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Mobile Agent Framework for WSN Based On CoAP

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Abstract. IoT devices and nodes integrated with suitable mobile agents are deployed in various fields to collect data or monitor the systems. With the rapid developing of software architecture, it highlights the usage of the distributed frameworks, which introduces the Internet communication between nodes. The Constrained Application Protocol (CoAP) is a suitable Internet protocol that could be applied to network-constrained systems. In this paper, it illustrates how to enhance the architecture of such a framework based on CoAP to access and manage nodes with RESTful interfaces via the Internet.

Keywords: Mobile agent; CoAP; RESTful interface; WSN

1. Introduction

It is common that many mobile agents are deployed on the IoT devices to implement the automatic data transmission and system migration. Applying to such functionalities, it needs a full-featured network. However, it remains several vital issues that the devices and nodes are mostly based on constrained chips and micro-controller boards with the limitation on the network connection and low power supply. In this paper, it introduces the CoAP, which denotes constrained application protocol, to enhance mobile agent framework that is featured on: (1) Simplicity of exchanging messages between devices; (2) Full-featured methods on Internet data transmission and (3) Low-cost energy usage based on battery. [3,4]

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2. Methodology

CoAP is designed for machine-to-machine applications with constrained nodes and networks [1]. Firstly, CoAP is structured in Requests/Responses Layer and Messages Layer between Application Layer and UDP Layer, shown in Fig 1, to fullfill the demands of data exchange simplicity and request method full-featured [2]. In Requests/Responses Layer, it contains full RESTful methods which are GET, POST, PUT, DELETE; while in Messages Layer, it supports four simple message statuses: confirmable, non-confirmable, acknowledgement and reset. Secondly, the content defined in the protocol is transmitted in the binary text with only 4 bytes header, which is concerned with less power consumption on network usage.

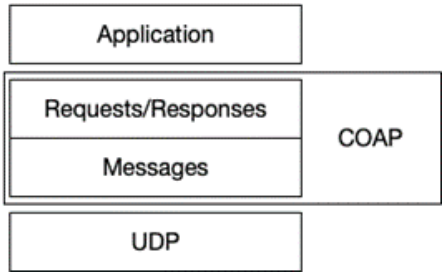

Fig. 1 Abstract Layer Structure of COAP [1]

The mobile agent framework designed in this paper contains hardware connectors, data models, system controllers and CoAP-based APIs, which is illustrated in Fig 2. It introduces the RESTful interfaces [3] to access the controllers and datasets of the mobile agent.

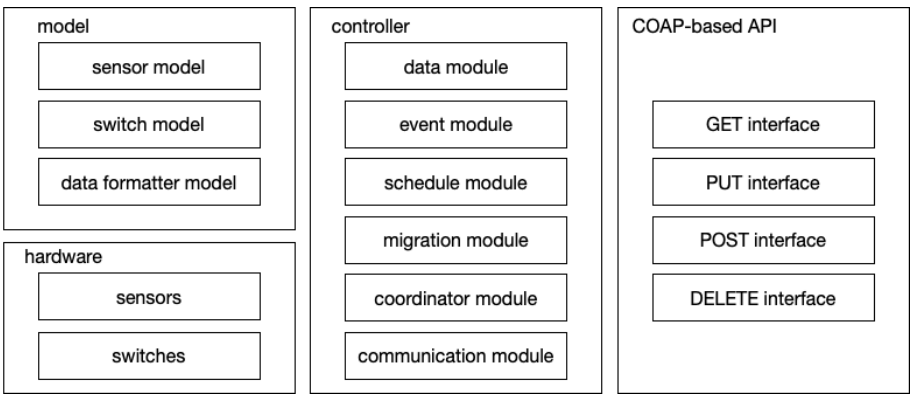

Fig. 2 Architecture of Mobile Agent Framework based on CoAP

RESTful interfaces are used to identify and manage resources with specific methods. Resources accessed by mobile agent framework are (1) the datasets monitored by sensors, (2) the availability and status of hardware, (3) the migration actions of agents and (4) the scheduled and iterated events to execute. The mapping of RESTful Interfaces and abstracted controller functionalities are shown in Table 1.

Table 1: Description of the samples

Interfaces	Abstracted Controller Functionalities
GET	Retrieve datasets; Retrieve migrations; Retrieve system status
PUT	Update events; Update Schedules; Update system status
POST	Create migrations; Create events; Create Schedules
DELETE	Destroy events; Destroy schedules; Destroy specific datasets

3. Conclusion

CoAP is a typical full-featured Internet protocol based on traditional TCP/IP or UDP protocol. It provides several functions which are user-friendly to network-constrained applications such as mobile agents. It is desirable to introduce such protocol to a common mobile agent framework so that it brings convenience to end-point users with less Internet relevant concerns.

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