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A Study on regarding the description of the network topology in home network

Reo Fujimaki (1610046)

School of School of Advanced Science and Technology,
Japan Advanced Institute of Science and Technology

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Along with the development of information technology, in addition to personal computers (PC), the number of devices that can be connected to the home network is increasing. For example, mobile terminals such as information appliances and smart phones can be cited. As a result, due to the mixture of different network devices and various devices, the topology of the home network becomes complicated. For example, even if the terminal is wired, there may be a configuration in which radio or power line communication section enters between the terminal and the home router. For this reason, it is extremely difficult for ordinary users with little knowledge about networks to solve problems by themselves from complicated networks themselves. Therefore, in order to manage and operate the home network smoothly, it is necessary to automatically detect the topology information and to provide it to users and managers.

A mechanism for collecting pieces of fragmentary information for topology detection is installed from end terminals and network devices connected to the home network. One such mechanism is HTIP (Home Network Topology Identifying Protocol). HTIP is a protocol for detecting the topology of the home network. However, there is little scientific discussion on how to handle the topology information collected with this HTIP. Besides, there is a method of detecting the topology of the network by using management tools such as SNMP and LLTD, etc. Both methods form a complicated topology, and the present state of the home network where various devices can be connected It is not on the point. Also, in order to gather information on topology and utilize the detected topology, it is necessary to describe topology information in an appropriate format. Conventionally, in order to facilitate and automate the construction and operation of a large-scale network, information on topology by a network description model has been described. However, the necessity of dealing with the formal description of the topology information of the home network is not considered to be high yet, and there are few examples. In addition, compared to enterprise networks and data center networks, the diversity of technologies being used, poor prospects due to repeated expansion of the system from the past, designers and administrators who are grasping the whole There is also a problem peculiar to the home network such as absence, and there is a high possibility that the data center technology can not be diverted directly.

In this research, we propose a method to describe the topology information in the home network uniformly. In the home network, the topology of the home network is complicated by connecting different networks and various kinds of devices. On the other hand, the topology is automatically detected from the management operation information collected from each device connected to the home network, and the topology information is described by the network description model.

Based on the proposed method, we implemented an algorithm to detect topology from topology information and modeled topology information. In the topology detection, it is shown that the network topology can be detected from the collected connection configuration information. In modeling topology information, it was shown that it is possible to describe the detected topology information and grasp the network topology. As a result, we implemented an application that visualizes the network topology as an application example. However, the connection configuration information used in the system is prepared information in advance, and it is necessary to conduct experiments in an actual home network environment in which HTIP is installed or in a simulated environment.

In the description of the topology information, which is the proposed method, it is possible to describe the topology among a variety of terminals or between network technologies cross-layer, and it is possible to grasp the entire topology of the home network. Also, by using the network description model, the topology information can be read by a computer. This makes it possible to facilitate and automate the identification of the cause of the failure of the home network, for example, contributing to the improvement of the availability of the home network by utilizing the topology information.