IMPP: A New Instant Messaging Standard and Its Impact on Internet Business

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There are already more than 130 million instant messaging users worldwide. This paper describes our research and development to apply the power of instant messaging, especially that of the "buddy list," to electronic commerce. We have been engaged in standardization for instant messaging at the Internet Engineering Task Force (IETF) to make an open and secure standard called IMPP. AOL dominates the current market, but the protocols of AOL lack security. Therefore, they are not suitable for electronic commerce. We have submitted our own version of IMPP to the IETF that enables selective publication of presence. In this paper, we describe an application of the selective publication of presence for electronic commerce. We also describe our PePP prototype under development.

1. Introduction

Instant messaging will become the third killer application on the Internet, after email and the World Wide Web. There are already more than 130 million instant messaging users worldwide. America Online (AOL) has 120 million users of its instant messaging products and dominates the current market. AOL's AIM and ICQ Instant Messaging Services are everyday tools used by people to communicate with one another. However, the competition has just begun. The wireless Internet is expected to become much larger than the wired Internet, and companies around the world, including AOL, Microsoft, Lotus, and Tribal Voice, are about to venture out to dominate it. This paper describes our strategy for holding a strong position in the instant messaging market, especially for electronic commerce.

The Internet is evolving so quickly, and it is often difficult to enter an established market. Hence, in late 1997, when ICQ was drawing attention because of its large customer base, we decided to participate in the instant messaging development competition. We have been engaged in instant messaging protocol standardization at the Internet Engineering Task Force (IETF) since 1998. We have also been engaged in development of an instant messaging system and service since 1999.

2. Instant messaging

In this chapter, we define instant messaging and explain its merits.

2.1 Definition of instant messaging

The term "instant messaging" has various meanings. In this paper, instant messaging refers to buddy list applications such as AIM and ICQ which consist of two orthogonal services, presence and short messaging.

Table 1 shows a classification of four important Internet applications. Buddy lists and chats are classified as realtime communication applications, because the messages or contents created by a sender will be delivered to the receiver as soon as possible. Email and the Web are classi-

fied as non-realtime communication applications, because the messages or contents created by a sender will be stored somewhere in the net and then delivered to the receiver on demand. Moreover, buddy lists and email have a common feature: the messages are delivered to people and every person must have a unique name, for example an email address, to which the messages are sent. Chats and the Web also have a common feature: the messages or contents are delivered to places and every place must have a unique name, for example, a chat channel name or a URL, to which the messages or contents are sent and from which they are then automatically sent or manually retrieved. The distinction between applications, however, is often blurred in real products because developers tend to incorporate features of all four applications into their products.
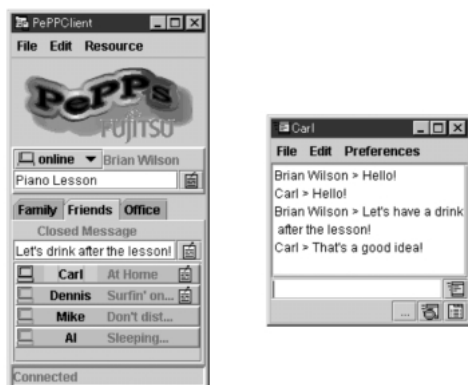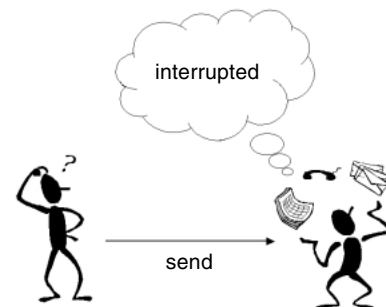
2.2 Power of instant messaging

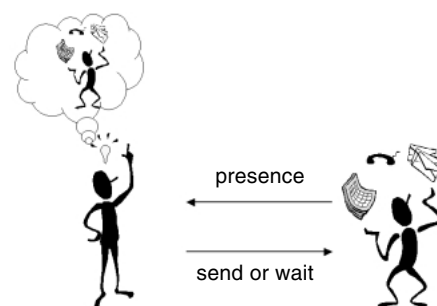**Figure 1** shows a typical buddy list client.

You can see whether a person is online, not present, or working. The main window (left) shows the presence of your buddies, and a new buddy can be added if and only if you know that person's buddy address. The presence shown in Figure 1 is indicated simply using icons and text, but it could be indicated in any form, for example, by voice or video. The sub-window (right) is a conversation window in which you can send and receive short messages with your buddies in realtime.

The power of the buddy list lies in the seamless combination of presence and short messaging (**Figure 2**). Without presence, a sender using short messaging might interrupt a receiver because the sender did not know the receiver's status (Figure 2 (a)). However, the sender can choose a better time for short messaging by learning the receiver's presence (Figure 2 (b)).

The power of the buddy list could be further increased by incorporating a third feature, appli-

Table 1
Classification of Internet applications.

	Unique name for every person	Unique name for every place
Realtime communication	Buddy lists	Chats
Non-realtime communication	Email	Web

Figure 1
Buddy list (presence and short messaging).

(a) Short messaging without presence

(b) Short messaging with presence

Figure 2
Power of instant messaging.

cation launching. ICQ has application launching, but it is just a shell-like command invocation. Our prototype, shown in **Figure 3**, provides presence in the form of lists of the applications that each buddy currently permits to be launched. The applications lists change from time to time as the buddies' situations change. To communicate with a buddy, you can select an application in the list, for example, a NetMeeting, and launch it. The appropriateness of your selected application can be very high because it can be chosen to be convenient for the intended receiver's current situation. Intel's Launch and Connect[1] also has application launching, but the applications list is not a true presence but only a list of applications installed on the buddy's PC.

Short messaging is still useful even with application launching because it is useful as a general "ringing" mechanism across various applications. For example, you might send a short message, "I want to discuss this with a video-chat. May I call you up right now?" Short messages are expected in the buddy list and are therefore more polite than sudden video-chat calls.

3. Standardization of instant messaging protocol

The de facto protocol for chats is Internet Relay Chat (IRC),[2] but there are no true stan-

Figure 3
Application launching.

dards for buddy lists. In this chapter, we describe our activities to seek a standard for buddy lists and describe a buddy list protocol called Privacy-enhanced Presence Protocol (PePP) that we have developed in our standardization activities.

3.1 Need for open and secure standard

The protocol of AIM or ICQ could have the potential to become a de facto standard of instant messaging because AOL dominates the market. However, the protocols have two drawbacks: they are proprietary and non-secure. The first drawback will disappear whenever AOL decides to make the specification of the protocols open, but the second would make it necessary to redesign the protocols. Security will be indispensable for expanding the use of instant messaging into electronic commerce. This is why we have engaged in standardization at the IETF. The name of the standard protocol under development at the IETF is the Instant Messaging & Presence Protocol (IMPP).

3.2 Brief history

In November 1997, Microsoft submitted an Internet draft about the Rendezvous Protocol (RVP) and started a mailing list as a discussion forum for the worldwide standard of buddy list protocols. Some active players sharing similar interests immediately joined the mailing list and had intensive discussions about holding a Birds of a Feather (BOF) meeting as a preparation to form a Working Group (WG). The first BOF meeting, called the Presence Information Protocol Requirements (PIPR) BOF, was held at the 41st IETF meeting in March 1998.

Fujitsu joined the community at this meeting and since then has been actively participating in this joint work. In the summer of 1998, Microsoft, Lotus, Activerse, and Fujitsu planned an interoperability demonstration to show the importance of a worldwide standard. Having developed a simple protocol called PIP-DEMO, they held an interoperability demonstration at the
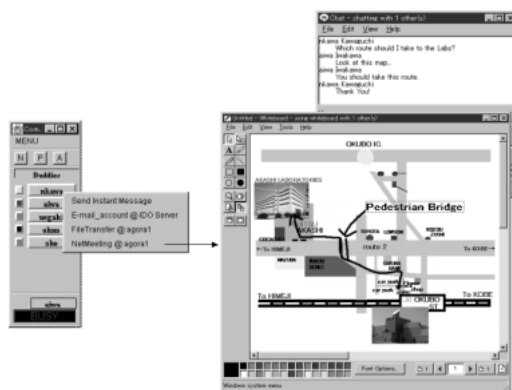
42nd IETF meeting in August and at NETWORLD + INTEROP'98 in October 1998. At the 43rd IETF meeting, the charter of the expected WG was discussed. The first IMPP WG[3] was held at the 44th IETF meeting in March 1999. The WG finished the IMPP requirements in August 1999 and then started on the protocol design. At the 47th IETF meeting, to break the delay in progress, the area directors of the WG decided to invite concrete protocol specifications that met the IMPP requirements mentioned earlier. Fujitsu submitted its own protocol, PePP, in response to this invitation.

4. Development of instant messaging protocol

The IMPP requirements were published as two RFC documents in February 2000.[4],[5] Our PePP should fulfill the published requirements. One of the salient features of PePP is that it enables selective publication of presence.
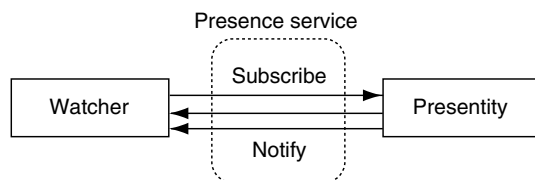
Figure 4
IMPP model.

4.1 Basic design

RFC 2778 describes the IMPP model (**Figure 4**). A *watcher* can *subscribe* to the presence of a *presentity*, which is an entity that provides the presence information of a user. The watcher receives instant *notification* every time there is a change in the presence of the presentity for which the watcher has a *subscription*. RFC 2779 states three basic principles for the IMPP standard: security and privacy, scalability, and wireless operation. **Table 2** summarizes the PePP solutions for each requirement.

As mentioned above, one of the salient features of PePP is that it enables selective publication of presence (**Figure 5**). Presence in PePP is not a single entity but several presence sections which correspond to the *presence tuples* defined in RFC 2778. A presence section is at least a user status or a communication means and its status (Figure 5 (a)). The types of presence sections are extensible using Extensible Markup Language (XML).

A user status describes the current availability of a user, for example, "busy" or "idle." A communication means describes a contact address to the user of the presentity, for example, a telephone number or a chat channel name, and the status indicates whether contact at the address is currently possible. The application launching described in Section 2.2 is easily realized using presence sections in PePP.

Table 2
IMPP requirements and PePP solutions.

	IMPP requirements	PePP solutions
Security and privacy	The standard protocol must provide a means for exchanging short messages and publishing presence in a secure and privacy-protected way.	PePP provides selective publication of presence and enables individual fine grained publication from person to person.
Scalability	The standard protocol must work even for huge amounts of users distributed on the Internet, while allowing comfortable conversational exchange of short messages.	PePP provides multiple client-server connections to prevent the server from being blocked due to bulk message transfer.
Wireless operation	The standard must be usable via mobile IP wireless access devices.	PePP provides selective presence publication and enables sending of only updated presence items.

ID	Name	Contents
01	home	User status #1
02	home	User status #2
03	office	User status #3
04	phone	Communication means #1 and its status
05	phone	Communication means #2 and its status

(a) Presense sections example

ID	Watcher		
	X	Y	Z
01	⊠	☐	☐
02	☐	⊠	☐
03	☐	☐	⊠
04	⊠	⊠	☐
05	☐	☐	⊠

(b) ACL setting example

Watcher X
   home : user status #1
   phone : communication means #1

Watcher Y
   home : user status #2
   phone : communication means #1

Watcher Z
   office   : user status #3
   phone : communication means #2

(c) Selective publication example

Figure 5
Selective publication of presence.

Each presence section can be shown to or hidden from individual watchers. This is achieved by the Access Control List (ACL) associated with each presence section (Figure 5 (b)). When a watcher subscribes to a presentity, a collection of presence sections permitted by its associated ACL

is visible to the watcher and the changed section contents are reported to the watcher every time the visible sections are changed. The names of visible presence sections are also reported to the watcher. The presentity can publish a different presence section having the same name (Figure 5(c)). Thus, the selective publication of presence enables individual fine-grained publication from person to person and gives a simple solution for the security and privacy requirements.

This selective publication enables sending of only updated presence, which reduces the size of data transfer and also provides a solution for the wireless requirement. Moreover, PePP provides multiple client-server connections to prevent the server from being blocked due to bulk message transfer and provides a solution for the scalability requirement.

4.2 Application to electronic commerce

It is now well understood that electronic commerce must overcome peoples' concerns regarding the abuse of private information. In "Permission Marketing"[6] Seth Godin states the need to obtain customers' permission step by step, starting from a simple greeting, until their full trust is won. Online sales promotion obtains customers' permission to "watch" their presence, but the extent of privacy publication should be totally under the customers' control. It is the selective publication of presence that enables this total control. Customers show their selective presence to the sales companies, and the sales companies send short sales-promotion messages to selected target customers.

A concrete example is as follows. An electronic shopping cart is now an indispensable tool and can be seen at many electronic Web commerce sites. It helps customers to defer their shopping decisions and then make their final decisions with a single mouse click. The contents of an electronic shopping cart represent a customer's current needs: what the customer really wants now. From the view of the sales companies, the contents

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offer a chance for sales promotion; whereas, from the customer's view, the contents are private information. The selective publication of presence makes it possible to selectively publish the contents of an electronic shopping cart to sales companies. **Figure 6** shows a new type of electronic shopping cart. It enables a customer to designate his or her favorite sales companies as watchers of the contents of the cart, and only those designated sales companies are given the chance to initiate sales promotions. To make this designation, the customer simply gives our cart the icons of his or her favorite sales companies. This feature of accepting shop icons is currently unique to our cart.
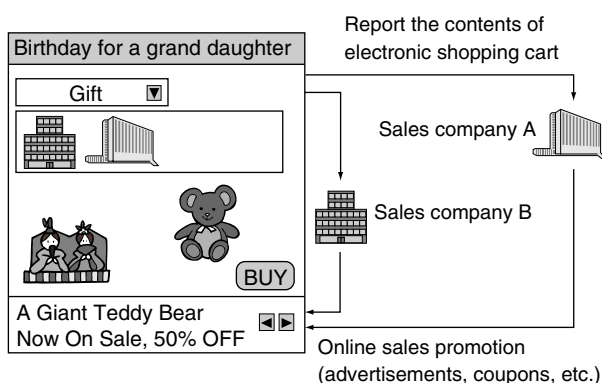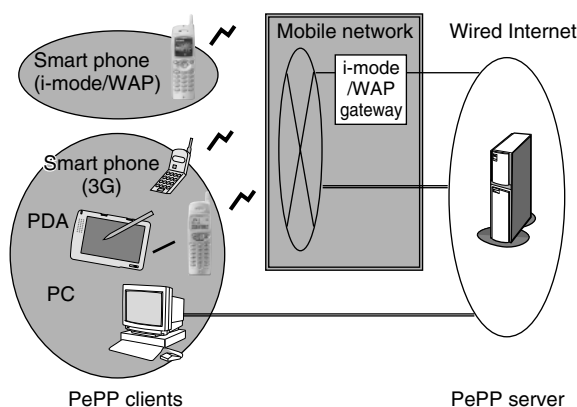

Figure 6
New electronic shopping cart.

5. Development of instant messaging system

We have developed an instant messaging system that conforms to PePP. We will adopt IMPP as soon as it is standardized at the IETF. **Figure 7** shows the architecture of the system. It covers wireless and wired Internet operation and supports Web-enabled cellular phones, personal digital assistants (PDAs), and personal computers (PCs) as PePP clients.

The buddy list shown in Figure 1 is our PC-version PePP client. This is a Java client. We chose Java because it is platform-free and will be supported by most wireless devices. **Figure 8** shows a buddy list displayed on a smart cellular phone. We currently target the i-mode cellular phones operated by NTT DoCoMo in Japan, but we plan to convert to the Wireless Application Protocol (WAP) so that our system can be applied worldwide. The i-mode does not support a general push function, so we have used mail notification instead. In the near future, the wireless Internet will support the Transmission Control Protocol/Internet Protocol (TCP/IP), and we expect that PePP over TCP/IP or IMPP over TCP/IP will become a standard buddy list protocol, even over the wireless Internet.

Figure 7
System architecture.

Figure 8
Buddy list on i-mode cellular phone.

6. Conclusion

Instant messaging now draws considerable attention due to its attractiveness to communities. Fujitsu has been working with the IETF to help standardize IMPP, an open and secure instant messaging protocol, expecting that instant messaging will be an important component in future electronic commerce. Email was originally intended for personal communication and the World Wide Web for information retrieval, but they are now both indispensable components of electronic commerce. We expect that the same thing will happen to instant messaging.

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