Pure Bundling Better than Mixed? Or, Why doesn’t AOL Offer Standardized Dial-Up Service?

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Abstract

Some dial-up Internet access providers, such as the market leader AOL, require customers to install proprietary connection software to use their service. This is puzzling, because while the software helps certain users, it creates disutility for others (especially expert users and early adopters of Internet service). Why, then, does AOL insist on this connection manager? Why not choose a mixed bundling approach where power users can choose a standardized service that offers access to the Internet and AOL-managed content, and novice users are given a service that integrates access with the connection manager. This paper proposes different possible explanations for why firms might willfully create barriers to entry for customers by pursuing a pure—rather than mixed—bundling strategy where the bundle contains one feature that is negatively valued by a customer segment. Developing economic models for this problem, we propose different hypotheses for explaining the puzzle. We postulate that power users impose exceptionally high cost on AOL’s system, and show that the presence of bad customers (whose cost exceeds their valuation) can cripple the profits from the access-only option. Another hypothesis is that even if adding the access-only service improves profits in the short-term, the presence of this service may create a learning effect, where novice users learn to manage without AOL’s proprietary software and switch to the cheaper access-only option in future periods.

1 Introduction

Millions of American households are proud recipients of computer disks containing free software from America Online (AOL). AOL emerged as the dominant Internet Service Provider (ISP) in the 1990s [9, Ch. 4], differentiated on account of its IT-enabled content services: Internet chat rooms, carefully screened content and commercial services (travel services, online entertainment, financial news etc.), a clean design, and a unique “sense of community.” Another differentiating factor in AOL’s service was client software—a proprietary connection manager—that purportedly simplified the setup and installation process. This approach suited millions of consumers who, in the early 1990s, suddenly had access to the Internet but lacked the technical knowledge to configure suitable telephone access numbers, resolve mysterious and complicated modem settings, procure and install application programs, or locate useful information and content services. Other ISPs placed the burden of initial installation on the consumer, while AOL aimed to provide the friendliest access ramp to the Internet. Finally, AOL’s strategy was distinctive in offering an integrated service combining the connection manager with access to AOL content and the Internet [12].

AOL’s connection manager implemented non-standard connection protocols and modified certain generic operating system files. While this design facilitated a friendly, customized look-and-feel, it restricted AOL users from using certain non-AOL communication programs (such as for email, file-sharing, and web browsing) and peripheral devices [14]. The software required frequent updates, was considered clumsy and slow, and caused extra overhead during startup and shutdown [5]. These features resulted in diametrically opposite effects for two different classes of users.1 Novice users, those who were new to the Internet, appreciated this friendly hand-holding approach. This appreciation was not shared by power users who had Internet experience and application programs, technical competence in software installation, and ability to navigate Internet and

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1Customer feedback on AOL is polarized, with rave reviews from novice users (very friendly, easy to use, nice interface, community services, parental control) and complaints from more serious users (slow download speeds, slow search, terminated connections, poor browser). Source: Epinions.com, see http://www.epinions.com/cmsw-ISP-All-AOL/display_reviews.
Web content. These users not only found no value in the “friendly on-ramp,” they suffered a loss in utility because of the restrictions and inefficiencies imposed by the connection manager [2].

Since the connection manager causes loss in utility to some users, it is puzzling that this feature is forced on everyone.2 Even if the demands of novice users required non-standard software, AOL could have adopted a mixed bundling strategy (see Figure 1), targeting novice users with the integrated service and offering power users an access only option, covering standardized access to the Internet and its managed content services. Marketing strategy suggests the superiority of mixed bundling, because AOL’s service contains two components (connection manager and managed content services) each of which is differentiated from competitors’ offerings. 3 elaborates on this puzzle.

We view AOL’s pure bundling strategy as deliberately creating barriers to entry for a certain group of customers. AOL is, of course, not unique in this regard. Airlines enforce strict security regulations on their customers—but that, we are informed, is for your own safety. Restaurants and stores refuse alcohol to customers less than 21 (or 18, in the more desirable states) years old, but that’s the law. The law forces the gun industry to turn away certain willing customers, but the industry fights hard to resist such restrictions. The defence industry must verify antecedents of buyers before selling them arms and ammunition, but this regulation exists to prevent sales to rogue nations or freelance terrorists. Firms selling advanced computer technologies also are forced by regulation to erect barriers or even dismiss potential customers. What makes the AOL situation different is that it voluntarily prevents the sale of its product to certain customers.

In many industries, barriers provide a positive value on the aggregate even though those facing the barrier are temporarily worse off. Many airplane travelers may not appreciate a full-body search or having their suitcases turned inside out, but those of us who watch the spectacle are supposed to feel safer. A to-be murderer might feel clueless on being refused a gun, but the potential victim is better off. Teenagers might suffer disutility on being turned away from a bar, but statistics tell us that the rest of us on the road are rendered safer. In all these cases, there is a positive externality—the disutility that a customer faces from an entry barrier is offset by the gains felt by others. But the analogy breaks down in the AOL case: there is no indication that novice users benefit from forcing power users to install the connection manager.

Why, then, did AOL wilfully and voluntarily impose entry barriers that made at least some customers balk at purchase? Surveying AOL decision makers might be one way to answer this question. However, our interest extends beyond this particular firm and product. We also seek to understand, more generally, conditions under which pure bundling is preferred to mixed bundling, and when a firm might systematically seek to exclude certain kinds of customers from its market. Hence we apply the lens of economic modeling to examine this puzzle, developing rigorous models of firm and consumer behavior to understand and explain their choices. Our approach obviously involves assumptions about customer behavior and preferences across the different service options. The narrow purpose of this article is to develop alternative theories for AOL’s actions based on alternative sets of assumptions (about the firm, its product and customers) and examine whether these theories are consistent with the observations. If such hypotheses are plausible, it might be worthwhile to examine them systematically through rigorous behavioral and empirical study.

Our research into this question is set in the early to late 1990s period, when AOL grew from a small online service to be a dominant Internet firm.4 Our analysis is done in a

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2Content services, on the other hand, offer a non-negative utility to everyone, hence we needn’t ask the parallel question of why AOL did not offer a standalone connection manager, sans the content services. Starting 2003, AOL started offering a content-only option to high-speed Internet subscribers under a “bring your own access” plan. This separation of packaged content from high-speed Internet access suits AOL today, since it has been unable to offer a profitable high-speed Internet access service [13]. However, our analysis is focused on the 1990s when AOL enjoyed a significant profit margin on Internet connectivity, hence we include Internet access with access to content in the “access only” option.

3AOL’s later acquisition of Compuserve might seem like an answer to the puzzle. However, Compuserve is neither inexpensive nor standardized, and is not offered under the AOL brand. AOL seems to target Compuserve
2 Model Formulation and Customer Preferences

To get a better appreciation of preferences of different categories of users for the different aspects of dial-up service, it is useful to consider the evolution of dial-up Internet service. The Internet Almanac [9] gives specific data regarding overall number of Internet users, market shares of major ISPs, new product introductions, and major industry developments, at specific times in the 1990s. AOL’s focus on “customer-friendly” approach to Internet access can be seen as a natural response to the exponential increase in non-expert Internet users in the mid-1990s.

2.1 Evolution of Dial-up Internet Access

In the late 1980s and early 1990s, dial-up Internet access was provided by a) universities and military/government organizations that were on the Internet, or b) a few private firms such as AOL, Prodigy and Compuserve. The service provider ran a modem bank either in a specific geographical location (typical under case a) or with national coverage (case b). Commercial ISPs typically employed usage-based pricing, charging as high as $2 per hour of use beyond the first 5 hours or so per month. While universities and government networks were based on TCP/IP (the Internet), the networks run by firms such as AOL constituted private worlds based on proprietary network protocols. Connectivity between these two networks was limited but improved over time (the networks are nearly interoperable today). For example, sending email traffic between such networks progressed from impossible to difficult to standardized. More to our point, the procedures and software for dial-up access were highly complicated. Modems were slow (1200 bps, for example) and subject to proprietary communication schemes, settings and software. The user had to configure various parameters in the modem (compression, mode, telephone number, data rate, etc.) and match these with the provider’s modem configuration, a task made harder because of multiple existing “standards.” Dial-up Internet access captured only a small market of users who were expert enough in IT to deal with these issues or those who had very high value for access.

In the mid-1990s after privatization of the Internet, the demand for dial-up access grew rapidly, and a number of local and national-level ISPs entered the industry. The national players included the major telephone companies, as AT&T, MCI and Sprint began offering dial-up Internet service. Flat-rate pricing (typically, $15-$17/month) was introduced around 1996 and soon became the industry standard. Casual users far outnumbered power users in this time period. Given the profile of novice users, many service providers concentrated on simplifying the access experience for non-expert users. After some initial missteps, America Online (AOL) emerged as a leader, both in offering “user-friendly” easy access to the Internet and in offering additional content services such as online communities, content filtering, email virus detection, chat rooms, and travel services. This strategy helped AOL capture a major share of the market for dial-up access, even while charging a higher monthly fee.

2.2 Customer Preferences

Building on the idea that customer preferences for the connection manager and access to the combination of content/Internet are heterogeneous and negatively correlated, we model Internet users along a type parameter \( \theta \in [0, 1] \) that represents degree of expertise in Internet and IT usage. Let \( V_a(\theta) \) represent a type \( \theta \)’s valuation of the connection manager software, and let \( V_s(\theta) \) represent valuation for access to Internet and AOL content. We require the valuation function to satisfy the following properties:

- **A I** \( V_a \) and \( V_s \) are continuous and differentiable in \([0, 1]\), with first derivatives \( V_a' \) and \( V_s' \).
- **A II** \( V_a' \geq 0 \), and \( V_s' \leq 0 \).
  Valuation for access increases with expertise but valuation for connection manager decreases with expertise.
- **A III** \( \exists \alpha \in [0, 1] \) such that \( V_a < 0 \) for all \( \theta > \alpha \)
  Power users are the users with \( \theta \in [\alpha, 1] \), they have negative value for AOL software. Casual users are in \([0, \alpha] \) and have positive value for software.

To facilitate the analysis and exposition, we adopt a specific valuation function that satisfies these assumptions. Figure 2 provides a graphical illustration.

\[
V_a = \theta q \\
V_s = (\alpha^2 - \theta^2) s
\]

where \( q \) and \( s \) are scaling parameters, and can be interpreted as the quality level of access and connection software respectively.
Let \( p \) and \( \theta \) denote the variable cost per user, representing mostly the pro-rated cost of access, since the marginal cost of connection software negligible.

\[
U_b(\theta) = \theta q + (\alpha^2 - \theta^2)s - p_b \\
U_a(\theta) = \theta q - p_a
\]

Let \( c \) denote the variable cost per user, representing mostly the pro-rated cost of access, since the marginal cost of connection software negligible.

**Pure Bundling:** When the ISP offers only the integrated bundle at price \( p_b \) it captures users in \([\theta_1, \theta_2]\) where the indifference points \( \theta_1 \) and \( \theta_2 \) satisfy \( U(\theta_1) = U(\theta_2) = 0 \). Hence

\[
\theta_1 = \max\left\{0, \frac{q - \sqrt{q^2 - 4p_b s + 4\alpha^2 s^2}}{2s}\right\} \\
\theta_2 = \min\left\{\frac{q + \sqrt{q^2 - 4p_b s + 4\alpha^2 s^2}}{2s}, 1\right\}
\]

Users in \([0, \theta_1]\) (low-end novice users) and \([\theta_2, 1]\) get negative surplus, and choose not to purchase the service. When \( \theta_2 > \alpha \), some power users purchase the bundle, and when \( \theta_2 < \alpha \) no power users purchase the bundle. The ISP’s profit is

\[
\pi_b = (p_b - c)(\theta_2 - \theta_1)
\]

**Mixed Bundling** For the case where users have a choice between the integrated and access-only services, two additional indifference points are relevant. Let \( \theta_3 \) denote the marginal consumer who gets equal surplus from the two options, so that \( U_a(\theta_3) = U_b(\theta_3) \). Let \( \theta_4 \) denote the marginal consumer who has zero surplus for access \( U_a(\theta_4) = 0 \). Hence we get

\[
\theta_3 = \min\left\{\max\left\{0, \frac{\sqrt{p_a - p_b + 8s\alpha^2}}{\sqrt{s}}\right\}, 1\right\} \\
\theta_4 = \min\left\{\frac{p_a}{q}, 1\right\}
\]

Now, two scenarios are possible, as depicted in Figure 3.

1. \( (U_a(\theta_3) \geq 0) \equiv (\theta_3 < \theta_2) \). In this case, users in \([\theta_3, 1]\] purchase the access-only service, and users in \([\theta_1, \theta_3]\] purchase the integrated bundle. The firm’s profit is

\[
\pi_1 = (p_b - c)(\theta_3 - \theta_1) + (p_a - c)(1 - \theta_3)
\]

2. \( (U_a(\theta_3) < 0) \equiv (\theta_3 > \theta_2) \). Here, users in \([\theta_4, 1]\] purchase the access-only service, and users in \([\theta_1, \theta_2]\) purchase the integrated bundle. The profit function is

\[
\pi_2 = (p_b - c)(\theta_2 - \theta_1) + (p_a - c)(1 - \theta_4)
\]

Which scenario is realized depends on which one yields the higher profit. Thus, the ISP’s optimal profit under mixed bundling is

\[
\pi^*_a(b) = \max_{p_a, p_b} \{\pi_1^*, \pi_2^*\}
\]

### 3 Mixed Bundling is Better?

The AOL product contains two components—access to Internet and managed content services, and friendly connection manager—for which the preferences of power users and novice users are negatively correlated. Therefore, bundling the two features should yield a higher price and improve profits \([18, 16, 15, 3]\).

Yet, mixed bundling—offer the bundle to novice users and give power users a more standard gateway—should be even better. Adams and Yellen [1] and McAffee et al. [11] show that “we can immediately rule out pure bundling as a (uniquely) optimal strategy, because mixed bundling is always (weakly) better”. The literature on versioning and price discrimination \([10, 17]\) also supports this argument. Mixed bundling corresponds to a menu of high and low quality versions (the bundle and standalone service, respectively); customers self-select the option intended for their type, and the firm earns greater profits relative to offering the high-quality alone.
Figure 3. Utility functions, indifference points and buyers under two scenarios: $\theta_3 > \theta_2$ (left) and $\theta_3 < \theta_2$ (right)

Do these arguments establish that AOL would have been better off with the mixed bundling approach discussed in §1? There are some difficulties. First, the problem may have a boundary solution: pure bundling can achieve the same optimal profit as mixed bundling. Second, relative to prior work on bundling, the current problem is unique because some users have negative utility for one of the components (connection manager). Similarly, the versioning literature cannot be directly applied because not all users agree that the bundle offers higher quality than its parts. Fortunately, there is a simple constructive proof to show that

**Proposition 1** A mixed bundle, allowing a choice between the integrated bundle and an access-only option, is strictly superior to a pure bundling approach which offers the integrated bundle only.

4 Explanations for Pure Bundling Strategy

§3 demonstrates that a mixed bundling strategy would have improved AOL’s profits. Why, then, did AOL adopt the pure bundling approach? We study this issue further in order to uncover potential explanations that are consistent with the observed strategy.

4.1 Non-Standard Connection Manager Eliminates Bad Customers

Consider the possibility that different users impose different costs on the system, due to the amount of traffic they generate or the time they are online tying up resources in the ISP’s modem pool. In particular, it seems reasonable to postulate that the cost imposed on the system increases rapidly with a user’s expertise. For example, certain power users stay online for many hours—as much as, say, 10 hours a day. This is about 20 times the time spent by an average AOL user (32 minutes per day in January 1997, [7]). Power users also use complex file-sharing applications and download large multimedia files, resulting in higher bandwidth costs for AOL. Thus, if $c(\theta)$ denotes the cost imposed by a type $\theta$ user, it seems reasonable to claim that $c'(\theta) > 0$ and $c''(\theta) \geq 0$.

4.1.1 Bad Customers

Given a cost function $c(\theta)$, we define a “bad customer” as one whose valuation for service is below the cost they impose on the system (i.e., $V(\theta) < c(\theta)$). Servicing such customers is not only unprofitable for the ISP but it is also inef-
icient. Does the market and pricing environment for dial-up services suggest the presence of some bad customers? We note that dial-up Internet service has been provided under a flat-rate pricing (insensitive to usage) scheme since the mid-1990s. This scheme encourages wasteful, free-riding behavior: users engage in costly activities which deliver them little value. For example, many power users stayed connected, but idle, for hours at time, getting no benefit but occupying system resources; or downloaded massive multimedia files that resulted in system congestion and high bandwidth costs, even though the file had little value to them. Hence it is plausible that some high-end power users are bad customers.

To develop the explanation, we use the specific cost function \( c(\theta) = c \cdot \theta^2 \). Solving for \( V(\theta) < c(\theta) \), we see that bad customers are \( \theta > \frac{c}{2} \) where \( \theta \in [0, 1] \). Hence all power users are “good customers” when \( c \leq q \); all power users are bad customers when the cost function is sufficiently steep \( c > \frac{q}{2} \); and there exist both good power users and bad power users when \( c \in \left[q, \frac{q}{2}\right] \). See Figure 4 for an illustration. The most interesting case is \( c \in \left[q, \frac{q}{2}\right] \), covering cost functions (such as the dashed curve in the figure) for which there are both good power users and bad power users. Note that for such bad customers, the net loss in serving them (difference between cost and valuation) is increasing in the level of expertise. Formally,

**Lemma 1** When \( c > q \), there exists \( \hat{\theta} \) such that \( V_a(\theta) - c(\theta) < 0 \) for all \( \theta > \hat{\theta} \), and the loss \( |V_a(\theta) - c(\theta)| \) is increasing in this interval.

### 4.1.2 One Rotten Apple Spoils The Barrel

Under mixed bundling, where the ISP offers both the integrated service and the access-only service, the profit function is the higher of the two cases discussed in §2.2.

\[
\pi_1 = \int_{\theta_1}^{\theta_2} (p_b - c \cdot \theta^2) d\theta + \int_{\theta_2}^{1} (p_a - c \cdot \theta^2) d\theta \\
\pi_2 = \int_{\theta_1}^{\theta_3} (p_b - c \cdot \theta^2) d\theta + \int_{\theta_3}^{1} (p_a - c \cdot \theta^2) d\theta
\]

In either case, the second integral is negative when \( c > q \), i.e., there are some bad customers (see Appendix). In other words, a positive market share for the access-only service reduces profits. Thus, pure bundling is optimal in this case, and we postulate that

**Proposition 2** The market for dial-up Internet service in the 1990s contained some bad customers—power users whose valuation for access was below the cost they imposed on the system. AOL forced customers to install a non-standard connection manager in order to prevent certain high-end power users from signing on to its service.

Recall that the connection manager is appreciated by novice users and considered a nuisance by power users. Had AOL offered Internet service with standard connection manager, this service would have attracted several power users including some bad customers whose presence would have made the service unprofitable. Because flat-rate pricing became the industry standard (since 1996), AOL was unable to screen out such bad customers through usage-sensitive pricing. The non-standard connection manager was a means to damage the service in order to drive away these bad customers. Thus, the integrated service provided AOL an inexpensive way to screen out bad customers, and had a positive side-effect of providing benefits to the good customers. It was optimal for AOL to offer only this “damaged” dial-up service rather than to offer customers a choice between the integrated service and standardized access-only service.

This argument is further strengthened if we consider the perspective that AOL earns commission revenue from providers of premium content services—content goods like weather, news and entertainment, or collateral information about commodities. Content and goods providers pay AOL advertising revenue for the customers it brings—the industry standard for such revenues is performance based, measured as the number of eyeballs. We can view the commission as revenue as reducing the net cost imposed by a user. Novice users are more likely to use the content services; however, power users tend not to be heavy users of these services and thus impose an even higher net cost relative to novice users.

### 4.2 Novice Users can Learn to Become Power Users

A second, intuitive, explanation for not offering the access-only service to power users is the potential for (one-way) learning: the presence of access-only users could cause a change in novice users’ preferences. Novice users might reduce their appreciation of the connection manager after observing access-only power users. God forbid, some high-end novice users might even learn and transform into power-users! Hence in subsequent periods, some percentage of novice users would no longer be willing to pay a high price for the restricted AOL service, leading to a reduction in future profits. If this effect were strong enough, the overall profits would be lower in the mixed bundling case.

To study this explanation formally, consider the game in two periods. To make the argument conservative, let us grant that the mixed bundling approach improves the ISP’s profits in the first period. Thus, some consumers choose access-only service in the first period. Assume also that in the next period, some proportion of consumers who originally choose the integrated service are going to learn
from those using access-only, hence their valuation for integrated service is reduced. The extent of learning depends on $M_a$, the first period market size for access-only service. If there are more users of access-only service, there is a greater chance that some novice users of the integrated service will learn to manage without AOL’s software. Further, users with higher $\theta$ are more likely to learn and stop using the integrated service. Hence the effect of learning is captured via a shift in the $\theta$-threshold that separates power and novice users, which shifts left from $\alpha$ to $\tilde{\alpha}$. Equivalently, we may write the second-period valuation function for integrated service as

$$U_b(\theta, \tilde{\alpha}) = \theta q + (\tilde{\alpha}^2 - \theta^2)s - p_b$$

where $\tilde{\alpha} = \alpha - \delta(M_a)$, and $\delta(\cdot)$, which denotes the intensity of learning, is a function of $M_a$, with $\delta(0) = 0$ and $\delta(1) = \alpha$. Customers’ utility function for access-only service remains the same in the second period: $U_a(\theta) = \theta q - p_a$.

Now AOL’s decision problem is to choose the optimal $p_a$ and $p_b$ to maximize its two-period profit, if it offers the mixed bundling options. Let $\pi^p(p_a, p_b; \alpha)$ represent the $i$’th period profit when offering mixed bundling, with novice users and power users being separated by $\alpha$, we can express the decision problem as:

$$\max \pi^1(p_a, p_b; \alpha) + \pi^2(p_a, p_b; \tilde{\alpha}) \quad (3)$$

If AOL were to not offer the access-only option in the first period, then there is no learning, thus the decision problem is:

$$\max 2\pi^1(p_b; \alpha) \quad (4)$$

where $\pi^1(p_b; \alpha)$ represents the profit of only offering integrated service.

To fully characterize Eq. 3 requires a total of 16 (4 x 4) cases, since in the second period there are the same number of cases to discuss as in the first period. For simplicity, we omit the formal analytical approach and present the numerical computation results. Our objective is to determine whether there exist conditions under which pure bundling yields the optimal solution. We postulate that

**Proposition 3** The market for dial-up service in the 1990s consisted of a high fraction of novice users who could potentially defect to the less profitable access-only service in the second period, if they observed an access-only user group in the first period. This fraction ($\alpha$) was sufficiently high such that the second period loss due to defection exceeded the additional profits obtained from the access-only service.

Figure 4.2 illustrates the result when $q = 0.9$, $s = 0.8$, $\tilde{\alpha} = \max(\alpha - 0.1(1 - \max(\theta3, \theta4)), 0)$, where “*” represents the performance of the mixed bundling strategy, and “o” represents that of the pure bundling strategy. The performance improves under both strategies as the number of novice users increases. More importantly when $\alpha > 0.6$, the optimal strategy is to not sell the access only option.

![Figure 5](image-url)
5 Discussion

Our research was motivated by the observation that AOL offers only one approach to Internet access—in which non-standardized software is bundled with access to its content and the internet—a strategy that seems suboptimal since AOL’s approach is disliked by power users and effectively eliminates them from AOL’s market. Capturing such users by offering a second access-only service without the software should increase profits. This argument is compatible with a versioning approach and with the superiority of mixed bundling over pure bundling. In this paper, however, we develop two explanations for the observed pure bundling approach, arguing that it may be optimal either if power users impose substantially higher costs or if a community of access-only users would cause novice users to drift away from the high-priced AOL software-access bundle.

We find the problem and the potential explanations worthy of study because they relate to several well-developed streams of research. In the bundling literature, it is well understood that pure bundling is typically better than unbundling under negligible marginal costs, and mixed bundling is usually strictly better than pure bundling. Our model formulation and analysis for this problem offers an interesting twist, since consumer preferences for the two core features are not only negatively correlated, but there exists a feature that is negatively valued by some customers. Hence the valuation of the bundle is less than the valuation of its part (unlike in traditional analysis of bundling), furthermore this is true for only some customers. Consequently, we have established new conditions—differential marginal costs and word of mouth learning effects—under which pure bundling is preferred to mixed bundling. Our research is also related to the versioning literature, but again we have a non-standard problem: the two service options are neither vertically nor horizontally differentiated, and users cannot be typed purely on willingness-to-pay. Hence, we have modelled a setting that deviates traditional analysis of versioning, and have found conditions under which offering one service level is preferable to versioning. Finally, our research is related to the concepts of screening [8] and damaged goods [6]. Marketing departments in firms routinely spend vast sums of money on customer relationship management, identifying profitable and unprofitable customers, and figuring out how to fire bad customers. AOL’s strategy, we have postulated, might be an inexpensive damaged goods approach for screening out bad customers. This is interesting since typically the objective behind both screening and the damaged goods approach is to enable versioning—the damaged good captures low-type consumers while preserving high-type consumers’ incentive to purchase the standard product—whereas AOL objective in applying these concepts is to limit its market share. 

Our research also suggests potential avenues for further work. There may be other explanations for the observed phenomenon. In addition, the explanations offered in this paper certainly need to pass an empirical test under the particular setting of Internet access services. It seems useful to examine whether these explanations apply to other settings as well, where firms prefer pure bundling to mixed bundling, or more generally where firms bundle a feature that has disutility for certain users. For example, most American automobile manufacturers offer cars with only the more expensive—and, for some drivers, less desirable—automatic transmission option. Our work could also be extended to study the present market for Internet service, which is gravitating towards high-speed broadband service. AOL, and other leaders in the dial-up market have begun offering broadband access, and AOL is presently continuing with the proprietary software approach. Given the potential to offer multiple QoS in the broadband access market [4], the ISP may be able to offer higher-speed broadband access to power users at a much higher price, without the risk that novice users would learn and switch to a cheaper service.

A Technical Details

Proof of Proposition 1. Suppose that the optimal price for offering the bundle only is \( p_0 \), we show that ISP can improve profits by offering additional access-only service. Let \( \theta_1^* \) and \( \theta_2^* \) be the optimal indifference points so that the bundle covers consumers in \( [\theta_1^*, \theta_2^*] \).

1. If \( \theta_2^* > \alpha \), then the firm attracts some power users under the pure bundling approach. Now suppose the firm adds an access-only service at the same price \( p_0 \). Since novice users get lower utility from access-only, none of them will switch. Since power users get higher utility, all the current power buyers will switch to access-only. In addition, all the other power users to the right of \( \theta_2^* > \alpha \) will also buy the access service, thus increasing both market share and profit.

2. If \( \theta_2^* < \alpha \), then the pure bundling approach covers only novice users. Now power users present an additional market to the ISP, without any threat of interference between the two markets. Thus the ISP can determine a price for the access-only service, independent of any effect on the current market for its bundled service: any price which attracts some power users will increase profits.

In both cases, \( \pi_{a,b}^* > \pi_b^* \), mixed bundling is strictly better than pure bundling. ■

Proof of Proposition 2. For case 2, where there is no competition within the firm’s product line (i.e., between the integrated service and access-only service), the net profit
from the access-only component is \( \int_{\theta_4}^{1} (p_a - c \cdot \theta^2) d\theta \). By definition, \( \theta_4 = \frac{p_a}{q} \) so that the ISP’s profit is

\[
\pi_a = \int_{\theta_4}^{1} (p_a - c \cdot \theta^2) d\theta
\]

Computing the integral, we see that whenever \( c > q \), which corresponds to the case where there is at least one bad customer (see Figure 4), then the ISP cannot earn positive profit at any price.

Case 1 corresponds to competition between the integrated and access-only services, hence the profit for each component is lower than the profit for that component under no competition. Specifically, this implies that the access-only service cannot contribute a positive profit.

\[ \square \]

References


