New economic models are driving digital content and access providers toward a tighter integration.

Anjana Susarla, Manoj Parameswaran, and Andrew B. Whinston

Emerging Market Structures in the Digital Supply Chain

The supply chain for distributing digital goods is in the process of spasmodic change. A wide array of new, high-speed access technologies are transforming the last mile, eroding the market power of established access providers, making smaller companies disappear overnight, and generating huge alliances. Customers face a rich set of options in access and content. The many access options and speeds have been accompanied by increasingly innovative digital products and services, most of them personalized. Wireless is maturing as a medium for data distribution with exciting new applications.

While most observers recognize that the industries of content and access provision are in flux, it is unclear which business models may survive. The savvy organization—and individual—need to correctly interpret the implications of the dazzling developments in technology to effectively position themselves in the market.

In this article, we characterize scenarios that are likely to occur based on the premise that you can't think of content and access provision as separate markets. Value-added bundles of dynamically customized content will be the order of the day. Will you and your organization be ready for the change?

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DEATH OF THE LOCAL ISP

We think small Internet service providers that specialize in only one form of local access provision are on the way out. To remain competitive, local ISPs must offer bundled products, as well as hedge their bets and use multiple access technologies. Several forces drive this strategy.

A local ISP with an established market holds an advantage that it can leverage only if it retains market share. Retention in the presence of increasing competition requires that the provider differentiate its product by packaging access with value-added services to raise the *switching costs*—the dollar cost and inconvenience of moving to a new provider.

To add value, a local ISP can add content relevant to the local market, such as weather, local news/events, yellow-pages services, and local interactive applications. Local ISPs can also cache content from major providers at its local sites to provide far better quality of service.

Increasing competition in the backbone access provision market is driving large access providers (such as AT&T) to move into local markets. They are trying to obtain market share that will drive traffic directly into their networks. With national and local resources at their disposal, they will provide various bundles of products and services for customers who desire one-stop shopping.

For example, such large providers can offer a small-business package of phone, fax, multiple e-mail accounts, Web hosting, and content-caching services for a flat fee. This is a much more con-

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Complementarities Will Be Key to Access/Content Provider Success

Jane Doe signed up for a Web-based e-mail account as a temporary measure. Meanwhile, she started receiving stock quotes, movie reviews, and local show times through e-mail. Eventually her ISP gave her a POP (Post Office Protocol) account, but she is reluctant to switch because she uses the bundled services.

In the digital world, products bundled together often represent enhanced value. Providers must identify products exhibiting complementarities to be bundled together. When the provider bundles more and more components, it raises the switching cost to the customer. Monopoly providers can use this strategy effectively.

Microsoft leverages its market share in Web mail by packaging the mail service along with MSN Messenger. AOL keeps adding new services such as online bill payment and photo processing, which increases brand loyalty by enhancing consumer value.

Customer retention is the holy grail, and bundling complementary products is the best way to seek it.

venient solution than shopping for the best value in each market and managing multiple access lines in a call center. Small ISPs face being bought out by such large providers. Effective resistance will depend on the small ISP's ability to retain customers and develop a healthy revenue model.

Survival strategies: Small local providers face extinction unless they adopt strategies to establish a strong and loyal market segment. Such strategies would include bundling access and content, offering value-added services to their local customers, and providing a high degree of customization.

STRATEGIES FOR THE LARGE ISP

Entrenched players with a very high degree of market penetration in content or access provision have a degree of monopoly power. But even they are not invulnerable to shifts in the digital content/access market. So look for these large providers of content and access to constantly reshape themselves.

In the discussion that follows, we discuss monopolistic firm A, a large content/access provider. Examples could be AOL (in providing content) and AT&T (in providing access). Firm A sources content from different content providers and also uses its own content.

Complementarities between content

Various content providers can provide complementary services, as discussed in the sidebar "Complementarities Will Be Key to Access/Content Provider Success." For example, if one content provider offers e-mail and the other offers stock quotes, there is an advantage in combining both to deliver dynamic e-mail updates of stock prices. In these cases, it is in the interest of monopolistic firm A to insist on exclusivity (Michael D. Whinston, "Tying, Foreclosure, and Exclusion," *The American Economic Review*, Sept. 1990, pp. 837-859)—that the content be provided only through its server. By tying e-mail to stock quotes, the monopolist is enhancing consumer value. The content provider could use micropayments for per-use charge, or aggregate monthly charges. When the content provider also provides access, it becomes easier to monitor usage patterns and possibly charge per usage.

Using reputation and brand to an advantage

Expect to see firms with market power leverage their reputation to attract customers to new product offerings. For example, Citigroup and AOL signed a deal under which Citigroup's payments program became a part of AOL's package. While there are plenty of competitive bill payment services available, AOL leveraged the advantage of reputation it already had by landing a contract with an equally redoubtable player. The combined quality signal was sufficient to draw customers to their service. Consumers obviously believe that this service will continue to be provided in future, which will ensure their dependence on AOL. In effect, AOL raised the switching cost to the customer.

Horizontal externalities

A consumer visits an online information broker such as AOL's MySimon (http://www.mysimon.com), which presents extensive comparison shopping information for free. Large companies can subsidize information provision from other operations. In turn, providing the information could lead to customer spending at the same company's online stores, generating revenues. Thus, a company's operations in one field affect its revenues in another, targeted at the same market base; this is a *horizontal externality*, as the sidebar "How Externalities Work" explains.

On the flip side, consumers could use a broker to get information and then shop at a different store. Providing information for free entails this risk. How can a provider respond to the risk? First, it must coordinate the free information with the availability of attractive deals at its own stores. Second, it can impose exclusivity, for example, by providing information only to active shoppers at its stores.

A contract is exclusive if it effectively excludes others, for example, AOL's insisting that the content provider con-

tract its services with AOL alone. A related phenomenon is *tying*, whereby a firm requires that another firm entering into a contract with it also buys or subscribes to some of its other services.

Survival strategies: Providers with market power should identify complementary products and services and bundle them together. If necessary, they should outsource the creation of these services through exclusive contracts. The provider's market power will induce other providers to partner in such contracts. The more large players can bundle such products, the more the value added to the customer, and the higher the switching cost.

Market power goes with reputation, which should be enhanced and leveraged to entice customers into buying new products. Market power in one product should be used to subsidize offering free information that can enhance consumer spending in the core products. Care should be taken to coordinate activities in multiple markets so that the positive externalities of one market should lead to enhancing revenue in other markets rather than eroding them by giving business to competitors.

DEALING WITH YOUR VALUE CHAIN THROUGH INTEGRATION?

Now we look at a model in which others in the economic value chain can affect a firm or customers (a *vertical externality*). The externality problem refers to the effect—often unintended—of a market player's action on other agents in the market.

Consider the content provider as an upstream firm, and the access provider as a downstream firm. Say a firm with monopoly power, such as AOL, strikes a deal with a downstream firm such as AT&T, which has monopoly power for value-added services. Here, the extent of market power held by each firm and the actions of each in its own market, have externality effects on each other.

The access provider can be affected if the content provider with stable demand also begins offering its products over a competing medium, say wireless or cable. This action would force the access provider to buy into those technologies. For instance, a dial-up customer may want to defect to another provider who offers a packaged service of dial-up, wireless, and cable, all of which access the same personalized content, such as stock quotes from AOL. AOL's providing its content through other media can precipitate an erosion of AT&T's market.

On the other hand, if AOL only offered its services over dial-up connections, a national provider with a local cable modem access tie-in could emerge as a broadband competitor. Such a situation would immediately erode AOL's market base. Customers would prefer the broadband access and would substitute AOL's product offerings with individual content providers. AOL will need to provide its offerings through each popular access medium to make customers' choice of content independent of their choice of access mode.

This scenario might trigger the *double marginalization problem* (Jean Tirole, *The Theory of Industrial Organization*, MIT Press, 1988), which refers to a situation in which both upstream and downstream firms are monopolists. That

How Externalities Work

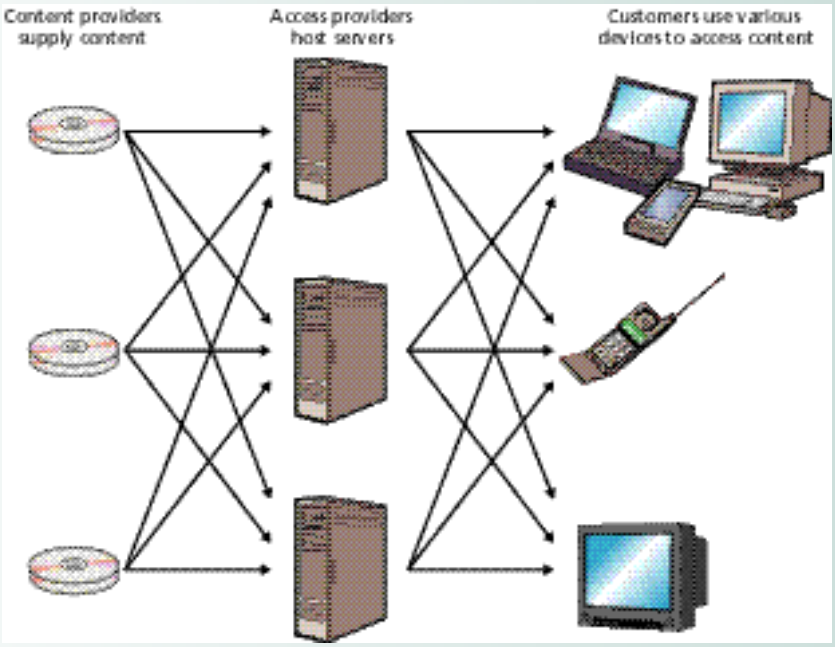
Away.com is a popular site for travelers seeking unusual destinations for outdoor adventure. It provides how-tos a wealth of quality information on trips and gear. The interesting part is that it also provides for purchasing travel reservations and outdoor gear. Visitors looking for information at the site are highly likely to shop there as well.

Ticketmaster is currently a dominant player in selling event reservations on the Web. However, wireless Internet access through handheld devices will become widespread in the near future. If Ticketmaster is limited to the Web as its distribution channel, a new player could easily wrestle away market share by selling tickets over wireless devices.

Economists call each of these externalities in play. Externalities result when the actions of players outside a market affect a market's outcome. Digital products markets are often characterized by externalities from network effects. Externalities may be good (positive) or bad (negative). For example, the more users sign up for a community or an interactive game, the more its value. The more users clog up a network, the less its performance.

Away.com gives away quality content to enhance customer spending in another market. This is a horizontal externality. As another example, building an excellent Web site about a music band could stimulate growth of music sales. Providing information like this is also significant in Ticketmaster's case, where the externality results from technological changes downstream. Even though the externality comes from downstream, Ticketmaster must respond to it to survive. This situation represents a vertical externality. The response often involves integration or partnering with multiple providers to hedge the risk.

Figure 1. Buyer-seller networks allow the greatest diversity and combination of content and access providers.



is, both firms will charge higher prices compared to a competitive situation, which entails a double loss for consumers. It may thus be profitable for AOL to develop network assets to provide services at a lower price. So it would appear that both content and access providers with market power have incentives to integrate into the other market and guard against vertical externalities.

Survival strategies: Protecting against vertical externalities requires providers to at least partially integrate vertically. Further, each type of provider should diversify by offering multiple modes of access and sources of content to minimize externality effects stemming from a single partnership. Firms with value chain partners that hold market power should explore how they can shave off the additional markups and offer lower-priced products to customers.

FREE-FOR-ALL: COMPETING PROVIDERS

Despite the market power of firms like AOL and AT&T, a single aggregator may not necessarily come to dominate content provision. Multiple content providers can contract with multiple access providers to make a variety of content available in packaged bundles.

To characterize such a market—one that competitively provides both access and content—we use the theories of *buyer-seller networks*. Such a model characterizes any contract between content and access providers as a link between buyer and seller (Matthew O. Jackson and Asher Wolinsky, "A Strategic Model of Social and Economic Networks," *J. Economic Theory*, Vol. 71,1996). One typical motivation for such linkages is the pooling of uncertainty in demand or reducing shocks in supply.

Link formation is affected by link costs—costs incurred by market participants in forming the link.In our case, the cost to the content provider of finding people (and access providers) who are interested in the content provided can be considered a link cost.

Ideally, networks will form based on the least linkage costs and highest valuation (which could depend on the content quality).Upstream firms (sellers) compete based on content quality, and there is competition among access providers to see who can pool together various demand profiles from different buyers.

The advantage is that all the various groups of buyers can access content from different content providers, as shown in Figure 1. The way most Internet portals operate now approximates this scenario. A possible advantage for the customer is that access providers can add value by dynamically updating customized content. This structure doesn't lock users into one technological choice. For example, if AOL refuses to offer its service over cable, and competitive providers offer similar services over cable, consumers are likely to switch.

Survival strategies: These models could show broadband operators and other digital technology players the route to take if they want to leverage the power of their technological infrastructure. Theories of buyer-seller networks predict that there should be tighter linkages between content and access, for example by an access provider's linking up with localized content provision to personalize content to suit each customer.

PEER-TO-PEER: WILL CONTENT PROVIDERS DISAPPEAR?

Peer-to-peer content provisioning will pose problems for some types of content providers. The traditional content providers place the content in centralized servers, enabling them to track individual usage, and if necessary, charge prices. In peer-to-peer, a community of users replicates and distributes content to be stored over a set of nodes, which form a network,allowing users to roam over

the network to obtain a particular item.Such replication may often involve piracy or copyright violations, and the decentralized network makes it impossible to target litigation at a single entity, or bring down the network. For example, Gnutella is a network of largely anonymous users who store MP3 files in their computers. Any user can easily join the network and make her collection available online, and download any of the MP3 files stored over the network. The music industry perceives this as a threat, as the free exchange of pirated MP3 versions of copyrighted music might suppress its own sales of content.

Will peer-to-peer transform the scenario of content and access provision? To examine this possibility, we need to distinguish between private and public goods. *Private goods* are sold by producers at a price determined by market signals. *Public goods* are available for free consumption,and consumption by one customer doesn't preclude consumption by another. Because the market doesn't provide signals for pricing (and hence no profit incentive), providers may have no reason to adequately supply such products (A. Mas-Collell,M.D.Whinston, and J.R.Green, *Microeconomic Theory*, Oxford University Press, 1995).

Peer-to-peer provisioning essentially transforms goods from private to public by making them available for free sharing. The technology undermines any legal or other means to protect and price digital goods, or to track down copyright violations and preempt free distribution. In doing so, peer-to-peer provisioning robs the sellers of profits and incentives to provide the product. The issues are: Is this a general threat to the content industry? Will it alter the content and access provision landscape as we know it? Where it is a threat,how can providers respond?

This scenario threatens only durable digital goods, such as music. In a durable digital good, such as an MP3 file, or an online book, the customer value obtains from a single, static file, which may be downloaded at a price from a traditional content provider, or replicated in a P2P network. A nondurable digital good would be such as interactive content, streaming media such as online radio, or dynamically updated content, where the customer value is not derived from a single file. The very nature of peer to peer—its lack of centralized control or quality assurance—implies that the type of goods shared will cater only to a demand for products with no quality assurance in content or delivery.

Survival strategies: Content providers can respond by making their products nondurable by, for instance, building an interactive experience into the product. (For an idea of what interactivity brings to a product, see the sidebar "Interactivity: The Future of Content?") Providers can themselves join peer-to-peer communities and provide quality goods distributed across high-performance sites and use that to entice customers to private-good offerings. Access providers can use peer-to-peer provisioning to deploy efficient network sharing of public information

Interactivity: The Future of Content?

To a significant number of its users, AOL's messenger service is its most attractive feature. Users chat with friends and meet new friends online. Even as users are exposed to new modes of access and content, they want to continue using this feature.

AOL effectively locks in large communities of customers because of its messenger service. Less Web-savvy customers begin by using AOL to find content; but AOL retains many customers because of interactive messaging.

The value of interactive content is intimately linked to the community available for interaction. It is here that AOL uses its first-mover advantage to telling effect.So long as AOL's messaging service is not an open standard, competitors are forced to offer messaging based on new and incompatible standards. Although these standards could be technologically superior, the customer wants the best place to meet people. What matters is whether there are people to meet. Microsoft may offer a dazzling messaging product, but, with a large majority of friends chatting away on AOL, a customer has no reason to sign up with Microsoft.

Content providers find it increasingly difficult to differentiate themselves and retain customers, and interactivity provides an attractive solution. With interactivity, customers won't be lured away by a superior product or by whims of taste or trend, so long as a critical mass of users exist.

Static digital content is a durable good, which users can replicate and redistribute without cost. Transforming static content into an interactive experience effectively renders the product unique. The personalized experience also increases the customer's brand loyalty.

The advent of wireless marks a medium naturally conducive to interactive content. Wireless is set to reach a much larger market base than conventional Internet access. The typical wireless customer profile parallels that of AOL's customer; these are compelling reasons for AOL to enter the wireless market with its messaging service.

Wireless Content Translators

The limited memory and display capabilities of wireless devices, the much broader demand profiles of the new market segment, and the inherent quirks of wireless as an access medium dictate that providers cannot simply port conventional digital content to wireless medium. Instead, they must identify specific products that appeal to wireless customers and also use little bandwidth.

Typical wireless customers are not casual surfers; rather, they will look for specific information about weather or entertainment that instantly caters to a need. Much more important, wireless opens up the market demand for an entirely new set of products such as interactive games.

All these content forms must be translated into a wireless format, pointing to a new type of intermediary that would source content from reputed providers and convert it. Content aggregators would distribute it to wireless access providers.

Codeonline (http://www.codeonline.com) is a Finnish startup that identified this strategic opportunity early. It rolled out interactive, multiplayer knowledge-based games in wireless-ready format. Its latest offering involves the popular Trivial Pursuit game. The company contracted with the game provider to develop a wireless-compatible, lean version of TP and prepare it for wireless delivery, along with software that allows individuals to play TP over cell phones. It is predictable that users idling time in a flight or traffic jam could find this entertaining. Wireless, interactive applications will reach a much wider audience than other applications.

The key to providing any such interactive content is that users obtain value not merely from the product, but from the quality of the group they interact with as well.

goods, such as reference information. They can use the free information to attract subscribers who will eventually subscribe to packaged content.

THE IMPACT OF WIRELESS

The advent of wireless technologies into the US market, albeit delayed, has dramatically altered the landscape of markets for digital goods. Various singular features differentiate wireless as a new game, though it overlaps with conventional access media. The market for wireless devices is different and much larger than the Internet customer base. At the same time, existing network infrastructure and content archives may be leveraged to advantage as upstream sources of content for wireless distribution. Existing providers must quickly move into the wireless market to effectively leverage such resources.

The Bell Atlantic-Verizon Wireless case is a good example. Bell Atlantic and GTE, two leading telecom providers, came together to form Verizon Communications, and aligned forces with Vodafone Airtouch and PrimeCo to start Verizon Wireless, now the leading US wireless provider. Recognizing the significance of wireless, these companies moved quickly to leverage established reputations and bring in wireless players to position themselves as value-added providers of both wireless and conventional telecom products. The bold move in abandoning two trusted brand names in favor of a new name—Verizon—is noteworthy.

Wireless, with rapid pace of technological development and the entry of new players, is a market where quick market penetration is vital. Stiff competition dictates that value-added services are the means to penetrate the market. Wireless frequency spectra constitute a scarce resource, and providers with access to frequency bands must develop value-added services based on them to effectively exploit their advantage.

Customers in wireless markets for voice are sensitive to pricing in their choice of providers; however, customers of Internet content do not choose content based on pricing. Users could pay for access to the same content through various access providers or they could pay for bundled packages of content and access. As content providers move to wireless platforms, they will need to recognize that the existing customer base is sensitive to pricing, and adapt to a model that combines features from both worlds. It will be crucial for

- content aggregators to provide content across multiple platforms, and
- wireless access providers to source content from as many quality providers as possible.

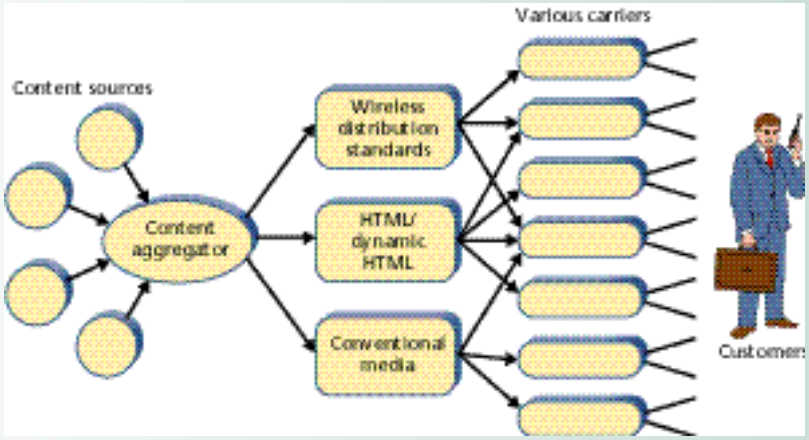
Content providers and aggregators must move quickly to generate wireless versions of their portals and offerings. Players with market power in conventional content must offer similar products in wireless, so that the customer can access, say, the same stock quotes at work and on the move. This situation could spur the rise of content translators—intermediaries that convert standard content into a wireless format (see the "Wireless Content Translators" sidebar).

The multiplicity of wireless access technologies and standards implies that customers will switch frequently, so winning market share may be much easier than retaining it. Content aggregators can deal with this by generating a series of comprehensive, customized bundles of content and making them available in each competing wireless

delivery format. (Examples of such formats include the WML-WAP (Wireless Markup Language and Wireless Access Protocol) framework and SMS (Short Messaging Service). Then content aggregators can license various wireless access providers to distribute this content.

For example, customers would like to look up times for movie showings, get directions, buy stocks, read news, make travel reservations, and play multiperson games, regardless of the type of wireless device or provider they have. If an aggregator were to provide such services seamlessly across multiple platforms, customers would find it very attractive. Network externality effects would further enhance the value of some of these services when more customers use it. A case in point is DoCoMo of Japan: Most wireless customers use DoCoMo's digital services, regardless of access provider. Figure 2 shows what this emerging model looks like.

Figure 2. Today's emerging wireless services rely on content aggregators like DoCoMo of Japan.



Portable content reduces customers' switching costs, which is more attractive to new customers. Since market penetration is vital,a strategy of offering popular content initially and then building in differentiation to raise switching costs makes sense. Customers benefit because the market remains competitive.

Survival strategies: Content providers should provide wireless versions of content quickly. A firm could either bet on network externalities by providing its content through all competing standards or leverage its market power by imposing its standard as de facto on all wireless access providers. Access providers should focus on exploiting their allotted spectrum frequencies to the maximum with value addition. Wireless access providers need to adapt from the rules of the voice game to that of dealing in data.

Knowing something about the changes in access and content provision will help you make better decisions for your career (if you work in these industries) or for your company (if you're the one evaluating and purchasing services).In planning for services to your enterprise, expect to see

- content aggregated and customized to a very fine degree, pushed across multiple access providers,
- companies offering access trying to capture economies of scale and scope and some consolidating in the process;
- telecommunications companies trying to leverage their infrastructure by providing value-added services, such as more interactive media;
- an emphasis on standards to support pushing content across a variety of access technologies;and
- peer-to-peer content distribution of public goods bundled with private goods.

No matter which side of the fence you sit on,the future of these markets will be a tighter integration,focusing on the economics of selling content and network services. It also appears that though a few content providers may have disproportionately higher market power than the others, it is not likely that customers will be locked into a particular type of access or content provider. ■

Anjana Susarla *is a doctoral student in the Department of Management Science and Information Systems at the University of Texas at Austin.She is also a research associate at the Center for Research in Electronic Commerce at the University of Texas at Austin. Contact her at anjana@mail.utexas.edu.*

Manoj Parameswaran *is an assistant professor of decision and information technologies at the Smith School of Business, University of Maryland. He holds a joint appointment with the Institute for Systems Research, University of Maryland,and is a research associate at the Center for Research in Electronic Commerce at the University of Texas at Austin. Contact him at pcm@rhsmith.umd.edu.*

Andrew B. Whinston *is the Hugh Roy Cullen Professor of Information Systems, Economics, Computer Science and Library and Information Sciences at the University of Texas at Austin. He is the director of the Center for Research in Electronic Commerce at the University of Texas at Austin. Contact him at abw@uts.cc.utexas.edu.*

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