

Title: Quantum Blockchain: A Security Union and Communication Protocol for Quantum Computer Based Internet

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Abstract: We present a security union and communication protocol called quantum blockchain for quantum computer based Internet. The blockchain is secured by quantum key distribution and entanglement in both time and space through quantum channel modeling. To capture the internal qubit data signal flow dynamics of the channel, we model it via a deep convolutional neural network (DCNN) with generalized stochastic pooling in terms of resource-competition among different quantum eigenmodes or users. The pooling is corresponding to a resource allocation policy with two levels of competitions as in cognitive radio: the first one is on users' selection in a "win-lose" manner; the second one is on resource-sharing among selected users in a "win-win" manner. To wit, our scheduling policy is the one by mixing a saddle point to a zero-sum game problem and a Pareto optimal Nash equilibrium point to a non-zero-sum game problem. The effectiveness of our policy is proved by diffusion modeling with theory and numerical examples.