Stopping Junk Email by Using Conditional ID Technology: privango

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Abstract

We have developed a conditional ID technology called privango, which enables users to set usage conditions freely, and a privango email system, which provides a conditional email address containing usage conditions, e.g., expiration date and a specific sender. Using a conditional email address, the system prevents unsolicited email from being sent to users. In this system, the conditions for receiving an email are cryptographically embedded in the email address itself, so no database is needed to store filter rules for the addresses. The practical usability of the presented system has been tested with major Internet services that require email addresses. Besides email, we are studying various other possible uses for privango.

1. Introduction

Needs for email utilization becomes more and more sophisticated. Today, the exchange of email is not limited to family members, acquaintances, and colleagues but can occur with anyone, and often via websites. However, unsolicited (junk or spam) email is a major nuisance for all email users. Once junk email starts arriving at a specific address it is very difficult to stop it from continuing to arrive.

One way to avoid junk email is to selectively use different email addresses depending on the email sender, the email purpose, and/or the timeframe in which email arrives. NTT Information Sharing Platform Laboratories has developed a system that provides email addresses containing usage condition information such as an expiration date and the email sender. Emails sent from such an addressing system are called privango* mail. An email sent to a conditional email address, i.e., a privango mail address, is either sent to the recipient's real email address or blocked depending on whether the conditions are met or not. Obtaining an email address with user-defined rejection conditions, such as expiration date, purpose, and sender, allows the user to control the reception of unsolicited email.

2. Problems and solutions

Some well-known measures for stopping junk email include:

- *Setting rejection conditions for receiving email*: specifying email addresses/domains from which emails should be accepted because they originate

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* Privango: This is a coding technology developed by NTT Information Sharing Platform Laboratories to protect email addresses and other private information by using encryption and other security technologies. The main feature of privango is the encoding of access information into the ID itself in such a way that the ID is compact enough for the user to enter it easily. The word "privango" is derived from "privacy" and "ango" (a Japanese word for encryption).

from a reliable sender or rejected because they originate from an unknown sender. This is also known as setting up a white list and/or black list.

- *Using disposable email address*: using an email address until junk email starts arriving and then switching to a different email address.
- *Filtering by content*: analyzing the content of an incoming email and determining whether it is junk or not.

Setting rejection conditions is fairly effective when the email addresses sending junk email are known. However, it is not a completely satisfactory solution because there is usually a limit on the number of addresses/domains that can be registered for blocking emails. Also, it is difficult to select a completely workable list of addresses/domains because many junk email senders use address spoofing, which offers them an almost infinite number of possible addresses.

Using disposable email addresses has the drawback that it is too anonymous, so receivers easily forget the user's identity.

Filtering by content is fairly effective for stopping junk mail; however, although the accuracy of the filtering methods is improving, the filters are not 100% reliable and occasionally mail that is not junk is filtered by mistake.

Considering these problems, we developed privango mail, which offers a means of stopping junk email that is free from the above limitations and combines the advantages of the conventional measures mentioned above. Rather than define rejection conditions for the user's real address, privango mail allows selective use of a number of email addresses that have the conditions for receiving an email embedded in the email address itself. Such conditions may include the possible senders to these email addresses and how these email addresses are used. In addition, just as with disposable email addresses, the user can create multiple email addresses and attach conditions to each of them. The limitation where the email sender's identity is lost has been solved by assigning a unique and permanent nickname to each privango mail member, which is included in a privango mail address.

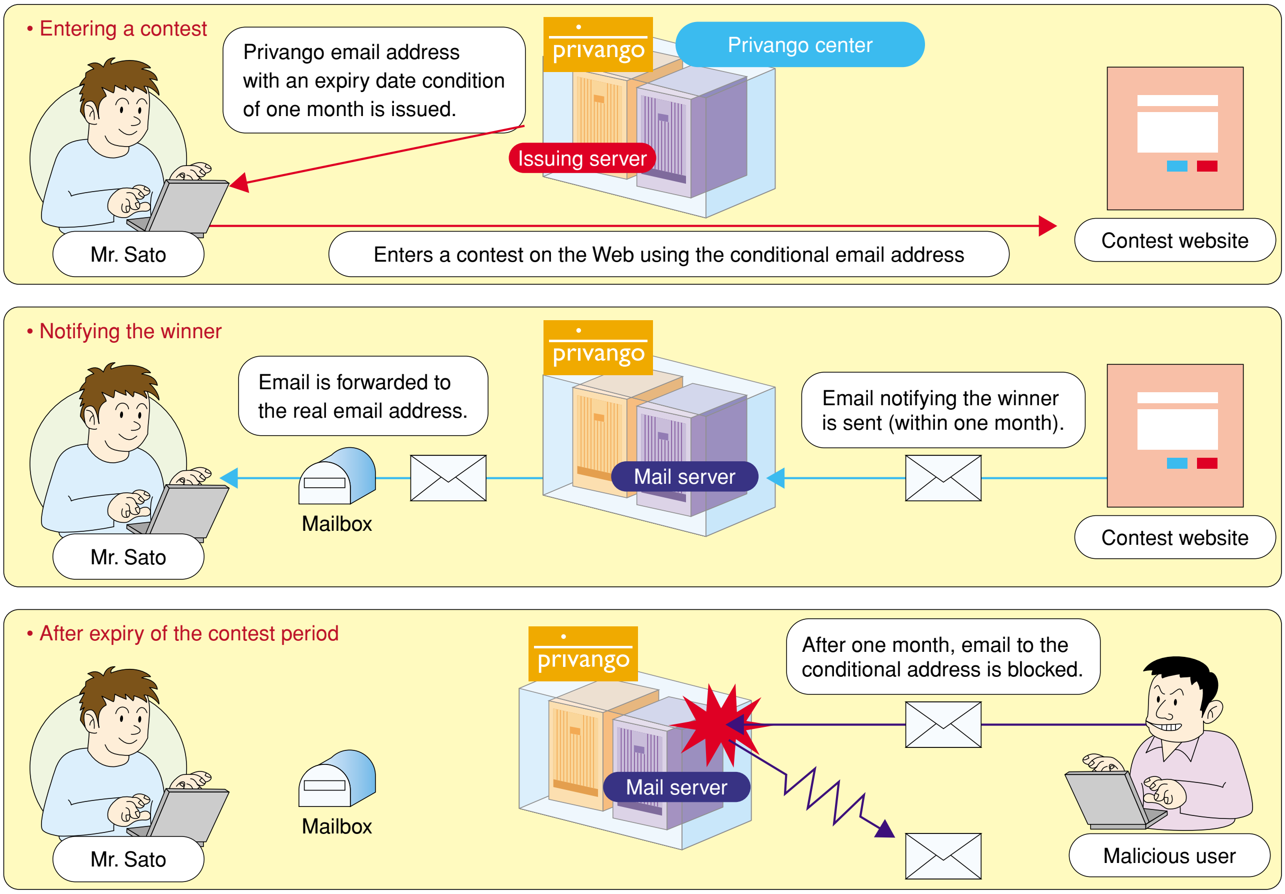
• Entering a contest
Privango email address with an expiry date condition of one month is issued.
privango
Privango center
Issuing server
Mr. Sato
Enters a contest on the Web using the conditional email address
Contest website
• Notifying the winner
Email is forwarded to the real email address.
privango
Mail server
Email notifying the winner is sent (within one month).
Mailbox
Mr. Sato
Contest website
• After expiry of the contest period
privango
After one month, email to the conditional address is blocked.
Mail server
Mailbox
Mr. Sato
Malicious user

Fig. 1. Example of temporary use of various services, such as email and Web service.

3. Procedure for using privango mail system

3.1 Registration at a website

User interaction with the privango mail system is explained below using **Fig. 1**. Suppose that Mr. Sato finds an advertisement for a new product giveaway campaign on the Internet. When he visits the specified website, he finds that he must enter his email address to participate in the campaign, but he is worried about receiving unsolicited advertisement email or that his email address will be released to third parties. In such a case, Mr. Sato can use the privango mail service to obtain a privango mail address that has an expiration date. He can enter this privango mail address instead of his real email address (Fig. 1(a)). Any email sent to a privango mail address is checked by the privango center for any matching conditions contained in the email. If the email meets the conditions, it is forwarded to Mr. Sato's real email address (Fig. 1(b)). If email arrives after the expiration date, it is blocked by the privango center so that Mr. Sato will not receive it (Fig. 1(c)). By using the privango mail service, Mr. Sato takes precautionary measures to avoid receiving unsolicited email or having his real email address released to unknown parties.

3.2 Exchanging email between acquaintances

Figure 2 shows a case where a person wants to exchange email with a specific person and avoid receiving unsolicited email. Mr. Yamada and Mr. Suzuki always contact each other by email via their mobile phones. Since they often receive junk email, they change their mobile phone email addresses from time to time, but this is troublesome because they must change their mail settings and notify each other of the changes. They can avoid such inconvenience by using the privango mail service, which allows them to use email addresses that guarantee only email from the other party will be received. To set up this protected communication system, Mr. Yamada obtains a privango mail address from the privango mail service, specifying that email to that address can only be from Mr. Suzuki. Similarly, Mr. Suzuki obtains a privango mail address and specifies that email to that address can only be from Mr. Yamada. By using these email addresses, Mr. Yamada and Mr. Suzuki can contact each other, confident that they will not receive junk email.

4. Main features

The privango mail system is an email forwarding

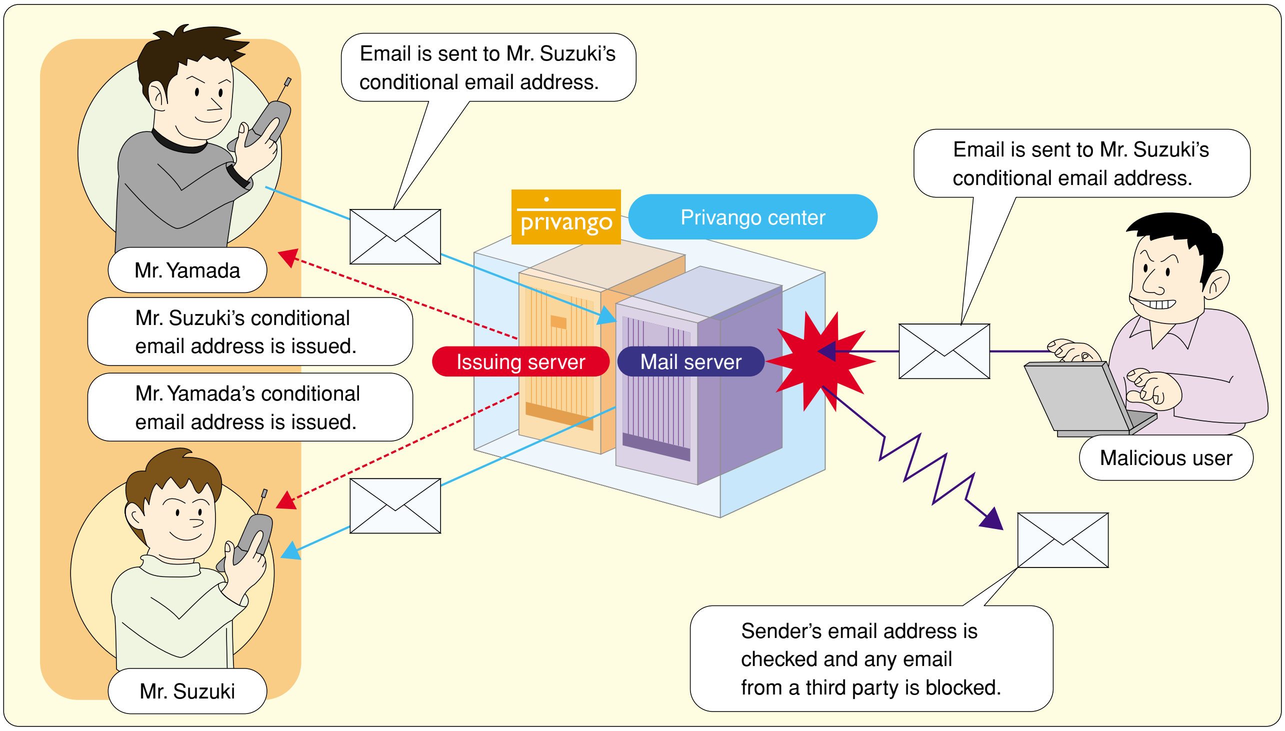
Email is sent to Mr. Suzuki's conditional email address.
Email is sent to Mr. Suzuki's conditional email address.
privango
Privango center
Mr. Yamada
Mr. Suzuki's conditional email address is issued.
Mr. Yamada's conditional email address is issued.
Issuing server
Mail server
Malicious user
Mr. Suzuki
Sender's email address is checked and any email from a third party is blocked.

Fig. 2. Example of blocking unsolicited email and allowing email exchange with only specific email addresses.

system that receives an email sent to an alias address (an address different from the recipient's real address) and forwards it to the real address. Thus, a privango mail address is an alias. The privango center that receives an email to a privango mail address checks whether the email meets the conditions specified in the address and forwards it to the real address only when it satisfies the conditions. The user can use his or her ISP-provided email address, office email address, or mobile phone email address as his or her real address. A privango mail address has the following features:

(1) Encryption

The usage conditions are embedded in the email address using encryption. The result is an email address consisting of the nickname and usage conditions (**Fig. 3**). The nickname can be selected without any association to the real address and is an unchangeable character string unique among the members registered with the privango mail service. Since the usage conditions are encrypted, no third parties can read or change them. In addition, since no equipment is required to hold the information about the issued email addresses or their usage conditions, an infinite number of safe email addresses can be generated at a low cost.

(2) Versatile configuration

Any or all of the following four conditions can be embedded in an email address:

- Expiration date (e.g., March 1, 2005)
- Sender email address (e.g., only email from suzuki@ntt.co.jp is accepted)
- Sender's email address domain (e.g., only email with the domain name ntt.co.jp is accepted)
- Specific key words in the subject (e.g., only email whose subject includes "ABC" is accepted)

(3) Automatic conversion of sender address

When a user replies to an email sent to his or her privango mail address, the privango mail system automatically converts this reply address to the privango mail address used by the original email. Since the user need not change the reply address, he or she can exchange privango mail just like ordinary email.

5. Field tests

The privango mail system was implemented on a Linux-based server and operated experimentally in an Internet environment. About thirty users participated in this field test, which lasted from August 2003 to March 2004. During the test, privango mail addresses were used for contacting acquaintances, registering on electronic commerce websites, sending Internet auction bidding notifications, posting messages on Internet bulletin boards, and publishing email addresses on websites. In spite of the short period of the field test, several unsolicited emails, most of which were addressed to email addresses published on websites, arrived at the privango center. These junk emails were discarded by the privango center in accordance with the expiration dates included in the privango mail addresses. Thus, the system protected the users from receiving junk mail.

6. Future work

In addition to the email application explained above [1], we are developing a series of other applications for safely accessing information (schedule information, etc.) using email [2] and an URL application for safely accessing websites [3]. We are also creating a software development kit to facilitate the development of privango-based systems.

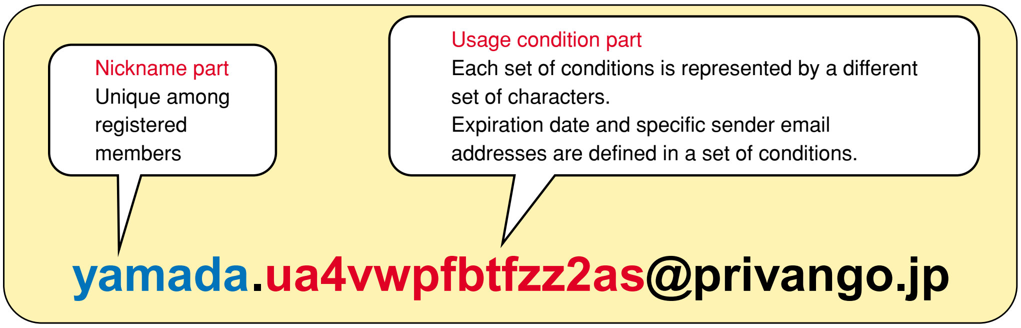
Nickname part
Unique among registered members
Usage condition part
Each set of conditions is represented by a different set of characters.
Expiration date and specific sender email addresses are defined in a set of conditions.
yamada.ua4vwpfbtfzz2as@privango.jp

Fig. 3. Example of a privango email address.

References

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