This research could be expanded further by adding a topology discovery logic to the smart contract. At present, devices are added manually through the React based application. However, network switches, on connecting to the control layer, can be allowed to add themselves along with the details of the neighboring switches to a list of connected switches in the smart contract. Then, the application layer may approve the switch and add it to the topology.

In the longer run, the difficulty bomb function as discussed in the above section can make mining blocks increasingly consume more time and may lead to a phenomenon called the ice age [22]. Even though this will no more be a problem once Ethereum adopts the proof of stake algorithm, a custom Ethereum client can be built by modifying the difficulty function to avoid this problem.

IX. Conclusion

This research aimed to solve the problems of Single Point of Failure, Denial of Service attacks, and absence of authentication between the application and the controller. By distributing the control plane of SDN across multiple devices while keeping it logically centralized allowed us to solve the aforementioned problems. In addition, using blockchain also helped resolve the usual challenges posed when trying to use a multi-controller setup such as:

1. State synchronization across devices
2. Even distribution of workload over all controllers
3. An immutable database of flow entries
4. A history of state changes for security auditing and analysis

By offering a solution to the security problems found in SDN using blockchain, this research helps alleviate the security-related skepticism against SDN and facilitates the industry adoption of this technology by network engineers.

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