Title	
Author(s)	,
Citation	
Issue Date	2020-03
Type	Thesis or Dissertation
Text version	author
URL	http://hdl.handle.net/10119/16420
Rights	
Description	Supervisor: , ,

Research on consistency management of smart home ecosystem

1810174 Koki Maemura

In recent years, the implementation of IoT systems has changed drastically. In the past, devices were once aggregated by devices called home gateways, and from there, these devices connected directly to the Internet and cooperated with services. Nowadays, the model is changing; it is shifting to a connectivity form known as the "device cloud", usually provided by a device maker. This makes it possible to quickly introduce devices and services to the market, add functions after sales, and correct defects. In recent years, a large number of device hubs for controlling existing home devices such as smart speakers with an interface such as infrared rays have been released.

The device hub provided by one company, the cloud connected to it, and the application connected to the cloud are considered as one ecosystem in this paper. In addition, in order to identify a physical device in the smart home the cloud has a registered device name (entity), a property name and an installation location name as device properties. This entity is in the virtual space of the cloud, but is associated with a device in the physical space of the smart home. Also, in order to distinguish it from other entities in the virtual space, it is identified by a registered device name.

In recent years, it has become possible to achieve cooperation between clouds of different companies, and it is possible to operate a device of an ecosystem of one company using a device hub from an ecosystem of another company. For example, the user gives a command to company A's smart speaker by voice to turn on the TV, the smart speaker passes through the company B's cloud via its own cloud, and the infrared light from the device B's device hub is sent to the TV and turned on.

Let us consider the case where three different ecosystems are present: ecosystem A, B and C. A cooperates with B and C, and the user can issue a command to A to operate B's device hub and C's device hub. A also receives the information regarding the entities present in ecosystems B and C. At this time, if there is a discrepancy in information regarding an entity between different ecosystems, a problem may occur. The most desirable state is a consistent state. This is a state when there is no inconsistency in this information and the registered device name, type name, and installation location name are the same among the ecosystems. In this paper, the state

of consistency is a state in which entities and their properties are consistent between multiple ecosystems.

In this paper, in the field of smart home, problems that can occur between multiple ecosystems and problems that occur within one ecosystem are formulated and exhaustively enumerated. In addition, a model including specific examples of each of the listed problems was shown, and a solution method for taking consistency between ecosystems in a smart home was proposed. By solving the problem, the horizons of smart home users can be broadened, and we expect that accidents caused by unintended settings and accidental operation of wrong devices can be avoided