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Extraction of traffic features in Software Defined Networks using an SDN Controller

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Machine learning methods can be used to solve the problems of detecting and countering attacks on software-defined networks. For such methods, it is necessary to prepare a large amount of initial data for training. Mininet is used as a modeling environment for SDN. The main tasks of modeling a software-defined network are studying traffic within the network, as well as practicing various scenarios of attacks on network elements. The SDN controller ONOS (Open Network Operating System) is used as the network controller. Various network topologies are considered in the modeling. In addition to the tree network topology, Fattree, Dragonfly, Jellyfish network topologies are used, which have several alternative data transfer routes between one pair of nodes. During the modeling, nodes (hosts) are created. Hosts number depends on the configuration. Then these nodes are networked using a set of virtual switches. Direct communication between nodes is also specified in the configuration. Once the SDN is initialized, the hosts begin streaming according to scripted scenario. The possibility of analyzing information about traffic within the network using an SDN controller in real time is investigated, as well as the possibility of collecting information in the form of a set of features. Modeling of software-defined networks under different initial conditions and for different attack scenarios can be carried out on a distributed computing system. Since the computational problem to be solved can be divided according to the data into many autonomous tasks, it is possible to use grid systems from personal computers and voluntary computations to speed up the process.

Summary

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