

Research on Addressing Technology of Internet of Things

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Abstract. In order to construct a unified object coding model, the coding and addressing characteristics of Internet of Things are studied in detail, and the types of codes that may appear in the Internet of Things are defined, and the coding addressing mode of the Internet of Things is defined. Based on the analysis of the addressing characteristics of the Internet of Things, the lightweight coding model of the Internet of Things is given. Based on the definition of the lightweight addressing model of the Internet of Things, the sensing layer and the network layer are analyzed respectively. The scalability analysis of the model and the compatibility of other coding methods.

Introduction

The current Internet address (not including the Internet of Things) generally refers to the computer network addressing, the computer network has four encoding: domain name address, IP address, physical address. Respectively, corresponding to the OSI seven-tier model in the application layer, network layer, data link layer. From the point of view of physical characteristics, the address in the computer network can be divided into software address and hardware address: the software address is also called logical address, such as domain name and IP address; hardware address is also called physical address, such as network adapter MAC address. But there are more than a hundred times more than the computer network nodes in the end of the network nodes, and even some of the items only through the RFID logo, the Internet will be more addressing the Internet address address more complex. The sensing layer of the Internet of Things has a large number of devices different from the Internet nodes. It is usually composed of various identification devices, sensors and repeaters, including two-dimensional code labels, RFID tags and readers, camera, GPS, temperature sensor, humidity Sensors, carbon dioxide concentration sensors and other sensing terminals. These devices are generally less capable of processing, one of which is important and special is the RFID device, which consists of an interrogator (or reader) and multiple transponders (or electronic tags). Electronic tag is the information carrier in the RFID system, usually by the simple coupling of the original (coil, microstrip antenna, etc.) and micro-chip composed of passive units, so in the Internet of things, the electronic tags can only be indirectly addressed, The acquisition, processing and management functions of the object identification information need to be further realized by the interrogator in a wireless or wired manner. In the perception layer and the network layer through the Internet of things through the interface, the perception of data through the existing network environment for transmission.

Characteristics and Requirements of Internet of Things

In addition to the logo system requires a new design, the Internet of things addressing mechanism is more worthy of further study. At present, the study of Internet of things resource address is still in the initial stage, basically directly follow the existing Internet addressing technology. However, the particularity of the Internet of Things itself fundamentally determines that the resource addressing has the similarity with the Internet resource addressing, and there are many items coding standard coexistence caused by resource addressing conflict and other specific addressing problem. Therefore, the Internet of Things on the existing Internet addressing technology presents a new challenge, the existing addressing technology can not fully meet the needs of the Internet resources

needs. Internet resource addressing technology mainly implements the addressing of resource name to resource address in the Internet. It provides perfect addressing support for traditional Internet resource names such as MAC address, IP address and domain name. 164 number of addressing is based on specific rules for the number of pre-processing to achieve addressing support. Thus, the Internet for the need to pretreatment of the resource name and can not achieve automatic processing, and must be aware of the specific pre-processing rules in advance to complete the addressing operation. However, there are many different coding standards, such as EPC and u Code, and the new coding standard may emerge. Therefore, in order to avoid the use of different items in the coding of the object code in the Internet of things to address the resources generated Conflict, the item code also requires a preprocessing operation to complete the addressing. And the code of the item is different according to the coding standard, and the rules of the corresponding preprocessing operation are different, and the new rules will be accompanied by the development of the new coding standard. Therefore, the object network resource addressing prepares the item code Rules can not be used in advance to know the way, but should support an automatic addressing, matching processing mechanism. In addition, the current Internet resource addressing technology does not provide effective guarantee for the privacy protection of resource addressing, and the Internet of Things resources address sensitive information such as logistics, so it needs new and more suitable for privacy protection of Internet of Things application system mechanism.

Lightweight Coding Addressing Model

Addressing problems are generally not a continuous process, but a multilevel iterative process. For example, the IP address is relative to the MAC address in the Internet, but its MAC address and IP address logically identify the same resource. Similar to the coding characteristics of the Internet, there are multiple addresses in the resources of the Internet of Things. This topic divides the Internet of things into two major categories: one is direct encoding, it is in the bottom of the addressing iterative process, directly identifies a certain entity, and is the only local, such as the Internet coding concept in the MAC address; A class is an indirect code, which is in the middle of the addressing iterative process, indirectly identifies an entity, and an entity can have multiple indirect codes, such as the IP address in the Internet Coding concept. In this paper, we analyze the direct and indirect codes existing in the Internet of China.

The concept of EPC was presented by MIT's three professors of Sanjey Sarma and David Brock in October 1999. The core idea was to provide the only electronic identifier EPC for each product and to automate data collection through RFID technology. In the Internet of Things, the EPC code is stored on the electronic tag, and the EPC code is further acquired by the transponder to obtain the specific information of the item. The EPC code is a set of numbers consisting of a version number plus a domain name manager, an object classification, and a serial number. The version number indicates the version number of the EPC; the domain name management represents the information of the product manufacturer; the object classification indicates that the product belongs Type of information; serial number that corresponds to the serial number of the product.

EPC-64, EPC-96 and EPC-256 can be further subdivided into EPC-64 Type I, Type II, Type III, EPC-96 Type I, EPC-256 Type I, Type II, Type III and so on. EPC-64 Type I, Type II, Type III, respectively, to provide a million, one hundred million, one million product identification capacity, according to the different manufacturers, you can choose the appropriate EPC code for product identification. The EPC-96 I-type encoding provides a wider range of identities than the EPCII type. The serial number field identifies more than 67.7 billion product individuals that have exceeded the total amount of all currently identified products. The EPC-256 Type I, Type II and Type III encodings are capable of identifying up to 2160 individual products and are sufficient to give a unique identification for all items within a few hundred years. Such a large range of identities even exceed the number of IPv6 addresses, and electronic tags only store EPC coding, and obviously no direct processing capacity, the analysis of EPC code through the Internet connected to the server to complete. It can be seen that the EPC coding is completely different from the coding nature of the Internet, and the EPC can not be directly addressed by any existing network protocol. The EPC

electronic tag is only a passive response to the interrogator. Therefore, for this type of coding will be used to study the way indirect addressing.

MAC codes are typically burned directly in a communications device and are typically managed and assigned by the IEEE registrar to an OUI (Organizational Unique Identifier) code for the device manufacturer, and then the respective manufacturers replenish the remaining encodings, different protocols The length of the MAC address may be different.

The length of the node MAC address in the IEEE802.15.4 network is 64 bits, which is called a long address and is represented by a colon in a hexadecimal format. For example, "00: 14: 83: 00: 46: 8a: be: ae " Long addresses are globally unique, and each 802.15.4 device has been assigned this address at the time of production. The 0-23 bits are managed and assigned by the IEEE registry to the network card manufacturer to identify the identity of the LAN node, and the remaining 40 bits are assigned by the manufacturer themselves and it should be unique to each device. MAC encoding and EPC coding is different from the existing network protocol to complete the next layer of the address of each other, such as MAC address can be through the ARP and RARP protocol to the next level of indirect coding - IP address translation, because the Internet of things perception layer There is also a certain computing power of wireless devices, so you can use the hardware address as a direct connection of Internet resources.

In addition to the previously mentioned MAC addresses, some other wireless communication technologies use their own defined segment address forms for addressing and information exchange between devices. At present, there are many technical standards for short-range communication. Only common sensor network technologies include Zig Bee, Z-Wave, RUBEE, Wireless HART, ANT / ANT +, Wibree, Insteon and so on. Each technology for a certain type of application started, the lack of compatibility between the agreement, can not communicate. Such as: Z-Wave mainly for wireless intelligent home network, RUBEE for interference or more obstacles in the environment, Wireless HART is mainly used in industrial monitoring.

IPv6 coding addressing technology

The sensing layer of the Internet of Things generally uses short-range wireless communication technology and requires it to have low power consumption and low cost. In this paper, the perceptual layer of the proposed model is based on the low power wireless communication protocol of IEEE802.15.4 protocol. The physical layer data frame defined by IEEE802.15.4 is 127 bytes, the maximum frame header is removed, the maximum frame length of the MAC layer is 102 bytes The If you consider the link layer security, using AES-CCM-128 encryption transmission, then only 81 bytes available, remove the 40-byte IPv6 header, provided to the upper protocol space only 41 bytes, plus The overhead of the upper layer protocol and the cost of slicing / reloading, the fewer fields for data transmission, and the lower transmission efficiency. So the standard IPv6 message format needs to be optimized to improve its transmission efficiency.

The Dispatch value is identified as NALP from 00000000-00111111, indicating that the subsequent bits do not belong to the 6Lo WPAN frame. Any node that receives the dispatch value of 00000000-00111111 discards this packet. If the other non-Lo WPAN protocol matches 6Lo WPAN, This byte should be added after the MAC header. Dispatch value is 01000001 Description This IPv6 packet is a standard IPv6 packet. Dispatch value of 01000010 identified as Lo WPAN-HC1, said the subsequent bytes for the Lo WPAN-HC1 header compression encoding, that is, stateless compression coding. This code can only compress the local link address, can not be achieved on the global routing IPv6 address compression, for the realization of neighbor discovery. Dispatch value of 01010000 identified as Lo WPAN-BC0, under normal circumstances if the logo, dispatch will follow an 8bit serial number, used to achieve lightweight IPv6 in the multicast mechanism. Dispatch value from 00000000-00111111 identified as Lo WPAN_IPHC, said the subsequent bytes for the Lo WPAN-HC1 header compression coding, that is, context-based compression coding, any IPv6 address can be compressed.

IPv6 coding is very different from standard IPv6. Its encoding defines the Lo WPAN header and adds the dispatch field to identify the subsequent encoded parsed form before the Lo WPAN header

and the IPv6 and UDP headers. The purpose is to maximize To the extent that the standard IPv6 packets are compressed. At the same time, the Internet's perceptual layer low-power environment has strict requirements on the length of the packet, even if the perceived layer of data may be smaller and has been compressed on the IPv6 header, but still can not rule out the situation of excessive load, It is necessary to carry out the data load at the sending end and reorganize the data load at the receiving end. In summary, the key technology problem in the application of IPv6 coding in Internet of Things is the indentation and reloading of IPv6 header compression technology and IPv6 packet.

Conclusion

The existing Internet identification system and addressing technology can not meet the development needs of things. At present, the research on the identification and addressing of Internet of Things is still at the initial stage. The related research basically follows the existing technical system of the Internet, and does not analyze and model the basic characteristics of the Internet of Things. Network identification and addressing the technical aspects of the many areas also need further in-depth study of the industry.

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