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Study about Smart-Sensor Interaction Transmission System for IoT

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Abstract**:** *IoT means the technology that built in sensors and communication features on things to connect to the Internet. Things are consumer electronics, mobile devices, wearable computers, and various other embedded systems. Various things connected to one user is to provide a variety of services. After the emerge of the smart phone, this is expected to be the core components that make up s connection society through the convergence of mobile, cloud, big data technologies. There are prerequisite technologies like data analysis and reasoning, semantic technology platform, highly reliable networks, sensors-smart terminal interaction and collaboration, and energy smart sensors for a successful realization of the IoT. In this paper, trying to mention about the overhead when occurred sending and receiving data between the various terminals, one of the sensors and smart terminal interaction and collaboration technology. Therefore, in this paper, we present a scheme that can solve the overhead.*

Keywords: *IoT, Network, Sensor*

1. Introduction

Humanity enter the super-connection generation that linking human and things. Origin purpose is connecting human and all-things. But the price of sensor and network, the connecting g performance and volume of termination blocked the generalization. However, M2M and IoT technology is now growing with upgrading smart termination technology helps the generalization of smart sensor and smart equipment, dropping the price of communication module[1]. Also, IoT will be the heart of super-connection society with 'IIoE(Intelligent IoE)' which is interconnection system that combining thing, data, process, time, space, knowledge, etc around human[2]. Mackinsey prospect that IoT technology will change human's lifestyle very rapidly, and affect all general industry fields[3].

In 1999, Kevin Ashton suggests the concept of IoE for first time. He refers IoE as the system that connect physical space and internet with sensor. Mike Kuniavsky describes the smart things, same concept with IoT, as follows. First, the smart things have to have their own name. This is the big preconception that discriminate the smart thing and the other things. System is needed to naming a lot of things. So, the system, IPv6 (Internet Protocol Version 6), is used. The things that has no own ID cannot be found in internet, that's the reason why they cannot approach the service. Second, the own ID of things have to be searched in internet. This means the own ID of the things not only have to be discriminated between communication network and digital device, but also have a right to process the things through internet communication network in linked service software. The sensor which is attached at the thing, takes charge of network connection. When sensor is activated, sensor submit its own ID, when sensor is deactivated, the sensor could process the internet communication network by digital device such as camera and code reader. Third, the thing has to have its own ability to some data related work. Data collecting, gathering, calculating, submitting data can be examples.

Fig. 1: The Concept of IoT

Data related work has various contents and huge data handle range. Data related work is composed of from the smart phone, intricacy data handle device, to transportation card, simple data handle device that preserve location and fare information. IoT service can be provided when three conditions are satisfied. So, the proper data processing with the thing's own ID can be possible, when manufacturers adopt sensing technology. In this paper, I want to talk about the data processing which belongs to third condition. In IoT environment, when the device exchanges its data processing, mobility, linkage, connectivity, cooperation with the other device, the increasing overhead in device in inevitable. The increasing overhead is the main cause of the user service quality problems such as reaction delaying, delaying between devices, high cost. In these days, many researches and developments about finding short distance device, new transmission technique is ongoing to apply IoT service usage.

2. Materials and Methods

2.1. Design and Development for Content Sending/Receiving

The existing transmission system, base station(BS) and the user's device connect following recognition of the network, mobile devices, content to the server he or she would like the request, the server responds to this. The system will additionally transfer content on all the units receiving equipment to transmit the content. That is, it may become a principal when each device requests a service, or offer, and serves to mediate all these situations. In the end, content transmission system of these results in several problems. In an attempt to alleviate these problems, in this paper, we designed a content delivery service that is described in the following.

Suggested Content Transmission System Scenario

1. for certain operations, each node executes only its designated purpose
2. Content delivery through cooperation node (device)
3. Update the information in the device in the movement vicinity
4. Each device collects connection information about all nodes (device)

Each node (hereinafter, device), is assigned a role that suits the current state (request, provide control). This can reduce the overhead of the device owing to reduced redundancy. In addition, the information needs to be regularly updated to enable connection to the device itself. Moreover, the mobility of the mobile device has information about the connection between the subject of the movement of the feature or more. This effect can be expected to reduce the time in detecting a device in terms of cooperation between devices. Fig 3. Shows the role of each participating node in the content delivery system.

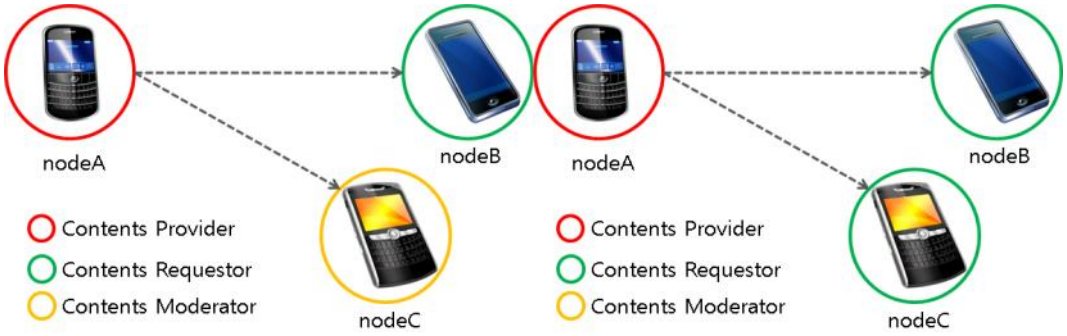

Fig. 2: Role of Each Node

Fig 3. As, there is only one role for transmission and reception status of content, the device reduces resource overhead. Further, each device is connected such that cooperation with each other is facilitated and the transfer of multimedia data is possible. To shorten the transfer time by supporting the content delivered through the device so as to update the information of the target device, each device serves as a control. Fig 4. Shows a method of transfer of content from a device.

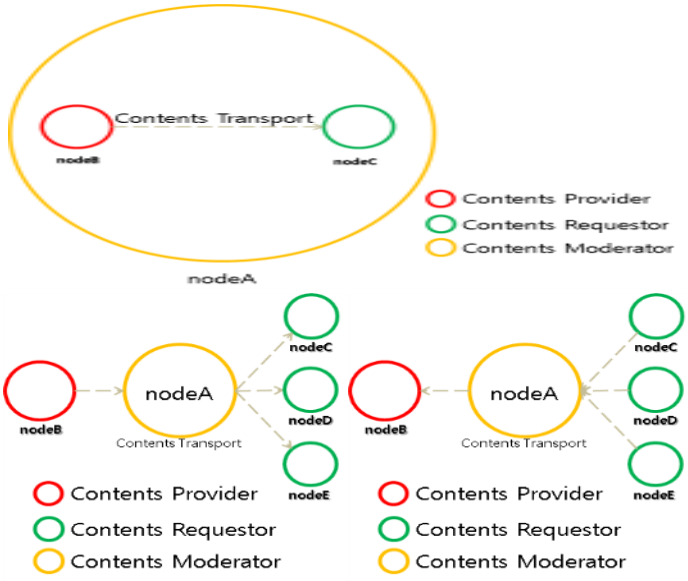

Fig. 3: Logic of the Content Transmission

Further, since the state of the service is known, status information updates of the device state and information acquisition about the mobility of the device occur rapidly. By then reduce the frequency of updating the information of the device there is little change in the state and to increase the period of the device not, thereby minimizing the waste of resources. As shown, are transferred to the adjacent device detection signal detected new device, it possible to update the information.

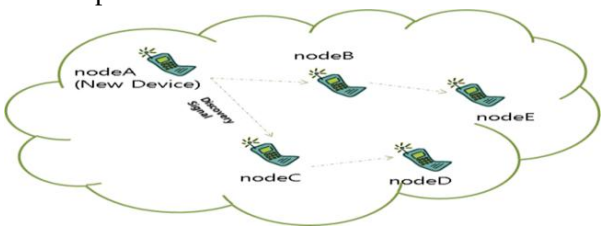

Fig. 4: Detected for New Node

In order to perform a given role, each device must have the information of the other devices. In this system, device information, is essential for efficient content distribution. Information on discovery of a new device, the requesting device, transmission device, the control device is stored in the candidate device. Information is stored by use of SQLite DB in smart devices. Index is used to access DB for the value of the primary key of each table. It also indicates the current role of the equipment. Type has a value of the following three control, the request. Mac Address is the intrinsic value of the apparatus MAC address. Status indicates the current state of the device, if the content is in transmission, wait-send the request, which has a value of the information updated. The Target ID denotes the ID of the target device's Status. Location Information indicates the location of the device. Mobility shows the movement of the current device. The structure of the DB table is as follows.

TABLE 1: Basic device information table

Information Table Volume of Base Device						
Index	Type	MacAddress	Status	Location Inform		
Information Table Volume of Contents Control Device						
Index	Type	Priority	MacAddress	Status	TargetID	Mobility
Index	Type	MacAddress	Status	TargetID		

Fig 5. Shows the method to transfer content to multiple devices. The transmitting device selects an intermediary device within the radius of transmission and stores the position information of the device selected for connection in the database and communication environment. The intermediary device selects the receiving device for de-transmission within a certain radius, and stores the connection information in the database of the receiving device. Connection after completion is verified by the transmitting device to determine if the intermediary is ready to receive data; accordingly, a reception preparation acknowledgment message is transmitted. The intermediary device that receives the message, prepares to send a confirmation message to the receiving device. An intermediary message is sent indicating that the intermediary device is ready to receive the data. The receiving device that receives the message, sends to the intermediary device the data ready message. Intermediary data is sent to the intermediary device and multiple receiving devices by the receiving device. An intermediary reception completion message of data reception is sent by the intermediary device to the receiving device that is transmitting the data, and the message of the reception completion of the data to the transmitting device. When the data transfer is completed, then the receiving device closes the connection with the intermediary and the intermediary device closes the connection to the respective receiving device. The transfer is then complete.

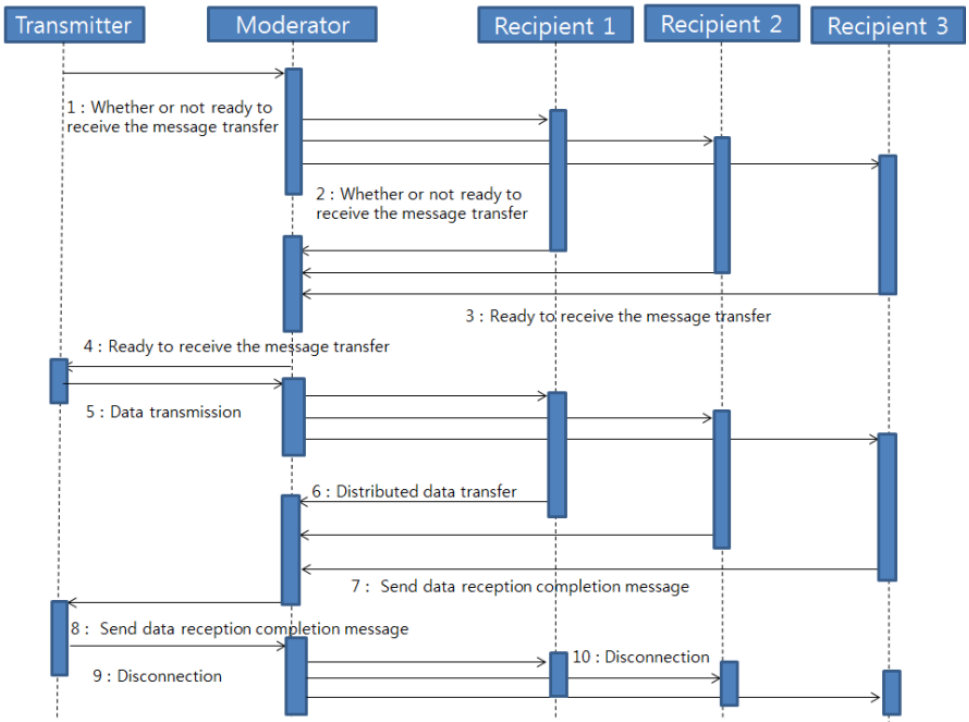

Fig. 5: Sequence Diagram of the Content Transmission (Multiple Devices)

Fig 6. Shows a sequence of cooperative forwarding. The transmitting device selects an intermediary device within the radius of transmission. It stores the position information of the device selected for connection in the database and communication environment. The intermediary device selects the receiving device for de-transmission within a certain radius, and it stores the database information of the receiving device and the connection. To determine if the intermediary is ready to receive data a message is sent to the intermediary device to confirm if it is ready to receive data; the transmitting device transmits to the receiving device a confirmation message. Receiving device transmits to the intermediary device the message of data ready to receive when the receiver is ready. Simultaneously as it receives the message of ready to receive, an intermediary that received the ready to receive messages sends a distributed range of data to and from each transmitting device. Transmissions of data to the intermediary device are performed within the range of the intermediary device, to consolidate data, and each transmission device transmits to the receiving device. Receiving device which is receiving the data, and transmits to the transmitting device via an intermediary device message receiving completion. Each transmitting device, and that it terminates the connection to the intermediary device, and terminates the connection of the receiving device and the intermediary device, the transfer is complete.

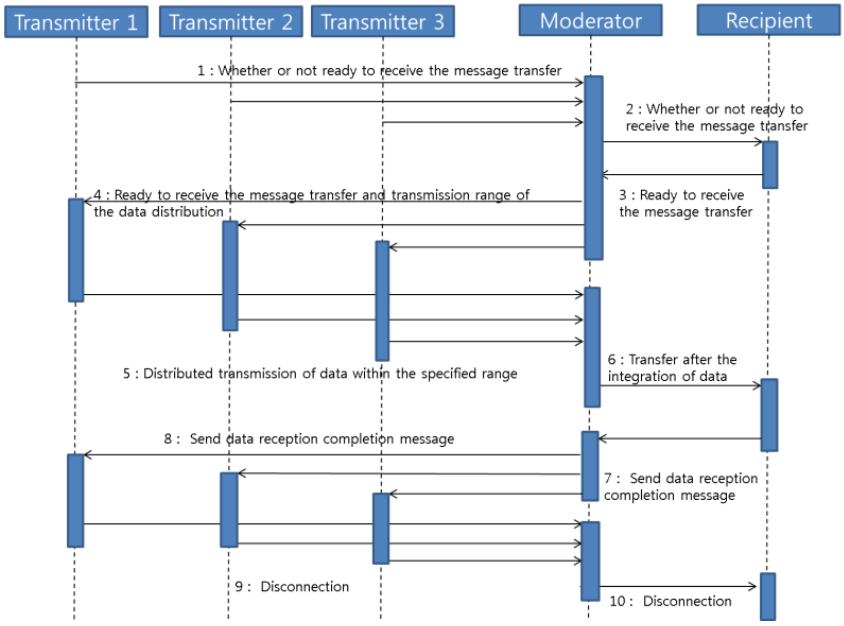

Fig. 6: Sequence Diagram of the Content Transmission (Cooperative)

3. Conclusion

IoT generation that enables the union of all things and internet is impending. IoT will be all-things-intelligent-internet when the computer can reach huge amount of information with advance-computing-ability. With all-things-intelligent-internet, we can interconnect between To matching these new trends, we need more technology progress in some fields, such as open type semantic platform, sense-smart terminal interaction technology, high-trust-low-power network technology, energy-harvesting, sensor technology. Also we have to overcome some hindrances such as invasion of privacy, information protection to matching new trend. In this paper, I conduct research to reduce overhead to efficient IoT information exchange. Control system which is controlling device, is added to origin transmit-receive system to manage storage, controlling and date transmit-receive. To apply various existing devices, not only ‘proposed new system’ but also ‘web standard’ needs more research. It will be a comparison with the existing transmission system can be implemented in the future by the actual proposed method.

4. Acknowledgement

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