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Abstract

Instant Messaging (IM) is changing the way people work and communicate. Because Instant Messaging offers real time and synchronous communication, IM may be the ideal tool to provide direct, real-time customer services in a Web based E-Commerce environment. So, IM is no longer just an online chatting tool, but a powerful tool that can used in customer service, customer relationship management (CRM), marketing, group collaboration and more. Because Instant Messaging has a promising future, the competition in the IM market is intense. In this article, we focus on the compatibility issues in Instant Messaging, and we use an analytical model to support our arguments. We consider IM service providers' incentives to show that under some market conditions, they will choose to open their networks, while under other conditions, they will not.

Introduction

According to webopedia.com, Instant Messaging (IM) is defined as a type of communication service that enables a user to create a private chat room with other users. Typically, the instant messaging system alerts you whenever somebody on your private list is online. You can then initiate a chat session with that particular individual. Most of the popular Instant Messaging applications provide features like text chatting and file sharing. Some even provide voice conversation and video conferencing. According to Pastore (2001), a Juniper Media Matrix research has found that the number of unique users of instant messaging applications at home increased 28 percent, from 42 million in September 2000 to 53.8 million in September 2001. At the same time, the number of unique users of instant messaging applications at work increased at an even higher rate of 34 percent, from 10 million to 13.4 million.

Instant Messaging is the latest incarnation of online chat, which has been available on the Internet since a Finn called Jarkko Oikarinen created Internet Relay Chat (IRC) in 1988. However, the popularity of Instant Messaging did not explode until November 1996, when an Israeli company called Mirablis introduced ICQ (pronounced "I seek you"), a free instant messaging application that anyone can use. The popularity of ICQ immediately drew the attention of Internet giant AOL, who later acquired Mirablis in June 1998. Now, with the two largest services in terms of members – AOL Instant Messenger (AIM) and ICQ, AOL is definitely the leader in Instant Messaging Market. Microsoft's MSN Messenger and Yahoo! Messenger are the fastest growing applications in this field. AT&T, Prodigy Communications and Earth Link, together with some other smaller companies like Jabber and Odigo, also have their own Instant Messaging applications.

Because Instant Messaging offers real time and synchronous communication, it is changing the way people work and communicate. Today, most communication is highly asynchronous. We can send a document to co-workers, but we have to wait for them to make changes and send it back. We can send e-emails, but we do not know when the receiver will respond. We can make phone calls, but we do not know if the people we are calling are there to pick up the phone. But with Instant Messaging, we can know right away if someone is available and then we can see them, talk with them and work with them together, all in real time.

A wide range of web services will depend upon a network's ability to detect a user's identity and then exchange information with that user in real time. As a result, Instant Messaging is making its way from home onto corporate desktops. Businesses in many industries, especially E-Commerce websites, are bolstering their customer services with IM, so customers can immediately chat

with a customer service representatives, rather than hold long on phones or send e-mails. In fact, for a Web based E-Commerce environment, IM may be the best and most natural way for a company to provide direct, real-time service to a site visitor who has a question, is lost or has special needs. It adds to a flexible, comforting human touch to an otherwise automated process. Companies are also deploying IM for Customer Relationship Management (CRM). By using IM, companies can contact customers in real time and streamline their operations. As a real time communication tool, IM is also ideal for effective targeted marketing and advertising. Companies can know whether the customers are listening, and provide personalize services.

Research Questions

The Instant Messaging market can be considered as a two-sided market – the client side and the server side. IM service providers serve both sides of the market, as shown in Figure 1.

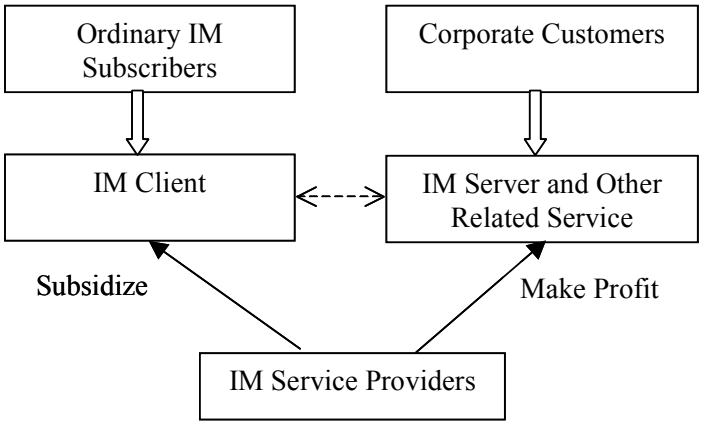

Figure 1. Structure of the Instant Messaging Market

The client side refers to the IM client programs. Theses client programs are generally free. Users can download the programs directly from the Internet, or, more often, get it as a component of the Internet service software package. IM service providers, such as AOL, MSN and Earthlink, are heavily subsidizing the client side of the IM market, hoping to attract more users to join their networks. The IM service providers can then make money from selling IM server programs to firms who are interested in using IM in their work. They can also lead their IM subscribers to advertising and other revenues while increasing their virtual "real estate" on the Internet. Hence, IM service providers are actually subsidizing the client side of IM, and making money from the server side and other related fields.

As the Internet is on track to become the pipeline of all types of communications in the future, Instant Messaging will eventually go beyond text and carry more forms of data. Like the Internet browsers, IM technology will probably be the platform which future communication applications will be built on. Of course, for all the communications to work smoothly, different IM applications should be able to communicate with each other. As a communication application, Instant Messaging is characterized by positive network externality. i.e., the more people use Instant Messaging, the higher the utility a user can get out of the service. Intuitive thought suggests that IM service providers have incentives to connect their networks, since this will increase users' utilities and users will be willing to pay more as a result. However, the reality suggests the contrary. The industry leader, AOL, has deliberately made its IM technology incompatible with anyone else's. Hu (2000), together with Hu and Junnarkar (1999) report that some companies, most notably Microsoft, Odigo and Yahoo, used to offer features that let their IM members to communicate with AOL's members. AOL responded by promptly blocking these attempts, and criticized the move as akin to "hacking" into its network. The latest news (Bowman 2002) is that AOL is blocking Trillian, a program that allows people to access multiple IM programs from one screen.

The inconsistency between intuitive thought and reality naturally leads to our research questions,

(1) Why does the industry leader, AOL, choose not to open its IM network in an industry that exhibits positive network externalities?
(2) Under what conditions will the IM service providers open and connect their networks?

In this article, we will attack the questions by using an analytical model. The rest of the paper is organized as follows: Section 3 gives the literature review. Section 4 presents the model and the analysis. Conclusions and discussions are presented in Section 5.

Literature Review

The literatures on interconnection and compatibility are extensive, and an excellent review can be found in Economides (1996). Katz and Shapiro (1985) show that if the costs of compatibility are lower for all firms than the increase in profits because of

compatibility, then the industry move toward compatibility is socially beneficial. However, it may be true that the (fixed) cost of achieving compatibility is larger than the increase in profits for some firms, while these costs are lower than the increase in total surplus from compatibility. Then profit maximizing firms will not achieve industry-wide compatibility while this regime is socially optimal. Further, if a change leads to less than industry-wide compatibility, the private incentive to standardize may be excessive or inadequate. This is because of the output change that a change of regime has on all firms. Similarly, the incentive of a firm to produce a one-way adapter, that allows it to achieve compatibility without affecting the compatibility of other firms, may be deficient or excessive because the firm ignores the change it creates on other firms' profits and on customers' surplus.

Matutes and Regibeau (1988) originate the mix-and-match approach to study the compatibility problems, and they are followed by Economides and Salop (1992), Matutes and Regibeau (1992), and others. They find that the incentive for compatibility of a vertically integrated firm depends on the relative sizes of each combination of complementary components. Reciprocal compatibility increases demand but also increases competition for the individual components. Therefore, when the hybrid demand is large compared to the own-product demand, a firm has an incentive to want compatibility. When the demand for hybrids is small, a firm does not want compatibility. Thus, it is possible, with two vertically integrated firms, that one firm wants compatibility while the other one prefers otherwise.

Our paper is also closely related to literatures on two-sided market and inter-network externality. The concept of inter-network externalities in a two-sided market is relatively new. Parker and Alstyne (2000) and Rochet and Tirole (2001) point out that most markets are two-sided. For example, member banks and merchants in the credit card system, and game consoles and software in the video game market. The presence (or absence) of each side makes the other more (or less) valuable to an organization that sells to both halves at once. Thus, the network externalities will be inter-market, which means more users in one market will increase the demand in another market. Hence, companies have incentives to heavily subsidize one market, and make money in the other market.

The Model and the Analysis

Let us consider an Instant Messaging market with two IM service providers, A and B. Both A and B are heavily subsiding the client IM programs by making it free, and trying to make money from the server side.

For the client side, let us assume there are X ordinary IM users. X_A of these users will subscribe to A, and X_B of them will subscribe to B. Since IM client programs are free, it is reasonable to assume that all users enter the market. i.e., $X = X_A + X_B$.

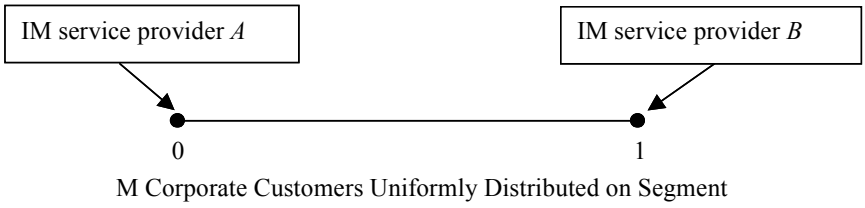

Figure 2. The Linear Program

For the server program side, let us assume the IM server program market[1] can be represented as lying on a line segment between 0 and 1, as shown in Figure 2. IM service provider A is located at 0, and B is at 1. There is a continuum of corporate customers who are interested in IM server programs and they are located uniformly along this line segment. The total number of these corporate customers is M, and each of them wants at most one copy of the IM server program. These corporate customers will be very interested in A and B's network size, since the larger the network, the more utility they can get. Let us use N_A and N_B to denote the network size of A and B respectively. If the networks of A and B are incompatible, then $N_A = X_A$ and $N_B = X_B$. On the other hand, if the networks of A and B are compatible, then $N_A + N_B = X$. For a corporate customer located a distance d from IM service provider i ($i = A$ or B), he or she has a willingness to pay $d + U(N_i)$ for i's IM server program.[2] We can interpret d as corporate customer's basic

[1]This IM server program market not only refers to the IM server software market, but also includes other related services, such as customer service, CRM services and advertising etc.

[2]In this model, the "farther" away a corporate customer is from IM service provider i, the higher the corporate customer is willing to pay more for i's server program. We choose this setting to make the later calculation easier. Replacing d with (1-d) can easily give the more "reasonable" setting in which the closer a corporate customer to IM service provider i, the higher the corporate customer is willing to pay for i's server program. These two settings will yield the same result.

willingness to pay for the program and $U(N_i)$ as the value he or she attaches to the network externality. The externality function U is taken to be twice continuously differentiable, with $U' > 0$, $U' < 0$. IM service provider A and B price their server programs at p_A and p_B respectively. The demands IM service providers get are q_A and q_B, and the profits are π_A and π_B. Then, the utility of a corporate customer who buys from i ($q_A = A$ or B) is $d + U(N_i) - p_i$. Corporate customers with positive utilities will enter the market, and they will choose the server program that maximizes their individual utilities.

Now let us consider two market scenarios: In the first case, not all corporate customers get positive utilities, while in the second case, all corporate customers enter the market.

Case 1

Figure 3(a) illustrates the purchase decisions of corporate customers in case 1. Given p_A, p_B, N_A and N_B, corporate customers at locations $[0, z_1)$ buy from IM service provider B. At these locations, $(1 - z) + U(N_B) - p_B > 0 > z + U(N_A) - p_A$.

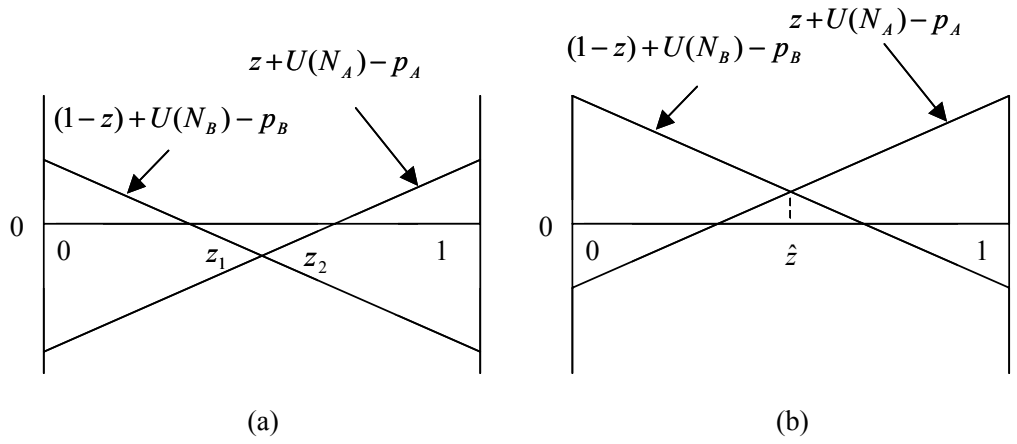

Figure 3. Market Segmentation

At location z_1, a corporate customer is indifferent between purchasing from B or not purchasing at all; that is, z_1 satisfies $(1 - z_1) + U(N_B) - p_B - 0$. Corporate customers at locations $(z_2, 1]$ buy from IM service provider A, since at these locations, $z + U(N_A) - p_A > 0 > (1 - z) + U(N_B) - p_B$. For the same reason as the above, a corporate customer located at z_2 is indifferent between purchasing from B or not purchasing at all. Hence, the demand each IM service provider gets is as follows,

$$q_A = (1 - z_2)M = [1 - p_A + U(N_A)]M$$

$$q_B = z_2 M = [1 - p_B + U(N_B)]M$$

From the above, we can also get the profits,

$$\pi_A = p_A q_A = p_A [1 - p_A + U(N_A)]M$$

$$\pi_B = p_B q_B = p_B [1 - p_B + U(N_B)]M$$

From the first order conditions, we can get the optimal prices and demands as follows,

$$p_A^* = \frac{1 + U(N_A)}{2} \quad , \quad q_A^* = \frac{1 + U(N_A)}{2} M$$

and

$$p_B^* = \frac{1+U(N_B)}{2} \quad , \quad q_B^* = \frac{1+U(N_B)}{2} M$$

Hence, the profits *A* and *B* realize are

$$\pi_A = \frac{[1+U(N_A)]^2}{4} M$$

and

$$\pi_B = \frac{[1+U(N_B)]^2}{4} M$$

Since *U* is monotonically increasing, it is obvious from the expressions of π_A and π_B that, in this case, both *A* and *B* have incentives to make their IM networks compatible. Making their IM networks compatible increases the value of their services to the corporate customers, and thus they can charge a higher price. Bigger network size also attracts more corporate customers to join the market. Since *A* and *B* are local monopolists, both of them can benefit from the market growth in their own market segment. So, in this case, both A and B can enjoy a higher profits by interconnecting their IM networks.

Case 2

The second market scenario is quite different from the first one. In the second case, *A* and *B* are on longer local monopolists and there are direct competition between them. Figure 3(b) shows the market segmentation in this case.

In the second case, given p_A, p_b, N_A, and N_B, all corporate customers can obtain a strictly positive surplus, and will enter the market. The location of the corporate customer who is indifferent between A and B is the point $\hat{z}$ such that $\hat{z} + U(N_A) - p_A = (1-\hat{z}) + U(N_B) - p_B$, or $\hat{z} = \frac{1+p_A - p_B - U(N_A) + U(N_B)}{2}$. Then, corporate customers located at [0, $\hat{z}$) buy from *B*, and the rest of them buy from *A*. Hence, in this case,

$$q_A = (1-\hat{z})M = [1 - \frac{1+p_A - p_B - U(N_A) + U(N_B)}{2}]M$$

$$q_B = \hat{z}M = \frac{1+p_A - p_B - U(N_A) + U(N_B)}{2} M$$

and

$$\pi_A = p_A q_A = p_A[1 - \frac{1+p_A - p_B - U(N_A) + U(N_B)}{2}]M$$

$$\pi_B = p_B q_B = p_B \frac{1+p_A - p_B - U(N_A) + U(N_B)}{2} M$$

Also from the first order conditions, we get

$$p_A^* = 1 + \frac{U(N_A) - U(N_B)}{3} \quad , \quad q_A^* = [\frac{1}{2} + \frac{U(N_A) - U(N_B)}{6}]M$$

$$p_B^* = 1 - \frac{U(N_A) - U(N_B)}{3}, \quad q_A^* = [\frac{1}{2} - \frac{U(N_A) - U(N_B)}{6}]M$$

Hence, the profits are

$$\pi_A^* = [1 + \frac{U(N_A) - U(N_B)}{3}]^2 \frac{M}{2}$$

and

$$\pi_B^* = [1 - \frac{U(N_A) - U(N_B)}{3}]^2 \frac{M}{2}$$

Without losing generality, we assume A has more users, i.e., $X_A > X_B$. When the IM networks are incompatible, $N_A = X_A$ and $N_A = X_A$ and $N_B = X_B$. Since U is monotonically increasing, $U(N_A) > U(N_B)$. When the IM networks are compatible, $N_A = N_B = X$, and $U(N_A) = U(N_B)$.

From the expressions of π_A^* and π_B^*, we can see that A benefits from the network size difference, so A has incentive to keep the advantage and keep the network incompatible. In fact, if A makes the network compatible, A will lose customers to B, and it will have to lower its price to compete with B. B, on the contrary, will benefit greatly from making the IM networks compatible. Hence, the duopoly market results in that IM service provider with larger network size will choose to make its network incompatible with its competitors, while the IM service provider with smaller number of users will try his best to make the IM networks compatible.

Conclusions and Discussions

In this paper, we try to study the compatibility issue in the Instant Messaging market. An analytical model is presented, and two market conditions are analyzed. We have shown that when IM service providers are local monopolists, they will try to make their network compatible, since this will get them more customers, increase the price, and lead to higher profits. However, when the IM service providers are competing directly with each other, the result is quite different. The IM service provider with larger networks will refuse to make its network compatible with others', since its bigger network size enables it to get more customers, charge a higher price, and of course, enjoy a higher profit. On the other hand, the IM service providers with smaller networks will try to make their networks compatible with the bigger one, since this will eliminate their disadvantage in network size, and lead them to higher profits.

The real world is more like the second case we discuss. The clear market leader, AOL, is blocking others from accessing its network, while others like MSN and Yahoo are using every means they have to open AOL's network. For instance, according to Hu (2000), Microsoft used to urge the Federal Communications Commission (FCC) to do a close examination of AOL's dominance in Instant Messaging. The latest development in IM market is that Internet Engineering Task Force (IETF) has proposed a universal standard called SIMPLE. SIMPLE stands for "SIP for Instant Messaging and Presence Leveraging Extensions". With SMPLE, users of different IM networks can easily communicate with each other. Moreover, SIMPLE uses another IETF standard called Session Initiation Protocol, or SIP, which was designed to handle much more complex net traffic such as digital video and voice. IETF claims that next generation IMs that use SIMPLE would then be able to handle digital movie files or even telephone-like conversations over a single simple interface. AOL and Microsoft have pledged their support for SIMPLE, but AOL also claimed it was technically very hard to develop a common language that would permit subscribers of different IM services to chat across networks, and the fact that cross communication on IM network was unprecedented made it even more difficult to achieve (George 2001). So, it is reasonable to believe that the way toward a universal IM standard will not be short and easy.

Instant Messaging is a technology that has a wide-open future, with wireless, voice and video among the possible applications that could take off. We believe the best of IM has not come yet, and all these possibilities require further research and examinations.

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