The Fast SIP Registration method Using MAC Address in VoIP system

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Abstract — In this paper, we propose the SIP Registration method using MAC address in VoIP system. In the process of registering from SIP terminal to the SIP server, the SIP server requests the MAC address of the terminal and uses the method of storing the MAC address which matches with the SIP terminal. So, if the terminal is initialized or the IP address of the terminal was changed by a user movement, the SIP terminal can be rapidly registered in the SIP server by using the stored MAC address.

Keywords — VoIP, SIP, Registration, MAC

1. Introduction

Nowadays, the multimedia services including an audio, data, a video have been accomplished through the internet protocol. That is, a variety of networks are converged into a network through the Internet, and the internet is used more frequently. Through this, the voice service provided through the existing PSTN is replaced by VoIP. The recent VoIP service tries to accomplish the quality improvement through the continued development. And it is used in the form of the existing PC-to-PC and anticipates the big change as to the convenience of an use. The SIP terminal has to be registered in the SIP server in order to use VoIP service.

The registration method for using the existing SIP-base VoIP service registers SIP terminal using general REGISTER command in the SIP server. And then, the SIP server sends the "401 Unauthorized" message to the SIP terminal. The SIP terminal receiving the SIP message including user ID, password, nonce, a domain, and etc. sends the second REGISTER to SIP server, and the SIP server authenticates the SIP terminal through the MD5 mode. Moreover, in case a user moves and the IP address of the terminal is changed, the registration error can be generated.

In this paper, we propose the Registration method using the MAC address of the SIP terminal in order to use of the VoIP service. The SIP terminal transmits the REGISTER message to the SIP server. And then, the SIP server sends the "401 Unauthorized" message which requests user ID, password, nonce, a domain, and etc. of the "WWW-Authenticate" field. The SIP terminal receiving the authentication request message sends to the second registration message to the User name item of the "Authenticate" field including its own MAC address to the SIP server. If the SIP server receives the second registration message including its own MAC address from the SIP terminal, it registers the MAC address in the SIP server and matches the SIP terminal with the registered MAC address. Next, the SIP server sends the response message to the SIP terminal. As a result, The SIP server authenticates the SIP terminal through MAC Address of REGISTER message, and registration time is reduced. Also, because signaling procedure for registration is simple, the network performance may improvement.

The remainder of this paper is organized as followed, in section 2, we provide related works of registration method for VoIP service. We propose a SIP terminal registration method for providing the VoIP service in a section 3. In section 4, we explain a effect on proposed method. Finally, we conclude the paper in Section 5.

2. Related Works

2.1 SIP(Session Initiation Protocol)
SIP is the new signaling protocol of IETF for the setting up of the real-time call and internet multimedia conference on the IP network. Presently, it is used for data transmission of not only the most of voice communications but also the different form. SIP has a form such as the E-mail address which is similar to the HTTP (Hyper Text Transfer Protocol), and the SMTP (Simple Mail Transfer Protocol) and WWW (World Wide Web) address as the internet protocol of the text based in which use is simple. And it changes the internet multimedia conference having one or the participant described in the above with production. It is the control protocol for lifting. Moreover, SIP was RSVP, reserving the network resource RTP, transmitting data on a real time basis RTSP, for controlling the delivery of the stream media the SAP (Session Announcement Protocol) for advertising the multimedia resource through a multicast, and multimedia data like the SDP (Session Description Protocol) for expressing the multimedia resource and control designed to an object. But a function and operation of SIP does not depend on this protocol. It independently operates in the network layer. Therefore, since it is excellent in an expandability, it has the advantage of designing to the general-purpose protocol.

2.1.1 SIP Registration
Registration binds a particular device Contact URI with a SIP user Address of 'Record(AOR)'.


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Bob sends a SIP REGISTER request to the SIP server. The request includes the user’s contact list. This flow shows the use of HTTP Digest for authentication using TLS transport. TLS transport is used due to the lack of integrity protection in HTTP Digest and the danger of registration hijacking without it, as described in RFC 3261. The SIP server provides a challenge to Bob. Bob enters her/his valid user ID and password. Bob’s SIP client encrypts the user information according to the challenge issued by the SIP server and sends the response to the SIP server. The SIP server validates the user’s credentials. It registers the user in its contact database and returns a response (200 OK) to Bob’s SIP Client. The response includes the user’s current contact list in contact headers. The format of the authentication show is HTTP digest. It is assumed that Bob has not previously registered with this server.

Bob sends a SIP REGISTER request to the SIP server. Bob’s request includes an updated contact list. Since the user already has authenticated with the server, the user supplies authentication credentials with the request and is not challenged by the server. The SIP server validates the user’s credentials. It registers the user in its contact database, updates the user’s contact list, and returns a response (200 OK) to Bob’s SIP client. The response includes the user’s current contact list in Contact headers.
2.2 Re-registration Method

When the SIP terminal moves to the other network, we are searched for Process of Re-registration Method. Firstly, the first SIP terminal registers in the SIP server of the Network A. SIP terminal sends a SIP REGISTER request to the SIP server. The SIP server sends "401 Unauthorized" message for authentication to The SIP terminal. The SIP terminal receives this message sends 2nd "REGISTER" message with Authentication information to The SIP server. Finally, the SIP Server sends the response message to the SIP terminal. This procedure follows figure 1 SIP Registration flow. When the SIP terminal registered Network A moves Network B, IP address of the SIP terminal is changed. Because of the session disconnection, the SIP terminal re-registers in the SIP server. Re-registration procedure equal of the figure 1.

3. Proposed registration method using MAC address.

3.1 Message format using MAC address

The general command using registration is REGISTER. The SIP terminal transmits the REGISTER message to the SIP server. And then, the SIP server sends the "401 Unauthorized" message which is requesting user ID, password, nonce, a domain, and etc. of the "WWW-Authenticate" field. The SIP terminal receiving the authentication request message sends to the second registration message to the User name item of the Authentic field including its own MAC address to the SIP server. If the SIP server receives the second registration message including its own MAC address from the SIP terminal, it registers the SIP server and matches the SIP terminal and the registered MAC address at the same time. Next, the SIP server sends the response message to the SIP terminal.

Figure 7. SIP REGISTER Message

Figure 8. SIP 200 OK Message

Figure 9. The registration method of moving to the other network.

Figure 10. Proposed SIP 1st REGISTER Message

Figure 11. Proposed SIP 401 Unauthorized Message

Figure 12. Proposed SIP 2nd REGISTER Message
The SIP terminal needs the function which recognizes clearly the MAC address and which the SIP terminal transmits to the SIP server. Also, The SIP server needs the function which manages MAC address of SIP terminal. The SIP terminal and SIP server are more crowded with a functional.

An implementation and performance analysis of the SIP User Agent and the SIP server leave through the further study.

5. Conclusion

In this paper, we propose the SIP Terminal registration method which utilizes the MAC address of the SIP terminal using of the VoIP service. The SIP server requests the MAC address of the terminal and use method of storing the MAC address in order to be matched with the SIP terminal. When the SIP terminal moves to the other network, the IP address of the terminal was changed. As the proposed method is used, The SIP terminal can rapidly register SIP server by using the stored MAC address.

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