

Implementing and Testing a Decentralized Web Protocol Abstract

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Increasingly we are seeing governments around the world periodically shutting down Internet access to prevent the free flow of information. These shutdowns occur in the form of limiting access to particular websites such as social media or total blackouts of all network access in order to control citizens and the narrative around an event. This behaviour is enabled by the centralized nature of the current Internet architecture where a small number of gigantic technology firms control many of the popular applications in use today. Access to today's internet is traditionally provided by Internet Service Providers (ISPs). Governments can pressure these technology firms and ISPs to enforce restrictions on internet usage.

The Decentralized Web (DWeb) is a promising new approach to circumvent some of these issues, in which the Internet Protocol (IP) layer is replaced by a new network layer. The DWeb protocol design in this project makes use of mesh networks and Peer-to-Peer (P2P) links to connect community based routes in the network. Objects on the DWeb are indexed using blockchain technology in order to utilize a decentralized object storage method. The blockchain storage allows for easy searching and integrity checking of the data.

In this dissertation multiple network simulation tools are examined, the mesh network configuration is implemented, an initial prototype of the blockchain storage solution was created. However, combining the mesh network configuration with the blockchain solution was not successful. A network emulation configuration was successfully created using the Carrier Sense Multiple Access / Collision Detection (CSMA) protocol to connect the nodes in the network, instead of the mesh protocol, alongside blockchain storage and retrieval using Multichain streams.

The research that started with this project will certainly continue given the even stronger importance of physically secure and uncensored internet access in the period of the COVID-19 pandemic.