchain community has a vested interest in disintermediation, democratization of data, and decentralization. Government agencies have the potential for corruption, so why include them in the discussion at all? Very few blockchain companies have willingly wanted to cooperate with government agencies or even the law, since the movement has origins in the cyber-punk and crypto-anarchist movements (Filippi & Wright, 2019). Satoshi Nakamoto himself was seemingly upset by the choices regulated banks made during the Great Recession of 2007-2009. Many of the current design considerations of products within the DeFi market take Nakamoto's somewhat nihilistic or anarchist views of consensus into account. After taking this course, I have come to challenge the perception that blockchain technology is meant to independently replace governments or other regulatory agencies. I argue that Lex Cryptographica's vision of running deterministic codes as law is only possible if regulatory agencies become a part of the transaction economy on day one of their design. As someone who has more of a technical background in engineering, I will leverage the content I have learned in this course to further my own goal of founding my own blockchain company and developing a novel consensus mechanism. This is a technology that has the power to transform markets and transition us from relying on GDP as a market health indicator to the Environmental, Social, and Governance (ESG) movement's ideals of what helpful monetary measures ought to be. Through this class, I was able to develop an understanding of how and why existing legal frameworks exist. Since my background is a little more technical, I hope to use these principles

to help guide my ultimate goal of scaling the infrastructure that would allow *lex cryptographica* to efficiently operate. In this essay, I outline why the SEC or other regulatory bodies need to be involved in the consensus of transactions and look into the current research in scaling blockchain transaction processing, namely through principles of fog computing and game theory.

Blockchain and the SEC:

Blockchain companies, as of late, have been trying to skirt around the SEC and regulatory bodies in general. As Crenshaw (2021) put it, not a single blockchain company even messaged the SEC to try and legitimately/legally inform them of the potential security offerings they were going to provide to the public. The crypto-punk movement has good intentions distributing data and value more evenly among people, but it tends to be a little lost on how to get there. Unregulated markets, as Crenshaw describes, are absent of any majority disclosure requirements that the Securities and Exchange Act of 1934 enforces. This approach to market innovation involves a “buyer beware” approach, which created massive inequality within DeFi markets. Since companies are not required to be transparent in the DeFi space, they create two-tier markets that give the retail investors a majority of the risk when investing. This paradigm of regulation (or lack thereof) ends up making it possible for individual DeFi companies to be corrupt now, which is hardly in the spirit of DeFi to begin with. If the final vision of all investors having access to actionable and material data is ever going to be reached, there will likely need to be an independent body, like a regulatory agency, that needs to mediate the blockchain either through ex-post or ex-ante enforcement methods. This is why I think the development of novel consensus mechanisms that incorporate these regulatory bodies directly into a blockchain can help regulate DAOs or smart contracts a little better and help push the blockchain movement

towards a corruption-free regulatory engine operating on the principles of *lex cryptographica*. We can even look further to adding entities like HIPAA into blockchain apps to begin the democratization of healthcare.

Fog Computing, Game Theory, and Consensus:

It's no mystery that blockchains are just not efficient enough at processing computations to function as reliable, real-time data engines. Pillai and Rao (2016) describe their research for using game theory models to optimize the economic management of resources in cloud computing platforms. The cloud computing movement, lead by companies like Microsoft Azure and Amazon Web Services (AWS), was seen as a major movement in reducing costs for operating an IT department within your company. By virtualizing compute resources through a third-party vendor, it was now possible to rent the compute resources you need in order to more easily scale compute operations. While fog-computing helps address the centralization issues of cloud computing, there are still issues like resource management optimization which are yet to be fully addressed in the cloud computing model. Principles like game theory help manage the interests of parties with competing interests and consensus mechanisms like Proof of Work heavily rely on these modeling techniques. Pillai and Rao discuss the formation of coalitions within game theoretic models for resource management. Whether through a cloud or fog-computing paradigm, consensus can be defined by the actual coalitions that are likely to form in a transaction economy (like HIPAA, the SEC, retail investors). Since no consensus mechanism has been so specific with its definitions for resource allocation and coalitions, this paper's approach could prove to be highly useful in even a distributed, peer-to-peer network environment.

Tu et al. (2022) further the discussion by describing a model to decentralize the vending of compute power through what is known as fog computing. Tu et al. propose that fog computing can be a more secure way to model the social features (individual or group-based) of end-users. For individual social behaviors, design concepts like trust, reciprocity, and incentives are important to consider. Also, for group or network-based social behaviors, concepts like centrality, community, and colocation matter a great deal as well. The fog computing layer can help package together incentive mechanisms and parallel computing to greatly scale blockchain transaction processing.

Combining Tu et al. & Pillai and Rao's work, it could be possible to combine game theory models for resource allocation along with the social features of fog computing. The competing interests for coalitions like regulatory agencies, end-users, and companies could be more more easily managed within a single consensus layer. Then, on top of this consensus layer, it could be possible to more efficiently write smart contracts that implement *lex cryptographica*.

Conclusion:

There are a number of misconceptions within the blockchain community as to the right way to progress the movement. The general animosity between regulator and blockchain company is becoming counter-productive. Nakamoto's interest in crypto-anarchy and their discontent towards regulatory bodies could be argued as warranted, but their design considerations that went into Proof of Work are greatly limiting. The lack of inclusion of regulatory bodies during consensus was likely intentional on his part, but this could change with continued research and development. Through novel game theory models for resource and coalition management as well as leveraging a new kind of compute-resource renting model, fog

computing, we can specifically innovate consensus technology such that lex cryptographica is actually technically viable. Through my technical education and experience, I hope to lead efforts in developing and researching these novel frameworks that can help scale ESG efforts. I have a clearer picture for my capstone project now - a proposal to present to the SEC's FinHub. I hope to develop a novel consensus mechanism(s) that leverage fog computing and include regulators as transacting coalitions. The way I see it, it is only through innovations in the consensus layer that lex cryptographica would be even possible.

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